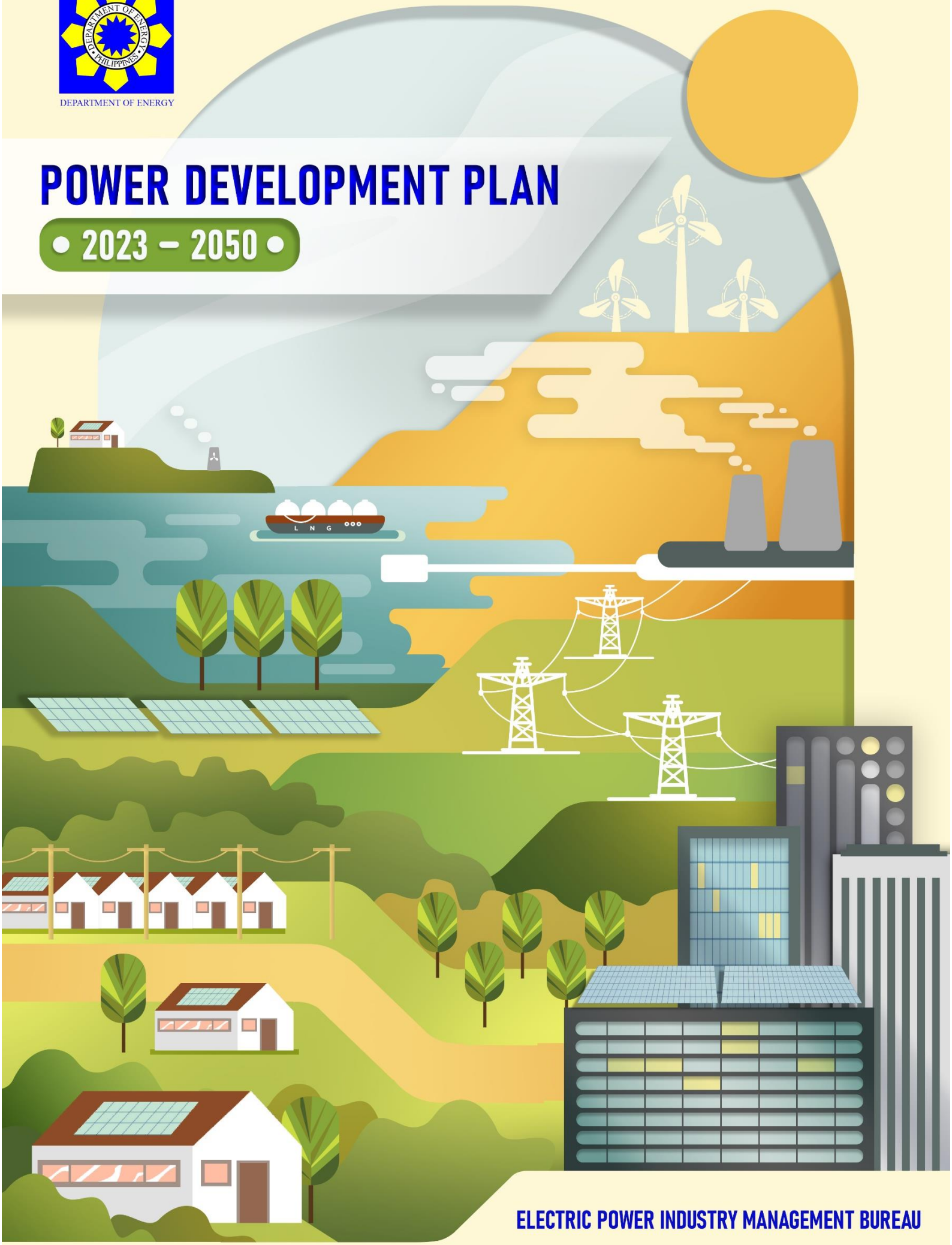
DEPARTMENT OF ENERGY

POWER DEVELOPMENT PLAN

2023 – 2050



ELECTRIC POWER INDUSTRY MANAGEMENT BUREAU

MESSAGE OF THE SECRETARY

The electric power industry plays a pivotal role in advancing the 8-point Socio-Economic Agenda of President Ferdinand R. Marcos Jr.'s administration. At its core, the industry is instrumental in safeguarding the purchasing power of Filipinos, primarily by driving down energy costs in both the near and medium terms. Beyond cost reduction, the power sector serves as a significant catalyst for job creation. Investments in energy infrastructure --- spanning generation, transmission, and distribution --- spur economic activity, stimulate industries, and generate employment opportunities across various sectors.

Aligned with these socio-economic objectives, our energy development agenda, as outlined in the Philippine Energy Plan, prioritizes the aggressive deployment of renewable energy, ambitious energy efficiency goals, and the promotion of diverse technologies and solutions. These initiatives aim not only to meet the growing energy demand but also to reduce costs, create sustainable jobs, and build a resilient, climate-proof energy infrastructure, ensuring long-term economic and environmental sustainability.

Corollary to this, the transformational shift envisioned for the power system is a critical step toward ensuring security, reliability, accessibility, and sustainability in the country's energy sector. Achieving this requires coordinated adjustments across the power industry's sub-sectors --- generation, transmission, distribution, and supply --- to align with the nation's medium- to long-term energy goals.

Guiding this transformation is the Power Development Plan (PDP) 2023-2050, a comprehensive blueprint for the sector's progress. The PDP adopted the national renewable energy power generation mix targets of 35% by 2030 and 50% by 2040, while providing a clear roadmap for stakeholders in the electric power industry. It addresses key areas such as generation, transmission, distribution, supply, and total electrification, alongside a long-term outlook on power supply and demand. By outlining strategic roadmaps for development, the PDP enables the necessary adjustments to drive the power industry toward a secure, reliable, and sustainable future.

The successful implementation of the PDP requires the unwavering commitment and collaboration of all stakeholders from the power sector industry. By working together, we can ensure the alignment of strategies and policies that will drive innovation, accelerate progress, and create a robust power system that meets the needs of our growing economy.

Through a steadfast focus on renewable energy, energy efficiency, and technological advancement, the power industry will not only secure the nation's energy future but also serve as a cornerstone of sustainable and inclusive development. This transformational journey reflects our shared aspiration for a stronger, more resilient Philippines.

RAPHAEL P.M. LOTILLA
Secretary

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ACRONYMS

ARC	Archipelago Renewable Corporation
ASEP	Access for Sustainable Energy Programme
AS	Ancillary Service
AS-CSP	AS Competitive Selection Process
ASPA	Ancillary Service Procurement Agreements
AAGR	Annual average growth rate
ATO	Authority to operate
BESS	Battery Energy Storage System
BLEP	Barangay Line Enhancement Program
BENECO	Benguet Electric Cooperative, Inc.
BOHECO II	Bohol II Electric Cooperative, Inc.
BUSECO	Bukidnon II Electric Cooperative, Inc.
BISELCO	Busuanga Island Electric Cooperative, Inc.
BMIP	Batangas-Mindoro Interconnection Project
CANORECO	Camarines Norte Electric Cooperative, Inc.
CCIP	Catanduanes-Camarines Sur Interconnection Project
CEM	Capacity Expansion Model
CES	Clean Energy Scenario
CEMP	Comprehensive Electrification Master Plan
CASURECO IV	Camarines Sur IV Electric Cooperative, Inc.
Ckt-km	Circuit kilometer
CSP	Competitive Selection Process
CREM	Competitive Retail Electricity Market
COTELCO	Cotabato Electric Cooperative, Inc.
CREVI	Comprehensive Roadmap for the Electric Vehicle Industry
CREZ	Competitive RE Zones
DCS	Dispatch Conformance Standards
DASURECO	Davao del Sur Electric Cooperative, Inc.
DOE	Department of Energy
DOJ	Department of Justice
DBCC	Development Budget Coordination Committee
DLF	Development and Livelihood Fund
DDP	Distribution Development Plan
DEPDMS	DOE's Electric Power Industry Database Management System
DER	Distributed energy resources
DMO	Domestic Market Obligation
DUs	Distribution utilities
ECs	Electric cooperatives
EPIMB	Electric Power Industry Management Bureau
EPIRA	Electric Power Industry Reform Act
EF	Electrification Funds
EO	Executive Order
ER 1-94	Energy Regulations No. 1-94
ERC	Energy Regulatory Commission
EU	European Union
EV	Electric Vehicle
EVOSS	Energy Virtual One-Stop Shop
EU	European Union
FIBECO	First Bukidnon Electric Cooperative, Inc.
FPIEC	First Island Philippines Renewable Energy Corporation

FIT	Feed-in-Tariff
GWh	Gigawatt-hour
GEA	Green Energy Auction
GEOP	Green Energy Option Program
GDP	Gross domestic product
GPOBA	Global Partnership on Output-Based Aid Grants
HPP	Hydroelectric power plant
IAEA	International Atomic Energy Agency
ILECO II	Iloilo II Electric Cooperative, Inc.
IRR	Implementing rules and regulations
IEMOP	Independent Electricity Market Operator of the Philippines
IMO	Independent Market Operator
IPO	Investment Promotion Office
ICCs	Indigenous Cultural Communities
IPS	Indigenous peoples
IRENA	International Renewable Energy Agency
KAELCO	Kalinga-Apayao Electric Cooperative, Inc.
KM	Kilometer
kV	Kilovolt
LUELCO	La Union Electric Cooperative
LGUs	Local Government Units
LGUGC	Local Government Unit Guarantee Corporation
LFP-TEP	Locally Funded Projects – Total Electrification Project
LNG	Liquefied Natural Gas
LTER	Local Total Electrification Roadmap
MAR	Monthly Accomplishment Report
MCPHC	Maharlika Clean Power Holdings Corporation
MERALCO	Manila Electric Company
MVA	Megavolt ampere
MVAR	Megavolt ampere of reactive power
MW	Megawatt
MEDP	Missionary Electrification Development Plan
MGSA	Microgrid Systems Act
MGSP	Microgrid Service Provider
MO	Market Operator
NCIP	National Commission on Indigenous Peoples
NEDA	National Economic and Development Authority
NEA	National Electrification Administration
NECDDP	National Electric Cooperatives Distribution Development Plan
NEP	Nuclear Energy Program
NGA	National Government Agencies
NGCP	National Grid Corporation of the Philippines
NPP	New Power Providers
NPC	National Power Corporation
NREL	National Renewable Energy Laboratory
TRANSCO	National Transmission Corporation
NIHE	Nationwide Intensification of Household Electrification
NEPIAC	Nuclear Energy Program Inter-Agency Committee
NEECO II A2	Nueva Ecija II Electric Cooperative, Inc. – Area 2
NOCECO	Negros Occidental Electric Cooperative
NTEF	National Total Electrification Framework
NTER	National Total Electrification Roadmap
OPEC	Organization of the Petroleum Exporting Countries
OSW	Offshore Wind

PALECO	Palawan Electric Cooperative
PEMC	Philippine Electricity Market Corporation
PGC	Philippine Grid Code
PSA-POPCEN	Philippine Statistics Authority's Population of Census
PV	Photovoltaic
PVM	Photovoltaic Mainstreaming
PDP	Power Development Plan
PETP	Philippine Energy Transition Program
PSA	Power Supply Agreement
PSPP	Power Supply Procurement Plans
PSPI	PowerSource Philippines, Inc.
PIOUS	Private Investor-Owned Utilities
PR	Prudential Requirements
PVM	PV Mainstreaming
QMIP	Quezon-Marinduque Interconnection Project
QTP	Qualified third party
QUEZELCO II	Quezon II Electric Cooperative, Inc.
RA	Republic Act
RE	Renewable energy
RECs	Renewable Energy Certificates
REM	Renewable Energy Market
RPS	Renewable Portfolio Standards
RCOA	Retail Competition and Open Access
RES	Retail electricity suppliers
RTM	Real-time Monitoring Requirements
RWMHEEF	Reforestation, Watershed Management, Health and/or Environmental Enhancement Fund
SDUR	Smart Distribution Utility Roadmap
SEP	Sitio Electrification Program
SGGP	Smart and Green Grid Plan
SOLR	Supplier of Last Resort
SO	System Operator
SREC	Sabang Renewable Energy Corporation
STS	Severe Tropical Storm
STY	Super Typhoon
SOCOTECO II	South Cotabato II Electric Cooperative, Inc.
SUKELCO	Sultan Kudarat Electric Cooperative, Inc.
SULECO	Sulu Electric Cooperative, Inc.
TARELCO II	Tarlac II Electric Cooperative, Inc.
TBD	To be determined
TDP	Transmission Development Plan
TEP	Total Electrification Program
TESC	Total Electrification Steering Committee
TFER	Task Force on Energy Resiliency
TL	Transmission line
Tp	Trading Participants
TWG	Technical Working Group
UC-ME	Universal Charge for Missionary Electrification
VPP	Virtual Power Plants
VRE	Variable Renewable Energy
WESM	Wholesale Electricity Spot Market
ZAMSURECO I	Zamboanga del Sur I Electric Cooperative, Inc.

EXECUTIVE SUMMARY

The Power Development Plan (PDP) 2023–2050 serves as a comprehensive guide for industry participants, offering a detailed view of the Philippine electric power industry highlights, outlook and roadmaps. This development plan contains three chapters, summarized as follows:

Chapter 1. Power Sector Highlights 2021-2022 delves into the country's power situation, presenting significant power-related statistics and identifying major policies and programs promulgated from 2021 to the second quarter of 2023.

Chapter 2. Power Demand and Supply Outlook 2023–2050 presents the annual peak demand forecast and corresponding power supply expansion with a focus on technology-specific projections. Aligned with the Department's commitment to cleaner energy, the PDP 2023-2050 adopted the national renewable energy (RE) power generation mix target of 35% by 2030 and 50% by 2040 as the reference scenario. Further, the Department simulated the generation capacity expansion plan using the following two additional scenarios, i.e., entry of Low or High Off-Shore Wind at 19 GW and 50 GW, respectively, nuclear technology at 4.8 GW, and repurposing of existing coal-fired power plants in each grid. The results highlighted that the country's peak demand will significantly increase from 16,596 MW (2022) to 68,483 MW (2050), equivalent to an annual average growth rate of 5.2%. This necessitates an increase to the Philippines' installed capacity by about five times for the reference scenario and Clean Energy Scenario 1, and six times for Clean Energy Scenario 2, which will come from existing, committed, and new build capacities.

Chapter 3. Power Sector Roadmap, 2023–2050 provides the updated power sector roadmaps for generation, transmission, distribution, supply, electricity market, off-grid development, and total electrification. These roadmaps are anchored on the following three main goals by 2050:

- Energy security, resiliency, affordability, and sustainability;
- Transparent and fair playing field in the power industry; and,
- Electricity access for all.

The chapter also emphasizes the overarching strategies, policies, and programs, such as smart grid and power sector database enhancement, among others.

The PDP 2023-2050 envisions a competitive Philippine energy industry that leverages clean, efficient, robust, and sustainable technologies. Its success hinges not only on effective implementation but also on collaboration and collective efforts of key stakeholders such as policy and regulatory bodies, energy stakeholders, and industry partners. Recognizing its role in the energy sector, the DOE reaffirms its commitment to seamlessly implement this development plan's goals to ensure a stable, reliable, secure, and reasonably-priced supply of electric power for all Filipinos.

CHAPTER 1. POWER SECTOR HIGHLIGHTS, 2021-2022

CHAPTER I

Power Sector Highlights 2021-2022

This chapter demonstrates how the electric power industry demonstrated how it recovered from the pandemic, showcasing its resilience and performance following the easing of COVID-19 restrictions. The industry was assessed in terms of power statistics, implemented policies and programs, and key developments during the years 2021-2022. Despite the nation's recovery from the pandemic, the power sector faced additional challenges in the form of natural disasters, including earthquakes and strong typhoons posing significant threats to the country's power system. Despite these formidable challenges, the power sector exhibited responsiveness by reconstructing the affected power infrastructures. Throughout these efforts, the power industry remained steadfastly committed to its mission and purpose, ensuring the provision of reliable, affordable, and sustainable energy for the nation.

1. Electricity Demand and Supply

1.1 Peak Demand and Electricity Consumption

In 2021, the Philippines' total non-coincidental peak demand[1] reached 16,036 MW, which slightly fell below the 2021 peak demand forecast by 1.8% (297 MW). Meanwhile, in 2022, the total non-coincidental peak demand was recorded at 16,596 MW, which is 3.2% (542 MW) lower than the projected peak demand forecast (Figure 1). The 2021 actual peak demand has surpassed the pre-pandemic actual peak demand (2019) of 15,581 MW and the pandemic actual peak demand (2020) of 15,282 MW. The increase in peak demand was attributed to the recovery of crucial economic sectors, with increased mobility and the resumption of partial to full normalization of economic activities.

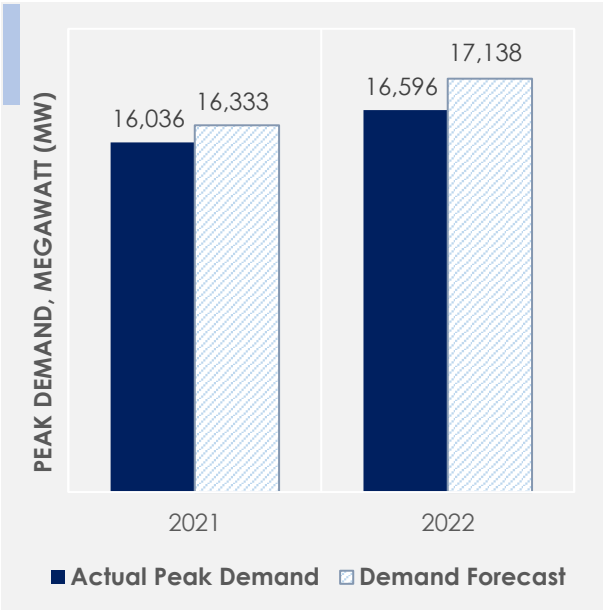


Figure 1. Actual Peak Demand and Demand Forecast (Year 2021 and 2022)

Meanwhile, Figure 2 shows that electricity sales and consumption across the residential, commercial, and industrial sectors returned to pre-pandemic levels. The residential sector has exhibited moderate growth from 34,292 GWh in 2020 to 35,324 GWh in 2022 owing to the continued adoption of hybrid work arrangement by various government agencies and private companies, including classes still being held both virtually and on-site. In 2022, the commercial and industrial sectors consumed 24,294 GWh and 28,844 GWh of electricity respectively, in which the industrial sector

[1] DOE Annual Power Statistics 2003-2022
Retrieved through: https://www.doe.gov.ph/energy-statistics/philippine-power-statistics

surpassed the pre-pandemic observed levels in 2019. The resurgence in electricity consumption across these sectors serves as a clear indicator of the country's economic rebound, showcasing resilience and adaptability in the wake of the challenges posed by the pandemic.

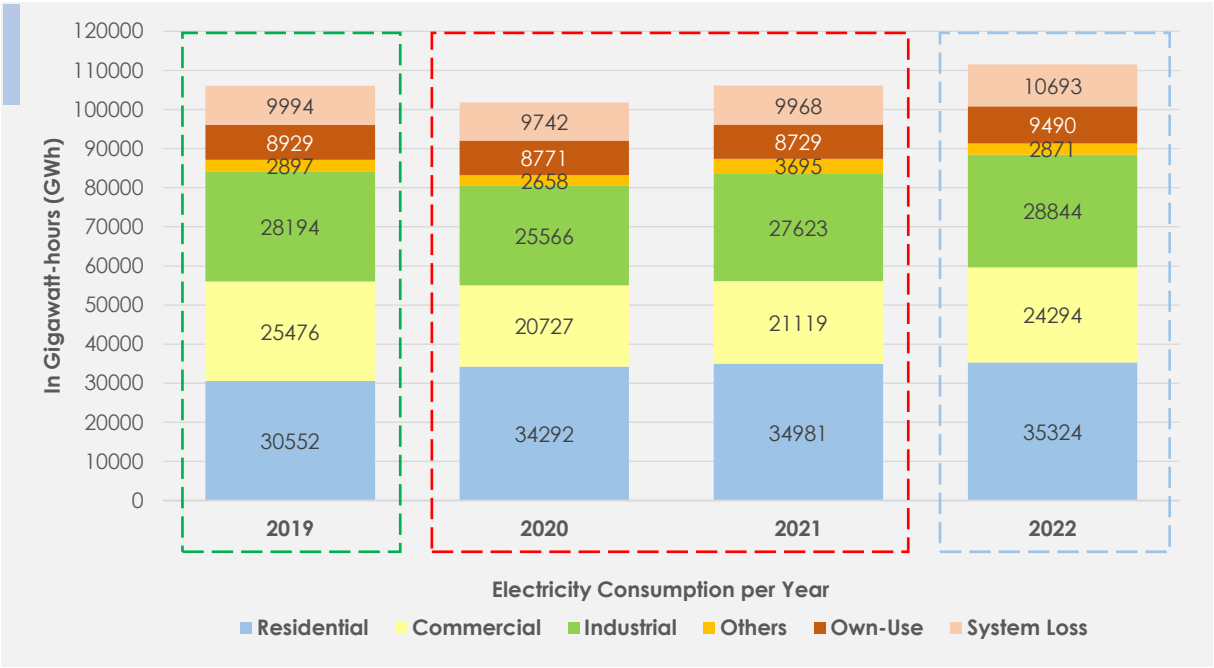


Figure 2. 2019 to 2022 Electricity Consumption, in GWh

The surge in COVID-19 cases in 2020 and 2021 led to a notable rise in the electric consumption category under "Others" sector. This increase was primarily contributed by the utilization of public and government infrastructures and establishment, repurposed as quarantine and isolation facilities to mitigate and control the spread of the epidemic in the country. As the nationwide efforts focused on vaccine distribution gained momentum in 2022 and all the while achieving herd immunity, the use of these facilities was lesser, resulting in a 41% decline or 2,871 GWh consumption level by 2022. The overall use of power increased by about 5.1%, or 5,401 GWh, between 2021 and 2022. This surge in power consumption was notably driven by the resumption of normal operations across various sectors. Specifically, residential, industrial, and commercial sectors had an upward trend, showcasing sustained growth as shown in Figure 3.

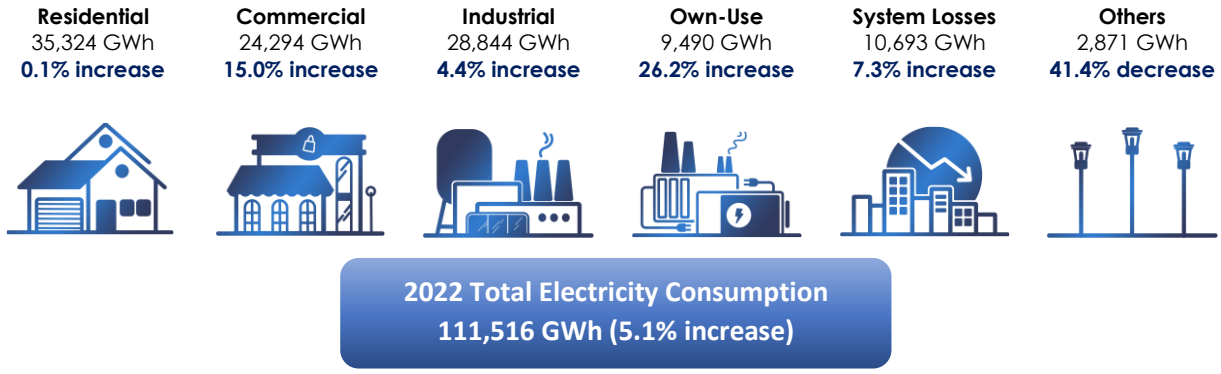


Figure 3. 2022 Electricity Consumption per Sector in GWh, and 2021-2022 Growth Rate

1.2 Installed Capacity and Gross Generation

The country's total grid installed capacity[2] increased by 5.1% (1,376 MW) from 26,882 MW in 2021 to 28,258 MW in 2022. Figure 4 visually represents the distribution of these capacities in 2022 according to fuel or power plant types. The increase in the grid installed capacity can be attributed to the commercial operations of 759 MW coal, 279 MW natural gas, and 350 MW RE, most of which comes from biomass and solar farms.

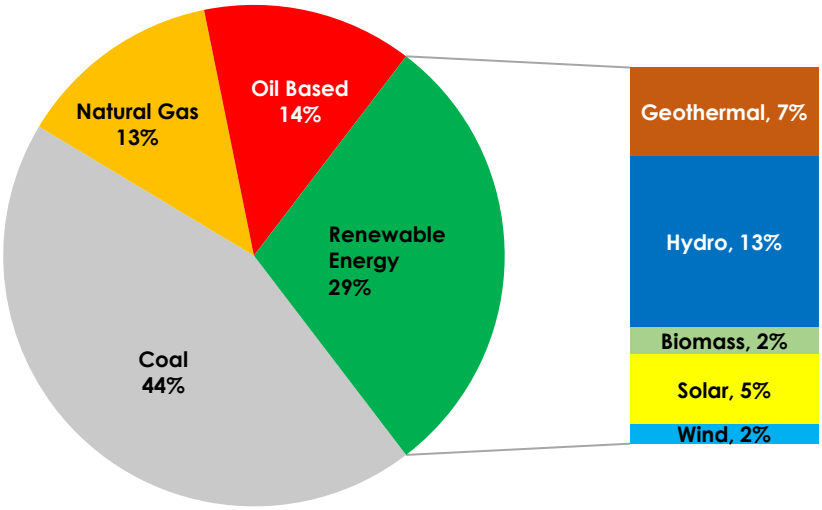


Figure 4. 2022 Installed Capacity and Percent Shares

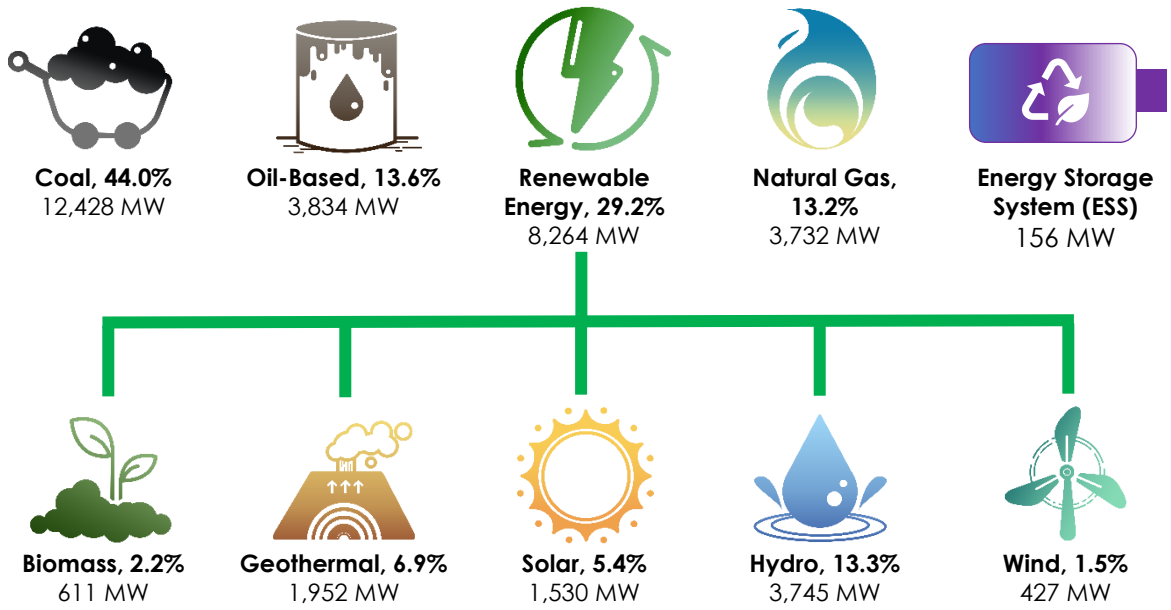


Figure 5. 2022 Installed Capacity, in MW Capacity

The Philippines' gross power generation increased by 5.1%, from 106,115 GWh in 2021 to 111,516 GWh in 2022, surpassing the pre-pandemic power generation in 2019.

[2] DOE List of Existing Power Plants as of December 2022
Retrieved through: https://www.doe.gov.ph/list-existing-power-plants

Natural gas power generation declined by 2.2% in 2021 and further by 6.2% in 2022. The decrease was due to the cessation of gas supply deliveries from the Malampaya Gas Field leading to higher dispatch of newly commercially operating coal plants and the preferential dispatch of renewable energies, replacing natural gas. Further, oil-based plants' share in power generation expanded from 1.5% to 2.3% (55.8% increase) to compensate for the needed power to meet the demand during peak periods.

In terms of share, coal-fired power plants continued to dominate the mix at 59.6%, which is 1.1% higher than its share in 2021. This is followed by RE (22.1%), natural gas (16.0%), and oil-based (2.3%) gross generation as depicted in Figure 6.

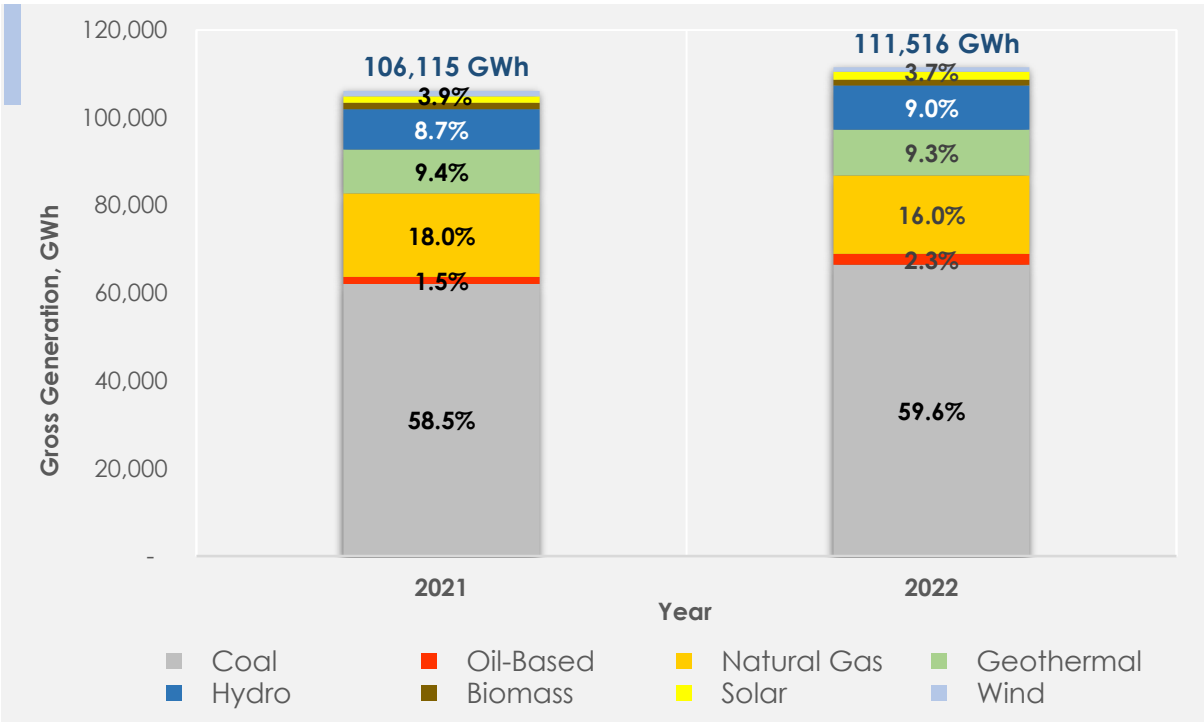


Figure 6. 2021 and 2022 Gross Power Generation per Technology, in GWh

Note:

1. *In 2021, the gross generation share for Biomass was at 1.4%, Solar at 1.4%, and Wind at 1.2%.*
2. *In 2022, the gross generation share for Biomass was at 1.2%, Solar at 1.6%, and Wind at 0.9%.*

The performance of the electric power industry improved substantially in 2021 and 2022, underscoring a robust and dynamic recovery of the national economy. The DOE was instrumental in this resurgence, successfully addressing the increasing electricity demand by facilitating the commissioning of an additional 1,376 MW installed capacity in the country's energy mix. Crucially, this substantial increase was made possible through collaborative efforts within the power sector, showcasing the coordinated endeavors of industry participants to fortify the nation's energy mix.

For more information about the 2021 and 2022 Power Statistics, please scan the QR code. Alternate link: https://www.doe.gov.ph/energy-statistics/philippine-power-statistics

1.3 Issued Endorsement for Power Generation Plants and Projects under the EVOSS System

Since the passage of the Republic Act (RA) No. 11234 or the "Energy Virtual One-Stop Shop (EVOSS) Act" on 08 March 2019, the DOE has migrated its processing of endorsements to the Energy Regulatory Commission (ERC), the National Grid Corporation of the Philippines (NGCP), National Commission for Indigenous People (NCIP) and other entities issuing permits and licenses for the operation of power generation plants and projects to a more efficient online system called EVOSS. As such, the DOE, processed applications and issued a total of 831 endorsements to concerned entities from August 2020 to December 2022 with details as follows:

Table 1. DOE Issued Endorsement for Power Generation, 2020-2022

Year Covered	Number of Issued Endorsements				
	SIS	NCIP	ERC	BOI	DAR
2020 (Aug to Dec)	12	5	17	1	-
2021 (Jan to Dec)	101	9	280	5	-
2022 (Jan to Dec)	109	20	266	4	2
TOTAL	**222**	**34**	**563**	**10**	**2**

Source: DOE – Investments Promotion Office

1.4 Coal Moratorium Updates

The DOE issued an Advisory on the Moratorium of Endorsements for Greenfield Coal-Fired Power Projects in Line with Improving the Sustainability of the Philippines' Electric Power Industry[3] on 22 December 2020. This aligns with the country's efforts to accelerate the entry of renewable energy sources in the energy mix, promote new technologies, increase system flexibility, and adhere to higher environmental standards. In the said advisory, the DOE will no longer process applications for endorsements of new coal-fired power generation projects

However, the moratorium does not affect existing and operational coal-fired power generation facilities as well as any new coal-fired power project considered as (a) committed coal-fired power projects; (b) existing power plant complexes which already have firm expansion plans and existing land site provisions; and (c) indicative power projects with significant progress, such as signed and notarized land acquisition of land or lease agreements and approved permits or resolutions from local government units (city/municipality, province) and Regional Development Council where the power plants are located.

[3] Coal Moratorium Advisory
Retrieved through: https://www.doe.gov.ph/announcements/advisory-moratorium-endorsements-greenfield-coal-fired-power-projects-line-improving

Table 2 lists the plants that have been issued with the necessary permits or are actively reporting to the DOE on the project's construction progress during the two-year period following the implementation of the coal moratorium. Moreover, there are still approximately 11,000 megawatts of coal-fired power projects that has been issued with the Clearance to Undertake System Impact Study by the DOE and may still signify their intention to proceed with the construction of their project. The confirmation of the project's non-coverage to the Coal Moratorium Advisory will be updated by the DOE in the next PDP updates.

Table 2. Coal Power Projects Prior to Issuance of the Coal Moratorium (Grid-Connected)

Project Name	MW Capacity	Owner	Power Project Status
Mariveles Coal-Fired Power Plant Phase I - Unit 1	150.000	Mariveles Power Generation Corporation	Committed Project
Mariveles Coal-Fired Power Plant Phase I - Unit 2	150.000	Mariveles Power Generation Corporation	Committed Project
Mariveles Coal-Fired Power Plant Phase I - Unit 3	150.000	Mariveles Power Generation Corporation	Committed Project
Mariveles Coal-Fired Power Plant Phase I - Unit 4	150.000	Mariveles Power Generation Corporation	Committed Project
Masinloc Power Plant - Unit 4	350.000	Masinloc Power Partners Co, Ltd.	Committed Project
Masinloc Power Plant - Unit 5	350.000	Masinloc Power Partners Co, Ltd.	Committed Project
Mariveles Coal-Fired Power Plant Phase II - Unit 5	300.000	Mariveles Power Generation Corporation	Committed Project
Mariveles Coal-Fired Power Plant Phase II - Unit 6	300.000	Mariveles Power Generation Corporation	Committed Project
Natural Gas-Fired Combined Cycle Gas Turbine Power Plant Project Phase 1 - Unit 1 (formerly AOE Coal-Fired Power Plant Unit 1)	600.000	Atimonan One Energy Inc. / Meralco Powergen Corp.	Committed Project – Changed Technology (With application to revert to coal)
Natural Gas-Fired Combined Cycle Gas Turbine Power Plant Project Phase 1 - Unit 2 (formerly AOE Coal-Fired Power Plant Unit 2)	600.000	Atimonan One Energy Inc. / Meralco Powergen Corp.	Committed Project – Changed Technology (With application to revert to coal)
Palm Concepcion Coal-Fired Power Plant Unit II	135.000	Palm Concepcion Power Corp.	Committed Project
Misamis Oriental 2 x 135 MW Circulating Fluidized Bed Coal Fired Thermal Power Plant	270.000	FDC Misamis Power Corporation (Formerly: FDC Utilities Inc.)	Committed Project
RPEI Coal-fired Power Plant	600.000	Redondo Peninsula Energy, Inc.	Committed Project but delisted
SRPGC Coal-Fired Power Plant Project	350.000	St. Raphael Power Generation Corporation	Indicative Project
SRPGC Coal-Fired Power Plant Project	350.000	St. Raphael Power Generation Corporation	Indicative Project
H & WB PCB Supercritical Coal-Fired Power Plant - Unit 1	350.000	H & WB Asia Pacific (PTE LTD) Corporation	Indicative Project
H & WB PCB Supercritical Coal-Fired Power Plant - Unit 2	350.000	H & WB Asia Pacific (PTE LTD) Corporation	Indicative Project
Therma Visayas, Inc. Coal - Fired Power Plant Expansion Project	150.000	Therma Visayas, Inc.	Indicative Project
San Ramon Power, Inc. Coal-Fired Power Station	120.000	San Ramon Power, Inc. (SRPI)	Indicative Project
2x500 MW KEPCO Pangasinan Coal-Fired Power Plant	1000.000	KEPCO Philippines Corporation	Indicative Project
SMC Circulating Fluidized Bed Coal-Fired Power Plant	600.000	SMC Global Power Holdings Corp.	Indicative Project

Project Name	MW Capacity	Owner	Power Project Status
SMC Circulating Fluidized Bed Coal-Fired Power Plant	600.000	SMC Global Power Holdings Corp.	Indicative Project
SMC Loboc Malabuyoc Coal-Fired Power Plant Project	300.000	SMC Global Power Holdings Corp.	Indicative Project
SMC Global Negros Coal-Fired Power Plant Project	300.000	SMC Global Power Holdings Corp.	Indicative Project
SMC Global PowerCoal-Fired Power Plant	328.000	SMC Global Power	Indicative Project
Sarangani Energy Corporation Coal-fired Power Plant Phase 3	105.000	Sarangani Energy Corporation	With pending application for non-coverage
Grand Total	**9,008 MW**		

1.5 Grid Operating and Maintenance Program (GOMP) Implementation

On 06 February 2020, the DOE promulgated Department Circular No. DC2020-02-0004[4] which aims to:

(a) Ensure energy security of the country at all times;
(b) Enhance transparency, fairness, and accountability in the operation of generation and transmission system and distribution facilities in the country;
(c) Promote open competition among electric power industry participants;
(d) Attainment of the objectives of the Electric Power Industry Reform Act (EPIRA) to ensure the quality, reliability, security, and affordability of the supply of electric power in the country; and
(e) Foster reliable operation and efficient conduct of planned maintenance of power plants.

Since its implementation in 2020, the National Grid Corporation of the Philippines (NGCP) has been submitting for the DOE's approval its proposed three-year schedule for planned and maintenance outages of grid and system operations-monitored power generation facilities, developed in consultation with the generating companies. The submission also includes information on the maintenance schedule for each power plant and its associated units, along with the overall weekly reserve profile per year per grid, which are being submitted to the DOE every 3rd quarter of the year. Additionally, it contains the NGCP's three-year maintenance program of transmission facilities, aligned with the planned outages of the power generation facilities.

Table 3. GOMP Implementation, 2020 to 2022

Particulars	Date of Submission to DOE
GOMP 2021-2023	09 December 2020

[4] Entitled, "Providing Guidelines of the Planned Outage Schedules of Power Plants and Transmission Facilities and the Public Posting of the Grid Operating and Maintenance Program"

Particulars	Date of Submission to DOE
GOMP 2022-2024	26 October 2021
GOMP 2023-2025	25 October 2022

1.6 Formulation of the Decommissioning and Mothballing Policy

Pursuant to Section 2.8[5] of the DOE Department Circular No. DC2010-03-0003, the DOE aims to finalize and complete the Generating Plant or Unit Decommissioning and Mothballing Policy by end of 2022. To gather feedback and recommendations, the DOE has actively engaged in Focus Group Discussions (FGDs) with relevant government agencies, offices, key energy stakeholders and industry players. The Electric Power Industry Management Bureau has successfully completed a total of eight (8) FGDs and three (3) public consultations (PubCon) during this period, as shown in Table 4.

Table 4. Decommissioning and Mothballing Policy FGD and Public Consultation

FGD and PubCon Dates	Agencies Involved
13 July 2022	Energy Regulatory Commission
	Philippine Electricity Market Corporation Independent Electricity Market Operator of the Philippines
	National Grid Corporation of the Philippines
	National Power Corporation National Transmission Corporation
18 July 2022	Philippine Independent Power Producers Association Power Sector Assets and Liabilities Management
11 August 2022	Department of Environment and Natural Resources
16 August 2022	Board of Investments
05 September 2022	RE Associations a) PHILHYDRO Association, Inc. b) National Geothermal Association of the Philippines c) Wind Energy Developers Association of the Philippines d) Biomass Renewable Energy Alliance e) Philippine Solar and Storage Energy Alliance f) Confederation of Solar Power Developers of the Philippines
22 November 2022	Visayas Leg - Public Consultation Bai Hotel Cebu, Mandaue City, Cebu
24 November 2022	Mindanao Leg – Public Consultation Apo View Hotel, Davao City
28 November 2022	Luzon Leg – Public Consultation The Marquis Events Place, BGC, Taguig City

The draft policy aims to help generation companies understand the definitions and processes involved in the decommissioning and mothballing. It also seeks to provide clear guidelines for applicants, enhance the DOE's ability to plan and monitor the power supply profile in coordination with System Operator, ensure that the generation

[5] Section 2.8 of DOE DC No. DC2010-03-0003 provides that Generating Companies shall seek prior clearance from the DOE regarding any plans for deactivation or mothballing of existing generating units or facilities critical to the reliable operation of the Grid

companies comply with the requirements set by relevant agencies, and clarify the roles and responsibilities of each agency involved.

2. Transmission and System Operation

2.1 Existing Transmission Facilities

In December 2022, the total substation capacity being managed by the National Grid Corporation of the Philippines (NGCP) reached 48,801 MVA with a total transmission line length of to 21,027 circuit-km (ckt-km), as summarized in Table 5. Luzon has the largest substation capacity, followed by Mindanao and Visayas. Mindanao's total transmission line length is more significant than the Visayas due to the grid's larger geographical size.

Table 5. Existing Transmission Facilities, 2021-2022

Grid	Substation Capacity (MVA)		Transmission Line Length (ckt-km)	
	2021	2022	2021	2022
Luzon	29,955	35,641.00	9,617.42	9,631.90
Visayas	5,287.50	5,848.50	5,297.99	5,393.49
Mindanao	6,091	7,311.00	5,864.14	6,001.60
Total	**41,333.50**	**48,800.50**	**20,779.55**	**21,027.00**

Source: Transmission Development Plan (TDP) 2023-2040 Consultation Report

To ensure that the voltages across the transmission network are compliant with the prescribed levels in the Philippine Grid Code (PGC), capacitor banks and shunt reactors have been installed in appropriate locations in Luzon, Visayas, and Mindanao. As of December 2022, the total Capacitor Banks and Shunt Reactors installed were recorded at 5,787 MVAR.

2.2 Transmission Projects

The NGCP completed 31 transmission projects or portions of a project from January 2021 to December 2022 based on the December 2022 Transmission Project Status Report, which is classified into three types, namely substation capacity upgrading, transmission line (TL) extension, and voltage improvement. These projects are expected to support the increasing electricity demand, accommodate the upcoming power generation capacities, and enhance the system reliability.

Table 6. Completed Transmission Projects, 2021-2022

Grid	Project Name	Energization
Luzon	Luzon Voltage Improvement Project 3	30 August 2021
Luzon	Luzon PCB Replacement	31 Jan 2021
Luzon	Luzon Voltage Improvement Project 6	01 May 2021
Luzon	North Luzon S/S Upgrading Project	12 December 2021

Grid	Project Name	Energization
Luzon	Calamba 230kV S/S	17 May 2021
Luzon	Luzon Voltage Improvement Project 4	30 May 2021
Luzon	Tower Resiliency of Bicol Transmission Facilities	05 October 2021
Luzon	Balsik (Hermosa) - San Jose 500 kV TL	19 December 2022
Luzon	Mariveles – Balsik (Hermosa) 500kV TL	09 April 2022
Luzon	San Jose – Angat 115kV TL Upgrading	20 May 2022
Luzon	Luzon Voltage Improvement Project 3	13 October 2022
Luzon	Pagbilao 500kV S/S Project	26 October 2022
Luzon	South Luzon S/S Upgrading Project 2	14 December 2022
Luzon	Clark – Mabiga 69kV TL Project	10 October 2022
Luzon	South Luzon S/S Upgrading Project	07 November 2022
Luzon	Ambuklao – Binga 230kV TL Project	17 July 2022
Visayas	Sta. Rita-Quinapondan 69kV TL Project	04 July 2021
Visayas	Permanent Restoration for the Panitan-Nabas 138kV TL affected by Typhoon Ursula (14 Towers)	06 October 2021
Visayas	Cebu – Negros Panay 230kV Backbone, Stage 3	24 December 2022
Visayas	Panitan – Nabas Line 2 Stringing Project	28 April 2022
Visayas	Tagbilaran 69kV S/S Project	06 November 2022
Visayas	Mindanao-Visayas Interconnection Project	10 December 2022
Visayas	Cebu-Negros-Panay 230kV Backbone, Stage 2	15 December 2022
Mindanao	Zamboanga Peninsula Voltage Improvement	23 April 2022
Mindanao	Mindanao S/S Upgrading Project	22 November 2021
Mindanao	Mindanao S/S Upgrading Project	04 June 2022
Mindanao	Kauswagan-Lala 230kV TL Project	23 February 2022
Mindanao	Polanco – Oroquieta 138kV TL Project	11 April 2022
Mindanao	Eastern Mindanao Voltage Improvement Project	21 August 2022
Mindanao	Mindanao-Visayas Interconnection Project	09 December 2022
Mindanao	Agus 2 Switchyard Upgrading/Rehabilitation	11 September 2022

Source: NGCP's Transmission Project Status Report as of December 2022

2.3 Ancillary Services – Competitive Selection Process

Following the promulgation of Department Circular No. DC2021-10-0031[6] on 04 October 2021, the DOE is continuously monitoring the implementation of the Competitive Selection Process (CSP) of the System Operator (SO). Out of the 38 bidders issued with Notice of Award from the result of the CSP, only the Ancillary

[6] Entitled "Prescribing the Policy for the Transparent and Efficient Procurement of Ancillary Services by the System Operator"

Services Procurement Agreements (ASPA) for the 36 bidders were executed and filed with the ERC due to non-acceptance of the award of two winning bidders.

2.4 Issued Endorsement for Transmission Projects under the EVOSS System

From January 2021 to December 2022, the DOE has issued 57 Certificate of Endorsement to Energy Regulatory Commission for the Point-to-Point (P2P) Limited Transmission Facilities. In November 2022, this process was integrated into the EVOSS system, resulting to two (2) endorsements being issued online as listed in Table 7.

Table 7. DOE Issued Endorsement for Transmission Projects, 2021-2022

2021	2022	November 2022 – EVOSS System
37	18	2

2.5 Direct Connection Updates

With the promulgation of RA No. 11032[7] and RA No. 11234[8], the process "Approval of Application for Direct Connection to the Grid" adopted the Quality Management System and conformed with the requirements of the ISO 9001:2015 to continually improve the process by ensuring that all strategic efforts are geared towards the established quality policy and objectives.

3. Distribution

3.1 Number of Customers

The distribution utilities (DUs) registered a total of 20.3 million captive customer connections in 2020. About 92% of them are residential customers, while the remaining are commercial, industrial, and others (other customer categories composed of government, streetlights, irrigation, etc.,) as summarized in Table 8.

Table 8. 2020 Captive Customer Connections, in million

Grid	Residential	Commercial	Industrial	Others	Total per Grid
Luzon	12.27	0.84	0.02	0.16	**13.29**
Visayas	3.55	0.18	0.01	0.08	**3.82**
Mindanao	2.90	0.21	0.02	0.07	**3.19**
Total per Sector	**18.72**	**1.23**	**0.05**	**0.31**	**20.31**

Source: 2021-2030 Distribution Development Plan (DDP)
Note: Totals may not add up due to rounding

[7] Entitled, "Ease of Doing Business and Efficient Government Service Delivery Act of 2018"
[8] Entitled, "Energy Virtual One-Stop Shop Act" or "EVOSS Act"

In 2021, 22.6 million captive customer connections were recorded by the DUs with an 11% annual growth rate from the 2020 level. Majority of the customers are residential, comprising 92% of the total number of customers, as shown in Table 9.

Table 9. 2021 Captive Customer Connections, in million

Grid	Residential	Commercial	Industrial	Others	Total per Grid
Luzon	13.17	0.90	0.02	0.17	**14.25**
Visayas	3.87	0.19	0.01	0.09	**4.15**
Mindanao	3.85	0.25	0.02	0.10	**4.21**
Total per Sector	**20.88**	**1.33**	**0.05**	**0.35**	**22.62**

Source: 2022-2031 DDP (Note: Totals may not add up due to rounding)

3.2 Capital Expenditures

The DUs have implemented various capital expenditure projects, which include electrification, network, and non-network projects, among others. As of 2020, the DUs have completed a total of 2,736 ckt-km of sub-transmission facilities, 67,515 ckt-km of distribution facilities, and 20,461 MVA of substation capacities as shown in Table 10. These projects were necessary to ensure that the load growth and development in the franchise area of the DU will be supported by a reliable and efficient distribution system.

Table 10. 2020 Capital Expenditures Projects

Grid	Sub-transmission Facilities (ckt-km)	Distribution Facilities (ckt-km)	Substation Capacity (MVA)
Luzon	2,456	48,943	19,819
Visayas	236	16,923	429
Mindanao	44	1,649	213
Total	**2,736**	**67,515**	**20,461**

Source: 2021-2030 DDP (Note: Totals may not add-up due to rounding)

In 2021, a total of 2,660 ckt-km of sub-transmission facilities, 48,509 ckt-km of distribution facilities, and 21,340 MVA of substation capacities (Table 11) were implemented by the DUs and added to their existing distribution assets.

Table 11. 2021 Capital Expenditures Projects

Grid	Sub-transmission Facilities (CKT-KM)	Distribution Facilities (CKT-KM)	Substation Capacity (MVA)
Luzon	2,398	36,253	20,995
Visayas	216	11,826	189
Mindanao	46	430	156

Grid	Sub-transmission Facilities (CKT-KM)	Distribution Facilities (CKT-KM)	Substation Capacity (MVA)
Total	2,660	48,509	21,340

Source: 2022-2031 DDP (Note: Totals may not add-up due to rounding)

3.3 Distribution Utilities – Competitive Selection Process

To streamline the conduct of CSP and the responsibilities of the DOE, Energy Regulatory Commission (ERC), and National Electrification Administration (NEA) under the Republic Act (RA) No. 9136 or the Electric Power Industry Reform Act (EPIRA), the DOE issued Department Circular No. DC2023-06-0021[9] on 30 June 2023, which took effect on 18 July 2023 after publication at The Daily Tribune and Business World on 04 July 2023. Pursuant to the said policy, the conduct of CSP shall be in accordance with the guidelines of the ERC and the NEA, in the case of Electric Cooperatives (ECs).

4. Supply

4.1 Retail Competition and Open Access Updates

Retail competition and open access (RCOA) participants have grown significantly since its establishment in 2013. Initially, the threshold was set at a monthly average peak demand of one (1) MW but later adjusted to 750 kW and 500 kW moving towards the EPIRA vision of customer choice. Despite the increasing number of contestable customers, there is still a notable number of qualified end-users under the captive market who haven't switched yet to RCOA especially in the 500 kW to 749 kW threshold.

Table 12. Captive vs. Contestable Customer Statistics

Retail Market Participants		Prospective End-users under Captive	Registered Contestable Customers
		December 2022	December 2022
Contestable Customers	Average Peak Demand ≥ 1MW	291	1,222
	750kW ≥ Average Peak Demand > 1MW	231	426
	500kW ≥ Average Peak Demand > 749 kW	649	275
	Sub-Total	**1,171**	**1,923**
Suppliers	RES	-	38
	Local RES	-	15
	Sub-Total	**-**	**53**

[9] Entitled, "Prescribing the Policy for the Mandatory Conduct of the Competitive Selection Process by the Distribution Utilities for the Procurement of Power Supply for Their Captive Market"

Supplier of Last Resort	-	25
Retail Metering Services Provider	-	63
Grand Total	**-**	**2,073**

On 29 July 2019, the DOE promulgated Department Circular No. DC2019-07-0011[10], which amended some provisions of DC2013-07-0013 and DC2018-01-0002 to clarify voluntary participation in the RCOA, designate the Independent Market Operator (IMO) as the central registration body and reduce barriers to entry for qualified contestable customers. To further promote competition and develop the retail market, the ERC adopted ERC Resolution No. 12, Series of 2020[11], which expanded RCOA participation to end-users with at least 500kW average monthly peak demand. Meanwhile, studies on the implementation of retail aggregation are being coordinated with the IMO to allow aggregation of lower threshold consumers contiguously situated for them also to exercise customer choice. Currently, the pilot implementation of the Retail Aggregation has commenced last 24 June 2022, in partnership with the ERC, Manila Electric Company (MERALCO), and UP Diliman, pending the implementation in UP Diliman while addressing their issues on the CSP.

4.2 Net Metering

Net-Metering refers to a system, not exceeding 100kW, appropriate for distributed generation, in which a distribution grid user has a two-way connection to the grid and is only charged for his net electricity consumption and is credited for any overall contribution to the electricity grid. This allows an end-user to be a prosumer (both a consumer and energy producer), but not a net power generator. As of December 2022, a total of 7,583 qualified end-users covering 65 DUs, were registered in the program, with a total rated capacity of 63.2MWp.

4.3 Green Energy Option Program

The supply sector became broader and more competitive with the promulgation of the Green Energy Option Program (GEOP). On 18 July 2018, the DOE issued Department Circular No. DC2018-07-0019[12]. However, it was only after the issuance of the ERC Resolution No. 8, series of 2021 or the "Rules for the GEOP" in August 2021 that the program became fully operational.

The GEOP is a non-regulated voluntary policy mechanism that allows electricity end-users with 100kW and above demand to source their electricity supply from RE sources through RE Suppliers. As of December 2022, the DOE has issued 18 GEOP Operating

[10] Entitled, "Amending Various Issuances on the Implementation of the Retail Competition and Open Access (RCOA)"
[11] Entitled, "A Resolution Prescribing the Timeline for the Implementation of Retail Competition and Open Access"
[12] Entitled, "Promulgating the Rules and Guidelines Governing the establishment of the Green Energy Option Program Pursuant to the Renewable Energy Act of 2008"

Permits to RE Suppliers through Department Circular No. DC2020-04-0009[13]. A total of 199 customers in Luzon and Visayas have already switched to the GEOP, which is equivalent to 60.99MW non-coincidental peak demand.

5. Electricity Market

5.1 Wholesale Electricity Spot Market (WESM) Mindanao

The establishment of WESM Mindanao serves as a mechanism for efficiently scheduling, dispatching, and settling energy transactions in the Mindanao Grid. Under the WESM regime, the DOE aims to rectify all grid arrangements, particularly those that do not comply with existing applicable rules and regulations.

In DC2022-12-0039, the DOE declared the launch of commercial operation of WESM Mindanao on 26 January 2023. WESM in Mindanao will be vital in facilitating the import-export of energy through the MVIP. Through the implementation of WESM and the connection of Visayas and Mindanao, the reliability and security of electric power supply, not only in the Mindanao but also in Visayas and Luzon, will be realized.

5.2 Reserve Market

The Reserve Market provides a new avenue for the procurement of reserves to augment the current procurement of Ancillary Services (AS) via CSP to satisfy the required AS levels and ensure a sustainable, reliable, affordable, and secure energy supply in the country through the co-optimization of energy and reserves in the WESM and Reserve Market. The full commercial operations of the Reserve Market will encourage more investments in the energy sector to satisfy the growing energy demand and ensure the reliability and stability of the Grid.

The DOE intends to release a Department Circular in the third quarter of 2023, to officially announce the commercial operations of the Reserve Market. The goal is to initiate full commercial operations by December 2023, at which point transactions will become financially binding and the complete co-optimization of energy and reserves will be achieved.

5.3 Preferential Dispatch for Renewable Energy

Through the DOE Department Circular No. DC2022-10-0031[14] issued on 05 October 2022, all intermittent and Feed-in-Tariff (FIT) eligible RE generating units, including wind, solar, run-of-river hydro, and ocean are given preference in the WESM dispatch schedule to ensure its maximum output injection to the grid. Biomass, geothermal, and impounding hydro have the option to enjoy preferential dispatch, taking into consideration the contractual obligations with their respective customers.

[13] Entitled, "Guidelines Governing the Issuance of Operating Permits to Renewable Energy Suppliers under the Green Energy Option Program"
[14] Entitled, "Declaring All Renewable Energy Resources as Preferential Dispatch Generating Units in the Wholesale Electricity Spot Market Amending for this Purpose Department Circular No. DC2015-03-0001"

6. Missionary Electrification

6.1 Demand and Supply Statistics

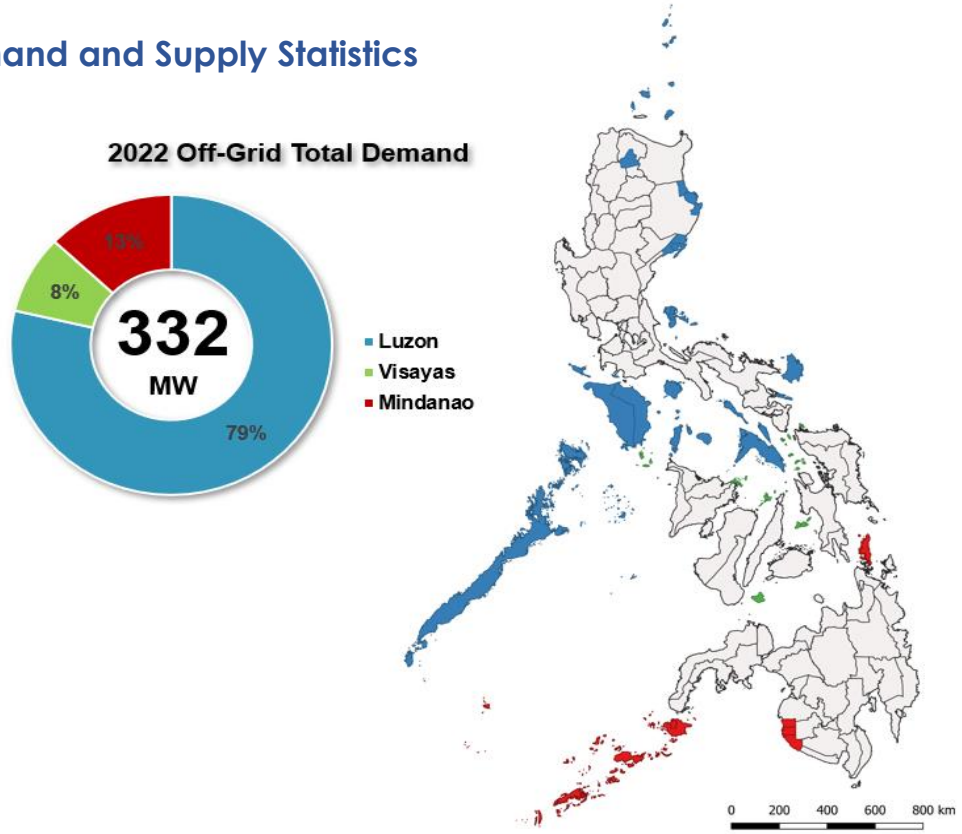


Figure 7. 2022 Off-Grid Demand and Supply Statistics

In 2022, the off-grid areas had a total demand of 332 MW, with Luzon having the highest share of 79% since it includes the very large island grids of Mindoro, Marinduque, Palawan, Catanduanes, and Masbate, while Visayas and Mindanao having 8% and 13% share respectively as shown in Figure 7.

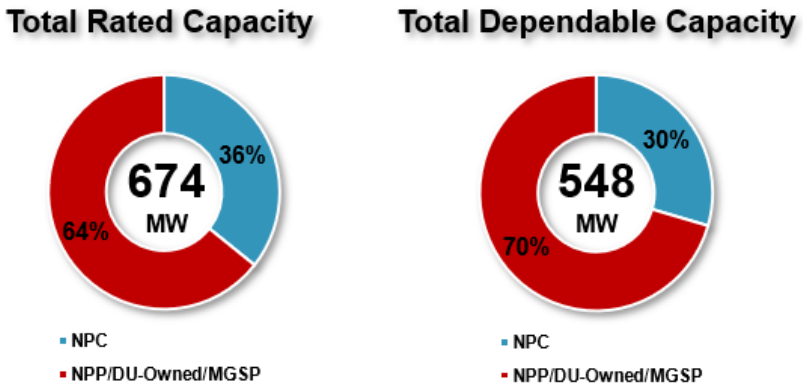


Figure 8. 2022 Off-Grid Total Demand as of 31 December 2022

As of December 2022, the total supply in off-grid areas in terms of the rated and dependable capacity is 674 MW and 548 MW, respectively, which is dominated by the New Power Providers (NPPs) as shown in Figure 8.

6.2 Off-Grid Transmission and Substation Systems

6.2.1 Existing Transmission and Substation Systems

Table 13 shows the summary of existing transmission system facilities of the National Power Corporation (NPC) in five (5) areas of Luzon namely Mindoro, Palawan, Catanduanes, Masbate, and Marinduque as of December 2022.

Table 13. 2022 Existing 69kV Transmission and Substation Systems in Off-Grid Areas

Area/Island	Transmission Line Length (ckt-km)	Substation Capacity (MVA)
Mindoro	449.03	95
Palawan	359.30	60
Catanduanes	99.67	20
Masbate	149.21	20
Marinduque	58.51	20
Total	**1,115.72**	**215**

Source: NPC's Missionary Electrification Plan (MEP) 2023-2027

6.2.2 Off-Grid Transmission and Substation System Projects

Table 14 shows the summary and status of NPC's transmission system projects as of December 2022 in five (5) off-grid areas.

Table 14. List of On-Going Transmission System Projects in the Off-Grid Areas

Project Name	Target Year of Completion	Status
• Palawan		
1. Construction of Roxas – Taytay 69kV TL (36.6 ckt-kms.) (Schedule 1)	2022	100% Completed
2. Construction of Roxas – Taytay 69kV TL (34.7 ckt-kms.) (Schedule 2)	2022	100% Completed
3. Upgrading of Roxas Substation from 5 MVA to 10 MVA Capacity	2023	On-going procurement
• Catanduanes		
1. Construction of San Miguel – Viga 69kV TL (23.0 ckt-kms.)	2022	80.08% Completed
2. Construction of 5 MVA New Viga Substation	2023	45.31% Completed
• Masbate		

Project Name	Target Year of Completion	Status
1. Construction of Tap – Uson 69kV TL (1.2 ckt-km)	2023	On-going procurement
2. Upgrading of Mobo Substation from 10 MVA to 20 MVA Capacity	2022	100% Completed
• Marinduque		
1. Construction of Mogpog – Buenavista 69kV TL (32.0 ckt-km)	2023	On-going procurement
2. Construction of 20 MVA New Mogpong Substation	2022	100% Completed
• Sulu		
Construction of Jolo Tie Line (5.0 ckt-km)	2026	Tendering

Source: NPC's MEP 2023-2027

6.3 Missionary Electrification Development Plan (MEDP) Publication

The DOE has published the 2021-2025 Missionary Electrification Development Plan (2021 MEDP) dated 17 February 2023 on the DOE Website. The 2021 MEDP provides major updates to the 2016-2020 MEDP to introduce new policies, strategies, and governance reforms for off-grid power development and missionary electrification in accordance with Department Circular No. DC2019-01-0001[15]. The main objectives of the 2021 MEDP are to support the following strategic goals of the Government as shown in Figure 9.

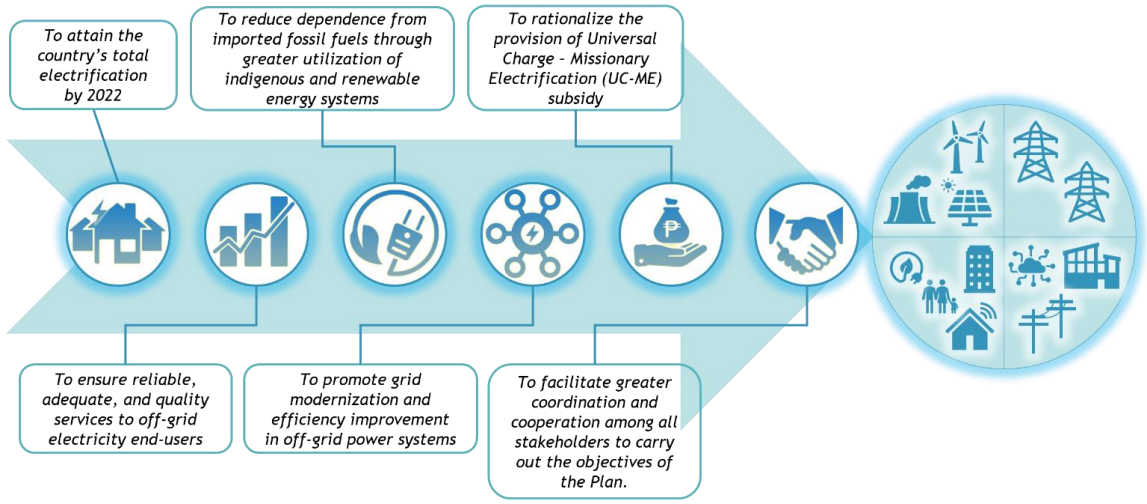


Figure 9. MEDP Objectives

[15] Entitled, "Prescribing the Omnibus Guidelines on Enhancing Off-Grid Power Development and Operation"

7. Total Electrification

Access to electricity is regarded as a transformative tool that leads to the improvement of the quality of life of people. The government, mindful of the impact that electricity access brings, is guided with the goal of attaining 100.0% electrification in the country by 2028. The attainment of the total electrification goal entails the continuous implementation of electrification programs that are overseen by the Total Electrification Steering Committee (TESC) composed of the DOE, NEA, and NPC and complemented by the National Total Electrification Roadmap (NTER) which is the consolidated Local Total Electrification Roadmap (LTER) of the DUs.

The provision of electricity is an obligation to be carried out by DUs and this must be supplied in the least cost manner subject to the collection of retail rates approved by the ERC. The DUs are also responsible for providing service to unviable areas and in cases wherein there is no viable solution, these areas may be transferred to another DU (if there is any available). A Microgrid Service Provider (MGSP), pursuant to RA No. 11646[16] or the "Microgrid Systems Act", comes in if DUs are unable to serve remote and unviable areas. The DOE is responsible for declaring these remote and unviable areas open for private-sector participation. The NPC may enter if neither a DU nor an MGSP can provide electricity service.

7.1 Total Household Electrification by 2028

To achieve the goal of 100.0% Household electrification by 2028, the National Total Electrification Framework (NTEF), as shown in Figure 10 below, has been thoughtfully designed to overcome past challenges and ensure the success of electrification plans and programs. This comprehensive framework encompasses key factors, such as electrification strategies, funding sources, and project implementers.

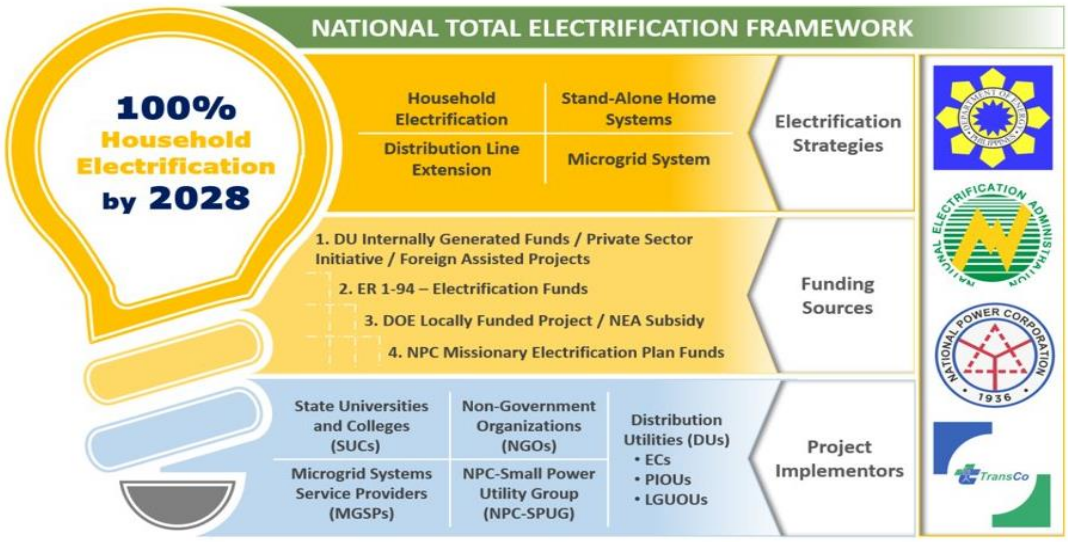


Figure 10. National Total Electrification Framework

[16] Entitled, "An Act Promoting the Use of Microgrid Systems to Accelerate the Total Electrification of Unserved and Underserved Areas Nationwide" or "Microgrid Systems Act"

7.1.1. 2022 Household Electrification Status

Electrification at the household (HH) level stood at 96.2% in 2022 based on the 2015 PSA census, an increase of 0.74 percentage points from the 2021 level of 95.4%. The rise in electrification level indicates that 25.91 million households out of the potential 22.98 million are now with electricity service.

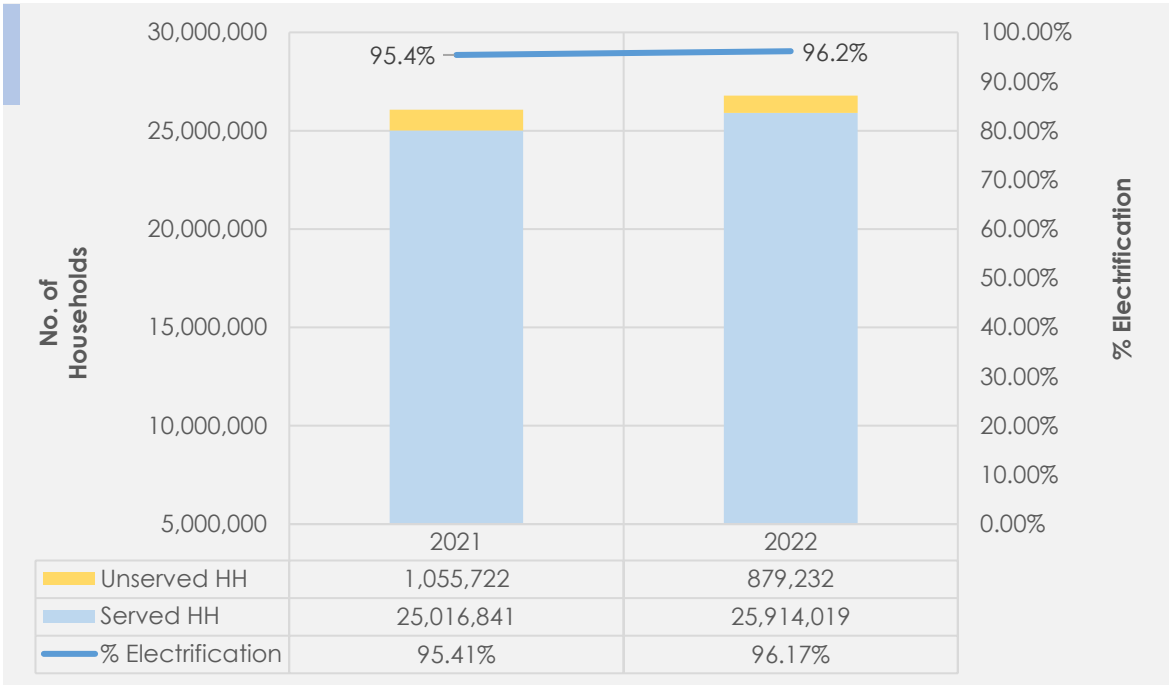


Figure 11. Household Electrification Status, 2021 – 2022

Luzon recorded the highest electrification level at 98.9% with 16.1 million energized households. Visayas closely followed with an electrification level of 97.6% equivalent to 4.83 million energized households, while Mindanao remains to have the highest number of unserved households at 625,687 equating to an electrification level of only 88.1%.

Table 15. Household Electrification Status, 2022 (Per Island Group)

Major Island Group	Potential HHs (2015 PSA)	Served HHs (4th Quarter 2022)	Unserved HHs, per DU per Province	% HH Electrification
Luzon	13,318,261	16,092,459	176,479	98.9
Visayas	4,401,698	4,834,595	105,110	97.6
Mindanao	5,265,012	4,987,091	625,687	88.1
Grand Total	**22,984,97**	**25,914,073**	**879,232**	**96.2**

In terms of electrification level aggregated by DUs, ECs stand at 94.2% electrification level accounting for 14,311,409 households. For the private sector, MERALCO already has achieved 100.0% electrification in its franchise area equivalent to 6.4 million households. Electrification remains a challenge for the unviable areas served by the MGSP (formerly Qualified Third-Party or QTP) with an electrification level of 62.6% or 23,696 households.

Table 16. Household Electrification Status, 2022 (Per DUs)

DUs	Potential HHs (2015 PSA)	Served HHs (4th Quarter 2022)	Unserved HHs, per DU per Province	% HH Electrification
ECs	14,311,409	15,420,243	829,287	94.2
EC-QTP/NPC-SPUG	23,696	15,194	8,873	62.6
MERALCO	6,478,982	8,207,684	0	100.0
Other DUs	2,170,884	2,270,952	41,072	98.1
Grand Total	**22,984,971**	**25,914,073**	**879,232**	**96.2**

7.1.2. Addressing Barriers to Program Implementation

a) *Policy Guidelines for the Implementation of the DOE-Locally Funded Projects – Total Electrification Project*

The DOE issued two (2) policies on the implementation of the Locally Funded Projects – Total Electrification Project (LFP-TEP). The DOE issuance of TEP 1 – Policy Guidelines on the implementation of LFP-TEP which provides allocation to NEA and NPC and the DUs to implement the application of electrification strategies for un-energized households in both grid and off-grid areas. The other policy is TEP 2 – which provided the policy guidelines for the provision of portable solar home systems to energize conflict-affected and vulnerable areas by the DOE in partnership with the concerned ECs. Another policy on the implementation of TEP will be issued for the participation of other qualified implementers such as State Universities and Colleges, and private groups, aside from NEA and NPC. This will address the issues of absorptive capacity to implement the projects and fund liquidation.

On 05 October 2022, the NEA and NPC submitted to the DOE their updated Work and Financial Plans for TEP fiscal year (FY) 2022 Funds. The submission was in consideration of the new timeline and project costing for their respective prioritized electrification projects. In addition, NPC has submitted the details of the PhP195 million allocated budget for the implementation of electrification projects in Missionary Areas.

Lastly, Executive Order (EO) No. 156, Series of 2021[17] Composite Team has approved the final list of projects to be funded under the TEP FY2022, including the electrification project of NPC for Missionary Areas. The corresponding Notices of Award to NEA and NPC were issued on 20 December 2022 and the Memorandum of Agreement for the approved project was signed, notarized, and issued on the same day.

[17] Executive Order No. 156, Series of 2021 entitled "Instituting Measures to Ensure Consistent and Reliable Electricity Service in Inadequately Served Areas, Improve Performance of Ineffective Distribution Utilities, and Achieve Total Electrification of the Country"

b) Institutionalization of Total Electrification Steering Committee

On 12 December 2021, the former President Rodrigo R. Duterte signed EO 156, s. 2021[18], which directs DOE to carry out the following: a) identify inadequately served areas; b) mandate the DUs to submit a comprehensive electrification master plan (CEMP) and modify or reject such if not in accordance with the total electrification objective; c) take appropriate steps to ensure electrification of inadequately served areas; d) formulate mechanism for the LGUs and communities to determine if they are inadequately served; e) determine and identify all underperforming and ineffective DUs; f) conduct performance review of DUs and agencies involved in total electrification; and g) promulgate rules and regulations for the entry and integration of microgrids, distributed energy resources (DERs), and other alternative service providers.

To accelerate and fully realize the implementation of the EO 156, s. 2021, the DOE issued the Department Order No. DO2022-02-0002[19] which created the Composite Team as the lead responsible for the overall implementation of the EO under direct supervision and guidance of the DOE and established a Technical Working Group (TWG) that will provide technical support and assistance in the planning and operation of the Composite Team.

On 21 January 2022, RA No. 11646 was issued by President Duterte while the IRR was released on 24 May 2022 as Department Circular No. DC2022-05-0017[20]. The DOE recognizes the need to organize a new steering committee dedicated to supervising and providing directions in the implementation of various plans and programs for the provision of electricity access to communities that are identified as unserved and underserved by the DUs and other responsible entities.

On 21 December 2022, the DOE issued Department Order No. DO2022-12-0016[21] TESC which supervises and provides direction in the formulation of NTER. The NTER shall be the consolidation of the LTER of DUs nationwide which includes areas declared as unserved and underserved areas, in accordance with RA No. 11646 and its implementing rules and regulations. The Steering Committee shall also monitor and conduct periodic reviews of the implementation of the NTER and direct adjustments as necessary, to consider, among others, demographic changes, new approaches to electrification, and identification of alternative support to expand energy access. Provide timely resolution to policy gaps and implementation issues affecting the achievement of the total electrification target.

[18] Ibid
[19] Entitled, "Implementing Framework of Executive Order No. 156 s. 2021"
[20] Entitled, "Rules and Regulations to Implement Republic Act No. 11646"
[21] Entitled, "Creating the Total Electrification Steering Committee to Accelerate the National Total Electrification"

c) Republic Act (RA) No. 11646

The enactment of the Microgrid Systems Act (MGSA) on 21 January 2022 serves to complement the government's continuing efforts towards total electrification. MGSA was enacted to pursue sustainable rural development and poverty reduction, promote private sector participation, provide a competitive environment and level playing field for different kinds of energy sources with a preference for low-cost, indigenous, and renewable, and ultimately to accelerate total electrification and ensure the provision of quality, reliable, secure, and affordable supply of electrification of underserved and unserved areas. In compliance with the MGSA, the DOE promulgated and published Department Circular No. DC2022-05-0017 or MGSA-IRR which took effect on 25 June 2022, 15 calendar days following its publication on 09 June 2022.

Under the said Act, those qualified to apply as an MGSP are entities, including private corporations, local government units (LGUs), cooperatives, non-government organizations, generation companies and their subsidiaries, and DUs and their subsidiaries who are capable and willing to comply with the technical, financial, and other requirements through CSP.

d) National Total Electrification Roadmap (NTER)

The passage of RA No. 9136 or the EPIRA provides the policy of the state to ensure and accelerate the total electrification of the country. With the fast-changing economic and demographic landscape, the DOE, being mandated to ensure that this objective is attained, has initiated various programs such as the Accelerated Barangay Electrification Program and the Expanded Rural Electrification Program, that led to an estimated 100.0% barangay electrification in 2008.

While substantial progress has been made in electrifying barangays, household electrification remains a challenge, prompting not only the DOE but other government instrumentalities as well to formulate programs to support 100.0% electrification. The challenges include ensuring 24/7 electricity services to all areas in the country up to the remote barangays and islands. Meanwhile, the framework must consider that demand for connection services in areas with access to the grid will continue to increase alongside population and household growth.

Total electrification of the country remains a priority amid population and economic expansion. The Philippine Energy Plan (PEP) 2023-2040 emphasized the goal of achieving total electrification in the country, particularly in bringing electricity services to consumers in off-grid or missionary areas, to which the involvement of the private sector is imperative.

Recognizing the importance of proper planning in total electrification, RA No. 11646 mandated the DOE to prepare and publish annually on its website the NTER, upon consultation with public and private stakeholders. The NTER is a comprehensive national strategic plan including a work plan to accelerate

total electrification in the country considering the various LTERs and the DDPs which shall be incorporated in the PEP.

7.2 Grid and Off-Grid Electrification

7.2.1. Grid

a) *Nationwide Intensification of Household Electrification (NIHE)*

The program reported a total of 274,035 energized households in 2022 out of the 344,090 households with approved house wiring and kilowatt-hour (kWh) meter subsidy. The restrictions imposed by community quarantine because of COVID-19 affected and halted installation activities for the identified beneficiaries. As a move to ensure project completion, the DOE drafted for approval an Advisory to provide guidance to concerned DUs implementing the program regarding their concerns on fund releases and inspection upon completion.

b) *Sitio Electrification Program (SEP)*

The SEP covers the energization of sitios, which are territorial enclaves within a barangay that is distant from the barangay center and composed of at least 30 – 40 households. As of December 2022, NEA was able to energize 951 sitios out of the 1,085 DBM-approved sitios to be energized under the 2022 General Appropriation Act (GAA) with an estimated project cost of Php1.27 billion.

c) *Barangay Line Enhancement Program (BLEP)*

The BLEP pertains to the connection to the grid of barangays previously energized through small generating sets, solar home systems (SHS), and micro-hydro. The program also covers the improvement of tapping points and/or installation of underground / submarine cables. For the period 2022 to 2026, 166 barangays are being targeted by the program with a proposed budget of PhP2.4 billion (to be proposed in the GAA from 2022 to 2026 and subject to the subsidy of the national government).

7.2.2 Off-Grid

a) *DOE- PV Mainstreaming (PVM)*

Solar PV Mainstreaming Program is the DOE's program to address un-energized highly dispersed, remote HHs who are far from the distribution lines of the ECs. It is financed by both the DOE's LFP and the European Union through the Access to Sustainable Energy Program (ASEP). The program adopts the Fee-for-Service Business Model where the ECs install the SHS in un-energized households (located in areas unviable for grid extension) within the EC's franchise area. The ECs are the owners of the hardware and are responsible for the installation, maintenance, repair, and replacement of the system components. The homeowner's responsibility covers the household wiring, lights, and other 12-volt direct current (DC) loads/appliances.

The Program under the DOE's LFP has completed seven (7) projects implemented by seven (7) ECs in Luzon, Visayas, and Mindanao. A total of 11,113 households benefited from the Projects for the reporting period. All participating ECs namely: Sultan Kudarat Electric Cooperative, Inc. (SULECO), Busuanga Island Electric Cooperative, Inc. (BISELCO), Quezon II Electric Cooperative, Inc. (QUEZELCO II), Iloilo II Electric Cooperative, Inc. (ILECO II), Zamboanga Sur I Electric Cooperative, Inc. (ZAMSURECO I) and Bohol II Electric Cooperative, Inc. (BOHECO II) were already technically and financially completed and liquidated.

An endorsement to the ERC was also made by the DOE for all the completed PVM Projects. This is in relation to the issuance of an Order of Approval and in compliance with the ERC Resolution No. 17 series of 2017[22].

Table 17. DOE's Locally Funded Project (LFP) on PVM

Electric Cooperative	No. of HH	Status	Remarks
QUEZELCO II	1,333	Completed	Closed
BISELCO	3,711	Completed	Closed
BOHECO II	530	Completed	Closed
SULECO	2,575	Completed	Closed
ZAMSURECO I	1,129	Completed	Closed
ILECO II	706	Completed	Closed
BISELCO (Batch 2)	1,129	Ongoing	Closed
QUEZELCO II	1,333	Completed	Closed
Total	**11,113**		

b) *Access to Sustainable Energy Programme (ASEP)*

The program's PVM component focuses on rural electrification by providing SHS to 40,500 households in the franchise areas of participating ECs. This is divided into two (2) windows where Window 1 targets 10,000 households (financed by the European Union or EU and Global Partnership on Output-Based Aid Grants or GPOBA) and Window 2 covers the remaining 30,500 households (EU financed only).

Table 18. EU-ASEP's PVM Component

Electric Cooperative		No. of HH	Status
Window 1	COTELCO	2,500	Completed
	DASURECO	2,500	
	SOCOTECO II	2,500	

[22] Entitled, "A Resolution Adopting the Rules Governing the Setting of Regulated Solar Home System (SHS) Tariff for the Provision of Electricity Service for Rural Electrification by Electric Cooperatives (ECs)"

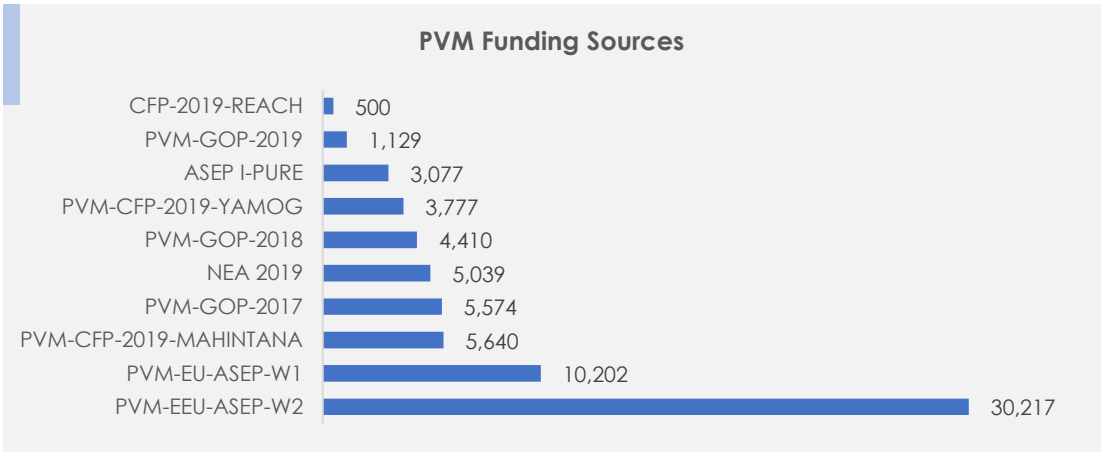
Electric Cooperative		No. of HH	Status
	SUKELCO	2,500	
	Sub-Total	**10,000**	
Window 2	FIBECO	1,000	On-going
	BUSECO	2,500	
	COTELCO	6,100	
	SUKELCO	5,900	
	DASURECO	7,500	
	SOCOTECO II	7,500	
	Sub-Total	**30,500**	
Total		**40,500**	

- The first window of PVM (10,012 SHS installation) was completed by the first implementation agency, Local Government Unit Guarantee Corporation (LGUGC) in March 2019 and the installed SHS are operational, and this benefitted 10,000 households within the franchise areas of COTELCO, Davao del Sur Electric Cooperative (DASURECO), South Cotabato II Electric Cooperative (SOCOTECO II), and SUKELCO.

- The second window of PVM (30,500 SHS installation) was completed by the National Power Corporation (NPC) as of September 30, 2022.

- The implementation of the PVM program was carried out through several funding sources. More than half of the total installations were funded through ASEP as shown in Figure 12.

Figure 12. PVM-SHS Installations per Funding Sources



c) *Microgrid Systems Act*

Last 21 January 2022, former President Rodrigo R. Duterte approved RA No. 11646 or the Microgrid Systems Act (MGSA). MGSA was enacted to pursue sustainable rural development and poverty reduction, promote private sector

participation, provide a competitive environment and level playing field for different kinds of energy sources with a preference for low-cost, indigenous, and renewable, and ultimately to accelerate total electrification and ensure the provision of quality, reliable, secure, and affordable supply of electrification of UUAs. In compliance with the MGSA, the DOE promulgated and published DC2022-05-0017. The MGSA-IRR took effect on 25 June 2022, 15 calendar days following its publication on 09 June 2022.

d) Micro Grid Service Providers (MGSP)

As of December 2022, a total of 10 existing MGSP Sites in the Philippines as shown in Table 19, are being Operated by three (3) MGSP Operators namely Power Source Philippines, Inc. (PSPI), Sabang Renewable Energy Corporation (SREC) and First Philippines Island Energy Corp. (FPIEC). The QTP operators transitioned into MGSP in June 2022.

Table 19. Existing MGSPs as of December 2022

Project Location	Proponent	Technology	Approved Tariff	Served Customers	Average Demand Load (kW)
Malapascua, Daan-Bantayan, Cebu	PSPI	Diesel 1.455 MW	<=40kWh = PhP12/kWh; >40kWh = PhP 15/kWh	1,163	9,733.46 (Daily)
Liminangcong, Taytay, Palawan	PSPI	Diesel- .805 MW	PhP 9.12/kWh	1,020	3,682.50 (Daily)
Candawaga & Culasian, Rizal, Palawan	PSPI	Diesel - .43 MW	PhP 9.9082/kWh	1,062	2,934.52 (Daily)
Sitio Sabang, Puerto Princesa City, Palawan	SREC	Diesel - 1.2 MW Solar- 1.452 MWp Battery Storage - 2.44 MWh	PhP12/kWh for Residential & Public Bldgs; PhP15/kWh for Commercial Bldg.	588	2,589.65 (Daily)
Lahuy Island, Caramoan, Camarines Sur	FPIEC	250 kWp Solar + 468 kW Diesel + 232 kWh Battery	N/A	940	93,003.75 (Monthly)
Haponan Island, Caramoan, Camarines Sur	FPIEC	107 kWp Solar + 104 kW Diesel + 232 kWh Battery		133	
Quinalasag Island Garchitorena, Camarines Sur	FPIEC	404 kWp Solar + 585 kW Diesel + 232kWh Battery		1,376	
Brgy. Manamoc, Cuyo, Palawan	PSPI	0.216 MW Diesel		659	28,125 (Daily)

Project Location	Proponent	Technology	Approved Tariff	Served Customers	Average Demand Load (kW)
Brgy. Port Barton, San Vicente Palawan	PSPI	0.61 MW Diesel		610	3,138.71 (Daily)
Balut Island, Saranggani, Davao Occidental	PSPI	0.71 MW Diesel	9.5530/kWh	3570	6000 kW (Daily)

The DOE issued Public Notice (PN) 2021-03-0001 on 12 March 2021, which opens 69 QTP Service Areas for the private sector – six (6) are under Negros Occidental Electric Cooperative (NOCECO) and 63 under Palawan Electric Cooperative (PALECO). About 26,874 households in Palawan and 3,249 households in Negros Occidental are expected to receive electricity services once these areas are served by QTPs/MGSPs. The QTPs/MGSPs serving these areas will be responsible for the generation of power including the equivalent distribution network.

Meanwhile, on 05 January 2022, the DOE issued Public Notice No.PN2022-01-001: Declaration of QTP Service Areas (updating PN 2021-03-001), wherein thirty-nine (39) areas within the PALECO's franchise area were declared open for private sector participation under the QTP Program. Pursuant to DC2019-11-0015, a Notice to Proceed dated 04 October 2021 was issued by the NEA authorizing PALECO to conduct a CSP for the provision of QTP Services in the declared unserved areas. The CSP Process was conducted by PALECO in April 2022 and a Notice of Award was given to Maharlika Clean Power Holdings Corporation (MCPHC) in consortium with Clean Grid Partners Pte. Ltd. and WEnergy Global Pte Ltd., with Special Purpose Vehicle – Archipelago Renewable Corporation (ARC) for a total of twelve (12) lots as follows, last 17 June 2022.

Table 20. MGSP Service Areas Awarded to ARC

MGSP Service Areas	DU	Potential HHs	MGSP	Capacity/ Technology
Sto. Tomas, Dumaran	PALECO	678	ARC	Solar - 151kwp BSS -193 kwh Diesel -83 kW
Bohol, Dumaran	PALECO		ARC	Solar - 227kwp BSS -226 kwh Diesel -112 kW
Sarong, Bataraza	PALECO	448	ARC	Solar - 151 kwp BSS -193 kwh Diesel -83 kW
Taratak, Bataraza	PALECO	426	ARC	Solar - 227 kwp BSS -226 kwh Diesel -112 kW
Catalagbak, Quezon	PALECO	381	ARC	Solar - 227 kwp BSS -226 kwh Diesel -112 kW
Taburi, Rizal	PALECO	1400	ARC	Solar - 365 kwp BSS -411 kwh Diesel -224 kW

MGSP Service Areas	DU	Potential HHs	MGSP	Capacity/ Technology
				Solar - 151 kwp BSS -193 kwh Diesel -83 kW
Canipaan, Rizal	PALECO	645	ARC	Solar - 227 kwp BSS -226 kwh Diesel -112 kW
Latud, Rizal	PALECO	560	ARC	Solar - 151 kwp BSS -193 kwh Diesel -83 kW
Alacalian, Taytay	PALECO	631	ARC	Solar - 365 kwp BSS -411 kwh Diesel -224 kW
Bantulan, Taytay	PALECO	773	ARC	Solar - 151 kwp BSS -193 kwh Diesel -83 kW
Silanga, Taytay	PALECO			Solar - 227 kwp BSS -226 kwh Diesel -112 kW
Caruray, San Vicente	PALECO	980	ARC	Solar - 365 kwp BSS -411 kwh Diesel -168 kW
				Solar - 151 kwp BSS -193 kwh Diesel -83 kW
Binga, San Vicente	PALECO	351	ARC	Solar - 302 kwp BSS -275 kwh Diesel -168 kW
Bebeladan, El Nido	PALECO	435	ARC	Solar - 365 kwp BSS -411 kwh Diesel -168 kW

7.3 Energy Regulations (ER) 1-94 Program Update

As a proactive response to the pandemic and with the recognition that initiatives are to be drawn up at the local level, the DOE issued Department Circular No. DC2020-04-0008[23]. The primary objective of the policy is to provide additional fund sources for host LGUs in addressing COVID-19. It also stipulates that all available ER1-94 funds comprised of Electrification Funds (EF), Development and Livelihood Fund (DLF), Reforestation, Watershed Management, Health and/or Environment Enhancement Fund (RWMHEEF) that was administered and still with the DOE and the generating companies (last billing quarter of 2019) will be remitted to the host LGUs upon issuance of letter of intent for implementation of COVID-19 related projects.

The DOE already disbursed 78.7% (PhP5.06 billion of the PhP6.4 billion) of available ER 1-94 funds to host communities and beneficiaries. Around PhP1.3 billion is still available that will need to be transferred and remitted to the host LGUs and concerned DUs.

[23] Entitled, "Rationalizing the Utilization of Energy Regulation (ER) 1-94 Funds by the Host LGUs in Response to COVID-19 Public Health Emergency"

Table 21. Status of Reconciled Vs. Remitted Funds to Host Beneficiaries (as of Dec 2022)

Fund Type	Reconciled Available ER 1-94 Funds with DOE (Php Billion)	Disbursed ER 1-94 Funds (Php Billion)	Remaining ER 1-94 Funds (Php Billion)
EF	3.436	2.422	1.012
DLF	1.474	1.304	0.170
RWMHEEF	1.516	1.328	0.187
Total	**6.425**	**5.055**	**1.370**

7.4 Indigenous People/Indigenous Cultural Communities

The DOE has broadened the policy framework for the equitable, sustainable, and inclusive sharing of financial benefits under the ER 1-94 Program by including Indigenous Peoples and Indigenous Cultural Communities (IPs/ICCs) through Department Circular No. DC2018-03-0005[24] and has provided the mechanisms to undertake it via Administrative Operating Guidelines through Department Circular No. DC2019-06-0010[25].

As of December 2022, the DOE has already enlisted 59 Host IPs/ICCs whose ancestral lands are host to 27 power generation facilities/energy resources that cover seven (7) regions, namely: Regions CAR, II, III, V, VI, XI, and XII. These DOE policies uphold the rights of indigenous peoples and give them access to financial benefits as provided through the power development projects within their ancestral lands. The DOE is in continuous coordination and collaboration with the National Commission on Indigenous Peoples (NCIP) of the necessary documentary requirements needed to allow for the direct remittance of financial benefits to the IPs/ICCs that host power generation facilities/energy resource development projects under the ER 1-94 (Benefits to Host Communities) Program.

Through this, the host IPs/ICCs beneficiaries can immediately avail and utilize the financial benefits to augment or support their identified development projects within their Ancestral Domain as well as help support the DOE's pursuit of energy self-sufficiency, power development, and total electrification without sacrificing the country's ecological and cultural concerns.

[24] Entitled, "Prescribing the Guidelines Recognizing the Rights of Indigenous Cultural Communities (ICCs)/Indigenous Peoples (IPs) in their Ancestral Domains and Access to the Financial Benefits as Host Communities under the ER 1-94 Program and Rule 29 (A) of the Implementing Rules and Regulations of Republic Act No. 9136, Otherwise Known as, "Electric Power Industry Reform Act of 2001"

[25] Entitled. "Prescribing the Administrative Operating Guidelines for the Availment and Utilization of Financial Benefits by the Indigenous Cultural Communities/Indigenous Peoples pursuant to the DOE Department Circular No. DC2018-03-0005"

8. Overarching Policies and Program Implementation

8.1 EVOSS Additional Process Flows

The passage of the EVOSS Act on 08 March 2019 paved the way for streamlining and expediting the permitting process for energy projects in the Philippines. From August 2020 to December 2022, the following endorsement and/or approval has been issued by the Electric Power Industry Management Bureau (EPIMB) to industry participants:

Table 22. No. of Issued Endorsement of EPIMB

EVOSS Process	No. of Issuances and Approval
Approval of TPBAC Process	28
Certificate of Endorsement for Point-to-Point Limited Transmission Facilities	2
Certificate of Endorsement to BOI	10
Certificate of Endorsement to ERC	563
Clearance to Undertake SIS	222
Direct Connection Application	11
Letter of Endorsement to BOI	2
Letter of Endorsement to NCIP	34
Letter of Endorsement to PNP	3
QTP Certificate of Endorsement to ERC	10

Source: DOE - Investment Promotion Office

Envisioned to improve efficiency, reduce bureaucratic barriers, and encourage private-sector participation and investment in the energy sector, the DOE has added four (4) new processes as part of the DOE's aim to enhance and integrate new processes in the EVOSS System.

The EPIMB and Investment Promotion Office (IPO) conceptualized and developed these additional processes from 2021 to 2022 and will be further enhanced and integrated EVOSS online platform by the first quarter of 2023. The new additional processes (Figure 13) including their respective checklist of requirements may be accessed through the EVOSS website (https://www.evoss.ph).

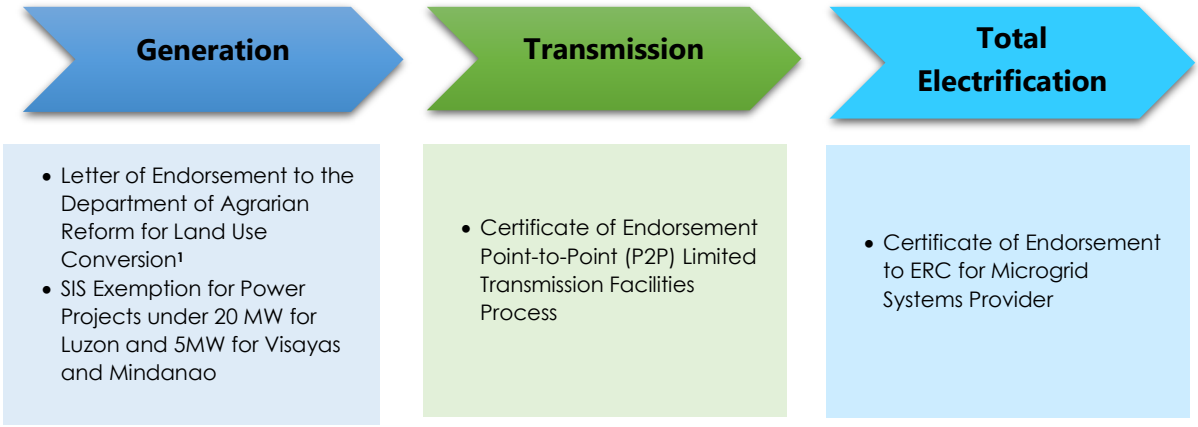


Figure 13. EVOSS Additional Process Flow

9. Major Policies Issued Related to the Electric Power Industry

From January 2021 to June 2023, the DOE has successfully promulgated significant laws and policies within the various power industry subsectors. In alignment with the DOE's mission and the EPIMB's mandate to supervise the electric power industry by ensuring an adequate, efficient, and reliable supply of electricity in the country, the DOE has issued sixty-five (65) policies covering the period.

Table 23. Major Policy Issuances (January 2021 - June 2023)

No	Reference Number	Policy Title	Date of Issuance
Generation (1)			
1	DO2023-05-0015	Enjoining the Energy Regulatory Commission (ERC) and Other Concerned Entities to Ensure Non-Discriminatory Treatment of Generating Facilities Utilizing Liquefied Natural Gas (LNG) in Accordance with their Respective Mandates	23 May 2023
Transmission and System Operation (2)			
2	DO2023-06-0018	Creating the Performance Assessment and Audit Team for the Operations of the Transmission Network Provider and System Operator (PAAT-TNPSO) and Providing for its Responsibilities	08 Jun 2023
3	DC2021-10-0031	Prescribing the Policy for the Transparent and Efficient Procurement of Ancillary Services by the System Operator	04 Oct 2021
Distribution (3)			
4	DC2023-06-0021	Prescribing the Policy for the Mandatory Conduct of the Competitive Selection Process by the Distribution Utilities for the Procurement of Power Supply for Their Captive Market	30 Jun 2023
5	DC2021-09-0030	Amending Certain Provisions of and Supplementing Department Circular No. DC2018-12-0003 on the Competitive Selection Process in the Procurement by the Distribution Utilities of Power Supply Agreement for the Captive Market	24 Sept 2021
6	DC2021-03-0003	Prescribing the Policy and Guidelines for the Formulation of the Distribution Utilities Distribution Development Plan Integrating the Relevant Laws, Policy Issuances, Rules, and Regulations	02 Mar 2021
Supply (1)			
7	DC2022-05-0014	Amending Department Circular No. DC2020-01-0001 on Rules Governing the Review and Evaluation of Direct Connection Applications of Industrial, Commercial and Other Electricity End-Users	10 May 2022
Database Management System (3)			
8	DC2023-04-0006	Providing Supplemental Policy for the Systematic Management of the DOE Reportorial Requirements for the Electric Power Industry Participants-Retail Electricity Suppliers	12 Apr 2023
9	DC2023-03-0005	Providing Supplemental Policy for the Systematic Management of the DOE Reportorial Requirements for the Electric Power Industry Participants – Distribution Utilities	14 Mar 2023
10	DC2022-02-0001	Providing Policies for the Systematic Management of the DOE Reportorial Requirements for the Electric Power Industry Participants	08 Feb 2022
Electricity Market (47)			

No	Reference Number	Policy Title	Date of Issuance
11	DC2023-06-0021	Prescribing the Policy for the Mandatory Conduct of the Competitive Selection Process by the Distribution Utilities for the Procurement of Power Supply for Their Captive Market	30 Jun 2023
12	DC2023-04-0007	Amending Certain Provisions and Supplementing Department Circular No. Dc2022-06-0022 on the Application Process of New WESM Members	19 Apr 2023
13	DC2023-01-0004	Adopting Amendments to Wholesale Electricity Spot Market (WESM) Rules, Various Market Manuals and Promulgation of the Retail Manual on the Procedures for the Implementation of the Green Energy Option Program (GEOP)	31 Jan 2023
14	DC2023-01-0003	Adopting Further Amendments to the WESM Rules, WESM Manual and Retail Manual on Validation Timeline Adjustment in Metering and Billing	12 Jan 2023
15	DC2023-01-0001	Adopting Further Amendments to Various WESM Manuals for Improvements to Market Resource Modeling and Monitoring"	11 Jan 2023
16	DC2022-12-0039	Declaring the Commercial Operation of the Wholesale Electricity Spot Market (WESM) in the Mindanao Grid	23 Dec 2022
17	DC2022-12-0038	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Market Manual on The Guidelines Governing the Constitution of The Pem Board Committees	21 Dec 2022
18	DC2022-11-0036	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manuals on System Security and Reliability Guidelines (SSRG) and Dispatch Protocol for the Implementation of the Reserve Market	21 Nov 2022
19	DC2022-11-0032	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manuals for the Implementation of Reserve Market	07 Nov 2022
20	DC2022-06-0025	Adopting further Amendments to the WESM Market Manual on Billing & Settlement (Provisions on Additional Compensation Process)	20 Jun 2022
21	DC2022-06-0024	Adopting Further Amendments to the WESM Rules and Market Manual on Constraint Violation Coefficient and Pricing Re-runs (CVC-PR) (Harmonization with the ERC Decision in ERC Case No. 2017-042 RC)	20 Jun 2022
22	DC2022-06-0023	Adopting General Amendments to the WESM Rules and Various Market Manuals on the Enhancement to the Market Operator and System Operator Procedures	20 Jun 2022
23	DC2022-06-0022	Adopting Further Amendments to the WESM Manual on Registration, Suspension, and De-Registration Criteria & Procedures (RSDCP) (General Enhancements to the Application Process of New WESM Members)	20 Jun 2022
24	DC2022-06-0021	Adopting Further Amendments to the WESM Rules and Market Manuals on Dispute Resolution Administration (DRA)	20 Jun 2022
25	DC2022-05-0015	Supplementing Department Circular No. DC2021-06-0013 on the Framework Governing the Test and Commissioning of Generation Facilities for Ensuring Readiness to Deliver Energy to the Grid or Distribution Network	20 May 2022
26	DC2022-03-0012	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules, Retail Rules, and Market Manual (Provisions for Audit and Performance Monitoring)	25 Mar 2022
27	DC2022-03-0011	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and its Market	22 Mar 2022

No	Reference Number	Policy Title	Date of Issuance
		Manual on Information Disclosure and Confidentiality (Exceptions for Confidentiality Undertakings for DOE and ERC)	
28	DC2022-03-0010	Adopting Further Amendments to the Market Manual on Registration, Suspension and De-Registration Criteria and Procedures to Clarify Bilateral Contracts Accounted for in Settlements	17 Mar 2022
29	DC2022-03-0009	Adopting Further Amendments to the WESM Rules and WESM Registration Manual (Provisions for De-registration and Cessation of Registration)	17 Mar 2022
30	DC2022-03-0003	Adopting Further Amendments to the WESM Rules its Market Manual on Billing and Settlement for the Implementation of Enhancements to WESM Design Operations (Provisions for Prudential Requirements)	01 Mar 2022
31	DC2021-12-0041	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manual on WESM Compliance Officers (WCO) Certification and Registration	21-Dec-2021
32	DC2021-12-0040	Amending Certain Provisions of Annex "A" of Department Circular No. DC2021-06-0015 Entitled "Declaring the Commercial Operations of Enhanced Electricity Spot Market (WESM) Design and Providing Further Policies"	21-Dec-2021
33	DC2021-11-0038	Amending Certain Provisions of Department Circular No. DC2021-03-0007 entitled "Adopting Further Amendments to the WESM Rules and Market Manual on the Management of Net Settlement Surplus (Harmonization with ERC Resolution No. 07 Series of 2019)"	09-Nov-2021
34	DC2021-11-0037	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manuals on the Rationalization of Billing Timelines	09-Nov-2021
35	DC2021-10-0033	Repealing Section 3 of the DOE Department Circular No. DC2017-04-0006 Entitled "Adopting Further Amendments to the WESM Rules and Market Manuals"	12-Oct-2021
36	DC2021-10-0034	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manual on the Procedures for Changes to the WESM Rules, Retail Rules and Market Manuals	12-Oct-2021
37	DC2021-08-0026	Adopting Further Amendments to The Wholesale Electricity Spot Market (WESM) Rules and Its Market Manuals for the Implementation of Enhancements to WESM Design and Operations (Provisions for Market Surveillance, Enforcement and Compliance)	30-Jul-2021
38	DC2021-08-0025	Providing Policies for the Adoption of the Wholesale Electricity Spot Market (WESM) Penalty Manual for the Implementation of Enhancements to WESM Design and Operations	30-Jul-2021
39	DC2021-07-0024	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules for the Operation of the Renewable Energy Market	09-Jul-2021
40	DC2021-07-0022	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Market Manual on the Constraint Violation Coefficients and Pricing Re-runs	25-Jun-2021
41	DC2021-07-0021	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manuals on Metering for the Implementation of Enhancements to WESM Design and Operations (Provisions for Metering Services Provider Performance, Metering Standards and Site-Specific Loss Adjustments)	25-Jun-2021

No	Reference Number	Policy Title	Date of Issuance
42	DC2021-06-0013	Adopting a General Framework Governing the Test and Commissioning of New Generation Facilities for Ensuring Readiness to Deliver Energy to the Grid or Distribution Network	03-Jun-2021
43	DC2021-06-0012	Adopting Further Amendments to the WESM Rules, Retail Rules and Various Market Manuals for the implementation of Enhancements to WESM Design and Operations (Provisions to Promote Participation in the Retail Competition	03-Jun-2021
44	DC2021-03-0009	Adopting a General Framework Governing the Operationalization of the Reserve Market in the Wholesale Electricity Spot Market and Providing Further Policies to Supplement DC2019-12-0018	17-Mar-2021
45	DC2021-03-0008	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manuals for the Implementation of Policy and Framework Governing the Operations of Embedded Generators	16-Mar-2021
46	DC2021-03-0007	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manuals on the Management of Net Settlement Surplus (Harmonization with the Energy Regulatory Commission Resolution No. 07, Series of 2019	16-Mar-2021
47	DC2021-03-0006	Adopting Further Amendments to the Wholesale Electricity Spot (WESM) Market Manual on Dispatch Protocol for the Implementation of Enhancements to WESM Design and Operations (Provision for Must-Run Unit)	16-Mar-2021
48	DC2021-03-0005	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Market Manual on Load Forecasting Methodology for the Implementation of Enhancements to WESM Design and Operations (Provisions for the Load Distribution Factors)	16-Mar-2021
49	DC2021-03-0004	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manual on Procedures for the Monitoring of Forecast Accuracy Standards for Must Dispatch Generating Units for the Implementation of Enhancements to WESM Design and Operations	16-Mar-2021
50	DC2021-02-0002	Adopting the Wholesale Electricity Spot Market (WESM) Industry Code of Ethics	24-Feb-2021
51	DC2021-05-0010	Adopting Further Amendments to the WESM Rules and Market Manual on Protocol for Central Scheduling and Dispatch of Energy and Contracted Reserves for the Effective Implementation of Enhanced WESM Design and Operations	15-Dec-2020
52	DC2020-10-0021	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules (Provisions for the Implementation of Independent Market Operator)	22-Oct-2020
53	DC2020-10-0020	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Market Manual on Dispatch Protocol for the Implementation of Enhancements to WESM Design and Operations (Provisions for the WESM Timetable)	06-Oct-2020
54	DC2020-10-0019	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Manuals on Registration, Suspension and De-registration, and Market Network Model Development and Maintenance for the Implementation of Enhancements to WESM Design and Operations	06-Oct-2020

No	Reference Number	Policy Title	Date of Issuance
		(Provisions for the New Load Facility of a Registered WESM Member)	
55	DC2020-06-0014	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manual on Billing and Settlement for the Implementation of Enhancements to WESM Design and Operations (Provisions for Prudential Requirements)	02-Jun-2020
56	DC2020-06-0013	Adopting Further Amendments to the Wholesale Electricity Spot Market (WESM) Rules and Market Manual on Registration, Suspension and De-Registration Criteria and Procedures for the Implementation of Enhancements to WESM Design and the Implementation of Enhancements to WESM Design and Operations (Provisions for Registration of New Facility and Harmonization with Republic Act No. 11234 entitled "An Act Establishing the Energy Virtual One-Stop Shop")	01-Jun-2020
57	DC2020-05-0011	Supplementing Department Circular No. DC2019-12-0018 by Including the National Transmission Corporation in the Membership of the Ancillary Services - Technical Working Group	11-May-2020
Total Electrification (5)			
58	Republic Act No. 11646	An Act Promoting the Use of Microgrid Systems to Accelerate the Total Electrification of Unserved and Underserved Areas Nationwide	21 Jan 2022
59	Executive Order 156	Instituting Measures to Ensure Consistent and Reliable Electricity Service in Inadequately Served Areas, Improve Performance of Ineffective Distribution Utilities, and Achieve Total Electrification of the Country	9 Dec 2021
60	DO2023-04-0012	Creation of the Special Bids and Awards Committee Pursuant to Sections 10 and 11 of Department Circular No. DC2022-05-0017	12 Apr 2023
61	DC2022-05-0017	Rules and Regulations to Implement RA No. 11646 (MICROGRID SYSTEMS ACT)	24 May 2022
62	DO2022-02-0002	Implementing Framework of Executive Order No. 156 s. 2021	21 Feb 2022
Off-Grid Development (2)			
63	DC2022-05-0016	Adopting and Integrating the Policies and Programs for the Graduation and Rationalization of the Universal Charge for Missionary Electrification Subsidy Pursuant to Department Circular No. Dc2019-01-0001	24 May 2022
64	DC2021-11-0039	Mandating the National Transmission Corporation as Small Grid System Operator in Specific Off-Grid Areas	09 Nov 2021
Overarching Policies and Programs (1)			
65	DC2023-04-0008	Prescribing the Policy for Energy Storage System in the Electric Power Industry	20 Mar 2023

CHAPTER 2. POWER DEMAND AND SUPPLY OUTLOOK 2023-2050

CHAPTER II

Power Demand and Supply Outlook 2023-2050

In this chapter, the DOE will discuss the Power Demand and Supply Outlook, which provides the annual peak demand forecast and the power supply expansion plan of the country on a per-technology basis, resulting in three scenarios for the planning period of 2023 to 2050, namely the **Reference Scenario**, **Clean Energy Scenario 1 (CES 1) and Clean Energy Scenario 2 (CES 2).**

The 2023-2050 PDP used the PLEXOS® software as the planning and simulation tool to determine the optimal capacity addition and generation expansion for the power supply and demand outlook. PLEXOS®[26] is a state-of-the-art simulation software used for power system and market modeling developed by Energy Exemplar. It has cutting-edge mathematical programming and stochastic optimization techniques that can effectively deal with extremely complex problems and uncertainties such as variable RE, batteries, outages, and reserves, among others. PLEXOS® is being utilized with over 350 organizations in approximately 60 countries.

The 2023-2050 PDP covers the entire Luzon, Visayas, and Mindanao grid with multiple scenarios in one PLEXOS® model. This shows different long-term projections of the power supply and demand outlook of the Philippines towards clean energy transition.

1. Methodology

The development of the Philippine Capacity Expansion Model (CEM) involved the utilization of PLEXOS®, following the structural framework outlined in Figures 14 and 15. The modeling activity encompassed four major steps:

1. **Data Gathering** - The initial step involved the comprehensive identification and collection of all necessary input data, including both historical and forecasted information.
2. **Creation of Scenarios and Assumptions** - The subsequent stage focused on establishing various scenarios and constraints assumptions that would form the foundation for the modeling process.
3. **Generation of Models / Simulation** - The core of the modeling activity involved the creation and execution of the CEM using PLEXOS® least-cost optimization. This step also encompassed the analysis of the resulting CEM to glean insights; and,
4. **Modification** – The final step was an iterative process of refinement, involving the ongoing update of parameters and constraints. This approach aimed to fine-tune the model, leading to the development of the ultimate version of the CEM.

[26] PLEXOS® Energy Modeling Software, Retrieved through https://www.energyexemplar.com/plexos

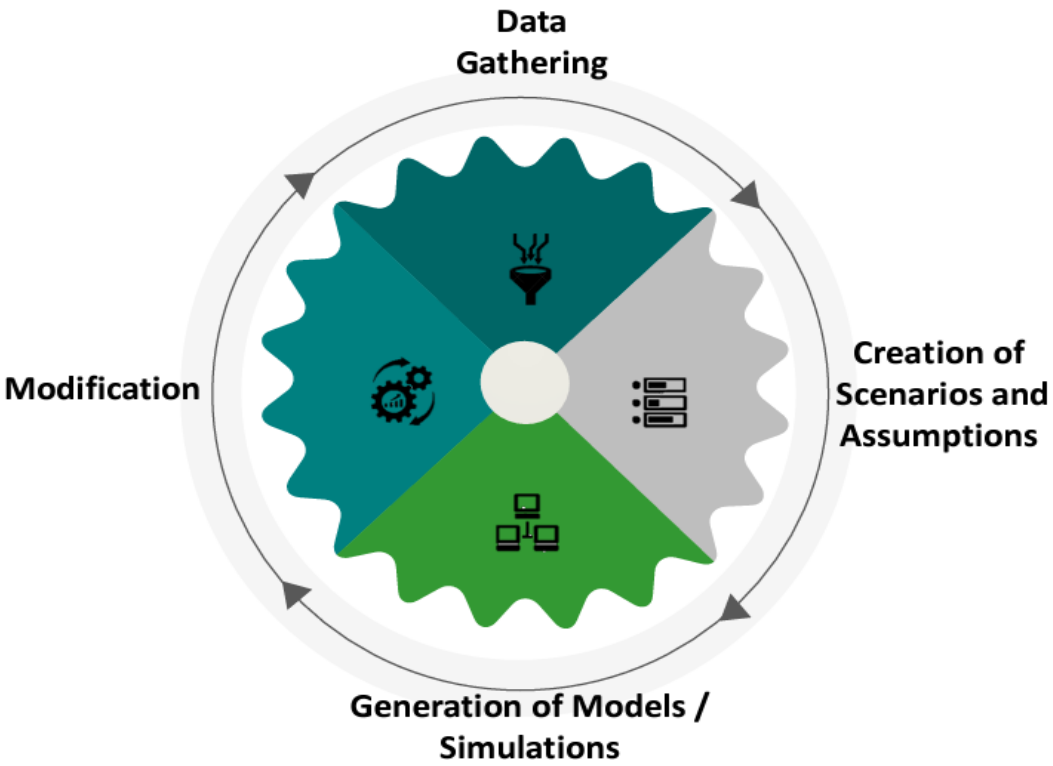


Figure 14. Generation of Models/Simulation

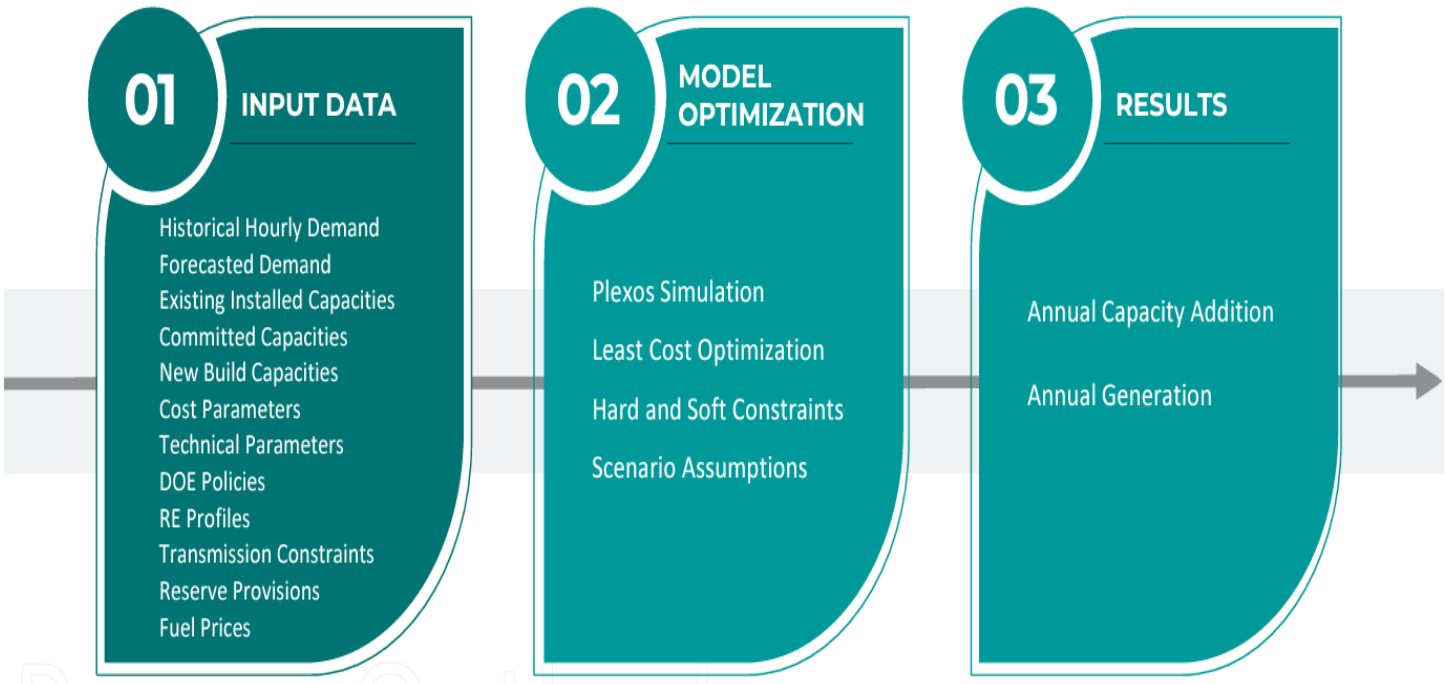


Figure 15. Modeling Structure

2. Data Inputs

2.1 Data and Assumption

The power demand and supply outlook up to 2050 were formulated using the following data, assumptions, and limitations:

Table 24. Data and Assumptions for the Power Supply Outlook

Particulars	Inputs
Electricity Demand	• 2022 Hourly Demand* • 2023 to 2050 Demand Forecast
Generator Parameters	• List of Existing Power Plants and Committed Power Projects as of April 2023 • WESM Registered Capacities as of May 2023 • Operating parameters of existing power plants based on submission of Generation Companies • Reserve provision classified as Regulating, Contingency, and Dispatchable Reserves • Fuel Costs (Coal, Gas, Oil, and Uranium)
New Build Options	• Gas, Biomass, WTE, Geothermal, Ground-mounted Solar, Roof mounted Solar, Floating Solar, On and Offshore Wind, ROR, Impounding Hydro, Pumped Hydro, Battery Energy Storage System (BESS), and Nuclear Technology • Other costs are based on the 2022 NREL database** • CREZ potential*** and Awarded Service Contracts as of April 2023 are set as limits for RE
Limitations	• Used 3 major nodes for analysis: Luzon, Visayas, and Mindanao • RE Targets set to 35% by 2030 and 50% by 2040 • Interconnection used were Leyte to Luzon HVDC and Mindanao-Visayas Interconnection Project (MVIP)

Note:

** - Data from NGCP*
*** - Data from the National Renewable Energy Laboratory (NREL)*
**** - Data from Grid Planning and Competitive RE Zones (CREZ) in the Philippines Report* [27]

The electricity sales forecast is estimated using macroeconomic models as it is found to be highly correlated with income and population. Gross domestic product, sectoral value added, and Household expenditures are used as proxy data for income. Socio-economic variables vis-à-vis assumptions and their corresponding data sources used in projecting electricity sales are listed in Table 25.

Table 25. Assumptions used in the Electricity Sales Forecast

Variables	Assumption	Source/Remarks
Real GDP (2018=100)	2022 (actual): 7.6%	NEDA-DBCC interval 2023-2028 (December 2022);

[27] Grid Planning and Competitive RE Zones in the Philippines Report
Retrieved through https://www.doe.gov.ph/renewable-energy/ready-renewables-grid-planning-and-competitive-renewable-energy-zones-crez

Variables	Assumption	Source/Remarks
	2023: 6% - 7%	2029 to 2050: adopted the trend of GDP projections from HSBC
	2024-2028: 6.5% - 8%	
	2040: 7.1%, 2050: 6.3%	
Population	2020-2030: 1.1%	2020 POPCEN actual
	2030-2040: 0.9%	10-year adjusted growth rates based on 2020 POPCEN
	2040-2050: 0.8%	
FOREX	Php52 per US$ until 2050	NEDA-DBCC (December 2022)
Crude Price (US$/barrel)	US$70-90 for 2023-2050	NEDA-DBCC (December 2022)
		OPEC, WB
Inflation	2%-4% [3% as midpoint] until 2050	NEDA-DBCC (December 2022)
Household Electrification Rate	100% by 2028	
Electric Vehicles	CREVI for CES: 50% EV fleet share by 2040	

Projections by grid (Luzon, Visayas, and Mindanao) are derived through a bottom-up approach, employing disaggregation by sectors (i.e., household, services/commercial, industrial, and other sectors). The sectoral electricity demand by grid follows a specific methodology:

- **Household (HH) electricity sales.** Estimations are made by regressing historical demand against the number of households and household expenditure in each major region.
- **Services/Commercial electricity sales.** Projections are based on its historical sales by grid, population by grid, and gross value added (GVA) the sector.
- **Industry electricity sales**. Projections for industrial electricity sales are determined through regressing its grid historical data with GVA for manufacturing, construction, and mining.
- **Other sector's electricity sales**. Establishment of the relationship between the gross regional domestic product (GDP) by the main region and grid historical data for electricity consumption in other sectors.

To enhance the accuracy of demand forecasting, the projections also incorporate the potential impact of a 50% penetration of electric vehicles (EV) by the year 2040.

2.2 Electricity Sales Forecast

The forecast for electricity sales across the three main grids spanning 2021-2050 is outlined in Table 27 under the Reference Scenario (Ref) and Clean Energy Scenario (CES). This projection considers various future factors, including the impacts of distributed photovoltaics (PV), the adoption of electric vehicles (EV), the implementation of demand-side management programs, and improvements in energy efficiency. The electricity sales forecast indicates an annual average growth rate (AAGR) of 5.4% for aggregate electricity sales in the country from 2022 to 2050 under the CES.

This growth trajectory of electricity sales under CES is anticipated to increase from 91,333 GWh in 2022 to 403,465 GWh in 2050. The Luzon Grid is expected to maintain the majority share, accounting for over 72.5% of the total, with the remaining portions contributed by the Visayas (15.9%) and Mindanao grids (14.0%) by the year 2050.

Table 26. Electricity Sales Forecast (2021-2050), in GWh

Year	Reference Scenario				Clean Energy Scenario			
	Philippines	Luzon	Visayas	Mindanao	Philippines	Luzon	Visayas	Mindanao
2021	**87,417**	64,420	11,555	11,442	**87,417**	64,420	11,555	11,442
2022	**91,333**	67,536	11,866	11,931	**91,333**	67,536	11,866	11,931
2023	**96,075**	70,952	12,537	12,586	**96,040**	70,903	12,537	12,600
2024	**100,155**	73,780	13,127	13,249	**100,182**	73,745	13,141	13,296
2025	**105,220**	77,286	13,896	14,038	**105,345**	77,291	13,931	14,124
2026	**111,109**	81,377	14,832	14,900	**111,366**	81,428	14,893	15,045
2027	**117,653**	85,927	15,900	15,826	**118,041**	86,025	15,988	16,028
2028	**124,797**	90,901	17,085	16,811	**125,302**	91,024	17,199	17,078
2029	**132,399**	96,183	18,358	17,858	**132,973**	96,293	18,491	18,188
2030	**140,459**	101,777	19,710	18,973	**141,039**	101,825	19,853	19,361
2031	**149,027**	107,735	21,148	20,145	**149,485**	107,650	21,280	20,555
2032	**158,062**	114,024	22,664	21,375	**158,332**	113,756	22,775	21,801
2033	**167,588**	120,660	24,259	22,670	**167,637**	120,174	24,346	23,117
2034	**177,624**	127,655	25,934	24,036	**177,417**	126,922	25,992	24,503
2035	**188,188**	135,023	27,689	25,476	**187,694**	134,016	27,714	25,964
2036	**199,260**	142,766	29,526	26,968	**198,439**	141,449	29,512	27,478
2037	**210,870**	150,901	31,445	28,524	**209,678**	149,236	31,388	29,054
2038	**223,045**	159,444	33,450	30,150	**221,505**	157,436	33,354	30,714
2039	**235,809**	168,407	35,544	31,857	**233,863**	166,011	35,402	32,450
2040	**249,186**	177,810	37,729	33,647	**246,816**	175,005	37,539	34,272
2041	**262,514**	187,196	39,908	35,411	**260,044**	184,269	39,712	36,064
2042	**276,378**	196,978	42,166	37,234	**273,781**	193,913	41,960	37,909
2043	**290,798**	207,169	44,506	39,123	**288,048**	203,944	44,286	39,818
2044	**305,794**	217,779	46,929	41,086	**302,863**	214,374	46,692	41,797
2045	**321,381**	228,817	49,436	43,127	**318,241**	225,211	49,178	43,852
2046	**337,524**	240,280	52,027	45,218	**334,150**	236,450	51,745	45,954
2047	**354,247**	252,176	54,703	47,367	**350,610**	248,103	54,394	48,113
2048	**371,567**	264,516	57,467	49,583	**367,640**	260,177	57,127	50,336
2049	**389,499**	277,307	60,319	51,873	**385,254**	272,680	59,944	52,630
2050	**408,057**	290,557	63,260	54,240	**403,465**	285,619	62,847	54,999

2.3 Peak Demand Forecast

The determination of peak demand involves considering the average load factors of the grids spanning 2016 to 2022 (Table 27) with 70.2% for the Luzon grid, 70.2%, and 68.7% for the Visayas and Mindanao grids, respectively.

The total peak demand for the country will significantly increase from 16,596 MW (2022) to 68,483 MW (2050), which corresponds to an annual average growth rate of 5.2%. Notably, the Luzon grid constitutes the predominant share at 73.0% at the base year (2022) and is seen to marginally decline by three percentage points (or 70.1%) by 2050. The decrease is attributed to the accelerated growth observed in the Visayas and Mindanao grids over the same period. Luzon grid's annual average growth rate is recorded at 5.0%, while Visayas and Mindanao are at 5.6% and 5.5%, respectively.

Table 27. Load Factors Assumptions

Grid	Load Factor[28] (%)
Luzon	70.2
Visayas	70.2
Mindanao	68.7

Table 28. Peak Demand Forecast (2021-2050) in MW

Year	Luzon	Visayas	Mindanao	Philippines
2021*	**11,640**	**2,252**	**2,144**	**16,036**
2022*	**12,113**	**2,316**	**2,167**	**16,596**
2023	12,559	2,464	2,315	17,338
2024	13,092	2,538	2,425	18,056
2025	13,728	2,687	2,588	19,003
2026	14,466	2,864	2,766	20,097
2027	15,274	3,063	2,954	21,291
2028	16,149	3,280	3,153	22,582
2029	17,070	3,511	3,363	23,944
2030	18,038	3,753	3,585	25,376
2031	18,985	3,990	3,790	26,765
2032	19,982	4,238	4,004	28,224
2033	21,031	4,496	4,229	29,757
2034	22,134	4,766	4,467	31,367
2035	23,293	5,047	4,717	33,056
2036	24,506	5,340	4,975	34,821
2037	25,778	5,643	5,245	36,666
2038	27,116	5,961	5,529	38,606
2039	28,516	6,291	5,827	40,634
2040	29,984	6,634	6,140	42,759
2041	31,496	6,985	6,455	44,936
2042	33,069	7,347	6,780	47,196
2043	34,705	7,720	7,117	49,542

[28] Six-Year Average Load Factors for Luzon, Visayas, and Mindanao Grids from 2016 to 2022

Year	Luzon	Visayas	Mindanao	Philippines
2044	36,405	8,106	7,466	51,977
2045	38,172	8,503	7,828	54,503
2046	40,003	8,913	8,198	57,115
2047	41,902	9,335	8,579	59,816
2048	43,869	9,770	8,970	62,609
2049	45,906	10,218	9,374	65,497
2050	48,014	10,678	9,791	68,483

*Actual Values

2.4 Generator Parameters

The CEM was built on a per-power plant basis using the DOE List of Existing Power Plants, which includes grid-connected and embedded generating facilities. The registered P_{max} capacities from WESM were employed to represent the maximum dispatchable capacities of all generating units, including new and derated capacities. For conventional or non-renewable plants, the modeling process relied on technical and operating parameters submitted to the DOE (e.g., heat rates, maintenance and forced outage rates, monthly generation). In contrast, RE plants were modeled with a monthly and hourly profiling basis/approach. Hydro, Geothermal, and Biomass plants were monthly profiled using available data submissions to the DOE. Solar and Wind plants were profiled hourly using weather data[29]. To streamline the process, all solar and wind plants were clustered into regional locations for profiling purposes.

2.5 Capacity Additions

The capacity additions for the CEM are structured into two distinct categories: 1) committed power projects, as shown in Table 29, and 2) new build capacities, as determined by the PLEXOS® as the modeling tool. This process incorporates considerations for emerging technologies, specifically nuclear technology, offshore wind, and energy storage systems. Notably, the new build options exclude any assumptions for coal plants, aligning with the DOE coal moratorium advisory. The 2022 annual technology baseline database of the National Renewable Energy Laboratory[30] (NREL) is adopted for the cost parameters of the new builds. These include fuel costs, build costs, variable, and fixed costs, among others. The DOE-awarded RE service contracts and the potential of the competitive RE-zones projects[31] are set as limits for maximum build capacity per technology in the CEM.

[29] Weather Data through Renewables Ninja
Retrieved through https://www.renewables.ninja/
[30] National Renewable Energy Laboratory Baseline Database
Retrieved through https://atb.nrel.gov/electricity/2022/technologies
[31] Ready for Renewables - Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines
Retrieved through https://www.doe.gov.ph/renewable-energy/ready-renewables-grid-planning-and-competitive-renewable-energy-zones-crez

Table 29. DOE's List of Committed and GEAP Awarded Power Projects as of 30 April 2023

Power Plant	Installed Capacity	Target Commercial Operation
Luzon		
Coal	**1,900.00**	
Mariveles Coal-Fired Power Plant Phase I	600.00	Unit 1 – Aug 2023 Unit 2 – Nov 2023 Unit 3 – Jan 2024 Unit 4 – May 2024
Mariveles Coal-Fired Power Plant Phase II	600.00	Unit 5 – Dec 2025 Unit 6 – Mar 2026 Unit 7 – Jun 2026 Unit 8 – Sep 2026
Masinloc Power Plant	700.00	Unit 4 – Jun 2025 Unit 5 – Dec 2025
Natural Gas	**2,412.50**	
Batangas Combined Cycle Power Plant - Phase 1	1,312.50	Unit 1&2 – Sep 2024 Unit 3 – Dec 2024
Natural Gas-Fired Power Plant	1,100.00	Jan 2027
Biomass	**8.60**	
2.4 MW Biogas Power Plant Project	2.40	Aug 2023
1.2 MW Biogas Power Plant Project	1.20	Jan 2024
Isabela Rice husk-Fired Biomass Power Plant Project	5.00	Aug 2023
Geothermal	**411.00**	
Palayan Binary Power Plant	29.00	Jun 2023
Tanawon Geothermal Project	20.00	Dec 2024
Tiwi Binary Geothermal Project	17.00	Dec 2023
Maibarara 3 Geothermal Power Project	20.00	Dec 2025
Bacman 4 Botong - Rangas Geothermal Project	20.00	Dec 2026
Kayabon Geothermal Project	30.00	Dec 2026
Kalinga Geothermal Power Project - Phase 1	40.00	Dec 2030
Kalinga Geothermal Power Project - Phase 2	40.00	Dec 2032
Kalinga Geothermal Power Project - Phase 3	40.00	Dec 2034
Mt. Malinao Geothermal Project	50.00	Dec 2025
Labo Geothermal Power Project	105.00	Dec 2027
Hydro	**146.87**	
Biyao Hydroelectric Power Plant	0.80	Dec 2023
Colasi Hydroelectric Power Plant	4.00	Jul 2023
Matuno Hydroelectric Power Plant	8.66	Jun 2023
Laguio (Laginbayan) Malaki 1 Hydroelectric Power Plant	1.60	Aug 2023
Mariveles Hydroelectric Power Project	0.60	Aug 2023
Ibulao Hydroelectric Power Project	4.50	Jul 2023
Labayat River (Lower Cascade) Hydroelectric Power Project	1.40	Jun 2023
Lalawinan Hydroelectric Power Plant	3.00	Dec 2024
Tibag Hydroelectric Power Plant	5.00	Jun 2023
Rangas Hydroelectric Power Plant	2.40	Dec 2025
Dupinga Hydroelectric Power Project	4.80	Jul 2023
Kapangan Hydroelectric Power Project	60.00	Dec 2025
Tignoan River (Upper Cascade) Hydroelectric Power Plant	1.50	Dec 2025
Daet Hydroelectric Power Project	5.00	Dec 2025
Tubao Hydroelectric Power Plant	1.50	Dec 2025
Sablan 1 Hydroelectric Power Project	20.00	Nov 2025
Asin-Hungduan Hydroelectric Power Project	9.80	Jun 2024
Ibulao 1 Hydroelectric Power Project	7.60	Jun 2024
Likud 2 Hydroelectric Power Project	0.56	Dec 2024
Dipalo Hydroelectric Power Project	4.15	Dec 2025

Power Plant	Installed Capacity	Target Commercial Operation
Solar	**2,095.21**	
Bulacan 2 Solar Power Project	17.60	Dec 2024
Concepcion 1 Solar Power Project (Phase 3)	12.00	Jun 2023
Concepcion 1 Solar Power Project (Phase 4)	30.00	Aug 2023
Ilocos Norte Solar Power Project	87.59	Feb 2023
Cayanga-Bugallon Solar Power Project	74.80	Aug 2023
PAVI Green Naga Solar Power Plant Project	40.40	Dec 2024
Talugtug Solar Power Project	99.98	Mar 2025
Concepcion Tarlac 2 Solar Power Project	200.00	Dec 2025
Santa Rosa Nueva Ecija 2 Solar Power Project	280.00	Dec 2025
Tayabas Solar Power Project	450.00	Dec 2025
Arayat-Mexico Solar Power Plant Project Phase 2	30.93	Mar 2023
Pinugay Solar Power Project	67.50	Mar 2023
Raslag III Solar PV Power Project	13.60	Mar 2023
Currimao Solar Power Project	48.12	Jun 2023
Lal-lo Hybrid Solar Power Project	82.45	Sep 2023
Sapang Balen Solar 2 Power Project (Phase I)	92.80	Dec 2024
Sapang Balen Solar 2 Power Project (Phase 2)	92.80	Jun 2025
Sapang Balen Solar 2 Power Project (Phase 3)	92.80	Dec 2025
Sapang Balen Solar 1 Power Project	96.24	Dec 2025
Sapang Balen Solar 2 Power Project (Phase 4)	92.80	Jun 2026
Sapang Balen Solar 2 Power Project (Phase 5)	92.80	Dec 2026
Wind	**260.00**	
Caparispisan II Wind Power Project	70.00	Dec 2025
Calatagan Wind Power Project	30.00	Dec 2025
Balaoi and Caunayan Wind Power Project	160.00	Dec 2025
Battery Energy Storage System	**1,504.00**	
Lamao Battery Energy Storage System	20.00	Jul 2023
Lamao Phase 2 Battery Energy Storage System	30.00	Jul 2023
BCCP Battery Energy Storage System	40.00	Jul 2023
San Manuel Battery Energy Storage System	20.00	Jul 2023
San Manuel Battery Energy Storage System Phase 2	30.00	Jul 2023
Gamu Battery Energy Storage System	20.00	Jul 2023
Gamu Battery Energy Storage System Phase 2	20.00	Jul 2023
Magapit Battery Energy Storage System	20.00	Jul 2023
Magapit Battery Energy Storage System Phase 2	20.00	Jul 2023
Concepcion Battery Energy Storage System	20.00	Jul 2023
Concepcion Battery Energy Storage System Phase 2	30.00	Jul 2023
Lumban Battery Energy Storage System	40.00	Jul 2023
Lumban Battery Energy Storage System Phase 2	20.00	Jul 2023
Mexico Battery Energy Storage System	50.00	Aug 2023
Mexico Battery Energy Storage System Phase 2	20.00	Aug 2023
Mahabang Parang Battery Energy Storage System	40.00	Dec 2023
Daraga Battery Energy Storage System	40.00	Jan 2024
Bauang Battery Energy Storage Project	40.00	Sep 2023
Labrador Battery Energy Storage System	40.00	Sep 2023
San Rafael Battery Energy Storage System	20.00	Sep 2023
Cabanatuan Battery Energy Storage	40.00	Sep 2023
Hermosa Battery Energy Storage System	40.00	Sep 2023
Laoag Battery Energy Storage System Project	40.00	Sep 2023
Navotas Battery Energy Storage System Project	40.00	Sep 2023
Mexico SJM Battery Energy Storage System	20.00	Sep 2023
Pagbilao Battery Energy Storage System	40.00	Sep 2024
Bacnotan Battery Energy Storage System	40.00	Sep 2024
Subic Battery Energy Storage System	40.00	Sep 2024
San Jose del Monte Battery Energy Storage System	40.00	Sep 2024
Bolo Battery Energy Storage System	40.00	Sep 2024

Power Plant	Installed Capacity	Target Commercial Operation
Tuguegarao Battery Energy Storage System	40.00	Sep 2024
Bayombong Battery Energy Storage System	40.00	Sep 2024
Calamba Battery Energy Storage System	40.00	Sep 2024
Labo Battery Energy Storage System	40.00	Sep 2024
Naga Battery Energy Storage System	40.00	Sep 2024
San Rafael Battery Energy Storage Phase 2	20.00	May 2025
Sual Battery Energy Storage System	60.00	May 2025
Urdaneta Battery Energy Storage System	40.00	May 2025
Dasmarinas Battery Energy Storage System	40.00	May 2025
Ilijan Battery Energy Storage System	40.00	May 2025
Gumaca Battery Energy Storage System	40.00	May 2025
La Trinidad Battery Energy Storage System	40.00	May 2025
BCCP Limay Battery Energy Storage System Project Phase 2	20.00	May 2025
Angat Battery Energy Storage System Project	20.00	May 2025
Visayas		
Coal	**135.00**	
Palm Concepcion Coal-fired Power Plant	135.00	Jun 2026
Diesel	**19.67**	
11.174 MW Calbayog Bunker C-Fired Diesel Power Plant	11.17	Jul 2023
Sulzer Diesel Power Plant	5.50	Sep 2024
Caterpillar Diesel Power Plant	2.00	Sep 2024
Cummins Diesel Power Plant	1.00	Sep 2024
Biomass	**14.00**	
6 MW Biomass Power Plant Project	6.00	Dec 2023
Central Azucarera de San Antonio	8.00	Dec 2023
Geothermal	**131.60**	
Biliran Geothermal Plant Project Unit 1	2.00	Dec 2023
Biliran Geothermal Plant Project Unit 2	6.00	Sep 2024
Biliran Geothermal Plant Project Unit 3	10.00	Dec 2025
Biliran Geothermal Plant Project Unit 4	10.00	Dec 2026
Biliran Geothermal Plant Project Unit 5	22.00	Dec 2027
Northern Negros Geothermal Project	5.60	Sep 2024
Mahanagdong Geothermal Brine Optimization Plant	36.00	Dec 2024
Dauin Geothermal Project	40.00	Dec 2025
Hydro	**23.10**	
Igbulo (Bais) Hydroelectric Power Project	5.10	Dec-2023
Tmbaban Hydroelectric Power Project	18.00	Aug-2023
Solar	**300.00**	
Kananga-Ormoc Solar Power Project	300.00	Dec 2025
Wind	**13.20**	
13.2MW Nabas-2 Wind Power Project	13.20	May 2025
Battery Energy Storage System	**300.00**	
Toledo Battery Energy Storage System	20.00	Jul 2023
Ubay Battery Energy Storage System	20.00	Jul 2023
Ormoc Battery Energy Storage System	20.00	Jul 2023
Ormoc Battery Energy Storage System Phase 2	20.00	Jul 2023
Tabango Battery Energy Storage System	20.00	Jul 2023
Dingle Battery Energy Storage System	20.00	Dec 2023
Samboan Battery Energy Storage System	20.00	Sep 2023
Compostela Battery Energy Storage System	20.00	Sep 2023
Nabas Battery Energy Storage System	20.00	Sep 2024
Calbayog Battery Energy Storage System	20.00	Sep 2024
Tabango Battery Energy Storage System Phase 2	20.00	May 2025
Toledo Battery Energy Storage System Phase 2	20.00	May 2025

Power Plant	Installed Capacity	Target Commercial Operation
San Carlos Battery Energy Storage System	20.00	May 2025
Mactan Battery Energy Storage System	20.00	May 2025
Ubay Battery Energy Storage System Phase 2	20.00	May 2025
Mindanao		
Coal	**270.00**	
Misamis Oriental 2 x 135 MW Circulating Fluidized Bed Coal-Fired Thermal Power Plant	270.00	Mar 2027
Biomass	**19.40**	
10 MW Biomass Cogeneration Plant	3.40	Nov 2023
10 MW Biomass Cogeneration Plant	10.00	Dec 2023
6 MW Biomass Power Plant Project	6.00	Sep 2023
Hydro	**72.42**	
Sipangpang Hydroelectric Power Plant	1.80	May 2023
Maramag Hydroelectric Power Project	2.04	Jun 2023
Liangan Hydropower Project	18.00	Aug 2023
Siguil Hydroelectric Power Project	14.50	Jun 2023
Tagpangi Hydroelectric Power Project	1.70	Dec 2023
Osmeña Hydroelectric Power Project	1.00	Dec 2023
Gakaon Hydroelectric Power Project	2.23	Dec 2024
Maladugao (Upper Cascade) Hydroelectric Power Project	8.40	Jan 2025
Titunod Hydroelectric Power Project	3.60	Dec 2024
Malitbog Hydroelectric Power Project	3.70	Nov 2025
Silo-O Hydroelectric Power Project	3.70	Nov 2025
Mat-I 1 Hydroelectric Power Project	4.85	Nov 2025
Clarin Hydroelectric Power Project	6.90	Nov 2025
Solar	**120.00**	
General Santos Solar Power Project	120.00	Dec 2025
Battery Energy Storage System	**280.00**	
Pitogo Battery Energy Storage System	60.00	Dec 2023
Sangali Battery Energy Storage System	20.00	Nov 2023
Maco Battery Energy Storage System	20.00	Jul 2023
Villanueva Battery Energy Storage System	20.00	Jul 2023
Jasaan Battery Energy Storage System	20.00	Jul 2023
Tagum Battery Energy Storage System	20.00	Jul 2023
Aurora Battery Energy Storage System	20.00	2023
Tagoloan Battery Energy Storage System Phase 2	20.00	May 2025
Placer Battery Energy Storage System	20.00	May 2025
Maramag Battery Energy Storage System	20.00	May 2025
General Santos Battery Energy Storage System	20.00	May 2025
Malita Battery Energy Storage System	20.00	Jul 2023

Source: List of Private Sector-Initiated Power Projects as of April 2023

3. CEM Simulation

3.1 CEM Settings

The CEM finds the long-term (LT) least-cost solution for a given horizon based on costs and constraint assumptions stated above. The objective function of this LT Plan seeks to minimize the net present value of build costs, fixed and variable operations and maintenance costs, and production costs. The running horizon is set from the year 2022 to 2050 with an hourly granularity or one-hour interval during the run, allowing the model to capture the variability of RE plants. The

year 2022 was set as the base year for the technical parameters of existing power plants and committed power projects.

3.2 Reserves

To provide sufficient supply to the demand needs, the CEM also integrates the current reserve or ancillary services requirements in the assumption. These include : 1) regulating reserve, which is equivalent to four (4) percent of the peak demand per grid, 2) contingency reserve, which corresponds to the capacity of the largest running generating unit per grid, and 3) dispatchable reserve, which corresponds to the second largest running generating unit per grid. Given the high targets of RE, the provision of reserves is vital to find a Long Term (LT) supply solution to sufficiently meet the forecasted demand in any region. Since the CEM is a per-plant model, the ancillary service agreement procurement plan submitted to the DOE by the NGCP was reflected in these reserve provisions.

3.3 Nodal Assumptions

The iterative analysis made in the CEM is nodal. To reduce the running time in PLEXOS® and to simplify the process, only the three (3) on-grid major island groups of the Philippines were considered as nodes in the CEM on a single-bus approach, namely: Luzon, Visayas, and Mindanao grids. The demand and supply from off-grid areas were excluded in this simulation. To connect the three nodes, the existing 440 MW HVDC line between Luzon and Leyte and the 450 MW HVDC line project between Zamboanga and Cebu or the Mindanao-Visayas Interconnection Project (MVIP) were considered. The MVIP is expected to be online in full load starting in 2024.

The planned expansion of the NGCP for the existing transmission line of Luzon-Leyte HVDC, with an additional capacity of 440 MW starting 2026, and the MVIP with an additional capacity of 450 MW starting 2041, were also considered in the model as shown in Figure 16.

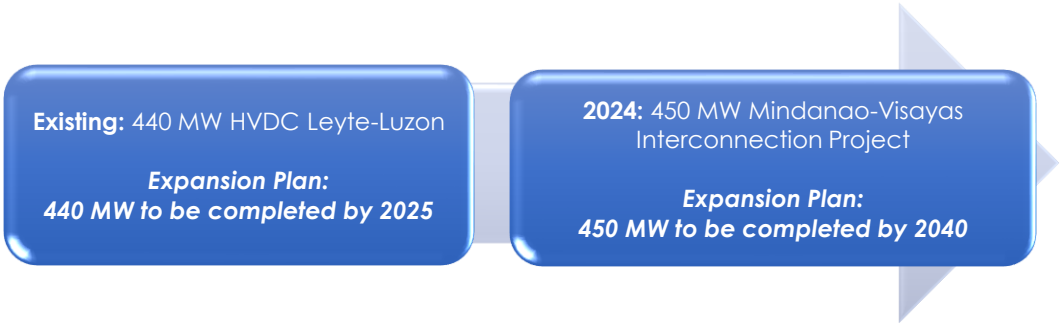


Figure 16. Existing Island Interconnections and Transmission Line Interconnection Projects

4. Power Demand and Supply Outlook

4.1 Scenarios

The DOE has simulated the scenario assumptions, outlining the future generation capacity expansion plan to ensure a reliable, cost-effective, and sustainable power supply in the country.

1. **Reference Scenario**. This scenario aligns with the National Renewable Energy (RE) power generation mix target of 35% by 2030 and 50% by 2040 up to 2050. It serves as a baseline for evaluating the progression of the country's energy landscape.
2. **Clean Energy Scenario 1 (CES 1)**. This scenario incorporates a combination of more than 50% RE share by 2050, Low Offshore Wind (19GW by 2050), Nuclear Technology of 1,200 MW by 2032, 2,400 MW by 2035 and 4,800 MW by 2050, and Coal Repurposing.
3. **Clean Energy Scenario 2 (CES 2)**. This scenario incorporates a combination of more than 50% RE share by 2050, High Offshore Wind (50GW by 2050), Nuclear Technology (same assumption as CES 1), and Coal Repurposing.

Both CES 1 and 2 entail the repurposing of existing coal-fired power plants. The DOE is presently engaged in discussions regarding offers and financing mechanisms from multi-lateral development partners on this undertaking and will be conducting forums to inform concerned stakeholders about the outcomes and ways forward. The DOE has also yet to run scenarios involving new emerging technologies such as hydrogen and ammonia co-firing power plants, and ocean thermal technologies. These emerging technologies are recognized as potential alternatives for cleaner energy sources and are earmarked for inclusion in future energy planning. Lastly, future simulations may also include a saturation study on RE technologies as part of the enhancement of the CEM.

4.2 Results

The model effectively provided insights into the technological mix required for the generation sector to align with the projected load envisioned in the CEM. The findings indicate that all scenarios successfully meet the targets set by NREP 2020-2040, aiming for 35% and 50% power generation mix by 2030 and 2040, respectively.

To attain the objectives, the Philippines' existing supply capacity must increase **five times** by 2050 under the reference scenario and CES 1, and **six times** under CES 2. This ambitious scale-up is essential for accommodating the anticipated growth in power demand and facilitating the transition towards a more sustainable and cleaner energy mix.

To further support the increased integration of variable renewable energy in both CES 1 and CES 2, particularly the growing impact of offshore wind technology (19 GW and 50 GW), the simulation has incorporated a flexible generation capacity of about 12 to 15 percent of the total, coming from natural gas technology. Additionally, around 20,000 MW (combination of 1H, 2H and 4H duration) of battery energy storage system were also included. These measures

aim to provide a responsive power system in terms of grid stability and intermittency of VREs not only during peak and low demand periods but also act as ancillary service in the event of significant unplanned outages of VRE sources, specifically with the targets of 19 GW and 50 GW of OSW and during other various operating conditions.

A more detailed breakdown of the results, specifically pertaining to the main island grids of the Philippines, is expounded upon in this section. For a comprehensive overview of the CEM simulations covering the entirety of the Philippines and individual major island grids including comparison of all scenarios and data assumptions, readers are encouraged to scan the provided QR code for access to additional information.

For full information of the Data Assumptions and Simulation Results of the CEM for the Reference Scenario, CES1, and CES 2, kindly scan this QR code.

Alternate link: **http://tinyurl.com/PDP2023to2050**

a) Reference Scenario

(35% RE Generation by 2030 and 50% RE Generation by 2040)

i. Luzon Grid

The Luzon installed capacity requirements is needed to increase by about four times from **19,746 MW** in 2022 to **80,781 MW** in 2050 coming from the existing, committed, and new build capacities[32]. The required BESS to support grid stability should also increase from 72 MW to 2,438 MW by 2050 as depicted in Figure 17.

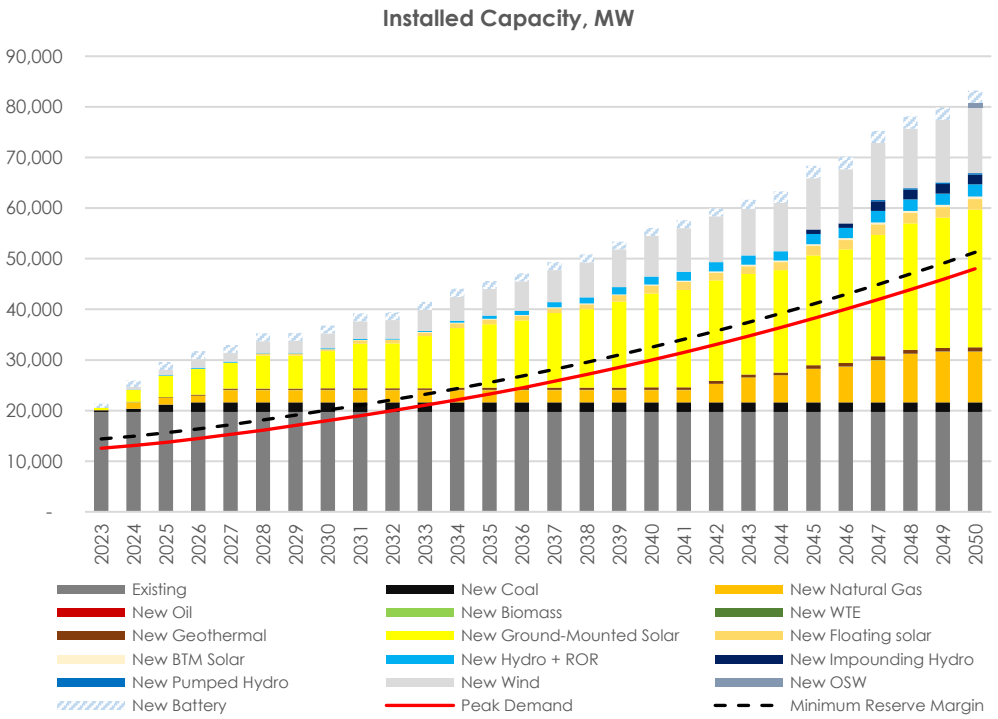


Figure 17. Reference - Luzon Power Demand and Supply Outlook

To meet Luzon's electricity demand of 48,014 MW by 2050 under the reference scenario, the simulation results have emphasized the need for **a new build RE capacity of 43,540 MW** on top of existing plants and committed projects. The RE capacity must increase eleven times from its current capacity of 4,910 MW. The proposed additions include 25,926 MW Solar, 12,644 MW Wind, 4,490 MW Hydro, 430 MW geothermal, and 50 MW biomass projects.

Recognizing the variability of RE sources, the simulation has resulted also in an additional 7,544 MW of natural gas plant facilities and BESS technology of 866 MW to provide support and stability in the power system (Table 30).

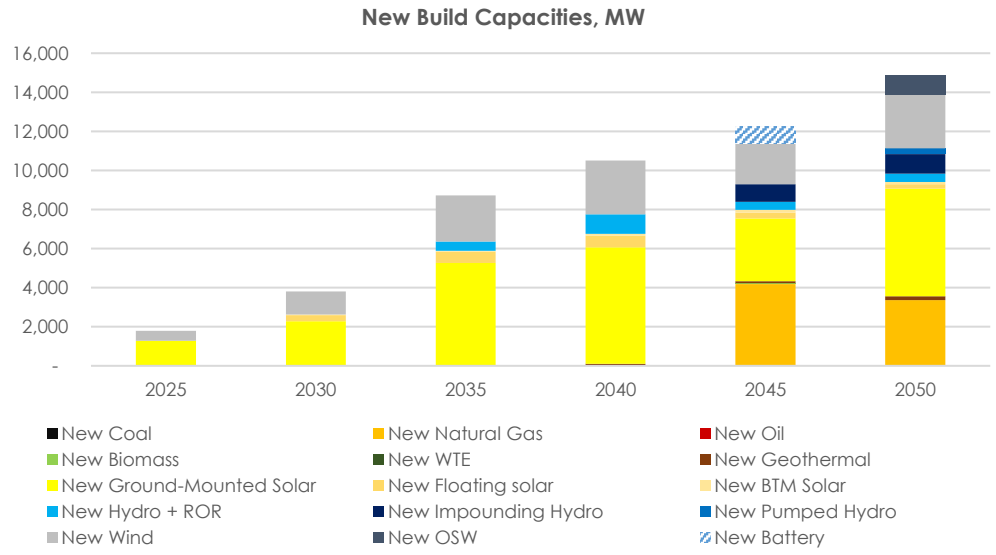
[32] New build capacities are defined as the additional generation capacity to be connected in a power system network to meet the electricity demand within a specified period.

Table 30. Reference - Luzon New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	**-**
New Natural Gas	-	-	-	-	4,180	3,364	**7,544**
New Oil	-	-	-	-	-	-	**-**
New Biomass	-	-	-	-	50	-	**50**
New WTE	-	-	-	-	-	-	**-**
New Geothermal	-	-	30	100	100	200	**430**
New Ground-Mounted Solar	1,276	2,289	5,234	5,964	3,211	5,495	**23,469**
New Floating solar	-	301	567	600	301	231	**2,000**
New BTM Solar	-	38	59	90	150	120	**457**
New Hydro + ROR	-	-	470	1,000	400	420	**2,290**
New Impounding Hydro	-	-	-	-	900	1,000	**1,900**
New Pumped Hydro	-	-	-	-	-	300	**300**
New Wind	510	1,172	2,360	2,750	2,102	2,750	**11,644**
New OSW	-	-	-	-	-	1,000	**1,000**
New Battery ESS	-	-	-	-	866	-	**866**

Note: Values presented herein are values of new build capacities every five-milestone year

Below is the structured breakdown which provides a clear reference for each technology's new build capacity and the respective milestone years of commercial operation.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 18. Reference - Luzon New Build Capacities per Technology

The new build capacities for this scenario resulted in a Luzon power generation mix with a diversified energy portfolio of natural gas plants share at 34% and RE at 47% by 2050. Meanwhile, the gross generation share of coal power plants is projected to be reduced at a significant rate from 59% to 19% by 2050, as depicted in Figure 19 and Table 31.

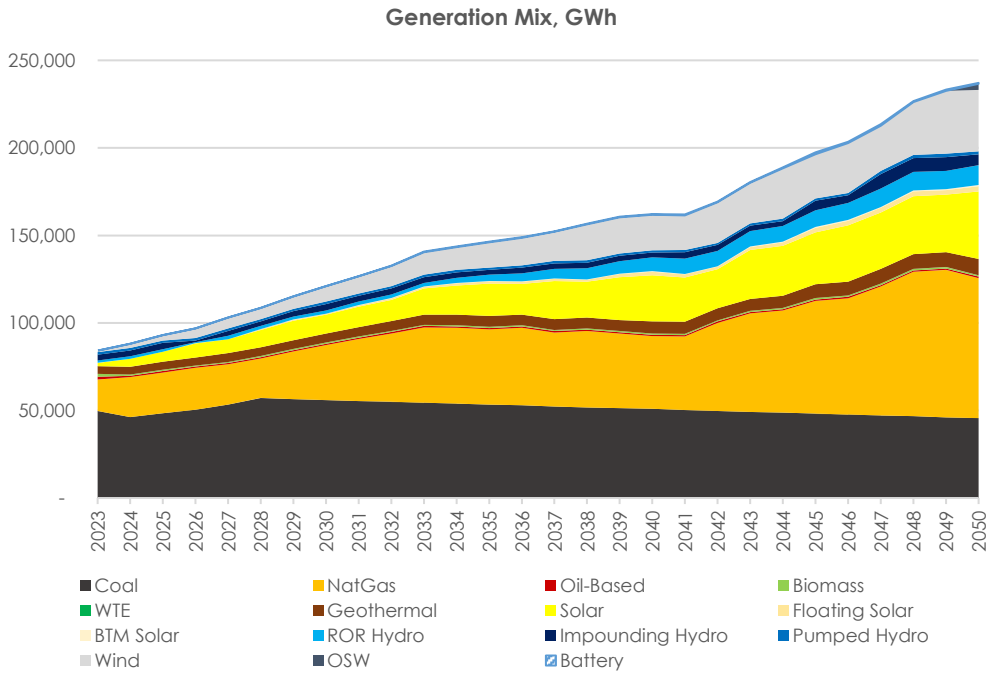


Figure 19. Reference - Luzon Power Generation Mix

Table 31. Reference - Luzon Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	49,643	48,368	55,936	53,358	50,918	48,200	45,622
Natural Gas	18,044	23,377	31,478	43,010	41,527	64,384	80,043
Oil-based	1,575	764	764	764	764	764	764
RE	**14,935**	**20,564**	**32,785**	**49,019**	**68,684**	**83,093**	**110,141**
Biomass	1,615	763	700	703	717	920	834
WTE	0	0	0	0	0	0	0
Geothermal	4,490	4,602	5,150	6,199	7,037	7,807	9,286
Ground-Mounted Solar	1,842	5,650	10,656	18,382	26,240	29,716	38,565
Floating Solar	0	0	530	1,380	2,115	2,569	2,996
BTM Solar	55	16	62	137	240	433	643
ROR Hydro	1,308	1,549	1,878	3,756	7,978	9,656	11,352
Impounding Hydro	3,275	3,543	3,630	2,626	2,662	5,343	6,217
Pumped Hydro	1,488	1,358	1,396	1,254	1,293	1,405	1,725
Wind	864	3,085	8,782	14,584	20,403	25,245	35,023
OSW	0	0	0	0	0	0	3,500
Total	**84,199**	**93,073**	**120,963**	**146,151**	**161,892**	**196,441**	**236,570**
BESS	0	18	24	317	329	958	577
Power Generation, in Percent (%) Share							
Coal	59	52	46	37	31	25	19
Natural Gas	21	25	26	29	26	33	34
Oil-based	2	1	1	1	0	0	0
RE	**18**	**22**	**27**	**34**	**42**	**42**	**47**
Biomass	2	1	1	0	0	0	0
WTE	-	-	-	-	-	-	-
Geothermal	5	5	4	4	4	4	4
Ground-Mounted Solar	2	6	9	13	16	15	16
Floating Solar	-	-	0	1	1	1	1

Plant Type	2023	2025	2030	2035	2040	2045	2050
BTM Solar	0	0	0	0	0	0	0
ROR Hydro	2	2	2	3	5	5	5
Impounding Hydro	4	4	3	2	2	3	3
Pumped Hydro	2	1	1	1	1	1	1
Wind	1	3	7	10	13	13	15
OSW	-	-	-	-	-	-	1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

ii. Visayas Grid

The Visayas installed capacity requirements is needed to increase by about twelve times from **3,971 MW** in 2022 to **47,450 MW** in 2050 coming from the existing, committed, and new build capacities cities. The required BESS to support grid stability should also increase from 35 MW to 969 MW by 2050 (Figure 20).

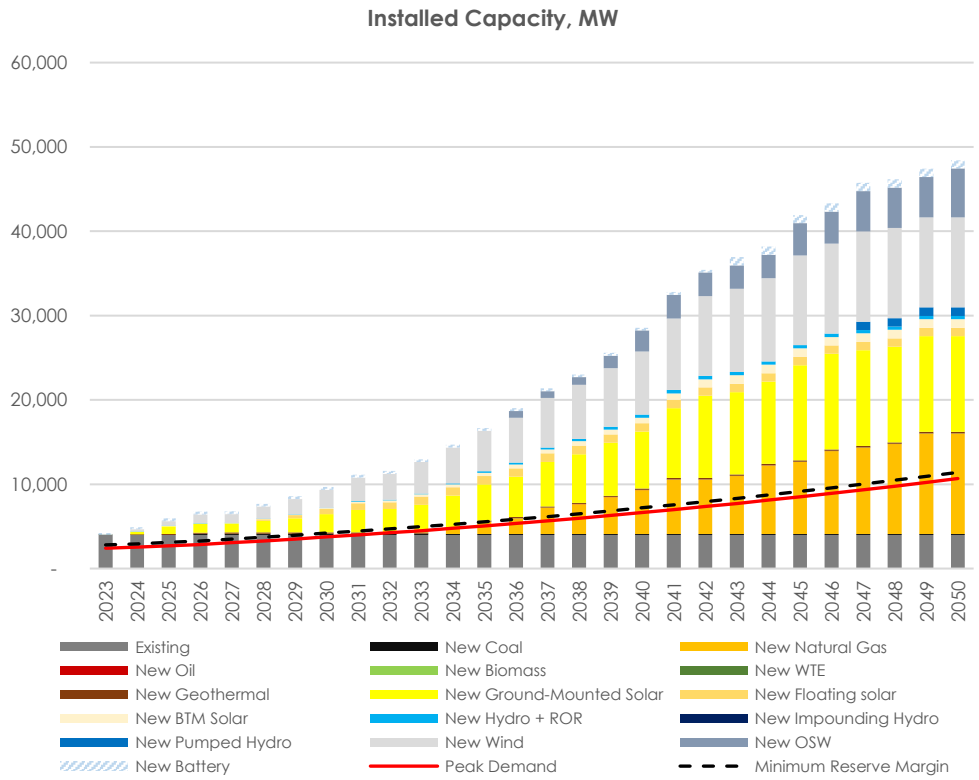


Figure 20. Reference - Visayas Power Demand and Supply Outlook

To meet Visayas' electricity demand of 10,678 MW by 2050 under the reference scenario, the simulation results have shown the need for a **new build RE capacity of 30,261 MW** on top of existing plants and committed projects. The RE capacity must increase seventeen times from its current capacity of 1,914 MW. The proposed additions include 12,876 MW Solar, 15,965 MW Wind, 1,380 MW Hydro, and 40 MW geothermal projects. The simulation has resulted also in an additional of 11,904 MW natural gas

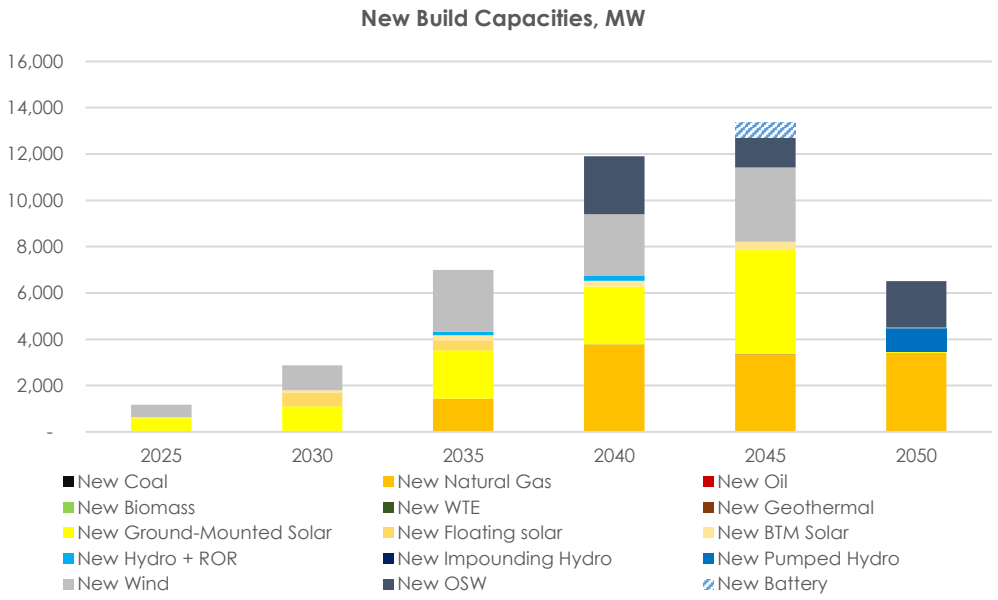
plant facilities and BESS technology of 634 MW to provide support and stability in the power system (Table 32).

Table 32. Reference - Visayas New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	**-**
New Natural Gas	-	-	1,434	3,762	3,344	3,364	**11,904**
New Oil	-	-	-	-	-	-	**-**
New Biomass	-	-	-	-	-	-	**-**
New WTE	-	-	-	-	-	-	**-**
New Geothermal	-	-	-	10	10	20	**40**
New Ground-Mounted Solar	599	1,100	2,097	2,500	4,501	79	**10,876**
New Floating solar	-	600	400	-	-	-	**1,000**
New BTM Solar	40	90	250	250	370	-	**1,000**
New Hydro + ROR	-	-	150	215	15	-	**380**
New Impounding Hydro	-	-	-	-	-	-	**-**
New Pumped Hydro	-	-	-	-	-	1,000	**1,000**
New Wind	532	1,088	1,664	2,665	3,174	42	**10,165**
New OSW	-	-	-	2,500	1,300	2,000	**5,800**
New Battery	-	-	-	-	634	-	**634**

Note: Values presented in this graph are per technology, per year of entry of new build capacities

Below is the breakdown showing each technology's new build capacity and the respective milestone years of commercial operation.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 21. Reference - Visayas New Build Capacities per Technology

The new build capacities added for this scenario resulted in Visayas power generation mix diversified energy portfolio with natural gas and RE plants both at 48% share. Coal plants were reduced at a significant rate from 44% to 4% by 2050, as depicted in Figure 22 and Table 33.

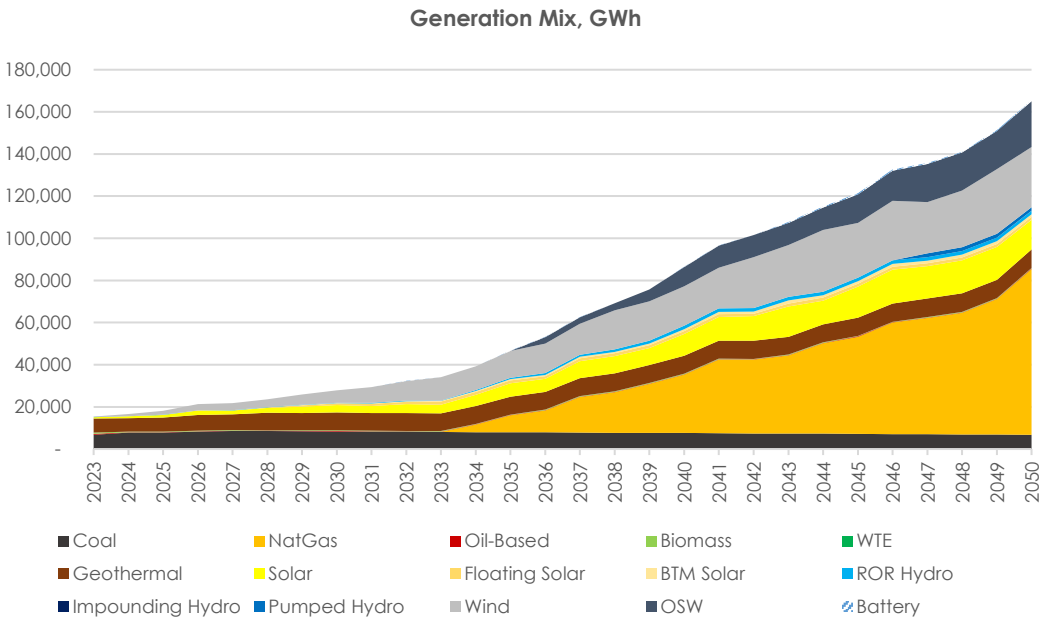


Figure 22. Reference - Visayas Power Generation Mix

Table 33. Reference - Visayas Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	6,723	7,800	8,330	7,946	7,583	7,178	6,794
Natural Gas	0	0	0	8,035	27,732	46,109	78,706
Oil-based	494	178	178	175	175	175	174
RE	**8,190**	**10,117**	**19,394**	**30,443**	**50,866**	**67,320**	**79,408**
Biomass	584	339	339	189	199	244	242
WTE	0	0	0	0	0	0	0
Geothermal	6,691	6,640	8,533	8,409	8,588	8,688	8,815
Ground-Mounted Solar	620	1,201	3,419	6,434	10,275	14,611	14,024
Floating Solar	0	0	818	1,440	1,439	1,382	1,433
BTM Solar	0	48	172	523	903	1,249	1,188
ROR Hydro	65	76	76	696	1,603	1,670	1,659
Impounding Hydro	0	0	0	0	0	0	0
Pumped Hydro	0	0	0	0	0	0	1,694
Wind	231	1,814	6,038	12,751	18,670	25,944	28,576
OSW	0	0	0	0	9,190	13,532	21,775
Total	**15,407**	**18,096**	**27,902**	**46,598**	**86,356**	**120,782**	**165,082**
BESS	0	5	21	68	76	600	405
Power Generation, in Percent (%) Share							
Coal	44	43	30	17	9	6	4
Natural Gas	-	-	-	17	32	38	48
Oil-based	3	1	1	0	0	0	0
RE	53	56	70	65	59	56	48
Biomass	4	2	1	0	0	0	0
WTE	-	-	-	-	-	-	-
Geothermal	43	37	31	18	10	7	5
Ground-Mounted Solar	4	7	12	14	12	12	8
Floating Solar	-	-	3	3	2	1	1

Plant Type	2023	2025	2030	2035	2040	2045	2050
BTM Solar	-	0	1	1	1	1	1
ROR Hydro	0	0	0	1	2	1	1
Impounding Hydro	-	-	-	-	-	-	-
Pumped Hydro	-	-	-	-	-	-	1
Wind	1	10	22	27	22	21	17
OSW	-	-	-	-	11	11	13
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

iii. Mindanao Grid

The Mindanao installed capacity requirements is needed to increase by about five times from **4,542 MW** in 2022 to **22,736 MW** in 2050 coming from the existing, committed, and new build capacities cities. The required BESS for grid stability should also increase from 49 MW to 373 MW by 2050 as shown in Figure 23.

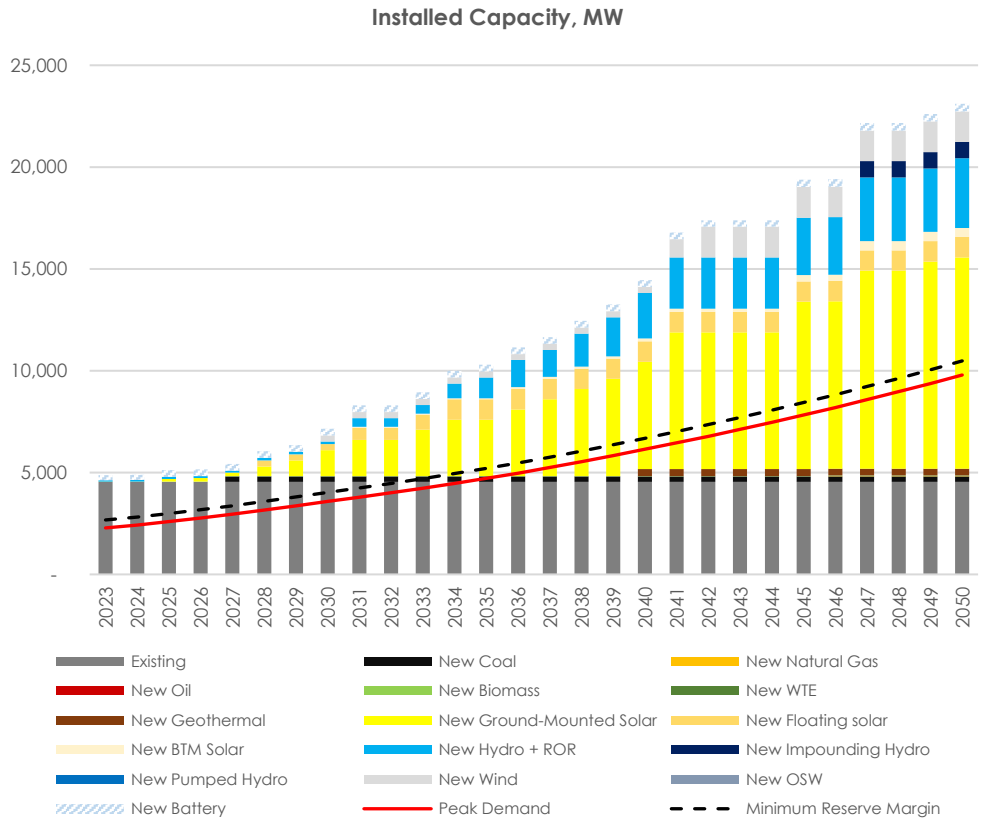


Figure 23. Reference - Mindanao Power Demand and Supply Outlook

To meet Mindanao's electricity demand of 9,791 MW by 2050 under the reference scenario, the simulation results have shown a **new build RE capacity of 17,616 MW** on top of existing plants and committed projects. The RE capacity must increase thirteen times from its current capacity of 1,441 MW. The proposed additions include 11,653 MW Solar, 1,498 MW Wind, 4,125 MW Hydro, and 340 MW geothermal projects. The simulation has resulted also in an additional of 20 MW natural gas plant facilities

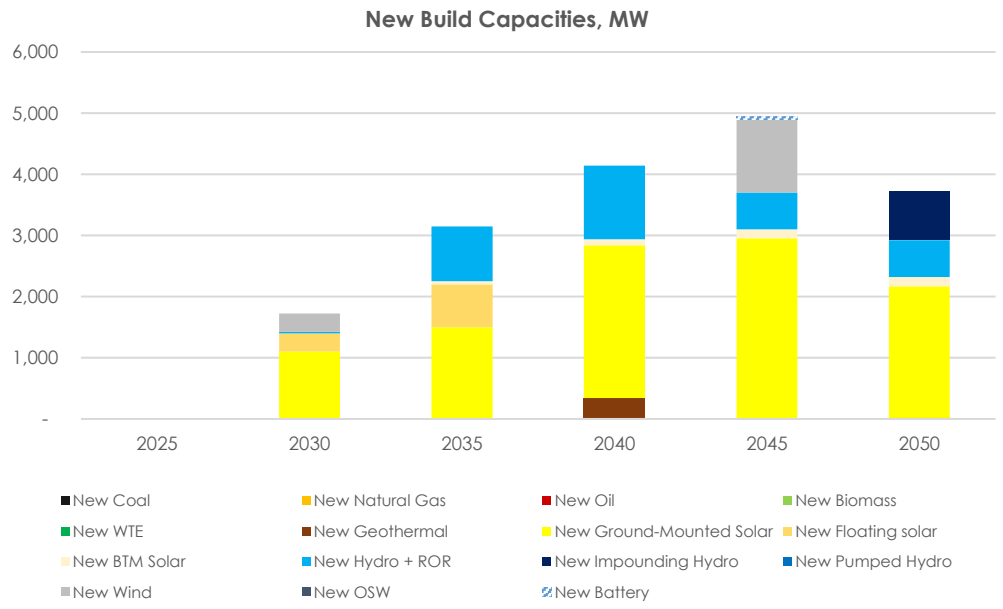
and BESS technology of 44 MW to provide support and stability in the power system as indicated in Table 34.

Table 34. Reference - Mindanao New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	**-**
New Natural Gas	-	-	-	-	-	20	**20**
New Oil	-	-	-	-	-	-	**-**
New Biomass	-	-	-	-	-	-	**-**
New WTE	-	-	-	-	-	-	**-**
New Geothermal	-	-	-	340	-	-	**340**
New Ground-Mounted Solar	-	1,100	1,500	2,500	2,952	2,151	**10,203**
New Floating solar	-	300	700	-	-	-	**1,000**
New BTM Solar	-	-	50	100	150	150	**450**
New Hydro + ROR	-	25	900	1,200	600	600	**3,325**
New Impounding Hydro	-	-	-	-	-	800	**800**
New Pumped Hydro	-	-	-	-	-	-	**-**
New Wind	-	298	-	-	1,200	-	**1,498**
New OSW	-	-	-	-	-	-	**-**
New Battery	-	-	-	-	44	-	**44**

Note: Values presented herein are values of new build capacities every five-milestone year

Below is a breakdown of each technology's new build capacity and the respective milestone years of commercial operation.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 24. Reference - Mindanao New Build Capacities per Technology

The new build capacities added for this scenario resulted in the Mindanao diversified power generation mix with RE plants share at 78% with a significant reduction in coal plants production from 68% to 22% by 2050, as depicted in Figure 25 and Table 35.

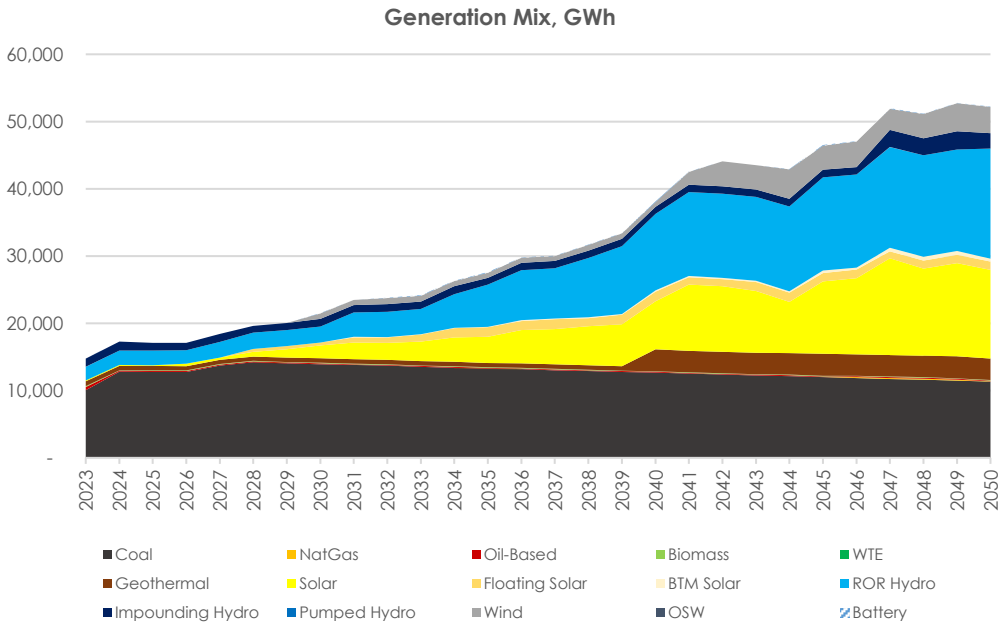


Figure 25. Reference - Mindanao Power Generation Mix

Table 35. Reference - Mindanao Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	10,055	12,780	13,916	13,274	12,667	11,991	11,350
Natural Gas	0	0	0	0	0	0	11
Oil-based	486	125	125	125	125	125	125
RE	**4,243**	**4,190**	**7,440**	**14,140**	**25,267**	**34,315**	**40,676**
Biomass	122	84	85	83	85	87	84
WTE	0	0	0	0	0	0	0
Geothermal	713	668	691	629	3,253	3,262	3,184
Ground-Mounted Solar	128	104	1,893	3,892	7,140	10,757	13,214
Floating Solar	0	0	409	1,417	1,439	1,270	1,194
BTM Solar	0	0	0	68	201	343	464
ROR Hydro	2,040	2,210	2,422	6,251	11,352	13,856	16,352
Impounding Hydro	1,239	1,123	1,131	1,026	1,063	1,170	2,299
Pumped Hydro	0	0	0	0	0	0	0
Wind	0	0	809	774	734	3,570	3,887
OSW	0	0	0	0	0	0	0
Total	**14,784**	**17,095**	**21,481**	**27,540**	**38,059**	**46,431**	**52,162**
BESS	3	5	19	60	61	96	39
Power Generation, in Percent (%) Share							
Coal	68	75	65	48	33	26	22
Natural Gas	-	-	-	-	-	-	0
Oil-based	3	1	1	0	0	0	0
RE	29	25	35	51	66	74	78
Biomass	1	0	0	0	0	0	0
WTE	-	-	-	-	-	-	-
Geothermal	5	4	3	2	9	7	6
Ground-Mounted Solar	1	1	9	14	19	23	25
Floating Solar	-	-	2	5	4	3	2
BTM Solar	-	0	0	0	1	1	1
ROR Hydro	14	13	11	23	30	30	31

Plant Type	2023	2025	2030	2035	2040	2045	2050
Impounding Hydro	8	7	5	4	3	3	4
Pumped Hydro	-	-	-	-	-	-	-
Wind	-	-	4	3	2	8	7
OSW	-	-	-	-	-	-	-
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

b) Clean Energy Scenario 1 (CES 1) – Low Offshore Wind

(Low Offshore Wind Technology + Nuclear Technology + Coal Repurposing)

i. Luzon Grid

Under the CES 1 simulation, the Luzon installed capacity requirements should increase by about five times from **19,746 MW** in 2022 to **101,212 MW** in 2050 coming from the existing, committed, and new build capacities. The required BESS to support grid stability should also increase from 72 MW to 13,418 MW by 2050 while a total of 3,287 MW capacity of coal plants (under existing capacities) may undergo plant repurposing into other technologies as shown in Figure 26.

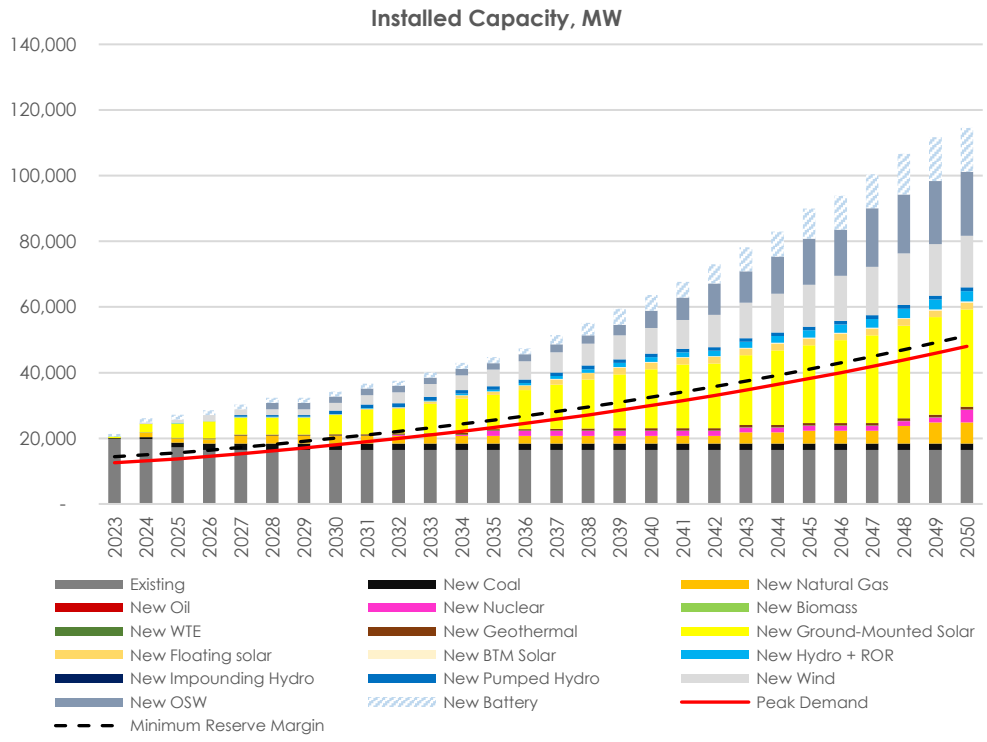


Figure 26. CES 1 - Luzon Power Demand and Supply Outlook

To meet Luzon's electricity demand of 48,014 MW by 2050 under CES 1, the simulation results have shown the need for a **new build RE capacity of 66,806 MW** on top of existing plants and committed projects. The RE capacity must increase sixteen times from its current capacity of 4,910 MW. The proposed additions include 28,230 MW Solar, 34,050 MW Wind, 4,130 MW Hydro, 300 MW geothermal and 96 MW biomass projects. The simulation has resulted also in an additional of 4,096 MW natural gas

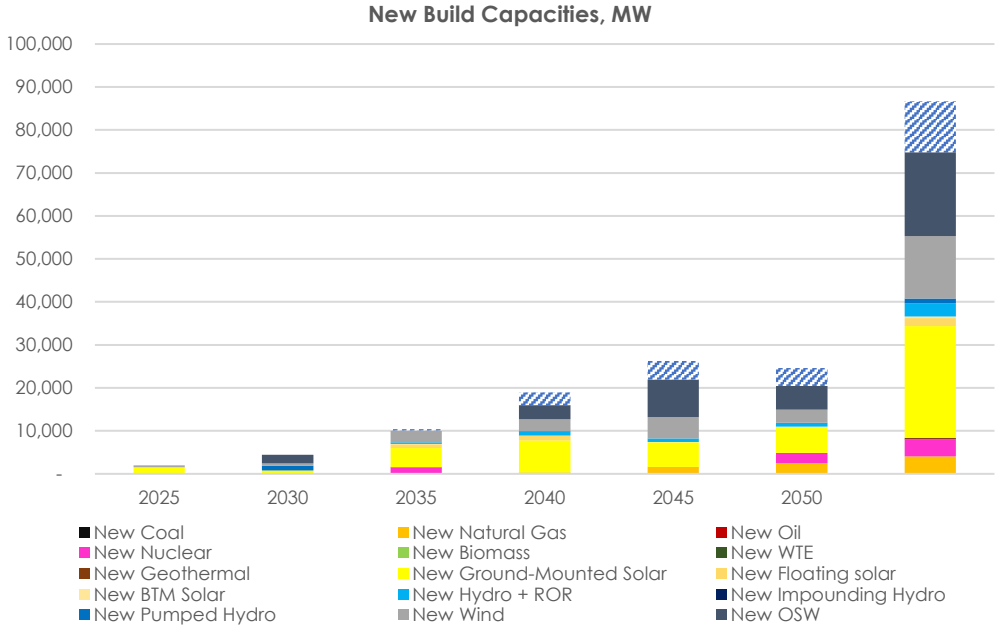
plant facilities, nuclear technology at 3,900 MW and BESS technology of 11,846 MW to provide support and stability in the power system as indicated in Table 36.

Table 36. CES 1 - Luzon New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	-
New Natural Gas	-	-	-	-	1,580	2,516	4,096
New Oil	-	-	-	-	-	-	-
New Nuclear	-	-	1,500	-	-	2,400	3,900
New Biomass	50	-	-	-	-	-	50
New WTE	12	34	-	-	-	-	46
New Geothermal	-	-	10	290	-	-	300
New Ground-Mounted Solar	1,437	737	4,500	7,500	5,786	6,000	25,960
New Floating solar	-	-	900	1,010	-	-	1,910
New BTM Solar	-	-	90	120	60	90	360
New Hydro + ROR	-	-	315	1,000	800	915	3,030
New Impounding Hydro	-	-	-	-	-	-	-
New Pumped Hydro	-	1,100	-	-	-	-	1,100
New Wind	500	550	2,750	2,750	5,000	3,000	14,550
New OSW	-	2,000	-	3,300	8,700	5,500	19,500
New Battery	-	-	295	3,000	4,360	4,191	11,846

Note: Values presented herein are values of new build capacities every five-milestone year

Depicted in Figure 27 is the breakdown of each technology's new build capacity and the respective milestone years of commercial operation.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 27. CES 1 - Luzon New Build Capacities per Technology

The new build capacities for this scenario resulted in a Luzon power generation mix with a diversified energy portfolio of natural gas plants share at 13%, nuclear technology at 10% and RE at 66% by 2050. Meanwhile, gross generation from coal power plants was significantly

reduced from 59% to 10% by 2050, as depicted in Figure 28 and Table 37.

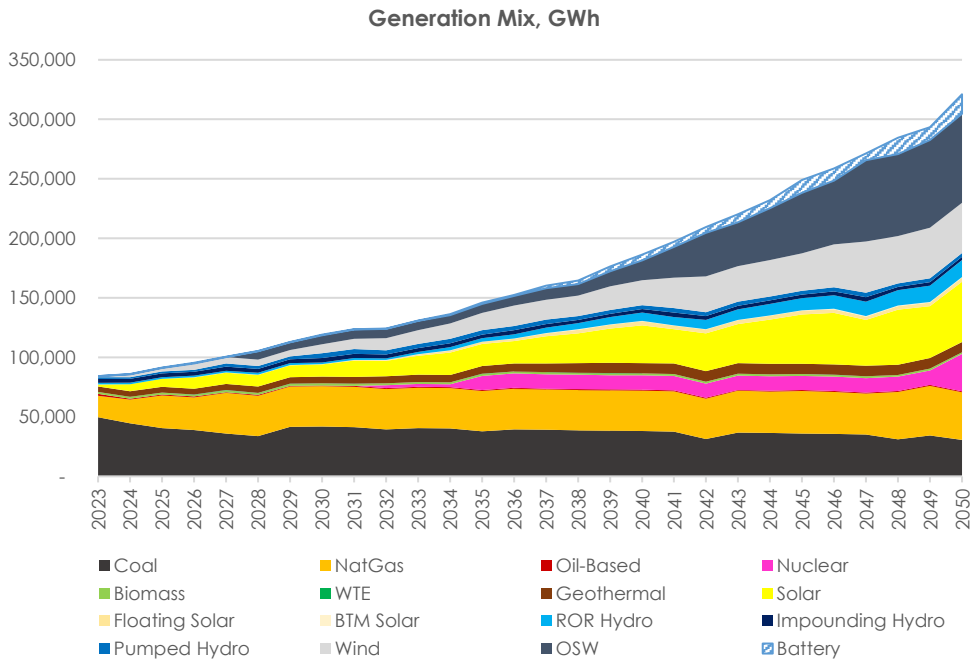


Figure 28. CES 1 - Luzon Power Generation Mix

Table 37. CES 1 - Luzon Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	49,643	40,659	41,773	37,743	38,025	35,996	30,663
Natural Gas	18,044	27,357	33,902	33,902	33,995	35,661	40,023
Oil-based	1,575	762	762	762	762	762	762
Nuclear	0	0	0	12,067	12,100	12,067	31,375
RE	**14,935**	**22,408**	**42,138**	**60,557**	**96,507**	**153,758**	**201,940**
Biomass	1,615	1,613	1,651	1,547	1,533	1,440	1,429
WTE	0	42	179	138	138	136	132
Geothermal	4,490	4,846	5,502	6,455	8,691	8,561	8,468
Ground-Mounted Solar	1,842	6,654	10,303	18,789	31,723	41,383	50,693
Floating Solar	0	0	143	1,697	3,305	3,141	3,374
BTM Solar	55	69	68	159	327	407	591
ROR Hydro	1,308	1,363	1,428	2,744	6,944	10,301	14,156
Impounding Hydro	3,275	3,293	3,682	3,189	3,002	2,871	2,766
Pumped Hydro	1,488	1,550	4,055	3,541	3,380	3,228	3,186
Wind	864	2,978	7,461	14,632	20,974	31,358	42,411
OSW	0	0	7,665	7,665	16,490	50,931	74,734
Total	**84,199**	**91,186**	**118,575**	**145,032**	**181,390**	**238,244**	**304,763**
BESS	0	268	419	917	4,812	10,694	16,274
Power Generation, in Percent (%) Share							
Coal	59	45	35	26	21	15	10
Natural Gas	21	30	29	23	19	15	13
Oil-based	2	1	1	1	0	0	0
Nuclear	-	-	-	8	7	5	10
RE	**18**	**25**	**36**	**42**	**53**	**65**	**66**
Biomass	2	2	1	1	1	1	0
WTE	-	0	0	0	0	0	0

Plant Type	2023	2025	2030	2035	2040	2045	2050
Geothermal	5	5	5	4	5	4	3
Ground-Mounted Solar	2	7	9	13	17	17	17
Floating Solar	-	-	0	1	2	1	1
BTM Solar	0	0	0	0	0	0	0
ROR Hydro	2	1	1	2	4	4	5
Impounding Hydro	4	4	3	2	2	1	1
Pumped Hydro	2	2	3	2	2	1	1
Wind	1	3	6	10	12	13	14
OSW	-	-	6	5	9	21	25
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

ii. Visayas Grid

The Visayas installed capacity requirements should increase by about nine times from **3,971 MW** in 2022 to **36,168 MW** in 2050 coming from the existing, committed, and new build capacities cities. The required BESS for grid stability should also increase from 35 MW to 4,960 MW by 2050 while a total of 103 MW capacity of coal plants may pursue repurposing by utilizing other technologies (Figure 29).

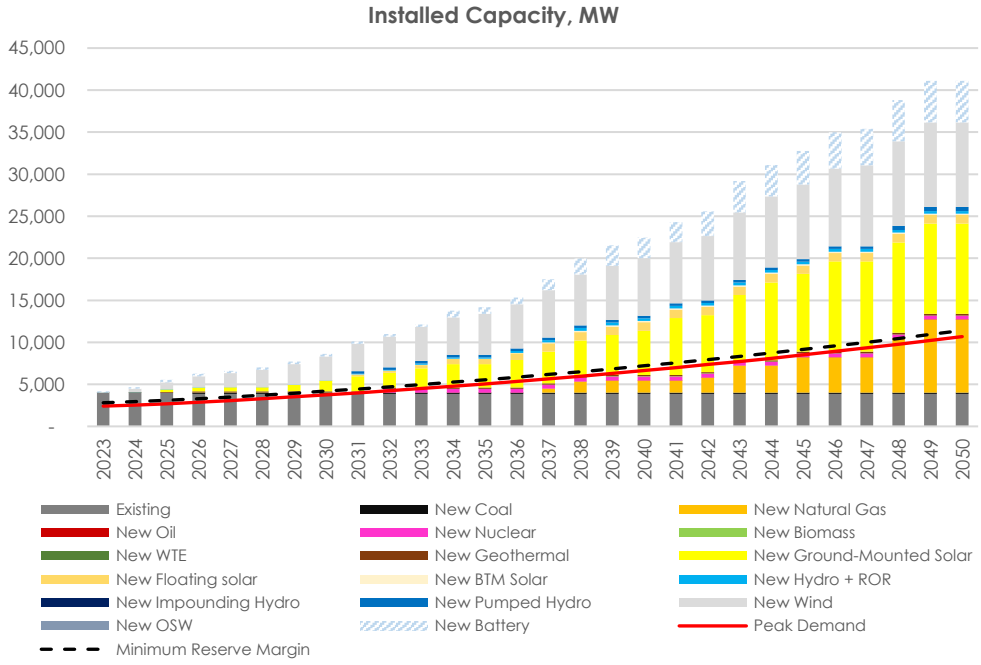


Figure 29. CES 1 - Visayas Power Demand and Supply Outlook

To meet Visayas' electricity demand of 10,678 MW by 2050 under CES 1, the simulation results have shown the need for **a new build RE capacity of 21,815 MW** on top of existing plants and committed projects. The RE capacity must increase thirteen times from its current capacity of 1,914 MW. The proposed additions include 11,436 MW Solar, 9,539 MW Wind, 800 MW Hydro, and 40 MW geothermal projects. The simulation has resulted also in an additional of 8,720 MW natural gas plant facilities, 450

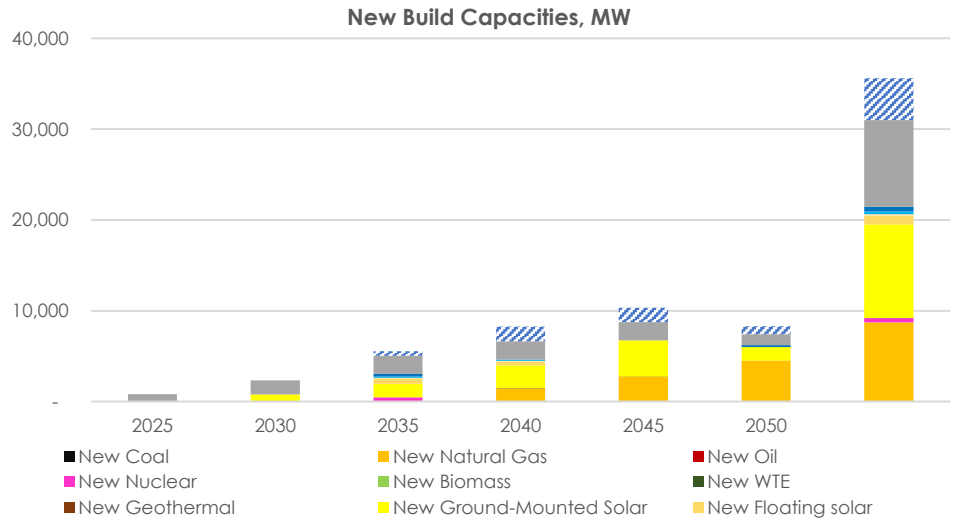
MW nuclear technology and BESS technology of 4,625 MW to provide support and stability as indicated in Table 38.

Table 38. CES 1 - Visayas New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	-
New Natural Gas	-	-	-	1,454	2,758	4,508	8,720
New Oil	-	-	-	-	-	-	-
New Nuclear	-	-	450	-	-	-	450
New Biomass	-	-	-	-	-	-	-
New WTE	-	-	-	-	-	-	-
New Geothermal	-	-	-	30	10	-	40
New Ground-Mounted Solar	-	800	1,500	2,500	3,986	1,500	10,286
New Floating solar	-	-	600	400	-	-	1,000
New BTM Solar	0	-	50	100	-	-	150
New Hydro + ROR	-	-	150	150	-	-	300
New Impounding Hydro	-	-	-	-	-	-	-
New Pumped Hydro	-	-	300	-	-	200	500
New Wind	800	1,539	2,000	2,000	2,000	1,200	9,539
New OSW	-	-	-	-	-	-	-
New Battery	-	-	500	1,625	1,600	900	4,625

Note: Values presented in this graph are per technology, per year of entry of new build capacities

As shown in Figure 30 is the breakdown of each technology's new build capacity and its milestone years of commercial operation.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 30. CES 1 - Visayas New Build Capacities per Technology

The new build capacities added for this scenario resulted in Visayas power generation mix diversified energy portfolio with RE plants accounting for 61% of the total share. Natural Gas plants were recorded at 28% while nuclear technology was at 4% of the total share. Coal plant

generation share in Visayas is projected to be reduced at a significant rate from 44% to 7% by 2050, as depicted in Figure 31 and Table 39.

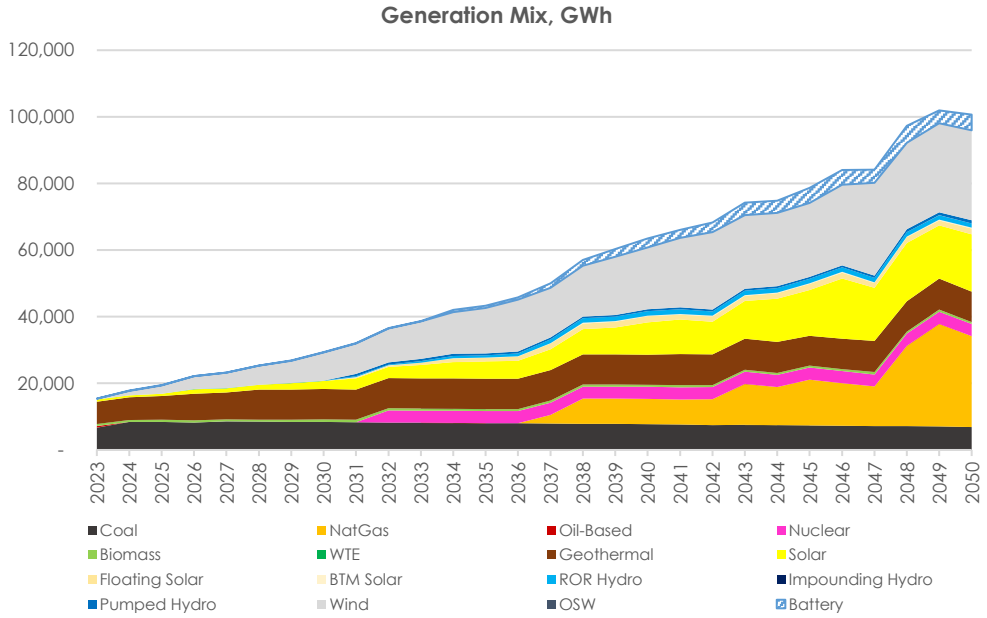


Figure 31. CES 1 - Visayas Power Generation Mix

Table 39. CES 1 - Visayas Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	6,723	8,374	8,377	8,053	7,749	7,371	6,888
Natural Gas	0	0	0	0	7,598	13,766	27,272
Oil-based	494	0	0	0	0	3	0
Nuclear	0	0	0	3,620	3,630	3,620	3,620
RE	**8,190**	**11,035**	**20,875**	**30,926**	**41,787**	**49,353**	**58,203**
Biomass	584	709	789	612	612	604	605
WTE	0	0	0	0	0	0	0
Geothermal	6,691	7,125	9,114	9,090	9,021	8,894	9,122
Ground-Mounted Solar	620	623	2,469	5,190	9,689	13,777	17,226
Floating Solar	0	0	0	1,050	1,807	1,821	1,746
BTM Solar	0	0	0	82	256	212	231
ROR Hydro	65	72	76	701	1,339	1,335	1,331
Impounding Hydro	0	0	0	0	0	0	0
Pumped Hydro	0	0	0	581	555	564	911
Wind	231	2,507	8,426	13,621	18,509	22,146	27,030
OSW	0	0	0	0	0	0	0
Total	**15,407**	**19,409**	**29,253**	**42,599**	**60,764**	**74,112**	**95,983**
BESS	0	53	90	713	2,760	4,557	4,641
Power Generation, in Percent (%) Share							
Coal	44	43	29	19	13	10	7
Natural Gas	-	-	-	-	13	19	28
Oil-based	3	-	-	-	-	0	-
Nuclear	-	-	-	8	6	5	4
RE	**53**	**57**	**71**	**73**	**69**	**67**	**61**
Biomass	4	4	3	1	1	1	1
WTE	-	-	-	-	-	-	-

Plant Type	2023	2025	2030	2035	2040	2045	2050
Geothermal	43	37	31	21	15	12	10
Ground-Mounted Solar	4	3	8	12	16	19	18
Floating Solar	-	-	-	2	3	2	2
BTM Solar	-	-	-	0	0	0	0
ROR Hydro	0	0	0	2	2	2	1
Impounding Hydro	-	-	-	-	-	-	-
Pumped Hydro	-	-	-	1	1	1	1
Wind	1	13	29	32	30	30	28
OSW	-	-	-	-	-	-	-
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

iii. Mindanao Grid

The Mindanao installed capacity requirements should increase by about four times from **4,542 MW** in 2022 to **16,939 MW** in 2050 coming from the existing, committed, and new build capacities cities. The required BESS to support grid should also increase from 49 MW to 3,637 MW by 2050 while a total of 232 MW capacity of coal plants (under existing capacities) may undergo plant repurposing into other technologies (Figure 32).

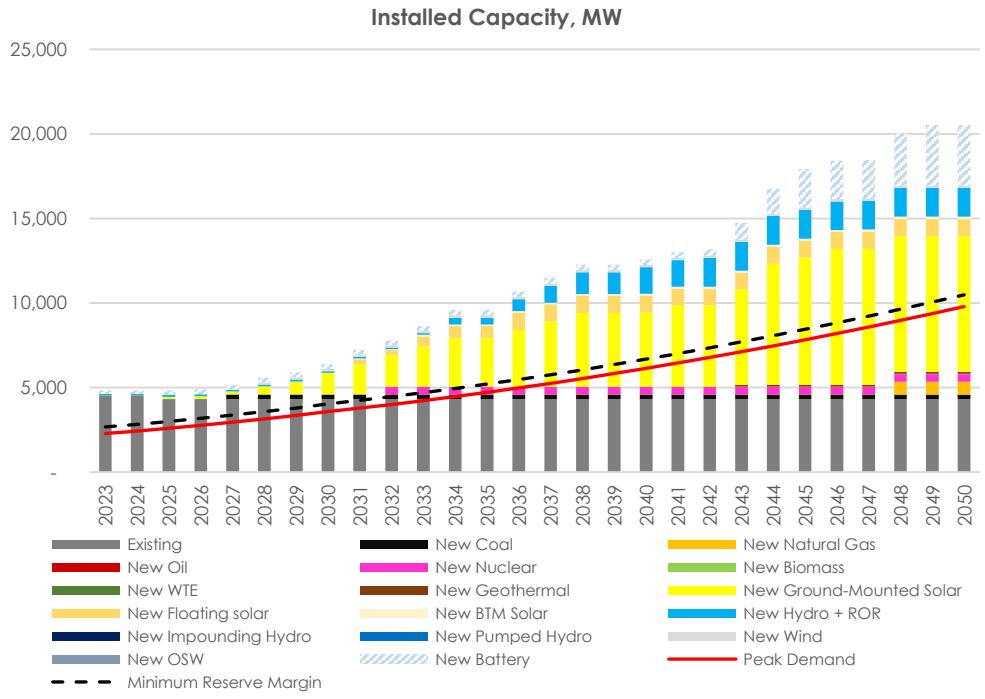


Figure 32. CES 1 - Mindanao Power Demand and Supply Outlook

Under CES 1, the simulation results have shown the need for a **new build RE capacity of 10,861 MW** on top of existing plants and committed projects to meet Mindanao's electricity demand of 9,791 MW by 2050. The RE capacity must increase nine times from its current capacity of 1,441 MW. These proposed additions include 9,005 MW Solar, 136 MW

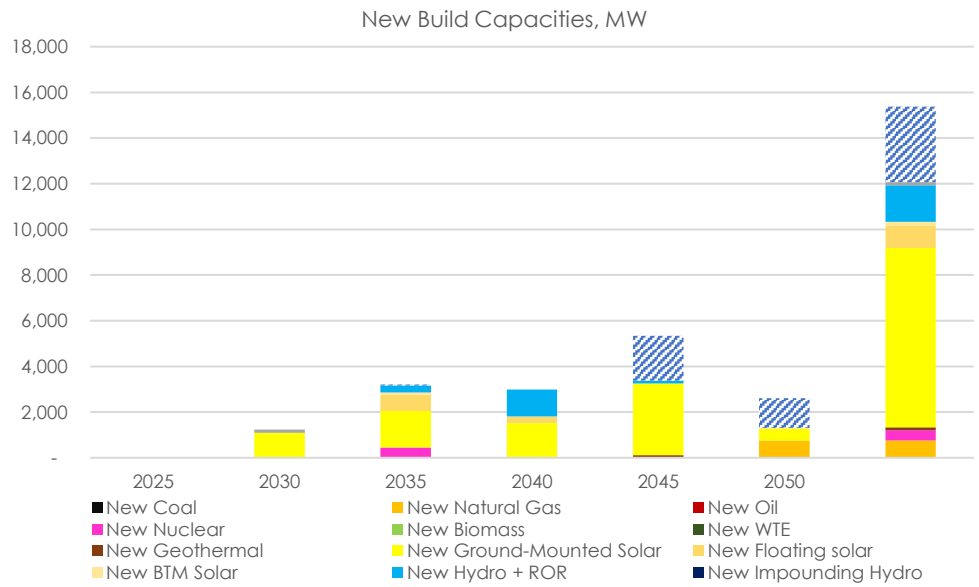
Wind, 1,600 MW Hydro, and 120 MW geothermal projects. The simulation has resulted also in an additional of 760 MW natural gas plant facilities, 450 MW nuclear technology and BESS technology of 3,308 MW to provide support and stability in the power system as indicated in Table 40.

Table 40. CES 1 - Mindanao New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	-
New Natural Gas	-	-	-	-	-	760	760
New Oil	-	-	-	-	-	-	-
New Nuclear	-	-	450	-	-	-	450
New Biomass	-	-	-	-	-	-	-
New WTE	-	-	-	-	-	-	-
New Geothermal	-	-	-	-	120	-	120
New Ground-Mounted Solar	-	1,100	1,599	1,515	3,132	509	7,855
New Floating solar	-	-	717	283	-	-	1,000
New BTM Solar	0	-	100	14	-	37	150
New Hydro + ROR	-	-	300	1,175	125	-	1,600
New Impounding Hydro	-	-	-	-	-	-	-
New Pumped Hydro	-	-	-	-	-	-	-
New Wind	-	136	-	-	-	-	136
New OSW	-	-	-	-	-	-	-
New Battery	-	-	44	-	1,964	1,300	3,308

Note: Values presented herein are values of new build capacities every five-milestone year.

Below is the breakdown which provides a clear reference for each technology's new build capacity and the respective milestone years of commercial operation (Figure 33).



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 33. CES 1 - Mindanao New Build Capacities per Technology

The new build capacities added for this scenario resulted in Mindanao diversified power generation mix with RE plants accounting for 64% of the total share. Natural Gas plants were recorded at 1% while nuclear technology at 8% of the total share. Meanwhile, coal plant generation were also greatly lowered as its share of 68% in 2023 was brought down to 26% by 2050, as depicted in Figure 34 and Table 41.

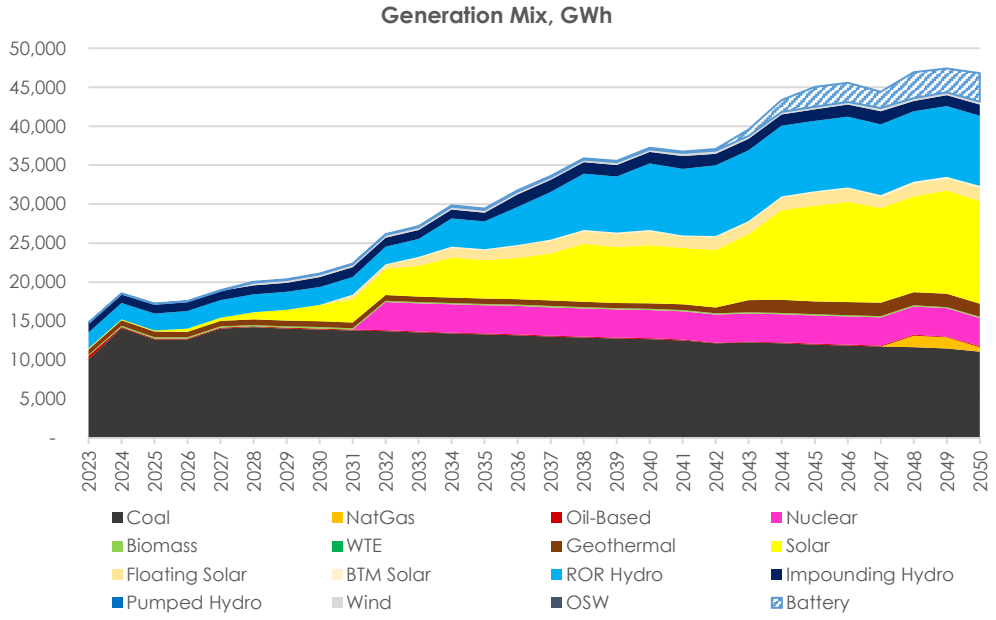


Figure 34. CES 1 - Mindanao Power Generation Mix

Table 41. CES 1 - Mindanao Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	10,055	12,638	13,928	13,285	12,678	12,001	11,089
Natural Gas	0	0	0	0	0	0	570
Oil-based	486	118	118	118	118	103	118
Nuclear	0	0	0	3,620	3,630	3,620	3,620
RE	**4,243**	**4,442**	**6,983**	**12,230**	**20,610**	**26,764**	**27,761**
Biomass	122	181	193	165	166	155	162
WTE	0	0	0	0	0	0	0
Geothermal	713	717	729	702	688	1,635	1,664
Ground-Mounted Solar	128	124	2,093	4,916	7,464	12,284	13,141
Floating Solar	0	0	0	1,243	1,769	1,683	1,746
BTM Solar	0	0	0	159	178	168	244
ROR Hydro	2,040	2,175	2,307	3,577	8,527	9,026	9,008
Impounding Hydro	1,239	1,246	1,270	1,100	1,468	1,484	1,433
Pumped Hydro	0	0	0	0	0	0	0
Wind	0	0	389	368	350	329	362
OSW	0	0	0	0	0	0	0
Total	**14,784**	**17,197**	**21,028**	**29,253**	**37,036**	**42,489**	**43,158**
BESS	3	51	85	168	207	2,567	3,635
Power Generation, in Percent (%) Share							
Coal	68	73	66	45	34	28	26
Natural Gas	-	-	-	-	-	-	1
Oil-based	3	1	1	0	0	0	0
Nuclear	-	-	-	12	10	9	8
RE	**29**	**26**	**33**	**42**	**56**	**63**	**64**

Plant Type	2023	2025	2030	2035	2040	2045	2050
Biomass	1	1	1	1	0	0	0
WTE	-	-	-	-	-	-	-
Geothermal	5	4	3	2	2	4	4
Ground-Mounted Solar	1	1	10	17	20	29	30
Floating Solar	-	-	-	4	5	4	4
BTM Solar	-	-	-	1	0	0	1
ROR Hydro	14	13	11	12	23	21	21
Impounding Hydro	8	7	6	4	4	3	3
Pumped Hydro	-	-	-	-	-	-	-
Wind	-	-	2	1	1	1	1
OSW	-	-	-	-	-	-	-
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

c) Clean Energy Scenario 2 (CES 2) – High Offshore Wind

(High Offshore Wind Technology + Nuclear Technology + Coal Repurposing)

i. Luzon Grid

Under the CES 2, the Luzon installed capacity requirements should increase by about six times from **19,746 MW** in 2022 to **120,824 MW** in 2050 coming from the existing, committed, and new build capacities. The required BESS should also increase from 72 MW to 15,783 MW by 2050 while a total of 4,059 MW capacity of coal plants (under existing capacity) may opt to undergo plant repurposing (Figure 35).

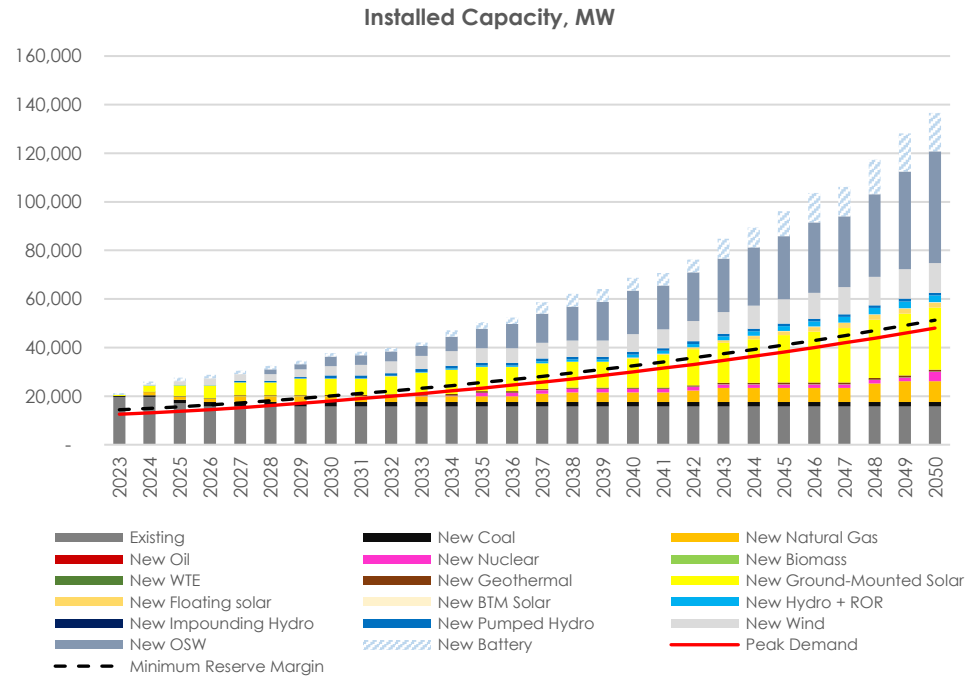


Figure 35. CES 2 - Luzon Power Demand and Supply Outlook

To meet Luzon's electricity demand of 48,014 MW by 2050 under CES 2, the simulation results have emphasized the need for **new build RE capacity of 85,070 MW** on top of existing plants and committed projects.

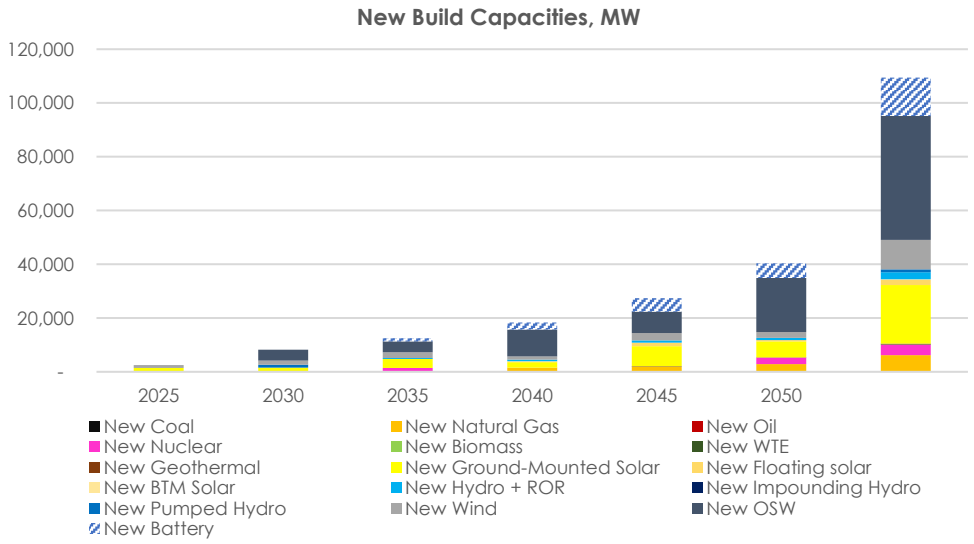
The RE capacity must increase nineteen times from its current capacity of 4,910 MW. These proposed additions include 23,877 MW Solar, 57,087 MW Wind, 3,170 MW Hydro, 300 MW geothermal and 96 MW biomass projects. Likewise, the simulation has resulted an additional of 6,216 MW natural gas plant facilities, nuclear technology at 3,900 MW and BESS technology of 14,211 MW to provide support and stability in the power system due to the influx of RE technologies as indicated in Table 42.

Table 42. CES 2 - Luzon New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	-
New Natural Gas	-	-	-	1,540	1,840	2,836	6,216
New Oil	-	-	-	-	-	-	-
New Nuclear	-	-	1,500	-	-	2,400	3,900
New Biomass	50	-	-	-	-	-	50
New WTE	12	34	-	-	-	-	46
New Geothermal	-	-	-	-	200	100	300
New Ground-Mounted Solar	1,437	1,500	3,267	2,023	7,500	6,000	21,727
New Floating solar	-	-	-	300	1,200	410	1,910
New BTM Solar	-	-	-	30	120	90	240
New Hydro + ROR	-	-	370	640	800	800	2,610
New Impounding Hydro	-	-	-	-	-	-	-
New Pumped Hydro	-	1,100	-	-	-	-	1,100
New Wind	1,000	1,600	2,200	1,237	2,750	2,200	10,987
New OSW	-	4,000	4,000	10,000	8,000	20,100	46,100
New Battery	-	-	1,163	2,567	4,985	5,496	14,211

Note: Values presented herein are values of new build capacities every five-milestone year

Figure 36 shows the breakdown of each technology's new build capacity, and the respective year of commercial operation arranged in every five-milestone year.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 36. CES 2 - Luzon New Build Capacities per Technology

The new build capacities for this scenario resulted in a Luzon power diversified generation mix of natural gas plants share at 8%, nuclear technology at 9% and RE at 74% by 2050. Meanwhile, gross generation from coal power plants was significantly reduced from its share at 59% in 2023 down to 8% by 2050, as depicted in Figure 37 and Table 43.

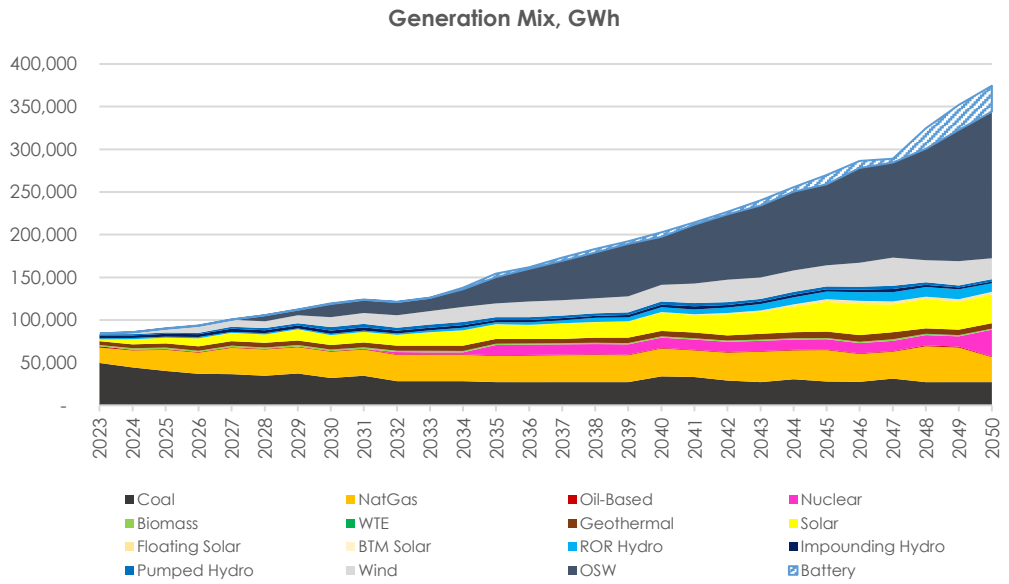


Figure 37. CES 2 - Luzon Power Generation Mix

Table 43. CES 2 - Luzon Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	49,643	40,402	31,961	27,243	33,784	27,775	27,243
Natural Gas	18,044	24,832	30,773	30,773	32,621	36,923	29,230
Oil-based	1,575	762	762	762	761	829	762
Nuclear	0	0	0	12,067	12,100	12,067	31,375
RE	**14,935**	**23,803**	**55,354**	**79,270**	**118,153**	**181,253**	**255,483**
Biomass	1,615	1,621	1,647	1,174	1,535	1,341	1,174
WTE	0	42	179	138	138	136	132
Geothermal	4,490	4,856	5,488	5,626	6,173	7,524	6,391
Ground-Mounted Solar	1,842	6,654	11,467	16,960	21,631	34,743	33,781
Floating Solar	0	0	143	127	653	2,713	2,425
BTM Solar	55	68	67	64	115	308	341
ROR Hydro	1,308	1,367	1,425	2,398	5,637	8,990	10,391
Impounding Hydro	3,275	3,284	3,679	2,737	3,003	2,723	1,754
Pumped Hydro	1,488	1,538	4,032	3,258	3,422	3,109	2,810
Wind	864	4,374	11,898	16,207	19,840	25,010	24,623
OSW	0	0	15,330	30,581	56,004	94,655	171,661
Total	**84,199**	**89,800**	**118,851**	**150,115**	**197,419**	**258,847**	**344,093**
BESS	**0**	**248**	**441**	**4,123**	**5,397**	**11,128**	**30,444**
Power Generation, in Percent (%) Share							
Coal	59	45	27	18	17	11	8
Natural Gas	21	28	26	20	17	14	8
Oil-based	2	1	1	1	0	0	0
Nuclear	-	-	-	8	6	5	9
RE	**18**	**27**	**47**	**53**	**60**	**70**	**74**
Biomass	2	2	1	1	1	1	0

Plant Type	2023	2025	2030	2035	2040	2045	2050
WTE	-	0	0	0	0	0	0
Geothermal	5	5	5	4	3	3	2
Ground-Mounted Solar	2	7	10	11	11	13	10
Floating Solar	-	-	0	0	0	1	1
BTM Solar	0	0	0	0	0	0	0
ROR Hydro	2	2	1	2	3	3	3
Impounding Hydro	4	4	3	2	2	1	1
Pumped Hydro	2	2	3	2	2	1	1
Wind	1	5	10	11	10	10	7
OSW	-	-	13	20	28	37	50
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

ii. Visayas Grid

Under this scenario, the Visayas installed capacity requirements is needed to increase by about six times from **3,971 MW** in 2022 to **24,351 MW** in 2050 coming from the existing, committed, and new build capacities. The BESS requirement should also increase from 35 MW to 5,857 MW by 2050 while a total of 512.7 MW capacity of coal plants (under existing capacity) may opt to undergo plant repurposing (Figure 38).

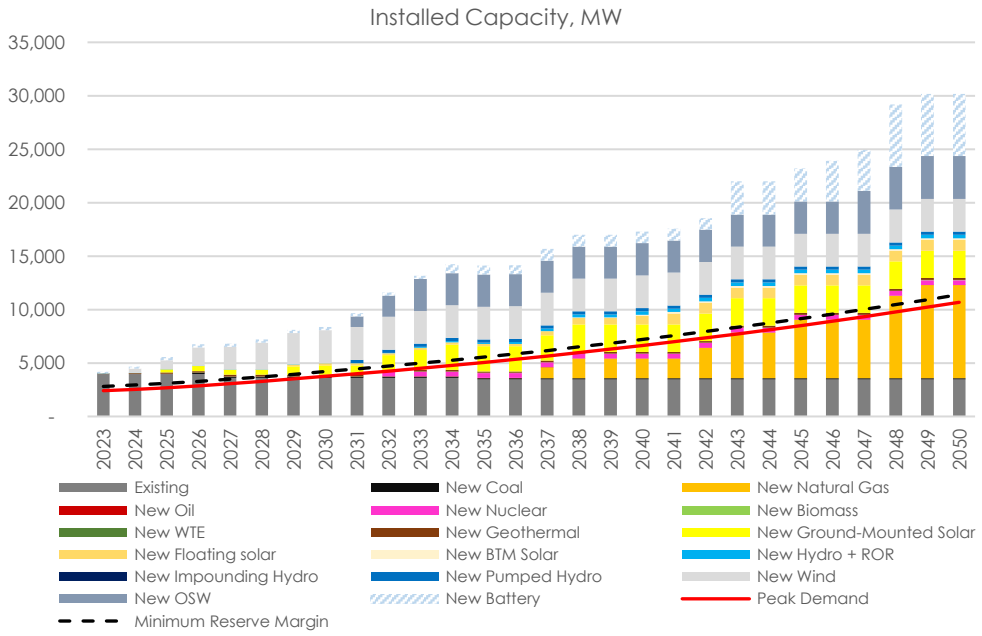


Figure 38. CES 2 - Visayas Power Demand and Supply Outlook

To meet Visayas' electricity demand of 10,678 MW by 2050 under CES 2, the simulation results have shown the need for a **new build RE capacity of 10,440 MW** on top of existing plants and committed projects. The RE capacity must increase seven times from its current capacity of 1,914 MW. These proposed additions include 3,250 MW Solar, 6,550 MW Wind, 600 MW Hydro, and 40 MW geothermal projects. The simulation has resulted also in an additional of 8,688 MW natural gas plant facilities, 450

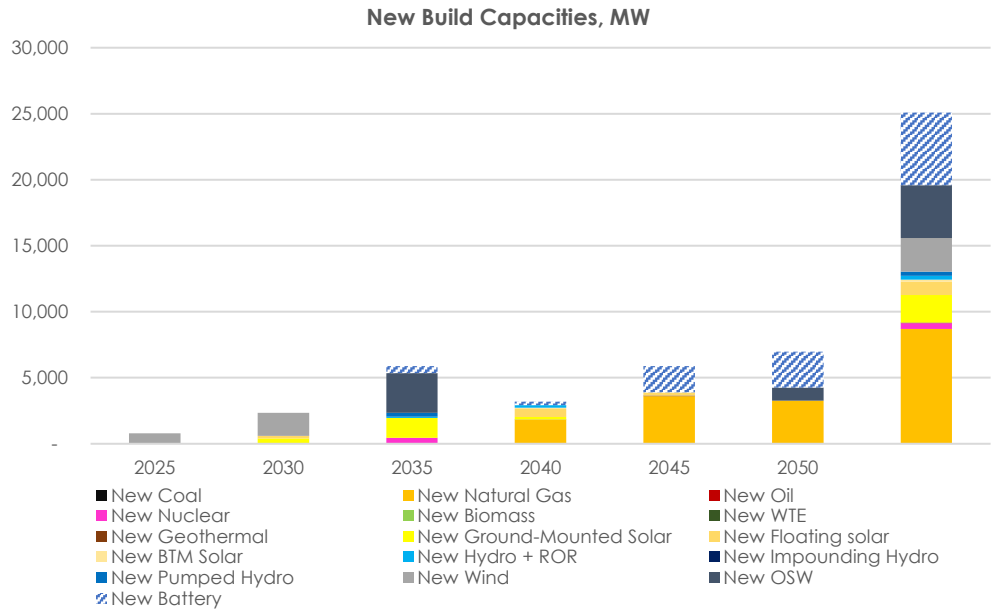
MW nuclear technology and BESS technology of 5,522 MW to provide support and stability in the power system as indicated in Table 44.

Table 44. CES 2 - Visayas New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	-
New Natural Gas	-	-	-	1,820	3,614	3,254	8,688
New Oil	-	-	-	-	-	-	-
New Nuclear	-	-	450	-	-	-	450
New Biomass	-	-	-	-	-	-	-
New WTE	-	-	-	-	-	-	-
New Geothermal	-	-	-	10	30	-	40
New Ground-Mounted Solar	-	399	1,500	201	-	-	2,100
New Floating solar	-	200	-	600	200	-	1,000
New BTM Solar	0	-	-	100	50	-	150
New Hydro + ROR	-	-	100	200	-	-	300
New Impounding Hydro	-	-	-	-	-	-	-
New Pumped Hydro	-	-	300	-	-	-	300
New Wind	800	1,750	-	-	-	-	2,550
New OSW	-	-	3,000	-	-	1,000	4,000
New Battery	-	-	534	271	2,000	2,717	5,522

Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 39 depicts the structured breakdown for each technology's new build capacity and the respective milestone years of commercial operation.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 39. CES 2 - Visayas New Build Capacities per Technology

The new build capacities added for this scenario resulted in Visayas diversified power generation mix with RE plants accounting for 62% of the total share. Natural Gas plants were recorded at 26% while nuclear

technologies at 5% of the total share. The share of Coal plant generation was also significantly reduced from 44% in 2023 to 7% by 2050, as depicted in Figure 40 and Table 45.

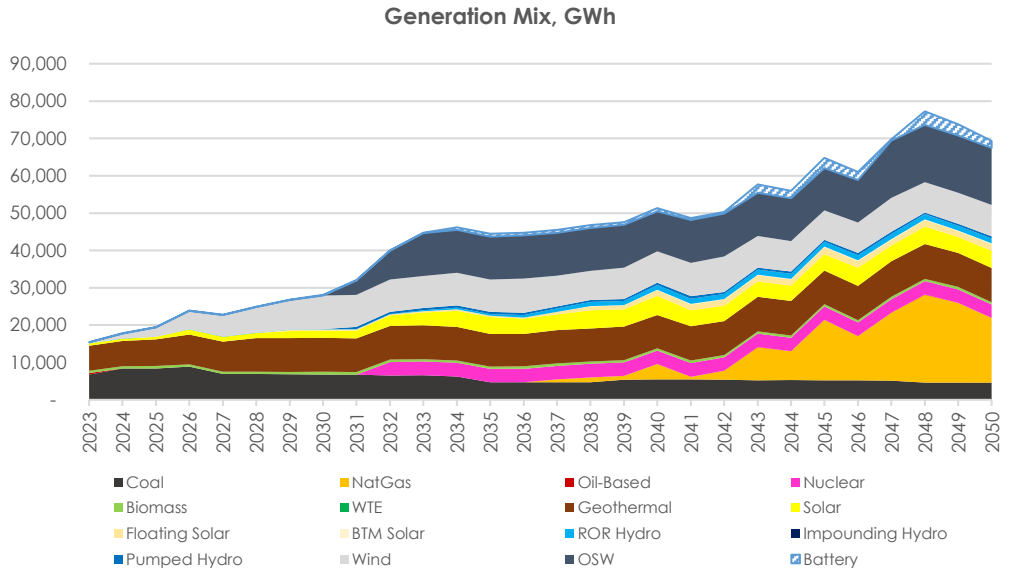


Figure 40. CES 2 - Visayas Power Generation Mix

Table 45. CES 2 - Visayas Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	6,723	8,374	6,766	4,688	5,502	5,240	4,586
Natural Gas	0	0	0	0	4,072	16,163	17,338
Oil-based	494	0	0	0	9	3	0
Nuclear	0	0	0	3,620	3,630	3,620	3,620
RE	**8,190**	**11,040**	**21,200**	**35,426**	**37,271**	**37,006**	**41,949**
Biomass	584	710	788	612	612	604	605
WTE	0	0	0	0	0	0	0
Geothermal	6,691	7,127	9,099	8,699	8,915	9,018	9,137
Ground-Mounted Solar	620	622	1,888	4,540	5,095	4,325	4,637
Floating Solar	0	0	318	350	1,446	1,821	1,746
BTM Solar	0	0	0	0	171	212	231
ROR Hydro	65	74	76	482	1,340	1,334	1,329
Impounding Hydro	0	0	0	0	0	0	0
Pumped Hydro	0	0	0	553	568	549	525
Wind	231	2,507	9,030	8,692	8,410	7,812	8,407
OSW	0	0	0	11,498	10,716	11,331	15,330
Total	**15,407**	**19,414**	**27,966**	**43,733**	**50,485**	**62,033**	**67,493**
BESS	**0**	**35**	**101**	**707**	**807**	**2,729**	**1,833**
Power Generation, in Percent (%) Share							
Coal	44	43	24	11	11	8	7
Natural Gas	-	-	-	-	8	26	26
Oil-based	3	-	-	-	0	0	-
Nuclear	-	-	-	8	7	6	5
RE	**53**	**57**	**76**	**81**	**74**	**60**	**62**
Biomass	4	4	3	1	1	1	1
WTE	-	-	-	-	-	-	-
Geothermal	43	37	33	20	18	15	14
Ground-Mounted Solar	4	3	7	10	10	7	7

Plant Type	2023	2025	2030	2035	2040	2045	2050
Floating Solar	-	-	1	1	3	3	3
BTM Solar	-	0	0	0	0	0	0
ROR Hydro	0	0	0	1	3	2	2
Impounding Hydro	-	-	-	-	-	-	-
Pumped Hydro	-	-	-	1	1	1	1
Wind	1	13	32	20	17	13	12
OSW	-	-	-	26	21	18	23
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

iii. Mindanao Grid

Under the CES 2, the Mindanao installed capacity requirement should increase by about two times from **4,542 MW** in 2022 to **11,214 MW** in 2050 coming from the existing, committed, and new build capacities cities. The required BESS to support grid stability should also increase from 49 MW to 3,022 MW by 2050 while a total of 232 MW capacity of coal plants (under existing capacities) may opt for the repurposing (Figure 41).

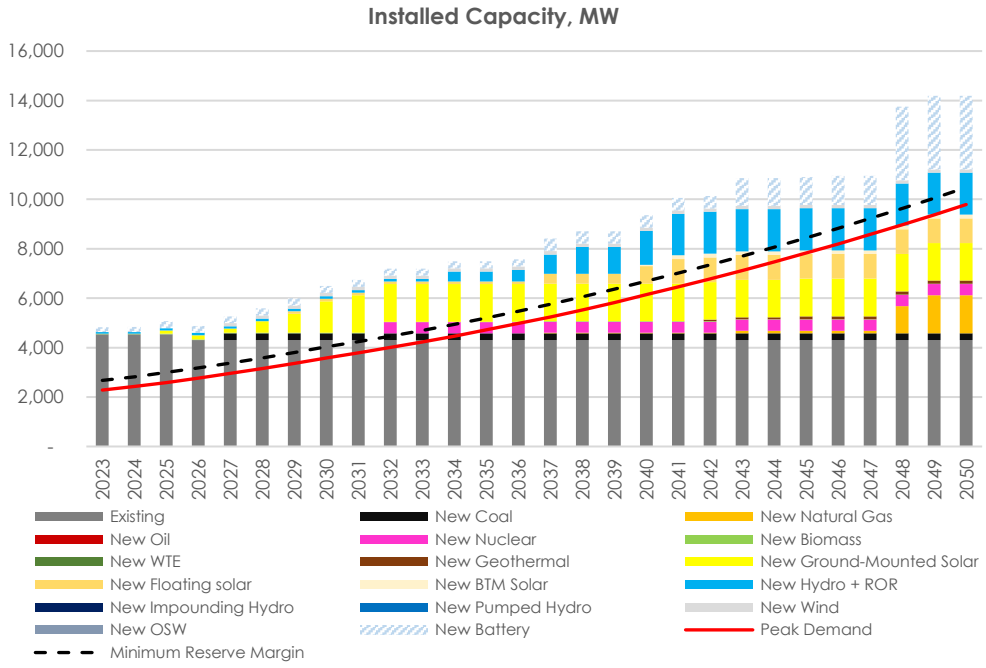


Figure 41. CES 2 - Mindanao Power Demand and Supply Outlook

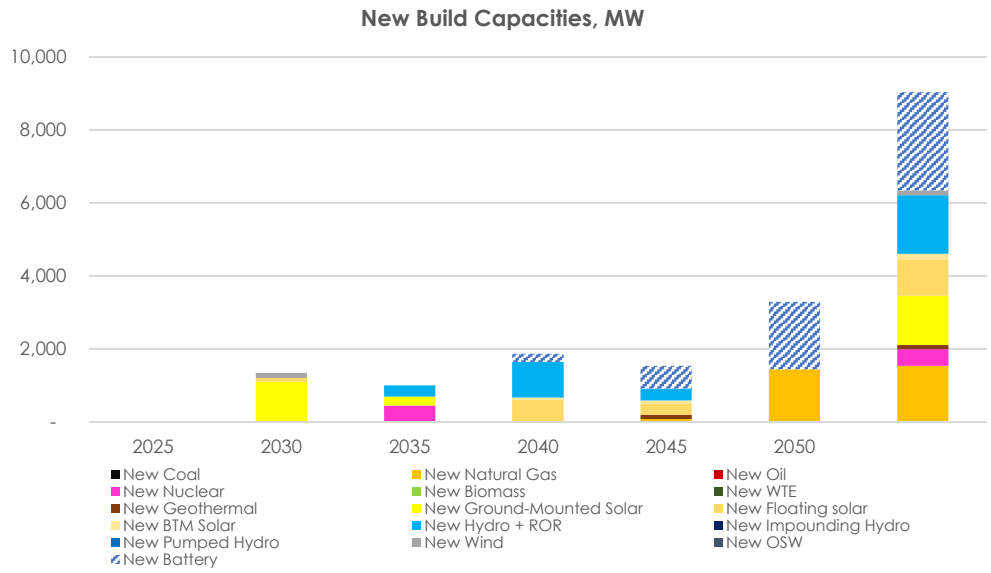
To meet Mindanao's electricity demand of 9,791 MW by 2050 under the CES 2, the simulation results have emphasized the need for a **new build RE capacity of 4,356 MW** on top of existing plants and committed projects. The RE capacity must increase four times from its current capacity of 1,441 MW. These proposed additions include 2,500 MW Solar, 136 MW Wind, 1,600 MW Hydro, and 120 MW geothermal projects. The simulation has resulted also in an additional of 1,540 MW natural gas plant facilities, 450 MW of nuclear technology, and BESS technology of 2,693 MW to provide support and stability in the power system as indicated in Table 46.

Table 46. CES 2 - Mindanao New Build Capacities

Particulars, in MW	2025	2030	2035	2040	2045	2050	Total
New Coal	-	-	-	-	-	-	-
New Natural Gas	-	-	-	20	80	1,440	1,540
New Oil	-	-	-	-	-	-	-
New Nuclear	-	-	450	-	-	-	450
New Biomass	-	-	-	-	-	-	-
New WTE	-	-	-	-	-	-	-
New Geothermal	-	-	-	-	120	-	120
New Ground-Mounted Solar	-	1,100	250	-	-	-	1,350
New Floating solar	-	106	-	600	294	-	1,000
New BTM Solar	0	-	-	50	100	-	150
New Hydro + ROR	-	-	300	975	325	-	1,600
New Impounding Hydro	-	-	-	-	-	-	-
New Pumped Hydro	-	-	-	-	-	-	-
New Wind	-	136	-	-	-	-	136
New OSW	-	-	-	-	-	-	-
New Battery	-	-	-	224	620	1,849	2,693

Note: Values presented herein are values of new build capacities every five-milestone year.

Below is the structured breakdown which provides a clear reference for each technology's new build capacity and the respective milestone years of commercial operation.



Note: Values presented in this graph are per technology, per year of entry of new build capacities

Figure 42. CES 2 - Mindanao New Build Capacities per Technology

The new build capacities added for this scenario resulted in Mindanao diversified power generation mix of RE plants accounting for 51% of the total share. Natural Gas plants were recorded at 7% while nuclear technology at 11% of the total share. Meanwhile, the coal generation share was significantly reduced to almost half from 68% in 2023 to 31% by 2050, as depicted in Figure 43 and Table 47.

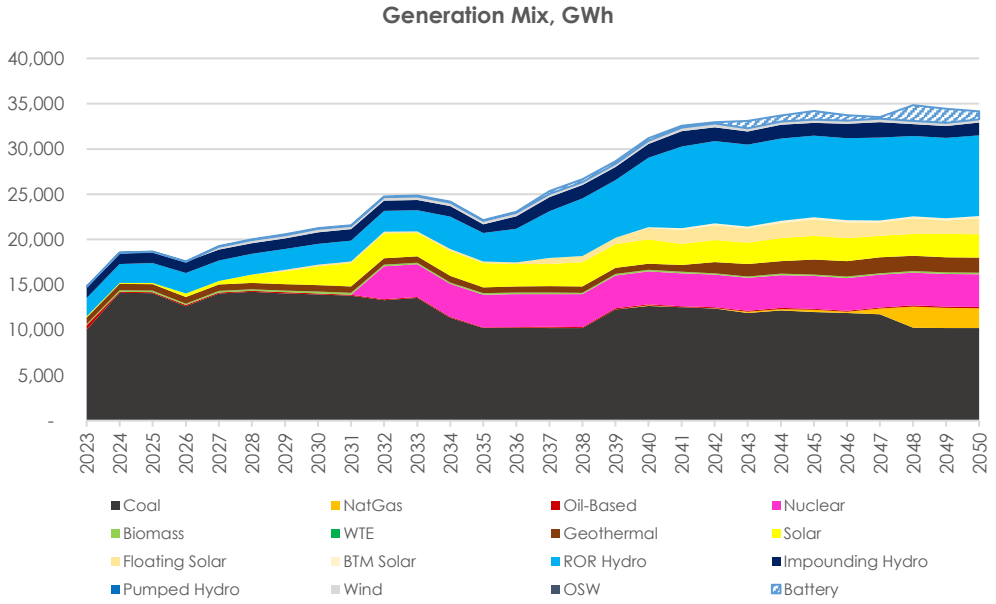


Figure 43. CES 2 - Mindanao Power Generation Mix

Table 47. CES 2 - Mindanao Power Generation in GWh and Percent Share

Plant Type	2023	2025	2030	2035	2040	2045	2050
Power Generation, in GWh							
Coal	10,055	14,077	13,928	10,223	12,678	12,001	10,223
Natural Gas	0	0	0	0	48	232	2,202
Oil-based	486	107	118	67	118	118	118
Nuclear	0	0	0	3,620	3,630	3,620	3,620
RE	**4,243**	**4,470**	**7,130**	**8,154**	**14,426**	**17,261**	**17,123**
Biomass	122	182	192	165	168	155	162
WTE	0	0	0	0	0	0	0
Geothermal	713	718	727	649	684	1,657	1,678
Ground-Mounted Solar	128	123	2,093	2,672	2,685	2,613	2,587
Floating Solar	0	0	168	186	1,276	1,821	1,746
BTM Solar	0	0	0	0	85	245	244
ROR Hydro	2,040	2,190	2,296	3,136	7,673	9,000	8,936
Impounding Hydro	1,239	1,257	1,263	971	1,494	1,433	1,407
Pumped Hydro	0	0	0	0	0	0	0
Wind	0	0	389	375	363	337	362
OSW	0	0	0	0	0	0	0
Total	**14,784**	**18,654**	**21,175**	**22,065**	**30,899**	**33,232**	**33,286**
BESS	3	33	88	87	280	965	878
Power Generation, in Percent (%) Share							
Coal	68	75	66	46	41	36	31
Natural Gas	-	-	-	-	0	1	7
Oil-based	3	1	1	0	0	0	0
Nuclear	-	-	-	16	12	11	11
RE	**29**	**24**	**34**	**37**	**47**	**52**	**51**
Biomass	1	1	1	1	1	0	0
WTE	-	-	-	-	-	-	-
Geothermal	5	4	3	3	2	5	5
Ground-Mounted Solar	1	1	10	12	9	8	8
Floating Solar	-	-	1	1	4	5	5
BTM Solar	-	0	0	0	0	1	1
ROR Hydro	14	12	11	14	25	27	27

Plant Type	2023	2025	2030	2035	2040	2045	2050
Impounding Hydro	8	7	6	4	5	4	4
Pumped Hydro	-	-	-	-	-	-	-
Wind	-	-	2	2	1	1	1
OSW	-	-	-	-	-	-	-
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

5. Committed and Indicative Power Projects Update

The DOE, through the EPIMB, publishes on the website the monthly list of committed[33] and indicative[34] power projects in Luzon, Visayas, and Mindanao grids using the information provided by project developers on its monthly accomplishment report (MAR) submission. Given the total number of additional capacities required by the Philippines by 2050 and considering the various scenarios discussed in the preceding section, the consolidated information provides a comprehensive overview of the current line-up of power projects that are essential to the development of the generation sector, aimed to meet the increasing demand for electricity of the country.

Based on the DOE's posting[35] as of 31 May 2023 (see Table 48), a total of **9,557 MW** committed power projects and an additional **2,084 MW** BESS projects are expected to be operational from 2023 to 2027, including those with commercial operation dates that are yet to be determined by the developers.

With the coal moratorium advisory[36] enforced by the DOE effective since 27 October 2020, the number of combined committed and indicative coal power projects has dropped by 72.3% from 11,289 MW in October 2020 to 3,125 MW in May 2023. The coal share is equivalent to 24.1% (2,305 MW) of the total share.

On the other hand, the RE contribution is currently at 38.4% (3,666 MW), natural gas at 36.6% (3,500 MW), and oil-fired power plants accounted for the remaining 0.9% (87MW) of the list. Of these committed power projects, **8,353 MW** capacity was included in the Power Outlook scenarios.

[33] Committed Projects refers to projects that have already secured its firm financial closing, already in construction stage, or Green Energy Auction (GEA) - awarded projects.
[34] Indicative Projects refers to projects that are in the pre-development stage, secured its Clearance to Undertake System Impact Study with the NGCP and are consistently submitting its Monthly Accomplishment Report to the DOE
[35] DOE's Posting of the List of Private Sector Initiated Power Projects
Retrieved through: https://www.doe.gov.ph/private-sector-initiated-power-projects
[36] Coal Moratorium Advisory
Retrieved through: https://www.doe.gov.ph/announcements/advisory-moratorium-endorsements-greenfield-coal-fired-power-projects-line-improving

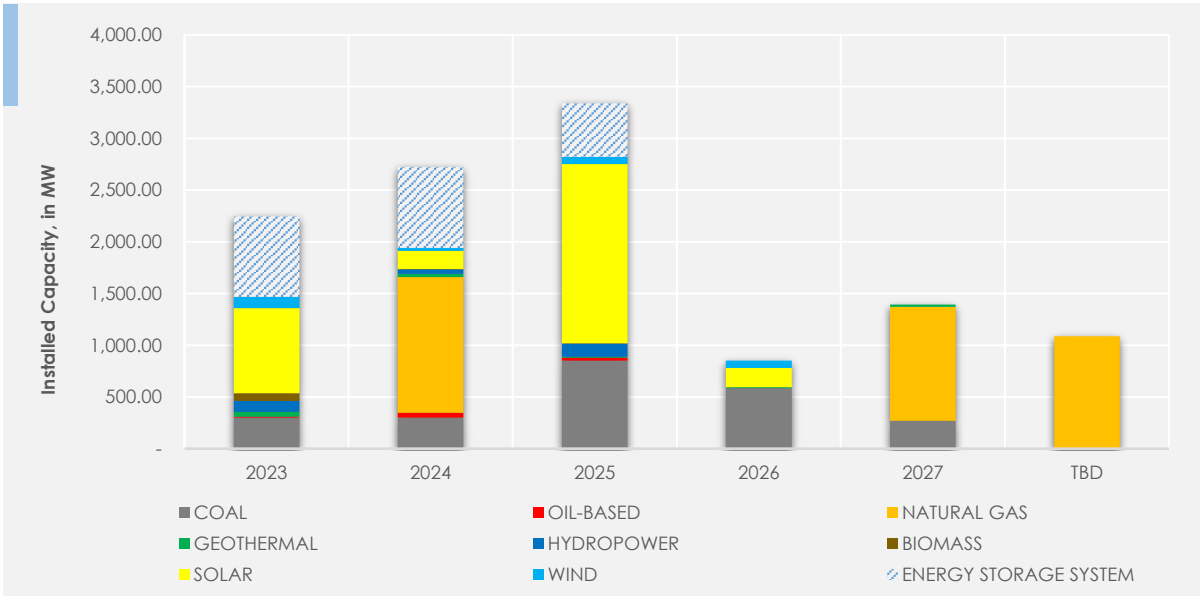


Figure 44. Committed Power Projects as of May 2023

Table 48. Target Commercial Operation of Committed Power Projects as of May 2023

Plant Type	2023	2024	2025	2026	2027	TBD	TOTAL
COAL	300	300	850	585	270	-	2,305
OIL-BASED	11	48	28	-	-	-	87
NATURAL GAS	-	1,313	-	-	1,100	1,088	3,500
RENEWABLE ENERGY	**1,157**	**279**	**1,942**	**266**	**22**	**-**	**3,666**
BIOMASS	*74*	*4*	*5*	-	-	-	*84*
GEOTHERMAL	*46*	*32*	*10*	*10*	*22*	-	*120*
SOLAR	*823*	*177*	*1,732*	*186*	-	-	*2,918*
HYDROPOWER	*104*	*41*	*127*	-	-	-	*271*
WIND	*110*	*25*	*68*	*70*	-	-	*273*
TOTAL	**1,468**	**1,939**	**2,820**	**851**	**1,392**	**1,088**	**9,557**
ESS	780	784	520	-	-	-	2,084
BATTERY ESS	780	784	520	-	-	-	2,084

TBD – To be determined.

Meanwhile, the indicative projects are projected to provide **57,258 MW** and **1,930 MW** BESS additional capacity for the country from 2023 to 2037, including those with no definite target commercial operation dates. About 1.4% (820 MW) will come from the coal power projects while natural gas projects are expected to contribute 18.9% (10,800 MW) and oil-based projects at 0.3% (155 MW) of the total share.

In pursuit of cleaner fuel in the energy mix, the RE projects will have the highest contribution at 79.4% (45,483MW), as depicted in Table 49. Among the RE technologies, wind technology is seen to dominate the indicative list with 55.0%

(31,497MW), followed by hydroelectric at 13.6% (7,812MW), solar at 9.9% (5,679MW), geothermal at 0.7% (421MW) and biomass at 0.1% (74MW).

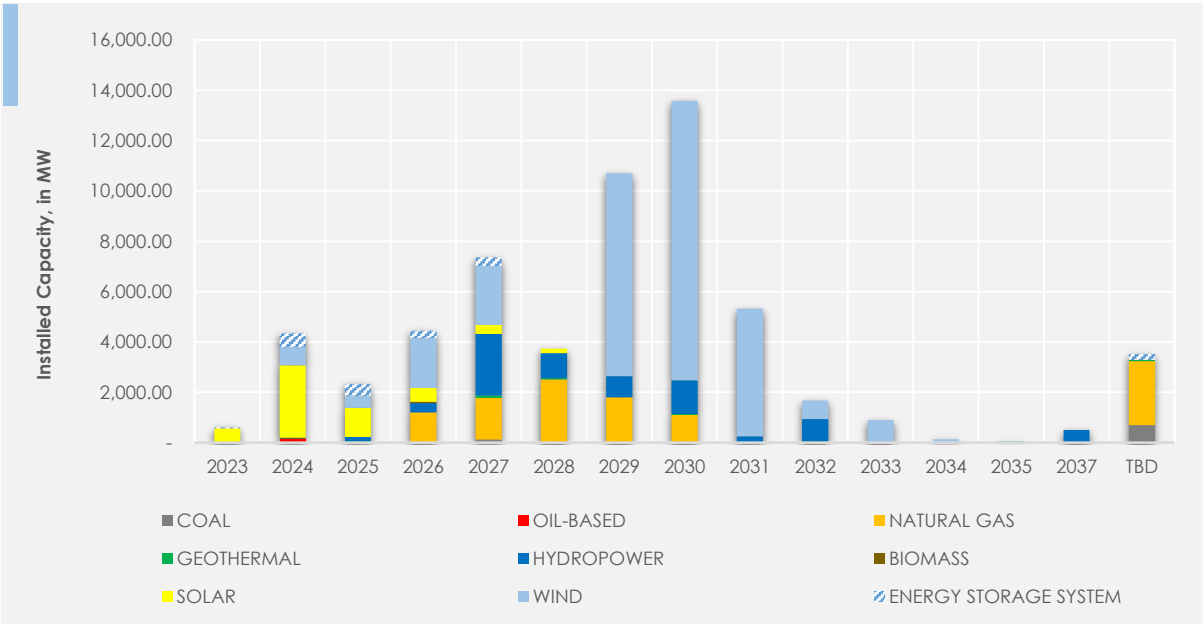


Figure 45. Indicative Power Projects as of May 2023

Table 49. Target Commercial Operation of Indicative Power Projects as of May 2023

Plant Type	2023	2024	2025	2026	2027	2028	2029	2030
COAL	-	-	-	-	120	-	-	-
OIL-BASED	-	155	-	-	-	-	-	-
NATURAL GAS	-	-	-	1,200	1,650	2,510	1,800	1,100
RENEWABLE ENERGY	**567**	**3,643**	**1,864**	**2,948**	**5,246**	**1,224**	**8,901**	**12,480**
GEOTHERMAL	-	*36*	*60*	-	*105*	*50*	-	*40*
HYDROPOWER	-	-	*165*	*377*	*2,440*	*993*	*847*	*1,340*
BIOMASS	*12*	*12*	-	*50*	-	-	-	-
SOLAR	*555*	*2,876*	*1,162*	*540*	*366*	*181*	-	-
WIND	-	*719*	*476*	*1,982*	*2,335*	-	*8,054*	*11,100*
TOTAL	**567**	**3,798**	**1,864**	**4,148**	**7,016**	**3,734**	**10,701**	**13,580**
ESS	**40**	**550**	**471**	**300**	**348**	**-**	**-**	**-**
BATTERY ESS	*40*	*550*	*471*	*300*	*348*	-	-	-

Plant Type	2031	2032	2033	2034	2035	2037	TBD	TOTAL
COAL	-	-	-	-	-	-	700	820
OIL-BASED	-	-	-	-	-	-	-	155
NATURAL GAS	-	-	-	-	-	-	2,540	10,800
RENEWABLE ENERGY	**5,323**	**1,668**	**900**	**130**	**40**	**500**	**50**	**45,483**
GEOTHERMAL	-	*40*	-	-	*40*	-	*50*	*421*
HYDROPOWER	*250*	*900*	-	-	-	*500*	-	*7,812*
BIOMASS	-	-	-	-	-	-	-	*74*
SOLAR	-	-	-	-	-	-	-	*5,679*
WIND	*5,073*	*728*	*900*	*130*	-	-	-	*31,497*
TOTAL	**5,323**	**1,668**	**900**	**130**	**40**	**500**	**3,290**	**57,258**
ESS	**-**	**-**	**-**	**-**	**-**	**-**	**222**	**1,930**
BATTERY ESS	-	-	-	-	-	-	*222*	*1,930*

TBD – To be determined.

6. Committed Power Projects and Associated Transmission Projects

Tables 50 to 52 provide a comprehensive listing of the major committed power plants in Luzon, Visayas, and Mindanao. These tables also include details about the associated transmission projects that have been planned to facilitate the integration of these power projects into the respective regions.

6.1 Luzon

Table 50. Luzon Committed Power Projects and Associated Transmission Projects

Based on DOE List of Private Sector-Initiated Power Projects as of May 2023			Based on Transmission Development Plan 2023-2040		
Proposed Major Power Projects	**Capacity (MW)**	**Commercial Operation**	**Connection Point**	**Associated Transmission Project**	**Estimated Time of Completion**
Coal					
Mariveles Coal-Fired Power Plant Phase I and 2	1,200	Unit 1–Aug 2023 Unit 2–Nov 2023 Unit 3–Jan 2024 Unit 4–May 2024 Unit 5–Dec 2025 Unit 6–Mar 2026 Unit 7–Jun 2026 Unit 8–Sept 2026	Mariveles (Alas-asin) 500 kV SS	Mariveles–Hermosa 500 kV TL Balsik (Hermosa)–San Jose 500 kV TL	Jan 2024
MPPL Supercritical Pulverized Coal Thermal*	700	Unit 1&2–Sept 2024 Unit 3–Dec 2024	Bolo 500 kV Substation	Western 500 kV BackboneStage 2 Palauig 500 kV Substation	Dec 2025 Dec 2027
Oil-Based					
SPC – Tarlac Bunker Fired Power Plant*	11.04	Sept 2023	TARELCO II Facility	None	N/A
Natural Gas					
EERI Batangas Combined Cycle Power Plant Phase 1 and 2	1,312.5	Unit 1&2–Sept 2024 Unit 3–Dec 2024	Ilijan 500 kV Switchyard	None	N/A
BCEI Natural Gas-Fired Power Plant	1,100	Jan 2027	Pinamucan 500kV Substation	Pinamucan 500 kV Substation	Jun 2024
EWC CCGT Power Plant*	650	TBD	Pagbilao 230 kV Substation	Pagbilao 500 kV Substation	Mar 2022
Geothermal					
Tiwi Binary Geothermal Project	17	Oct 2023	Tiwi-C 69 kV SS	None	N/A
Palayan Binary Power Plant	29	Sept 2023	Bacman 230 kV SS	None	N/A
Tanawon Geothermal Project	20	Oct 2024	Bacman 230 kV SS (through Palayan 230 kV Switchyard)	-	N/A
Maibarara 3 Geothermal Power Project	20	Dec 2025	TBD	TBD	TBD
Bacman 4 Botong - Rangas Geothermal Project	20	Dec 2026	TBD	TBD	TBD
Kayabon Geothermal Project	30	Dec 2026	TBD	TBD	TBD
Kalinga Geothermal Power Project - Phase 1	40	Dec 2030	TBD	TBD	TBD
Kalinga Geothermal Power Project - Phase 2	40	Dec 2032	TBD	TBD	TBD

Based on DOE List of Private Sector-Initiated Power Projects as of May 2023			Based on Transmission Development Plan 2023-2040		
Proposed Major Power Projects	**Capacity (MW)**	**Commercial Operation**	**Connection Point**	**Associated Transmission Project**	**Estimated Time of Completion**
Kalinga Geothermal Power Project - Phase 3	40	Dec 2034	TBD	TBD	TBD
Mt. Malinao Geothermal Project	50	Dec 2025	TBD	TBD	TBD
Labo Geothermal Power Project	105	Dec 2027	TBD	TBD	TBD
Hydro					
Biyao HPP	0.8	Dec 2023	KAELCO Facility	None	N/A
Laguio Malaki 1 HPP	1.6	Aug 2023	MERALCO Facility	None	N/A
Matuno 2 HEPP	8	Jun 2023	Bayombong– Lagawe 69 kV TL	None	N/A
Colasi HPP	1	Jul 2023	CANORECO Facility	None	N/A
Mariveles HPP	0.6	Aug 2023	PENELCO Facility	None	N/A
Ibulao HPP	4.500	Jul 2023	Bayombong– Lagawe 69 kV TL	None	N/A
Labayat River (Upper Cascade) HPP	3	Jun 2023	Lumban– FAMY-Infanta 69 kV TL	None	N/A
Man-Asok HPP	3	Nov 2021	BENECO Facility	None	N/A
Lalawinan Mini-Hydro PP	3	Dec 2024	Lumban– FAMY-Infanta69 kV TL	None	N/A
Tubao HPP	1.5	Dec 2025	LUELCO Facility	None	N/A
Tibag HPP	4.40	Jun 2023	Lumban– FAMY-Infanta69 kV TransmissionLine	None	N/A
Rangas HPP	1.5	Dec 2025	CASURECO IV Facility	None	N/A
Dupinga HPP	3	Jul 2023	NEECO II A2 Facility	None	N/A
Kapangan HPP	60	Dec 2025	Bacnotan 69 kV SS	None	N/A
Daet HPP	5	Dec 2025	CANORECO Facility	None	N/A
Ibulao I HPP	6	Jun 2024	Bayombong– Lagawe 69 kV TL	None	N/A
Tignoan River (Upper Cascade) HPP	1.5	Dec 2025	Lumban– FAMY-Infanta 69 kV TL	None	N/A
Sablan 1 HPP	20	Nov 2025	La Trinidad–Calot 69 kV TL	None	N/A
Asin-Hungduan HPP	9.8	Jun 2024	TBD	TBD	TBD
Likud 2 HPP	0.56	Dec 2024	IFELCO Facility	None	N/A
Dipalo HPP	4.15	Dec 2025	Nagsaag-Umingan 69 kV TL	None	N/A
Biomass					
2.4 MW Biogas PPP	2.4	Aug 2023	PELCO III Facility	None	N/A
1.2 MW Biogas PPP	1.2	Jan 2024	MERALCO Facility	None	N/A
Isabela Rice husk-Fired Biomass PPP	5	Aug 2023	ISELCO II Facility	None	N/A
Solar					
Concepcion 1 SPP Phase 3	12	Jun 2023	Concepcion 69 kV SS	None	N/A
Concepcion 1 SPP Phase 4	30	Aug 2023	Concepcion 69 kV SS	None	N/A
Bulacan 2 SPP	17.603	Dec 2024	San Rafael 69 kVSS	None	N/A
Ilocos Norte SPP	87.594	Feb 2023	Laoag 115 kV SS	None	N/A

Based on DOE List of Private Sector-Initiated Power Projects as of May 2023			Based on Transmission Development Plan 2023-2040		
Proposed Major Power Projects	**Capacity (MW)**	**Commercial Operation**	**Connection Point**	**Associated Transmission Project**	**Estimated Time of Completion**
Cayanga-Bugallon SPP*	74.800	Aug 2023	Bolo 230 kV SS	Bolo-Balaoan 500 kV TL	Mar 2028
PAVI Green Naga SPP	40.400	Dec 2024	Naga-Lagonoy 69kV TL	None	N/A
Talugtug SPP	99.980	Mar 2025	Nagsaag–Umingan 69 kV TL	Nagsaag–Tumana 69 kV TL	Jun 2024
Concepcion Tarlac 2 SPP	200	Dec 2025	Concepcion 230 kV SS	Marilao–Mexico 230 kV TI Upgrading	Aug 2032
Santa Rosa Nueva Ecija 2 SPP	280	Dec 2025	TBD	TBD	TBD
Tayabas SPP	450	Dec 2025	Tayabas 230 kV SS	Taguig-Silang 500 kV TL	Feb 2031
Arayat-Mexico SPP Phase 2	30.933	Mar 2023	Mexico–Clark 69 kV TL 2	None	N/A
Pinugay SPP	67.500	Mar 2023	Tap connection along the MERALCO-owned Dolores–Teresa–Malaya 115kV Sub-TL which is radially connected to NGCP's Taytay SS	None	N/A
Raslag III SPP	13.600	Mar 2023	Mexico-Clark 69 kV TL 1	Clark-Mabiga 69 kV TL Line	Feb 2025
Currimao SPP	48.118	Jun 2023	Currimao 115 kV SS	-	-
Lal-lo Hybrid SPP	82.448	Sep 2023	Lal-lo (Magapit) 69 kV SS	Nagsaag–Santiago 500 kV TL	Oct 2031
Sapang Balen Solar 2 Power Project (Phase I)	92.799	Dec 2024	Magalang 230 kV SS	Magalang 230 kV SS	Dec 2027
Sapang Balen Solar 2 Power Project (Phase 2)	92.799	Jun 2025	Magalang 230 kV SS	Magalang 230 kV SS	Dec 2027
Sapang Balen Solar 2 Power Project (Phase 3)	92.799	Dec 2025	Magalang 230 kV SS	Magalang 230 kV SS	Dec 2027
Sapang Balen Solar 1 Power Project	96.236	Dec 2025	Magalang 230 kV SS	Magalang 230 kV SS	Dec 2027
Sapang Balen Solar 2 Power Project (Phase 4)	92.799	Jun 2026	Magalang 230 kV SS	Magalang 230 kV SS	Dec 2027
Sapang Balen Solar 2 Power Project (Phase 5)	92.799	Dec 2026	Magalang 230 kV SS	Magalang 230 kV SS	Dec 2027
Wind					
Caparispisan II Wind Power Project	70.000	Dec 2025	Laoag 115 kV SS	None	N/A
Calatagan Wind Power Project	30.000	Dec 2025	Tuy 230 kV SS	Tuy 500/230 kV SS - Stage 1	Dec 2024
Balaoi and Caunayan Wind Power Project	160.000	Dec 2025	Laoag 115 kV SS	Bolo–Balaoan 500 kV TL Balaoan–Laoag 500 kV TL	Mar 2028

Source: Transmission Development Plan (TDP), 2023-2040 – not yet approved by the DOE

Note: The commissioning year for each power plant is still subject to update
TBD – To be determined
N/A – Not applicable

*With System Impact Study (SIS)

6.2 Visayas

Table 51. Visayas Committed Power Plants and Associated Transmission Projects

Based on DOE List of Private Sector-Initiated Power Projects as of May 2023			Based on Transmission Development Plan 2023-2040		
Proposed Major Power Project	**Capacity (MW)**	**Commercial Operation**	**Connection Point**	**Associated Transmission Project**	**Estimated Time of Completion**
Coal					
Palm Concepcion Coal-Fired Power Project*	135	Jun 2026	Direct connection to Concepcion Substation	Eastern Panay Transmission Line Project	Completed
Oil					
11.174 MW Calbayog Bunker C-Fired Diesel Power Plant	11.174	Jul 2023	Calbayog 69 kV SS	Visayas SS Upgrading Project 2	Dec 2025
Sulzer Diesel Power Plant	5.500	Sept 2024	Lapu-lapu 69 kV SS	None	N/A
Caterpillar Diesel Power Plant	2.000	Sept 2024	Lapu-lapu 69 kV SS	None	N/A
Cummins Diesel Power Plant	1.000	Sept 2024	Lapu-lapu 69 kV SS	None	N/A
Biomass					
6 MW Biomass Power Plant Project	6.000	Dec 2023	Tap connection along Bayawan-Tadlong 69 kV line	CNP 230 kV Backbone Stage 3	Mar 2024
Central Azucarera de San Antonio	8.000	Dec 2023	Dingle 69 kV SS	-	-
Geothermal					
Biliran Geothermal Plant Project	50	Unit 1 (2 MW): Dec 2023 Unit 2 (6 MW): Sept 2024 Unit 3 (10 MW): Dec 2025 Unit 4 (10 MW): Dec 2026 Unit 5 (22 MW): Dec 2027	Cut-in along LemonTap-Naval 69 kV TL	Tabango–Biliran 69 kVTransmission Line Project	June 2027
Northern Negros Geothermal Project	5.60	Sep 2024	Bacolod 138 kV SS	CNP 230 kV Backbone Stage 3	Mar 2024
Mahanagdong Geothermal Brine Optimization Plant	36.000	Dec 2024	TBD	TBD	TBD
Dauin Geothermal Project	40.000	Dec 2025	TBD	TBD	TBD
Hydro					
Timbaban	18.0	Aug 2023	Direct Connection to Nabas Substation	Panitan–Nabas 138 KV TL 2Project Nabas–Caticlan–Boracay TL Project	May 2021
Igbulo (Bais) Hydroelectric PowerProject	5.1	Dec 2023	Cut-in along Sta. Barbara-San Jose 69kV TL	Tigbauan 138 kV Substation Project	Sept 2027
Solar					
Kananga-Ormoc Solar Power Project*	300.00	Dec 2025	Ormoc 230 kV	Cebu–Leyte 230 kV Interconnection L3&4 Project	Dec 2031
Wind					

Based on DOE List of Private Sector-Initiated Power Projects as of May 2023			Based on Transmission Development Plan 2023-2040		
Proposed Major Power Project	Capacity (MW)	Commercial Operation	Connection Point	Associated Transmission Project	Estimated Time of Completion
13.2MW Nabas-2 Wind Power Project	13.200	May 2025	Through Nabas – Caticlan 69 kV line	CNP 230 kV Backbone Stage 3	Mar 2024

Source: TDP 2023-2040 – not yet approved by DOE

Note: The commissioning year for each power plant is still subject to update
TBD – To be determined
N/A – Not applicable

*With SIS

6.3 Mindanao

Table 52. Mindanao Committed Power Plants and Associated Transmission Projects

Based on DOE List of Private Sector-Initiated Power Projects as of May 2023			Based on Transmission Development Plan 2023-2040		
Proposed Major Power Project	Capacity (MW)	Commercial Operation	Connection Point	Associated Transmission Project	Estimated Time of Completion
Coal					
FDC-MPC CFB Coal-Fired Power Plant*	270	March 2027	Villanueva Substation	Villanueva–Kinamlutan 230 kV TL	Jan 2027
Hydro					
Maladugao (Upper Cascade) HPP	8.4	Jan 2025	Maramag Substation	No Transmission Reinforcement Required	N/A
Bubunawan HPP	23	Dec 2025	No SIS yet		
Liangan HPP*	11.9	Aug 2023	Agus 6 Substation	No Transmission Reinforcement Required	N/A
Sipangpang HPP	1.800	May 2023	TBD	TBD	TBD
Maramag HPP	2.040	Jun 2023	TBD	TBD	TBD
Sipangpang HPP	1.8	May 2023	TBD	TBD	TBD
Siguil HPP	14.5	Jun 2023	SOCOTECO 2's proposed Tinoto Line 3	-	-
Tagpangi HPP	1.7	Dec 2023	TBD	TBD	TBD
Osmeña HPP	1	Dec 2023	TBD	TBD	TBD
Gakaon HPP	2.23	Dec 2024	TBD	TBD	TBD
Titunod HPP	3.6	Dec 2024	TBD	TBD	TBD
Malitbog HPP	3.7	Nov 2025	Villanueva 69 kV SS	-	-
Silo-O HPP	3.7	Nov 2025	Villanueva 69 kV SS	-	-
Mat-I 1 HPP	4.85	Nov 2025	Jasaan – Balingasag 69 kV Line	-	-
Clarin HPP	6.9	Nov 2025	Villanueva 230 kV SS	-	-
Biomass					
10 MW Biomass Cogeneration Plant	3.400	Nov 2023	TBD	TBD	TBD
10 MW Biomass Cogeneration Plant	10.000	Dec 2023	TBD	TBD	TBD
6 MW Biomass Power Plant Project	6.000	Sep 2023	TBD	TBD	TBD

Source: TDP 2023-2040 – Not yet approved by DOE

Note: The commissioning year for each power plant is still subject to update
TBD – To be determined
N/A – Not applicable

*With SIS

CHAPTER 3. POWER SECTOR ROADMAP 2023-2050

(Short-, Medium-, and Long-Term)

CHAPTER III

Power Sector Roadmap 2023-2050

In this chapter, the DOE will present the new power sector roadmaps for generation, transmission, distribution, supply, electricity market, off-grid development, and total electrification. The updated roadmap is divided into three-term goals, the short-term, medium-term, and long-term. These roadmaps are anchored on three main goals by 2050 namely:

- Energy security, resiliency, affordability, and sustainability.
- Transparent and fair playing field in the power industry; and
- Electricity access for all.

By presenting these goals, the power sector roadmap sets a clear and comprehensive trajectory towards a future characterized by energy security, fairness, and accessibility for all. The integration of smart grid technologies and improvements to the sector's database further align these roadmaps with the evolving needs and challenges of the energy landscape.

Goal 1: Energy Security, Resiliency, Affordability and Sustainability

1. Generation

Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050
• Smooth integration of new and emerging power generation technologies into the country's energy mix • Enhance policy on the performance and operation of generation facilities toward self-healing grid system. • Policy support to incentivize more investments in generation. • Development of omnibus guidelines for the processing of generating unit/s requirements for commercial operation and other purposes	• Smooth integration of new and emerging power generation technologies into the country's energy mix • Policy on Virtual Power Plant / Consolidation of Distributed Energy Resources System	• Enhance and utilize non-fossil-based energy in power generation in support of cleaner energy transition and decarbonization. • Increase power generation flexibility

1. Smooth integration of new and emerging power generation technologies into the country's energy mix

Aligned with the nation's commitment to transitioning to a cleaner and more sustainable energy resources, the DOE is proactively exploring strategies to diversify and integrate new and emerging power generation technologies in the energy mix, anchored to enhancing the power supply security and reliability of the country's energy mix.

In this PDP update, the DOE has taken proactive move by incorporating various new emerging technologies (e.g., offshore wind, nuclear, energy storage system, and liquefied natural gas) into the generation capacity expansion planning. The goal is to offer valuable guidance to potential investors and financing institutions, providing insights into productive investment opportunities within the country.

On the policy and regulatory side, the DOE will identify potential barriers, propose incentives, and formulate supportive policies to promote the adoption and create a conducive environment for these new emerging technologies. The DOE will assess the reliability of these new technologies to ensure a consistent and stable power supply consistent with its mandate under the RA No. 9136, EPIRA Section 37[37]. Further, to develop backup systems and contingency plans to maintain energy security in case of unexpected failures or disruptions.

2. Enhance policy on the performance and operation of generation facilities toward self-healing grid system

As the country endeavors to achieve the targets of 35% and 50% RE share by 2030 and 2040, respectively, the reliability of the power system is expected to face heightened vulnerability due to the intermittent nature of incoming renewable sources. Given these anticipated challenges, it is essential that generation facilities must be resilient, dependable, and adaptable to any abrupt changes in the power network. The incorporation of energy storage systems, smart-grid technologies, and distributed energy sources will play a crucial role in mitigating the impact of RE sources, as it will provide buffer for abrupt changes in the power supply and demand dynamics. Achieving interoperability is also one of the key focuses, as it will enhance the overall flexibility and adaptability of the power system. The DOE will formulate policies to foster adaptable and reliable power systems in the face of an evolving energy landscape, as well as ensure that the generation sector will seamlessly integrate with these advanced systems and components.

3. Policy support to incentivize more investments in the generation sector

Given the existing policy framework primarily centered on fiscal and non-fiscal incentives, the DOE is committed to continually devise policies and programs that will further incentivize investments in the generation sector. Some of these measures are currently under discussion within the Department are:

a) Collaboration between the government and financial institutions, facilitated by the DOE's IPO, will enable conversations aimed at improving financial access for potential investments in the energy sector. Following a recent roundtable discussion with lenders and financing institutions, the IPO is set to initiate a sequence of sessions and engagements aimed at supporting and conducting an information campaign about the upcoming developments in the Philippine energy sector. This will include exploring other approved equivalent requirements, such as auction programs and WESM options, as viable alternatives to the intricate long-term power supply agreement requirements.

[37] EPIRA Section 37 entitled, "Role of the Department of Energy"

b) RE Projects Grid Connection – The DOE, in collaboration with the National Transmission Corporation (TransCo) and a group of technical consultants[38] initiated the formulation of a Smart and Green Grid Plan (SGGP) that seeks to establish a comprehensive roadmap for transforming the country's existing electric grid into a smart, green, and sustainable transmission system in support of the Philippine Energy Transition Program (PETP). The SGGP aims to intricately design the Philippines' Transmission Network, encompassing existing infrastructure and expansion plans to accommodate incoming generation projects as outlined in the Clean Energy Scenario goals of the country. The SGGP aims to seamlessly integrate additional RE power projects that are expected to become operational from 2024 to 2050.

4. Development of omnibus guidelines for the processing of generating unit/s requirements for commercial operation and other purposes

The DOE is set to formulate an omnibus guideline, which will serve as a unified framework consolidating all existing policies, application processes within the EVOSS, and other pertinent permitting procedures. This consolidated guideline is intended to streamline and harmonize the elements involved in obtaining approvals and permits, ensuring a more efficient and coherent process for projects leading up to their commercial operation.

5. Policy on Virtual Power Plant / Consolidation of Distributed Energy Resources System

Advancements in technology are enhancing energy efficiency, cutting costs, and promoting environmental sustainability. As the power industry evolves, there is a growing focus on incorporating innovative concepts like Virtual Power Plants (VPPs) and Distributed Energy Resources (DERs).

DERs, as defined in ERC Resolution No. 17, Series of 2023[39], refers to power sources connected to the Distribution System or electrical system of the End-Users, that could be aggregated to meet a demand. These are decentralized networks of small-scale energy equipment (solar, wind, or hydro), energy storage systems, intelligent grid management technologies, and demand response mechanisms of end-users, among others, are connected within a system network. VPP[40], is defined as an aggregator that bundles and optimizes the use of DERs. The purpose of VPP is to operate various DERs, such as renewables and storage systems among others, as a unified and optimized entity which allows them to collectively meet size requirements for participating in wholesale energy markets.

[38] Funded by the United States Agency for International Development (USAID) under the Energy Secure Philippines (ESP) Project.
[39] Entitled, "A Resolution Adopting the 2023 Revised Rules for the Issuance of Certificates of Compliance for Generation Facilities" issued on 13 September 2023
[40] Aggregators, Innovation Landscape Brief, International Renewable Energy Agency (IRENA)
Retrieved through: https://www.energy.gov/sites/default/files/2022-11/DOE-LPO-Poster-Series-05-VPP.pdf

The DOE is currently looking into possible avenues to encourage the deployment and adoption of these technologies through the creation of a policy framework and introduction of incentive programs (e.g. market participation, interoperability mechanisms, and grid-readiness to accept such technologies among others).

6. Enhance and utilize new technologies in power generation in support of cleaner energy transition and decarbonization

The DOE is actively advancing cleaner energy transition and decarbonization by embracing new technologies in power generation. This strategic initiative involves introducing conducive policies, incentives, and development goals to purposefully transform the country's power generation mix.

In the RE sector, the DOE has already introduced significant policies to boost the entry of RE sources, including the Renewable Portfolio Standard (RPS), Renewable Energy Market (REM), the Green Energy Option Program (GEOP), and conduct of Green Energy Auction (GEA). A significant development in the RE industry is the legal opinion issued by the Department of Justice (DOJ) on 29 September 2022, regarding the maximum (100.0%) foreign equity participation in exploring, developing, and utilizing solar, wind, hydro, and ocean or tidal energy resources. This opinion is expected to be a game-changer, thereby reducing costs associated with RE projects in the country.

Furthermore, the DOE considers nuclear technology as a viable, stable, and emission-free energy option for the Philippines, given that it has been globally recognized to provide diverse applications in the energy sector. In adherence to the commitment to explore alternative energy resources to ensure supply security as mandated by the EPIRA, the government actively engages in studying and advancing the development of nuclear energy by implementing policies and programs to support and promote the exploration of nuclear power development as a significant component of the country's energy mix.

EO No. 116, Series of 2020[41], issued on 24 July 2020, mandates a study for adopting a National Position on the Nuclear Energy Program (NEP) in accordance with pertinent International Atomic Energy Agency (IAEA) guidelines, relevant laws, rules, and regulations. Moreover, it establishes the Nuclear Energy Program Inter-Agency Committee (NEPIAC) which is tasked to formulate the national position on NEP and come up with a national strategy and roadmap including measures to address the challenges under the Milestones Approach of the International Atomic Energy Agency (IAEA), consisting of 19 Nuclear Infrastructure Issues. NEPIAC summarizes these infrastructure issues into four areas tagged as "The Four Cornerstones Approach" comprising of National Policy, Legislative Framework, Alignment with International Standards, and Public Awareness. Further advancing the NEP, former President Rodrigo R. Duterte through EO No. 164, Series of 2022[42] approved the Philippines' Nuclear Power Program on 28 February 2022. This directive aims to utilize nuclear power to address the anticipated decline of coal-

[41] Entitled, "Directing a Study for the Adoption of a National Position on Nuclear Energy Program, Constituting a Nuclear Energy Program Inter-Agency Committee, and for Other Purposes."
[42] Entitled, "Adopting a National Position on a Nuclear Energy Program and for Other Purposes."

fired power plants with the existing coal moratorium advisory along with coal repurposing based on the directive on Energy Transition towards cleaner energy in the future. The government, under this order, is empowered to adopt and implement a national position for the NEP, ensure peaceful nuclear technology use, assess, and develop NEPs, engage with stakeholders, and make recommendations on the viability of nuclear power installations in the country.

Lastly, considering the Philippines' abundant ocean and water resources, the DOE is continuously exploring and conducting further research on the ocean thermal conversion potentials. Concurrently, the DOE is delving into the study of hydrogen-based technologies, exploring avenues such as co-firing and mechanisms linked to renewable energy.

7. Increase power generation flexibility

The DOE had already identified the need to import Liquefied Natural Gas (LNG) in the future due to the depleting supply of indigenous natural gas in the country from the existing Malampaya gas facility. Natural gas has less carbon dioxide emission compared to coal and fuel oil. Increasing flexibility in power generation enables the system to synchronously adapt and adjust to dynamic conditions at any given time, resulting in optimized electricity demand and supply flow.

Power generation from natural gas is greatly pushed to provide the baseload, intermediate, or mid-merit supply requirement of the country, as well as replacement to coal and fuel oil in the future. Mid-merit gas power plants are load-following plants that can easily adjust their power production with the fluctuations in electricity demand.

As of 31 December 2022, a total of 3,500 MW committed installed capacity from natural gas is expected to be operational from 2022 to 2025. The DOE closely monitors the development of these projects, along with the 9,090 MW indicative natural gas capacity, which is still under the pre-development stage. These natural gas power plants, along with the existing ones should be fueled by the seven (7) proposed LNG terminal facilities that are expected to be completed from 2023 to 2026, to wit:

Table 53. List of LNG Terminal Facilities in the Philippines

Proponent	Project	LNG Storage Capacity[43]	Location	Estimated COD	Anchor Market
FGEN LNG Corporation	Interim Floating Storage and Regasification Unit (FSRU)	5.26 MTPA	Batangas City, Batangas	September 2023 (LNG Terminal) August-Sept 2023 (LNG Delivery)	Existing gas-fired power plants Proposed Fgen facilities extension
Linseed Field Corporation	Floating Storage Unit (FSU) and Onshore Regasification and 60,000	3 MTPA	Batangas City, Batangas	April 2023 (FSU and onshore regasification	1,200 MW Ilijan Power Plant Batangas Combined Cycle Power Project

[43] 1 metric tonnes per annum (MTPA) is roughly equivalent to 1000 MW as per Oil Industry Management Bureau

Proponent	Project	LNG Storage Capacity[43]	Location	Estimated COD	Anchor Market
	cbm buffer LNG storage tank			April 2023 (LNG delivery)[44]	
Energy World Gas Operations Philippines Inc.	LNG Storage and Regasification Terminal	3 MTPA	Pagbilao, Quezon	December 2023 (Unit 1 GT)[45]	Self-owned Gas-fired power plant (under construction)
Luzon LNG Terminal Inc.	FSRU LNG Terminal	4.4 MTPA	Batangas bay within the municipal waters of Mabini and San Pascual, and city water of Batangas	December 2025	EGCO Group[46] 3rd party access mode[47]
Vires Energy Corporation	FSRU Terminal	3 MTPA	Batangas City, Batangas	April 2026	Proposed 500 MW Floating Power Plant
Shell Energy Philippines, Inc.	FSRU Terminal	3 MTPA	Batangas City, Batangas	September 2025	AC Energy proposed gas-fired power projects in Mariveles and Subic JG Summit for 81 MW existing power plant and 30-40 MW expansion BCE 1,100 MW Proposed Power Plant
Samat LNG Corporation	Small-scale LNG terminal	14,400 m^3	Mariveles, Bataan	May 2025	Ingrid Power Holding's 40 MW conversion from diesel to natural gas Manufacture industries within 300-km radius of the terminal

Pursuing greater flexibility also allows the integration of variable RE (VRE) like solar and wind technologies. Flexible power plants like natural gas can reduce their electricity generation output (quicker than baseload power plants with longer ramp-up and down periods) when solar and wind production are at their highest. This flexibility of power generation facilities allows the reduction of VRE curtailment and maximizes its operating capacity during its economic life.

[44] Update as of July 2023
[45] Update from DOE site inspection in November 2022
[46] Small-scale LNG break bulk
[47] Transparent and non-discriminatory open access model

Goal 1: Energy Security, Resiliency, Affordability and Sustainability

2. Transmission and System Operation

Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050
• Assess the performance of the transmission system operator. • Review and develop policy on the reliability requirements of the grid, including system protection. • Enhance the Transmission Development Planning • Establish a coordination system to ensure the timely completion of transmission projects. • Develop supplementary policies for Ancillary Services • Interconnect the Luzon, Visayas, and Mindanao grids.	• Policy development on Smart Grid and Green Plan • Interconnections of Batangas-Mindoro; Quezon-Marinduque; Catanduanes-Camarines Sur; Palawan-Mindoro.	• Interconnect off-grid islands to the main grid. • Encourage looping of Luzon Grid and Visayas Sub-grids • Assessment of the Renewal of the Concessionaire Agreement

1. Assess the performance of the transmission system operator

The DOE promulgated Department Order No. DO2023-06-0018[48], that will establish a comprehensive and sustainable mechanism to confirm and validate the level of compliance of the Transmission Network Provider and SO. It provided policies, rules, and guidelines on how to conduct the assessment.

2. Enhance policy on the performance and operation of transmission system toward self-healing grid system

The self-healing grid is a smarter network that employs sensor, control, and communication technologies to enable real-time troubleshooting of unanticipated situations. With the said premises, the DOE issued the national policy framework for the smart grid and roadmap for distribution utilities through Department Circular No. DC2020-02-0003[49]. Under this Circular, the DOE adopted several criteria for transitioning the entire generation, transmission and distribution power system into a smart grid by 2040.

3. Review and develop policy on the reliability requirements of the grid, including system protection

[48] Entitled, "Creating the Performance Assessment and Audit Team for the Operations of the Transmission Network Provider and System Operator (PAAT-TNPSO) and Providing for Its Responsibilities"
[49] Entitled, "Providing a National Smart Grid Policy Framework for the Philippine Electric Power Industry and Roadmap for Distribution Utilities"

This pertains to projects that will ensure the reliability and protection of the Grid as prescribed in the Philippine Grid Code (PGC). In support of these projects, the DOE is continuously assessing ways and possible policy issuances in resolving the pending cases and permit applications involving these transmission projects, as these are critical in ensuring power reliability and protection.

4. Enhance the Transmission Development Planning (TDP)

In compliance with the EPIRA and its IRR, public consultations with electric power industry participants, namely generation companies, DUs, and end-users, were conducted to create and implement an enhanced and responsive 2022-2040 TDP. Though, TransCo was not involved in the TDP formulation, review, and evaluation as the grid owner in accordance with DOE Department Order No. DO2017-04-0004[50], TransCo commented that generally the projects in the TDP will aid the development of the grid and will help address the requirements for interconnections, generation entry, load growth, system reliability, operation and maintenance, and system operation.

5. Establish a coordination system to ensure the timely completion of transmission projects

Utilizing new transmission lines, increasing substation capacity, and upgrading transmission facilities are critical to effectively transfer electricity from new and existing plants to end customers. To ensure that transmission projects are completed on schedule, the DOE will continue to monitor the NGCP's monthly submission of the Transmission Projects Status Report. To reduce delays, the DOE continues to provide support to the NGCP through its endorsement to intervene and cooperate with other government agencies, as needed, to address concerns with right-of-way and permits, which create delays in transmission project completion.

6. Develop supplementary policies for Ancillary Services

On 4 October 2021, the DOE issued the Department Circular No. DC2021-10-0031, the AS Competitive Selection Process (AS-CSP) Policy, which mandates the NGCP to procure the required AS level through CSP. This policy was promulgated by the DOE to ensure transparency, competitiveness, and wide dissemination of bid opportunities to ensure the participation of all eligible generation companies to meet required levels of AS through Ancillary Services Procurement Agreements (ASPA). For an update, out of the thirty-eight (38) bidders issued with Notice of Award as a result of the 1st AS-CSP, only the Ancillary Services Procurement Agreements (ASPA) for the thirty-six (36) bidders were executed and filed due to non-acceptance of the award of two winning bidder.

[50] Entitled "Designating TransCo as Grid Owner to Participate in the Preparation, Review, and Evaluation of the Transmission Development Plan (TDP)"

7. Interconnect the Luzon, Visayas, and Mindanao grids

Having an interconnected grid system is one of the visions for the Philippines' electric power industry. Currently, Luzon and Visayas are already interconnected, while the integration of Mindanao is ongoing through the Mindanao-Visayas Interconnection Project, which is targeted to be completed by January 2024. To enable greater power supply import and export between the Luzon and Visayas grid, the Luzon–Visayas High Voltage Direct Current Bipolar Operation project is also proposed. Through an interconnected power network, the country can optimize its indigenous energy resources, such as natural gas in Luzon, geothermal in Visayas, and hydro in Mindanao.

8. Policy development on Smart Green and Grid Plan (SGGP)

The DOE is currently formulating the Smart and Green Grid Plan (SGGP) that aims to address major challenges confronting the electric power industry, like grid congestions, as it aspires to move its power system to be smart and capable of incorporating an increasing amount of variable renewable energy in the generating mix. The SGGP's goal is to provide a set of projects for grid upgrades, as well as high-priority modernization projects that will ensure that the energy transmission plan of the DOE will be achieved.

9. Interconnections of Batangas-Mindoro; Quezon-Marinduque; Catanduanes-Camarines Sur; Palawan-Mindoro

For the Batangas-Mindoro interconnection project, the linking of the Mindoro with the main Luzon Grid was envisioned to provide the island access to bulk generation sources in the main grid while at the same time providing the means to export possible excess power once the generation potentials, including RE-based plants, within the island have been developed.

With the envisioned interconnection of Mindoro Island to the Luzon Grid, the province of Palawan will be the next big island to be interconnected in terms of land area and energy demand. By connecting the existing Palawan grid to the Luzon grid via Mindoro Island, the province's present energy mix, which is primarily oil-based, is expected to depart from traditional sources in the coming years. This is owing to the anticipated introduction of renewable energy power plants, for which Palawan has a strong potential.

On the other hand, the proposed Quezon-Marinduque Interconnection Project involves interconnecting the island of Marinduque to the Luzon Grid through a submarine cable from General Luna, Quezon to Sta. Cruz, Marinduque. It aims to address the expected long-term development in the island province of Marinduque.

Lastly, the Camarines Sur–Catanduanes Interconnection Project aims to link the Catanduanes Island to the Luzon Grid and provide Catanduanes access to more reliable and competitive generation sources.

10. Interconnect off-grid islands to the main grid

A significant number of islands and far-flung areas in the country remain isolated from the main grid. These are classified as off-grid areas, which are the majority being operated and managed by the NPC-SPUG. In line to build one Philippine grid system, the DOE promulgated Department Circular No. DC2019-01-001[51]. This policy includes the assessment of economic feasibility and timeline for the eventual interconnection of off-grid areas into the main grid. It also requires the NGCP to prepare a report or an annual program for the interconnection of off-grid areas into the main grid to be integrated into the TDP.

11. Encourage looping of Luzon Grid and Visayas Sub-grids

The DOE envisioned the power system to have an extension and looping configuration in the three main island Grid of the country, providing an alternate transmission corridor to far-flung and radially connected areas for much more reliable power supply.

12. Assessment of the Renewal of the Concessionaire Agreement

Part of the objective of the DO2023-06-0018 is to have the other state-run firms like TransCo to have their respective participation in the audit undertaking which shall be centered on the performance of the transmission network provider and system operator in keeping with the provisions of its 25-year concession agreement with the government when it comes to the operation of the country's transmission facilities.

Goal 1: Energy Security, Resiliency, Affordability and Sustainability

3. Distribution

Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050
• Enhance digitalization of Distribution Development Plans • Ensure timely completion of Distribution Development Plans • Enhance the existing Competitive Selection Process Policy • Conduct policy review on the regulation and performance of Distribution Utilities • Review and develop climate-proof standards for distribution utility infrastructure.	• Develop policy to incentivize distributed energy resources and prosumer • Supplement existing policy toward smart grid systems and interoperability	• Transition to Smart Grid to improve the reliability of distribution facilities • Increase utilization of RE resources for power generation • Encourage consumers to utilize RE for non-power productive application

[51] Entitled, "Prescribing the Omnibus Guidelines on Enhancing Off-Grid Power Development and Operation"

1. Enhance digitalization of Distribution Development Plans

The DDP must be responsive to the developments in the electric power industry, thus the need to digitalize and optimize the current DDP Forms through the implementation of digital tools and platforms for efficient management and monitoring. This includes the updating of the existing DDP Forms and the creation of a database information system. The current DDP Forms shall be updated to integrate the new policies, laws, rules, and regulations into a single, uniform, detailed, and comprehensive DDP format. Likewise, a DOE DDP Information System shall be developed to serve as a database system of the contents of the DDP. This will be used internally by the DOE for easy processing of the information contained in the DDP, and externally by providing easy access to stakeholders of the DDP information to be accessible via the DOE website.

2. Ensure timely completion of Distribution Development Plans

Pursuant to Rule 7, Section 4(p) of the EPIRA-IRR and Department Circular No. DC2004-02-002[52], the DUs shall prepare and submit to the DOE an annual DDP not later than the 15th of March every year. In the case of ECs, it shall be submitted through the NEA for review and consolidation. Thereafter, the NEA shall submit to the DOE the National Electric Cooperatives Distribution Development Plan (NECDDP) not later than the 15th of March every year.

To assist the DUs in the preparation of a comprehensive DDP and ensure that the submissions are in accordance with the timelines set forth under the EPIRA, the DUs shall submit their initial DDP every 25th of January of each year for the DOE and NEA's review pursuant to Section 5.2 of DC2021-03-0003[53]. By March 15, the DUs shall submit their final DDP reflecting the changes based on the comments and recommendations of the DOE and NEA.

With the implementation of the said timelines, the DUs are expected to prepare and submit a comprehensive DDP on or before March 15. The NEA shall also be able to consolidate the NECDDP prior to its endorsement to the DOE by March 15. To further strengthen the timely submission of DDP, the DUs are mandated to upload their latest and duly accepted Power Supply Procurement Plan in the DOE CSP E-based Portal on or before June 30 as provided under Section 4.2 of DC2023-06-0021.

Considering that the plan is crucial in achieving a reliable power supply, the DOE and NEA require the timely preparation and submission of DDP by the DUs. The DOE is also working to further streamline the planning procedures and processes to ensure that the DUs will be able to comply with the timeline in the execution of CSP and project implementation. As part of streamlining the planning procedures and

[52] Entitled, "Prescribing the Guidelines for The Formulation of a Five-Year Distribution Development Plan Pursuant to Section 2 Of Department of Energy Circular No. 2003-12-011, Entitled "Enjoining All Distribution Utilities to Supply Adequate, Affordable, Quality and Reliable Electricity"

[53] Entitled, "Prescribing the Policy and Guidelines for the Formulation of the Distribution Utilities Distribution Development Plan Integrating the Relevant Laws, Policy Issuances, Rules and Regulations"

processes, DOE has to include discussions with ERC in fast-tracking CAPEX approval from the submitted DDPs for the immediate implementation of plans and programs of the DU.

3. Enhance the existing Competitive Selection Process Policy

On 30 June 2023, the DOE issued Department Circular No. DC2023-06-0021, which was published in The Daily Tribune and Business World on 04 July 2023, and took effect on 18 July 2023. The said DC amended the previous policies on the CSP which aimed to streamline the conduct of CSP and the responsibilities of the DOE, ERC, and NEA under the EPIRA that is adaptable and flexible to the needs of the DUs to ensure efficient, timely, and transparent procurement of power supply to the captive market. The issuance of this policy will also pave the way for the enhancement of the existing CSP E-based Portal.

4. Conduct policy review on the regulation and performance of Distribution Utilities

This is a continuous assessment of the DOE to harmonize the policy and regulatory framework applied to and adopted by DUs. The objectives of this activity are as follows:

a) Evaluate the quality of service provided by DUs in their respective franchise areas based on set performance standards.
b) Review existing laws, Department Circulars, ERC Resolutions, and other issuances related to DUs' regulatory framework and rate-making methodology.
c) Seek key energy agencies' evaluation of the current regulations applied to private DUs and ECs.
d) Recommend solutions to improve the quality of service provided to all electricity consumers, where both private DUs and ECs conform to the same operational performance standards.

5. Review and develop climate-proof standards for Distribution Utility infrastructures

The DUs shall ensure a resilient energy infrastructure through the adoption of energy resiliency in their plans and programs to mitigate the potential adverse effects of disasters on the distribution system in accordance with Department Circular No. DC2018-01-0001[54]. To further support the implementation of the policy, it aims to strengthen the distribution system and improve the resilience against naturally induced hazards through the following:

a) Review of the existing distribution construction standards generally adapted by the DUs;
b) Evaluation of the performance of the distribution system built using the present standards during the occurrences of naturally induced hazards; and

[54] Entitled, "Adoption of Energy Resiliency in the Planning and Programming of the Energy Sector to Mitigate Potential Impacts of Disasters"

c) Upgrade the present standards to improve the DU's performance during the occurrence of natural hazards or force majeure events.

6. Develop policy to incentivize distributed energy resources and prosumer

On 19 October 2022, the ERC issued Resolution No. 11, Series of 2022[55] which aims to encourage the development and utilization of DERs with the following objectives:

a) Provide the guidelines, requirements, and standards for the interconnection of DER to address engineering, power quality and reliability, and safety concerns;
b) Provide for applicable requirements in securing a COC consistent with existing ERC issuances and any amendment/s thereto;
c) Establish pricing methodologies for DER; and
d) Promote efficient and cost-effective energy planning and monitoring using the data gathered.

The DOE plans to develop a policy to encourage the development of DER and incentivize the prosumers (e.g., tax credits), like the privileges and benefits of other RE technologies.

7. Supplement existing policy toward smart grid systems and interoperability

The National Smart Grid Policy Framework and Roadmap for DUs was established in 2020 through DC2020-02-0003. Due to challenges in the acquisition and implementation of smart grid facilities, the majority of the DUs are still at Level 0 and/or 1 based on their Smart Distribution Utility Roadmap (SDUR).

The DOE shall review the status of the implementation of the smart grid policy and the SDUR of the DUs to identify the challenges and necessary government assistance to fully implement the policy. A supplemental policy may be issued to improve and support the full implementation of the smart grid program.

8. Transition to Smart Grid to improve the reliability of distribution facilities

In the long term, the DOE envisioned the full transition to a smart grid and aim to have a reliable, flexible, resilient, and secure automated distribution system integrated with decentralized energy sources. The modernized distribution system is expected to promote consumer empowerment and to influence consumer behavior towards efficient utilization of energy.

9. Increase utilization of RE resources for power generation

In support of the objective of having clean energy, the DUs are encouraged to contract their power supply requirements to RE power suppliers. Likewise, the DUs are also encouraged to develop RE greenfield power projects to provide additional generation capacity. This is in addition to the DUs compliance with the RPS requirements and other RE-related policy issuances.

[55] Entitled, "A Resolution Adopting the Rules Governing Distributed Energy Resources (DER)"

10. Encourage consumers to utilize RE for non-power productive application

The consumers are encouraged to utilize the non-power applications of RE technologies such as drying, heating, and cooling which will have a beneficial contribution in boosting the economy. To further encourage the consumers, the DOE is looking into developing policy issuances and support mechanisms to provide incentives to consumers utilizing RE for non-power productive applications.

Goal 2: Transparent and Fair Playing Field in the Power Industry

4. Supply

Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050
• Implement RCOA in Mindanao • Implement Retail Aggregation in Luzon, Visayas, and Mindanao • Comprehensive Review of the Retail Rules (switching and disconnection) • Amendments to WESM and Retail Rules and Manuals regarding Implementation of the Electric Retail Aggregation Program	• Adopt lower thresholds for RCOA in Luzon, Visayas, and Mindanao • Continuing review of retail rules and manuals • Develop policy for enhanced and digitized customer switching procedure	• Further lowering of the RCOA threshold up to the household level • Continuing review of retail rules and manuals • Implement digitized customer switching procedure

1. Implement RCOA in Mindanao

Upon implementation of the commercial operation of WESM in Mindanao, the DOE initiated to review the policies for the RCOA, Retail Aggregation, and GEOP in the region. A TWG was formed together with the ERC, Independent Electricity Market Operator of the Philippines (IEMOP), and Philippine Electricity Market Corporation (PEMC) to conduct a thorough review and harmonization of the relevant rules and policies, along with the conduct of public consultations and forums on the proposed department circular for the commencement of RCOA and GEOP in Mindanao. These activities will be done to gather valuable insights specific to Mindanao, which has peculiar industry characteristics different from Luzon and Visayas, where the existing RCOA policies are based and derived. Pursuant to ERC Resolution No. 12 Series of 2020[56], separate rules and procedures will be developed and implemented by the ERC for the RCOA in Mindanao. Further, all entities and persons who intend to supply electricity in the retail market shall secure a license or authorization from the ERC. The target declaration of the commercial operation of RCOA, and GEOP in Mindanao will be on 26 December 2023.

[56] Entitled, "A Resolution Prescribing the Timeline for the Implementation of Retail Competition and Open Access"

2. Implement Retail Aggregation in Luzon, Visayas, and Mindanao

The Rules for the Electric Retail Aggregation Program took effect on June 24, 2022, during the ERC's Pilot Implementation of Retail Aggregation in UP Diliman Campus through the signing of the Memorandum of Understanding between the University of the Philippines and Meralco.

As mandated by the EPIRA, the ERC shall establish a competitive framework in the electricity markets through the issuance of rules and regulations necessary to govern the Competitive Retail Electricity Market (CREM). Among the ERC's role is to promulgate rules and regulations that shall ensure a level playing field for all market participants, the prevention of anti-competitive behavior, as well as the registration and qualifications of the suppliers and customers in the electricity markets, therefore the Retail Aggregation Program was piloted by the ERC. Upon implementation of the RCOA and GEOP in Mindanao, Retail Aggregation will likewise be implemented.

3. Comprehensive Review of the Retail Rules (switching and disconnection)

To address the challenges of switching to a Retail Electricity Supplier (RES) raised by Contestable Customers, the ERC has issued Resolution No. 01, Series of 2023[57] amending Section I, Article II of the ERC Rules supplementing the switching and billing process and adopting a disconnection policy for the contestable customers. This Resolution provides the following:

a) Not allowing Eligible End-users to switch to a RES, shall it have an outstanding balance with its Network Service Provider, in case of an initial switch.
b) Allowing a Contestable Customer, already being serviced by a RES to switch or to be supplied by a new RES or Supplier of Last Resort (SOLR) notwithstanding the existence of an outstanding balance.

4. Amendments to WESM and Retail Rules and Manuals regarding Implementation of the Electric Retail Aggregation Program

The WESM and Retail Rules and Manuals shall be harmonized with all the policy issuances of the DOE and the ERC relating to the implementation of the Electricity Retail Aggregation Program. Hence, the concerned stakeholder may propose amendments to the WESM and Retail Rules and Manuals to the Rules Change Committee (RCC) for review and approval of the PEM Board. The proposals will then be endorsed to the DOE for review and final approval.

5. Adopt lower thresholds for RCOA in Luzon, Visayas, and Mindanao

Complementing the study currently being undertaken by PEMC and ERC, the DOE will examine the impacts of lowering the threshold of the RCOA, which is envisioned to reach the household level. The proposed DOE study shall:

[57] Entitled, "Amendment to the ERC Rules Supplementing the Switching and Billing Process and Adopting a Disconnection Policy for the Contestable Customers"

a) Assess the readiness of the retail market and suppliers for greater RCOA participation;
b) Evaluate and harmonize existing local guidelines and resolutions in support of RCOA;
c) Analyze the economic and technical impact of lowering the RCOA threshold on RES and local RES operated by private entities and DUs; and
d) Compare the current and future RCOA policy and regulatory frameworks with other jurisdictions having similar market designs.

6. Continuing review of retail rules and manuals

The WESM and Retail Rules and Manuals shall be harmonized and updated regularly to be up to date with all the policy issuances of the DOE and the ERC. Hence, the concerned stakeholder may propose amendments to the WESM and Retail Rules and Manuals to the Rules Change Committee (RCC) for review and approval of the PEM Board. The proposals will then be endorsed to the DOE for review and final approval.

7. Develop policy for enhanced and digitized customer switching procedure

The IEMOP as the Central Registration Body shall develop the enhanced process and digitalized procedures for the effective and efficient implementation of switching of Contestable Customers.

8. Implement digitized customer switching procedure

The IEMOP as the Central Registration Body shall develop the enhanced process and digitalized procedures for the effective and efficient implementation of switching of Contestable Customers.

Goal 2: Transparent and Fair Playing Field in the Power Industry

5. Electricity Market

Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050
• Full commercial operation of the WESM in Mindanao • Commercial operation of the Initial Reserve Market (Phase 1) • Policy support to Renewable Portfolio Standard compliance Study Electricity Derivatives Market (Contracts for Differences)	• Implement the Enhanced Reserve Market (Phase 2) • Implement Electricity Derivatives Market (Contracts for Differences) • Continuous improvement of Market design and rules • Study market design to allow higher RE penetration and EV Demand Response	• Continuous improvement and enhancement of the design and rules of the electricity market • Enhance market design to facilitate integration of RE and EVs in the electricity market

1. Full commercial operation of the WESM in Mindanao

On 23 December 2022, the DOE promulgated Department Circular No. DC2022-12-0039[58] providing for the commercial operations date of the WESM in Mindanao starting 26 January 2023.

To support the Trading Participants (TP) in their transition to the WESM operation, the said Circular provides that all the TPs with pending requirements are deemed registered in the Market, provided that full compliance shall be observed not later than 25 April 2023. In addition, compliance to Prudential Requirements (PR), Real-time Monitoring Requirements (RTM), and Dispatch Conformance Standards (DCS) were also given relaxation for three (3) months.

However, based on the report submitted by the Market Operator (MO) to the DOE, as of 20 April 2023, some TPs are still yet to complete their WESM Registration. Thus, on 26 April 2023, the DOE issued an Advisory Extending the Relaxation of Submission of Registration Requirements in the WESM until 25 June 2023.

Meanwhile, another Advisory was issued on 11 May 2023 for the declaration of the implementation of a Single Settlement for the Luzon, Visayas, and Mindanao Regions in the Wholesale Electricity Spot Market (WESM) starting on the May 2023 billing period, due to the energization and actual energy flow in the Mindanao-Visayas Interconnection. The integration of the Mindanao grid in the WESM is a significant leap toward achieving the country's goal of having "one grid, one market" despite being 17 years overdue. DOE initially launched the WESM in Luzon in 2006 and in Visayas in 2010.

[58] Entitled, "Declaring the Commercial Operation of the Wholesale Electricity Spot Market (WESM) in the Mindanao Grid"

2. Commercial operation of the Initial Reserve Market (Phase 1)

One of the key features of the WESM is the co-optimization of energy and reserves through the Reserve Market. In the Reserve Market, both energy and reserve offers are incorporated in the Market Dispatch Optimization Model of the WESM's Market Management System to determine optimal schedules and prices to simultaneously satisfy the energy and reserve requirements of the grid at any given interval while considering constraints such as cost and transmission limits, among others.

As earlier mentioned, the DOE promulgated Department Circular No. DC2021-03-0009[59] which defined the general framework for the operation of the Reserve Market. Its salient features are as follows:

a) Co-optimization of energy and reserves, protocols for the submission of offers, and determination and implementation of dispatch schedules;
b) Operational cap, locational reserve sharing, and scarcity hierarchy for reserves;
c) Tradeable AS categories and their minimum technical specifications and required levels;
d) Criteria for the readiness of market systems and corresponding responsibilities of the power industry participants, and
e) Appropriate pricing, billing, settlement procedures, mitigating measures, and cost recovery mechanisms to ensure consumer protection.

The Circular, likewise, provided the supplemental policies relative to AS, particularly on the accreditation of third-party AS testing entities and the conduct of CSP for the procurement of AS contracts of the SO. The Reserve Market is targeted to be implemented following the enhancements to WESM Design and operations and is subject to the readiness assessment of the WESM's Governance Arm and the DOE.

Through a DOE Advisory issued on 26 June 2023, the Reserve Market Trial Operation Program (TOP) was commenced by the IEMOP. The successful conduct of the Reserve Market TOP is one of the prerequisites for the commercial operations of the Reserve Market, which is targeted to be launched by the end of 2023. The DOE will likewise promulgate a Department Circular declaring the commercial operations of the Reserve Market once all the market participants, interfaces, and systems are ready for full operations.

3. Policy support to Renewable Portfolio Standard compliance

The RE Market involving the trading of Renewable Energy Certificates (RECs) will support the compliance of electric power industry participants to the Renewable Portfolio Standards (RPS). The regular updating of the RE Market Rules and Market Manuals will be continuously sought to cater to the diverse needs and growth of the RE Market and ensure that the market will remain relevant and responsive to the needs of the sector.

[59] Entitled, "Adopting A General Framework Governing the Operationalization of the Reserve Market in the Wholesale Electricity Spot Market and Providing further Policies to Supplement DC2019-12-0018"

4. Study Electricity Derivatives Market (Contracts for Differences)

The IEMOP, as coordinated with the DOE, has an ongoing study regarding the Electricity Derivatives Market, particularly Contracts for Difference, which can be incorporated and integrated into the Philippine WESM. The Electricity Derivatives Market can provide different benefits to the power sector such as price hedging from volatile WESM prices, minimized pricing risks, increased private sector competition and participation, and incentivized delivery of the least-cost electricity. The proposed Electricity Derivatives Market will involve IEMOP as the Electricity Derivatives Market Operator subject to compliance with the Securities and Exchange Commission's Securities and Regulation Code and its implementing rules and regulations. The implementation of the Electricity Derivatives Market will provide another venue for the market participants in sourcing their supply requirements.

5. Implement the Enhanced Reserve Market (Phase 2)

After Phase 1 of the Reserve Market, Phase 2 shall be implemented incorporating the classification of reserves in the Philippine Grid Code 2016 and the corresponding technical specifications and testing guidelines. Phase 2 shall integrate all the enhancements of the Reserve Market and the amendments to the WESM Rules and Market Manuals pertaining to its operations and compliance, among others.

6. Implement Electricity Derivatives Market (Contracts for Differences)

Higher RE penetration in the electricity market shall require more Ancillary Services in the power industry to balance the intermittent nature of variable RE. Market design enhancements particularly on the different products that can be offered in the Reserve Market and demand side participation will be very beneficial and essential in addressing the challenges imposed by the growth of RE in the Philippines. Studying the said enhancements will be grounded on existing policies and laws related to improving the electricity markets to accommodate the integration of higher RE penetration while ensuring the reliability, stability, and security of the electric power supply.

7. Continuous improvement and enhancement of the design and rules of the electricity market

Policy developments will be continuously pursued considering the latest updates and innovations in the electric power industry particularly for electricity markets. Amendments and enhancements of the design and rules of the electricity markets shall be implemented with the end in view of ensuring the competitiveness, efficiency, reliability, and transparency of the market while striving for the delivery of the least-cost electricity to consumers. The integration of various market mechanisms shall entail steady updating of rules and manuals to keep abreast with the latest innovations in the power industry and meet the needs of the participants.

Goal 3: Electricity Access for All

6. Off-Grid Development

Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050
• Monitor and assess the implementation of the Omnibus Policy, Small Grid SO Policy • Implement graduation and rationalization of UC-ME subsidy Policy • Review and develop policy on the modernization of off-grid power systems and operation • Increase utilization of RE resources for power generation and hybridization Encourage consumers to utilize RE for non-power productive application	• Interconnections of Batangas-Mindoro; Quezon-Marinduque; Catanduanes-Camarines Sur; Palawan-Mindoro • Study intraconnection of off-grid islands • Enhance graduation and rationalization of UC-ME Subsidy system • Continuous modernization of off-grid power system and operation	• Implement viable intraconnection of off-grid island

1. Monitor and assess the implementation of the Omnibus Policy, Small Grid SO Policy

In accordance with the provisions set forth in the Department Circular No. DC2019-01-0001 (Omnibus Policy), the 2024-2028 Missionary Electrification Development Plan (MEDP) shall be issued to provide major updates from the 2021-2025 MEDP and to present new policies, strategies, and governance reforms for off-grid power development and missionary electrification.

Further, the DOE shall evaluate the DC2019-01-0001 for a potential supplemental policy relative to off-grid power development and monitoring to further enhance data management and analytics and formulate proactive policies, plans, and programs.

As mentioned in Chapter 1, the DOE issued the Department Circular No. DC2021-11-0039[60] or the Small Grid SO Policy to formulate grid interconnection development plans and programs for the off-grid areas and prepare the Distribution Utilities and Generation Companies for the assumption of TransCo as Small Grid SO and the eventual interconnection of the small island grids into the Grid.

Subsequently, the DOE shall monitor the implementation of the plans and programs of the TransCo as the Small Grid SO of specific off-grid areas including its role in capacitating the Distribution Utilities in formulating its island interconnection development plan which shall form part of its Distribution Development Plan.

[60] Entitled, "titled "Mandating the National Transmission Corporation (TransCo) as Small Grid System Operator (SO) in Specific Off-grid Areas" or Small Grid SO Policy

2. Implement graduation and rationalization of UC-ME subsidy Policy

The rationalization of the Universal charge for missionary electrification (UC-ME) subsidy aims to maximize cost recovery of the electricity service through a more innovative tariff mechanism based on the capacity to pay by the end-users to be supported by corresponding improvement in the electricity services.

The main strategy for the subsidy rationalization framework shall be the development of the capacity of each DU with an off-grid area to formulate a holistic and integrated UC-ME Subsidy Rationalization Plan that outlines the various measures that will be employed by the DU and the local power stakeholders to rationalize the utilization of UC-ME subsidy within its franchise area.

The UC-ME Subsidy Rationalization Plan shall form part of the DDP and the Power Supply Procurement Plan (PSPP) to be submitted to the DOE in time with the annual submission of DDP and PSPP. The major strategies to graduate from and rationalize the UC-ME subsidy are as follows:

a) The interconnection of the off-grid islands into the grid, and in the case of MGSPs, the interconnection of unserved and underserved areas into the distribution lines of the DUs without adverse impact to the overall distribution system. Upon interconnection, the provision of UCME ceases.
b) On the supply side in off-grid areas, the main strategy is the entry of reasonable-cost RE and advanced generation technologies to replace or hybridize with the existing diesel and bunker power systems. This can be done through least-cost generation planning. For small applications, the promotion of RE-based hybrid microgrids is important. Capacity building of off-grid DUs in conducting CSP for their new requirements must also be undertaken.
c) On the demand and consumer side, there is a need to rationalize the current level of SAGR. UC-ME subsidy must prioritize low-income consumers in off-grid areas. Overall UC-ME subsidy to consumers must also be reduced which is commensurate to the current and foreseen economic progress in these areas.
d) The energy efficiency programs and activities at the customer level shall be implemented to mitigate the impacts of the current high cost of generation in off-grid areas and the application of UC-ME subsidy rationalization to the electricity consumers in off-grid areas.

3. Review and develop policy on the modernization of off-grid power systems and operation.

The DOE shall develop a policy to supplement the provisions set forth in Rule 8 of the Omnibus Policy for the promotion of reliability and efficiency for off-grid power systems including modernization. The goal of this policy shall transform the existing configuration of off-grid power systems into a system that can accommodate new and emerging technologies towards enhancing quality, reliability, and resiliency.

Moreover, the policy shall encourage the distribution utilities to invest in new technologies and devices that will improve the operation and management of the

distribution systems in off-grid areas, such as SCADA, modern telemetry and communication system, and other similar devices and equipment.

4. Increase utilization of RE resources for power generation and hybridization

To achieve greater utilization of renewable energy resources, the DOE has issued the Department Circular No. DC2023-05-0014[61] to require Mandated Participants to source or procure and subsequently maintain a certain percentage of their generation from eligible RE resources, consistent with the optimal supply mix per off-grid area.

5. Encourage consumers to utilize RE for non-power productive application

The DOE shall study and develop policy on the utilization of renewable energy (RE) for non-power productive applications, particularly in off-grid areas. RE sources offer a viable and sustainable alternative for non-power productive applications such as heating, cooling, and transportation which often rely on fossil fuels. Further, RE for non-power applications can achieve a level of energy independence for consumers which benefits economically and increases resiliency.

6. Interconnections of Batangas-Mindoro; Quezon-Marinduque; Catanduanes-Camarines Sur; Palawan-Mindoro

The DOE, in coordination with the TransCo and its concessionaire or successor-in-interest, shall monitor the implementation of various major interconnection projects such as the Batangas-Mindoro Interconnection Project (BMIP), Quezon-Marinduque Interconnection Project (QMIP), and Catanduanes-Camarines Sur Interconnection Project (CCIP) which will provide access for the above-mentioned large island grids to generation sources in the main grid.

7. Study intraconnection of off-grid islands

The archipelagic nature of the country presents a unique challenge in ensuring reliable and sustainable energy access for off-grid islands. The DOE shall continue to monitor the implementation of interconnection and intraconnection projects for off-grids islands in coordination with TransCo. Further, TransCo shall continue to conduct a comprehensive study to explore and implement intraconnection solutions for off-grid islands to achieve energy connectivity for economic development, social well-being, and environmental sustainability.

8. Enhance graduation and rationalization of UC-ME Subsidy system

The DOE shall continue to improve the implementation of the provisions set forth in the UC-ME policy to ensure the sustainability and effectiveness of the subsidy system. In addition, the DOE shall develop an enhancement of the UC-ME subsidy system which aims to streamline the process and programs, promote efficiency, and foster equitable access to electricity among the off-grid and missionary areas. Further,

[61] Entitled, ""Promulgating the Revised Rules and Guidelines Governing the Operationalization of the Renewable Portfolio Standards for Off-Grid Areas Pursuant to Section 12 of the Renewable Energy Act of 2008"

9. Continuous modernization of off-grid power system and operation

The evolving needs of communities and industries in the off-grid and missionary areas shall involve the continuous modernization of off-grid power systems and operation to ensure reliable, resilient, and sustainable energy access. This modernization shall involve the alignment of technological advancements in accordance with the standards and policies including the community needs and environmental sustainability for lasting positive impact.

10. Implement viable intraconnection of off-grid island

The DOE shall review the existing policies and programs for the implementation of viable intraconnection of off-grid islands. Intraconnection of off-grid islands will enable such areas to ensure reliable and efficient energy access, fostering economic development, and minimizing environmental impacts.

Goal 3: Electricity Access for All

7. Total Electrification

Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050
• Publish the National Total Electrification Roadmap (NTER) • Conduct Pilot Microgrid System Service Provider – Competitive Selection Process (MGSP-CSP) • Issue supplemental policies on the operationalization of Microgrid Systems Act • Achieve household electrification target rate for 2023 and 2024 based on 2020 Census Develop an improved electricity access statistics and monitoring system	• Achieve household electrification target rate for 2025-2027 and 100% household electrification target by 2028 • Full implementation of RA 11646 (Implementation of NTER and Conduct of MGSP-CSP) • Continuous improvement of electricity statistics and monitoring system	• Ensure electricity access to all household in the country • Continuous Improvement and Enhancements of Policies, designs, and strategies to ensure electricity access for all households in the country

1. Publish the National Total Electrification Roadmap (NTER)

The NTER aims to meet the total electrification services at 100% by 2028, consistent with the declared policy of the State to ensure and accelerate the total electrification of the country as provided in Sec. 2(a) of the EPIRA of 2001. EPIRA also mandates the DUs to provide universal service in their franchise areas including unviable areas at a reasonable time.

Consistent with its mandates, the DOE serves as the oversight agency for policy, planning, and implementation of this NTER. The NTER rationalizes all electrification initiatives, interventions, and strategies toward sustainable energy development,

improvement of the quality of life of every Filipino as well as reliable, and secure electricity services at reasonable rates in unserved and underserved areas while promoting private sector participation for electrification efforts, and prioritizing low-cost, indigenous, renewable, and environment-friendly sources of energy. The different electrification programs and activities shall be implemented in cooperation with NEA, NPC, all 149 DUs, the partner LGUs, and other Program partners, among others.

The NTER covers the entire Philippines, including both grid and off-grid areas. The roadmap targets all households in the country, particularly those in unserved and underserved areas, which include remote communities, island communities, indigenous communities, mountainous regions, and geographically isolated areas. The roadmap will utilize a range of technologies and solutions to achieve universal access to electricity, including microgrids, household electrification connections, distribution line extensions, and solar home systems. The implementation of the roadmap will involve the collaboration and coordination of different stakeholders, including the DOE, NEA, NPC, DUs including, ECs, Private Investor-Owned Utilities (PIOUs), LGUs, private sector companies, and the communities themselves. Each stakeholder will have specific roles and responsibilities, such as providing technical assistance, funding, and project management. The roadmap will also prioritize the participation and empowerment of local communities and indigenous peoples in the planning and implementation of electrification projects, in line with the principles of social inclusion and participatory governance.

2. Conduct Initial Microgrid System Provider – Competitive Selection Process (MGSP-CSP)

Pursuant to the provisions of RA No. 11646, the DOE will conduct a transparent CSP such as but not limited to auction, unsolicited proposal, and Swiss Challenge to determine a prospective MGSP. The awarded MSGP shall provide for an integrated power generation and distribution to the areas declared as unserved and underserved under the DOE's NTER. The first batch of MSGP–CSP will happen by the 4th quarter of 2023. The invitation to bid to cover all unserved and underserved areas in the Philippines will be in batches. The batches will serve as prioritization based on the viability of the areas for microgrid systems, number of households to be served and total demand as projected by the concerned DUs which will undergo evaluation in coordination with the concerned DUs, NPC, and NEA.

3. Issue supplemental policies on the operationalization of Microgrid Systems Act and Total Electrification Support Programs

a) Supplemental Policy on the LTER Development Guidelines

Pursuant to RA No. 11646, under Section 15, the DU shall integrate the LTER in its DDP. Accordingly, the DOE shall issue a supplemental policy on the LTER Development to guide the DUs in their LTER preparation harmonized with their DDP. This will institutionalize the submission of the LTER and provide further the roles of the DOE, NEA, NPC and the DUs for the implementation of projects to attain total electrification. Further, this LTER will replace the barangay and household electrification provision of the DDP.

b) Supplemental Policy to DC2018-08-0021 (ER 1-94 Allocation and Digitized Financial and Reportorial Compliance Monitoring)

On Chapter 1, the ER1-94 Funds were mentioned and utilized for COVID1-19 response projects pursuant to Department Circular No. DC2020-04-0008. Now that the state of public health emergency has been lifted, the ER1-94 resumed its implementation to its intended purpose as such, the EF will be utilized for electrification projects identified under Section 10.3 of DC 2018-08-0021. Accordingly, on the NTER Framework, the EF has been identified as one of the funding sources for the achievement of total electrification. To further efficiently and effectively utilize the EF, the DOE shall issue a supplemental guideline to have an equitable allocation to the DU hosting a power plant and serving the host communities and other DUs within the host province and region.

c) Revised Policy for the implementation of the Total Electrification Project to include other Instrumentalities

The DOE commenced the implementation of LFP-TEP in 2021, following the issuance of the TEP Policy 1–Policy Guidelines on the Implementation of LFP-TEP to support the government thrust of achieving the total electrification of the country. The previously allocated LFP-TEP approved various projects and implemented by NEA and NPC. To intensify the effective and timely implementation of the LFP-TEP to support the DUs in achieving the Government goal of 100% Household electrification by 2028, the DOE encourages the active involvement of other qualified project implementers including the Higher Educational Institutions (HEIs), Non-governmental Organizations (NGOs), qualified Distribution Utilities. Thus, this policy will be issued to prescribe the implementing guidelines to ensure efficient, sustainable, and appropriate electrification strategies to address the needs of remaining unserved and underserved households/areas.

4. Develop an improved electricity access statistics and monitoring system

To provide a clearer picture of the country's electrification situation, the DOE is keen on developing comprehensive electricity access statistics and monitoring systems. As an initial step in this undertaking, the DOE recently launched a Microgrid System and Photovoltaic Mainstreaming (PVM) dashboard which contains the microgrid systems and PVM dashboard database, relevant statistics, and a comprehensive listing of the existing microgrid and PVM installations.

a) Visual Mapping Platform - Philippine Space Agency

The DOE also aims to develop the platform that can assist in the validation of target NTER unserved households and areas with the use of Satellite Imagery and service offered by the Philippine Space Agency. In particular, real-time images of profile of areas offered for MGSP CSP will assist in the due diligence activity of the proponent, and for the case of the DOE will also assist in monitoring developments in the communities served by MGSP and by off-grid solutions implemented by the DOE and its attached agencies and by the Dus themselves.

b) Crowdsourcing Application for Household Electrification Targeting (Phases 1-2)

Further, the DOE aims to develop a Crowd-Sourcing Platform that enables voluntary reporting of unenergized households, its location for the DOE to address and program based on appropriate and available electrification solutions. In this way, there will be another tool that can assist the DOE, NEA, NPC and DU and other qualified third-party implementers of electrification projects of identifying areas and households who do not have access to electricity and implementing appropriate and sustainable solutions and provide electricity access.

5. Achieve household electrification target for 2023-2028 and 100% household electrification target by 2028

The DOE, through the TESC, aims to achieve 100% household electrification of the country using the total number of households from the PSA-POPCEN 2015 as the baseline. As earlier mentioned, the country's electrification rate as of December 2022 stood at 96.17%, with the remaining 3.83% or 879,232 unserved households. To electrify these areas, the TESC will implement the following:

a) Program-matching criteria and roll-out scheme to identify the appropriate electrification strategies for each unelectrified and unserved area and household;
b) Customized electrification solutions considering the viability and geographical set-up of the area (contiguous, island, isolated, etc.); and
c) Specific policies and programs separate for household, grid, and off-grid electrification.

Pursuant to RA11646, each DU must submit their respective LTER to include all unserved and underserved households and areas indicating but not limited to the appropriate electrification solution, required funding sources, and target of implementation/completion year. In the medium- to long- term, the DOE's thrust for 100% household electrification based on the latest PSA-POPCEN data will remain. The DOE shall continually improve its existing electrification strategies, utilize advanced and emerging technologies, and adopt innovative solutions, among others, to achieve this goal.

Further, once the updated NTER is finalized, the Department will be releasing the revised projected household electrification targets based on the 2020 Census of Population. Moreover, the adoption of a new computation for electricity access rate will be discussed with the TESC to account all forms and initiatives for electrification of unserved households. Anchored by the strategies stipulated under the NTER, the energy sector's goal is to meet its annual household electrification targets in the short-term period.

6. Full implementation of RA 11646 (Implementation of NTER and Conduct of MGSP-CSP)

In the medium- to long-term, the DOE's goal is to accelerate the total electrification of the unserved and underserved areas of the country. The DOE with continuous collaboration with NEA and NPC, will ensure the full and effective implementation of RA 11646. As such, the DOE intends to conduct successful CSPs for prospective MGSPs in a transparent and timely manner. Furthermore, the DOE will make way to smoothen the processes that will ensure the private sector participation in off-grid electrification through the enhancement of the processes and developing competitive and suitable terms of reference to promote more competitive selection among MGSPs.

7. Continuous improvement of electricity statistics and monitoring system

In addition to the launching and enhancement of the Microgrid and PVM dashboard, a comprehensive database of electricity statistics and monitoring systems is targeted to be developed in the medium-term. The database can be a critical tool in identifying effective electrification strategies that can serve as the basis for policy formulation.

8. Ensure electricity access to all households in the country

As the population steadily increases, so does the total number of households. Given this reality, the Department will be firm in its total electrification agenda, and this will be pursued and guided with the latest available information on the census as a reference in implementing policies and programs.

9. Continuous Improvement and Enhancements of Policies, designs, and strategies to ensure electricity access for all households in the country

To keep abreast with the ever-changing electrification landscape, the improvement of policies and strategies is one of the critical deliverables of the DOE in the long-term. This practice guarantees that the programs to be implemented are pragmatic and aligned with current trends and developments thereby facilitating expansion of access to reliable electricity services.

8. Overarching Policies and Program

Goal 1: Energy Security, Resiliency, Affordability and Sustainability

Goal 2: Transparent and Fair Playing Field in the Power Industry

Goal 3: Electricity Access for All

Short Term 2023-2024	Medium to Long Term 2029-2050
• Implementation of automated submission of reportorial requirements • Establish an integrated power sector database	• Fast-track the approval process for power facilities and infrastructure • Implement the smart grid policy and roadmap • Continuous evaluation and implementation of necessary amendments in the EPIRA • Continuous improvement of power development planning and policymaking

1. Implementation of automated submission of reportorial requirements

On 14 March 2023, the DOE promulgated Department Circular No. DC2023-03-0005[62] which provides the distribution utilities with guidelines in filling up the templates for their reportorial requirements. On 12 April 2023, the DOE promulgated Department Circular No. DC2023-04-0006[63] with the objective to provide RES and Local RES with guidelines in filling up templates for their reportorial requirements. As of 30 June 2023, 116 DUs and 18 RES have successfully uploaded their reports covering the billing periods of January 2023 to May 2023.

On 05 July 2023, the DOE started the enhancement of the DOE's Electric Power Industry Database Management System (DEPDMS) to add new and improved existing features that will make the end-user experience better. The enhancement of the DEPDMS is not only limited to the comments and suggestions of the end-users during the various rollouts but also covers features that will help the DOE to monitor and generate reports, formulate policy, gather information, and interact with the end-users faster and easier. Also, it will prepare the system for future reportorial requirements of the DOE to easily create and configure on how to collect information from stakeholders.

Through online submission of data, the DOE envisions providing an efficient way of report submissions from the power industry participants at the same time expecting an increase on the level of compliance from the stakeholders and reducing costs in the submission.

[62] Entitled, "Providing Supplemental Policy for the Systematic Management of the DOE Reportorial Requirements for the Electric Power Industry Participants – Distribution Utilities"
[63] Entitled "Providing Supplemental Policy for the Systematic Management of the DOE Reportorial Requirements for the Electric Power Industry Participants – Retail Electricity Suppliers".

2. Establish an integrated power sector database

As mandated under EPIRA, the DOE is required for the timely and complete provision of information that can be achieved through a single unified database or system that covers all the power industry sub-sectors. Undertaking this initiative will involve all the concerned power sector stakeholders from generation up to distribution.

To date, the DEPDMS warehouses market data and grid information. This is in collaboration with both MO and SO. Similarly, DEPDMS also receives and processes reportorial requirements from various electric power industry participants i.e., Generation Companies, DUs, RES, and QTP in a safe, secure, timely, and efficient manner. The integrated database will enable the DOE to generate periodic reports containing valuable insights and conclusive information that will support the decisions of the national government for the power sector.

3. Fast-track the approval process for power facilities and infrastructure

The DOE will continue to encourage the entry and utilization of needed power facilities and infrastructure by streamlining and fast-tracking approval and permitting processes of government services through the EVOSS System. EVOSS[64] is an online system that allows for the coordinated submission and synchronous processing of all required data and information, providing a single decision-making portal for actions on applications for permits and certifications of a proponent for new power generation, transmission, and distribution projects. As of December 2022, the EPIMB currently has seven active processes under the EVOSS for the following applications:

a) Clearance to Undertake SIS Endorsement to NGCP
b) Certificate of Endorsement to ERC
c) Certificate of Endorsement to Board of Investments
d) Certificate of Endorsement to NCIP for Generation Projects
e) Certificate of Endorsement to NCIP for Transmission Projects
f) Certificate of Endorsement to PNP
g) Application of Clearance for Direct Connection to the Grid

Additional processes were also added to the EVOSS system, which were reviewed and developed by the EPIMB and the Investment Promotion Office from 2021 and were rolled out in the EVOSS portal on the first half of 2023:

a) Certificate of Endorsement Point-to-Point Limited Transmission Facilities
b) Letter of Endorsement to the Department of Agrarian Reform for Land Use Conversion
c) SIS Exemption for Power Projects under 20 MW for Luzon and 5MW for Visayas and Mindanao
d) Certificate of Endorsement to ERC for Microgrid Systems Provider

[64] EVOSS https://www.evoss.ph/Home/DisplayFaq/6

4. Implement the smart grid policy and roadmap

The National Smart Grid Policy Framework and Roadmap for DUs was established in 2020 through Department Circular No. DC2020-02-0003[65] shall be fully implemented during the entire planning horizon. Smart grid uses advanced technologies modernizing and enhancing the efficiency of electrical grid infrastructure, ensuring power supply security and flexibility, and promoting consumer empowerment, among others. To realize this vision, a huge number of investments in the whole power supply chain is needed, along with strong regulatory support to implement smart grid projects.

Since the promulgation of the above-cited policy, the DOE has continuously issued policies and programs that are supportive of the smart grid vision, such as the following: (a) Green Energy Auction Program; (c) National Framework for Energy Storage Systems; and (d) Competitive Selection Process among others. Shown in the illustration below the current update of SDUR as of December 2022:

Table 54. SDUR Submission of DUs as of December 2022

	Level 0	Partially Level 1	Level 1	Partially Level 2	Level 2	Partially Level 3	Requires Resubmission	Total
Networks	28	51	16	1	1	1	1	99
% Share	28%	52%	16%	1%	1%	1%	1%	100%
Customer Service	45	32	15	4	1	1	1	99
% Share	45%	32%	15%	4%	1%	1%	1%	100%

5. Continuous evaluation and implementation of necessary amendments in the EPIRA

Pursuant to EPIRA law, the DOE continues to perform its mandated function for the supervision, assessment, and monitoring of the EPIRA Implementation among others in complying with submissions of reportorial requirements which not only provide significant accomplishments and developments undertaken by the attached agencies as mandated but also to recognize the continuing challenges in the EPIRA implementation thus possible formulation of amendment in the Act may be done. The DOE has consolidated and reviewed the proposals being received from various industry stakeholders for the amendment of the EPIRA which seeks to widen the sources of energy, encourage investors in the power industry, empower the DOE, Energy Regulatory Commission, and other government-mandated agencies, and entities in the power sector, modernize the distribution sector, streamline and fast track processes on critical energy infrastructures that will ultimately increase the supply of energy, render efficient and optimal utilization and allocation of power, and lower electricity prices in the Philippines, among others.

[65] Entitled, "Providing a National Smart Grid Policy Framework for the Philippine Electric Power Industry and Roadmap for Distribution Utilities"

6. Continuous improvement of power development planning and policymaking

The DOE is committed to the continual improvement of the assessment and enhancement process of the country's power development planning, which will seamlessly integrate emerging technologies, existing policies and programs, and adaptation to prevailing energy trends. By responding precisely to the dynamic shifts in the global energy landscape and incorporating this into the modeling simulation, the DOE works to provide the least-cost generation capacity expansion planning for the country. Conversely, policymaking necessitates a dynamic and responsive approach to keep in pace with the evolving energy trends. Periodic assessment of existing policies, identifying gaps, and addressing inefficiencies, among others, will be the future threading path of the DOE. These approaches may include, but are not limited to, Generation Adequacy per grid by assessing the Loss-of-Load Expectation (LOLE) or Loss-of-Probability (LOLP), considering assessment including per-island power situation of Visayas grid, development of criteria for retiring power generation facilities based on their performance and operation in the power system, and updating the reliability indices for generating plant in the guidelines prepared by ERC in the Resolution No. 10, series of 2020[66]. These improvements will be supported by the needed manpower, capacity building, and resources to the Department in order to achieve these goals. These endeavors and strategies are expected to transform the country's power development planning into a dynamic and adaptive process.

[66] ERC Resolution No. 10, series 2020: A Resolution Adopting the Interim Reliability Performance Indices and Equivalent Outage Days Per Year of Generating Units

POWER DEVELOPMENT PLAN 2023-2050

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