



PHILIPPINE ENERGY PLAN 2023 - 2050 VOLUME II

Transitioning to Reliable,
Clean, and Resilient Energy



Republic of the Philippines
DEPARTMENT OF ENERGY



Preface

Envisioning a sustainable future denotes the country's advancement of its clean and indigenous energy transition agenda. A pivotal aspect of this route is built around the attainment of a secure, reliable, clean, and resilient energy supply that aligns with the strategic directions outlined in the DOE's **ARC objectives: Facilitating Access to Affordable Energy; Ensuring Reliability and Resiliency of Energy Supply; and Transitioning to Clean and Sustainable Energy.**

A central focus of this volume is the **energy roadmaps**, providing comprehensive assessments of the various subcomponents of the energy sector. These encompass conventional energy, downstream oil industry, renewable energy (RE), energy efficiency and conservation (EEC), alternative fuels and emerging technologies, and power development. These roadmaps delve into the sectoral accomplishments from 2022 to 2023, the recalibrated plans and programs for each sub-sector, as well as the corresponding investment and employment opportunities within the planning horizon.

Moreover, this volume accentuates **transition finance**, encapsulating the Philippine Sustainable Finance Roadmap, Clean Energy Finance and Investment Mobilization (CEFIM) Programme, Clean Energy Finance Framework, Mobilizing Finance and Investment Roadmap, and Private Sector Initiative on Energy Transition Finance. These mainly pinpoint key actions crafted with the intent of prompting the financial sector to assist in driving clean energy investments and shape innovative approaches to overcome challenges in attaining a low-carbon future.





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Abbreviations and Acronyms

AC	Alternating Current	COA	Certificate of Accreditation
ACMF	ASEAN Capital Markets Forum	COC	Coal Operating Contracts
ADB	Asian Development Bank	COR	Certificate of Registration
AF	Alternative Fuels	CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
AFET	Alternative Fuels and Energy Technologies	COVID-19	Coronavirus Disease 2019
AFOC	ASEAN Forum on Coal	CPPA	Corporate Power Purchase Agreement
AHA	Anhydrous Bioethanol	CRB	Central Registration Body
AMA	Administrative and Management Agreement	CREATE	Corporate Recovery and Tax Incentives for Enterprises
AMS	ASEAN Member States	CREM	Competitive Retail Electricity Market
ANECO	Agusan Del Norte Electric Cooperative, Inc.	CREVI	Comprehensive Roadmap for the Electric Vehicle Industry
APG	ASEAN Power Grid	CREZ	Competitive Renewable Energy Zones
ARC	Archipelago Renewable Corporation	CSO	Civil Society Organizations
AS	Ancillary Services	CSP	Competitive Selection Process
ATO	Authority to Operate	CSU	Cagayan State University
BARMM	Bangsamoro Autonomous Region in Muslim Mindanao	CTCN	Climate Technology Center and Network
BCF	Billion Cubic Feet	CvSU	Cavite State University
BEEI	Building Energy Efficiency Index	DBM	Department of Budget and Management
BESS	Battery Energy Storage System	DBP	Development Bank of the Philippines
BEV	Battery Electric Vehicle	DC	Department Circular
BFP	Bureau of Fire Protection	DDP	Distribution Development Plan
BIMP-EAGA	Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area	DE	Designated Establishment
BIR	Bureau of Internal Revenue	DENR	Department of Environment and Natural Resources
BISELCO	Busuanga Island Electric Cooperative, Inc.	DEPDMS	DOE Electric Power Database Management System
BMIP	Batangas-Mindoro Interconnection Project	DER	Distributed Energy Resource
BOC	Bureau of Customs	DILG	Department of Interior and Local Government
BOI	Board of Investments	DNSH	Do No Significant Harm
BPI	Bank of the Philippine Islands	DO	Department Order
BSEI	Bataan Solar Energy, Inc.	DOE	Department of Energy
BSP	Bangko Sentral ng Pilipinas	DOF	Department of Finance
CAES	Compressed Air Energy Storage	DOST	Department of Science and Technology
CAPEX	Capital Expenditure	DOST-ITDI	Department of Science and Technology – Industrial Technology Development Institute
CAR	Cordillera Administrative Region	DOST-PCIEERD	Department of Science and Technology – Philippine Council for Industry, Energy and Emerging Technology Research and Development
CARS	Comprehensive Automotive Resurgence Strategy	DOTr	Department of Transportation
CBA	Cost-Benefit-Analysis	DPWH	Department of Public Works and Highways
CC	Contestable Customers	DRA	Dispute Resolution Administration
CCIP	Camarines Sur-Catanduanes Interconnection Project	DREAMS	Development for Renewable Energy Applications Mainstreaming and Market Sustainability Project
CCS	Carbon Capture, and Storage	DRFI	Disaster Risk Financing and Insurance
CCUS	Carbon Capture, Utilization, and Storage	DSM	Demand Side Management
CEA	Certified Energy Auditors	DTI	Department of Trade and Industry
CECO	Certification of Energy Conservation Officers	DU	Distribution Utility
CECO	Certified Energy Conservation Officers	EA	Energy Auditor
CEFI	Clean Energy Finance and Investment	EC	Electric Cooperative
CEFIM	Clean Energy Finance and Investment Mobilisation	ECA	Export Credit Agencies
CEM	Certified Energy Manager	ECP	Energy-Consuming Product
CEPNS	Certificate of Energy Project of National Significance	EDM	Electricity Derivatives Market
CES	Clean Energy Scenario	EE	Energy Efficiency
CfD	Contract for Difference	EEC	Energy Efficiency and Conservation
CFPP	Coal Fired Power Plant	EECP	Energy Efficiency and Conservation Program
CHED	Commission on Higher Education	EEE	Energy Efficiency Excellence
CINMF	Copenhagen Infrastructure New Markets Fund	EEEI	Electrical and Electronics Engineering Institute
ckt-km	Circuit-Kilometers	EF	Electrification Fund
CME	Coconut Methyl Ester	EICC	Energy Investment Coordinating Council
CNP	Cebu-Negros-Panay	e-JP	Electric Jeepney
CO ₂	Carbon Dioxide	EO	Executive Order
		EO	Environmental Objective
		EPC	Energy Performance Contract
		EPIRA	Electric Power Industry Reform Act

EPSA	Emergency Power Supply Agreement	IEA	International Energy Agency
ER	Energy Regulations	IEB	Intergovernmental Energy Board
ERC	Energy Regulatory Commission	IEC	Information, Education, and Communication
ERGO	Electricity Generating Public Company Limited Group	IEMOP	Independent Electricity Market Operator of the Philippines
ERSP	Expanded Roof Mounted Solar Program		
ESCO	Energy Service Company	IFI	International Financial Institution
ESI	Energy Savings Insurance	IoT	Internet of Things
ESP	Energy Secure Philippines	IPEF	Indo-Pacific Economic Framework for Prosperity
ESS	Energy Storage System	IPP	Independent Power Producer
e-TC	e-Tricycle	IRENA	International Renewable Energy Agency
ETM	Energy Transition Mechanism	IRR	Implementing Rules and Regulations
ETS	Emissions Trading System	JAO	Joint Administrative Order
EU-ASEP	European Union - Access to Sustainable Energy Programme	JIP	Joint Industry Platform
		K-ETS	Korea Emissions Trading System
EUMB	Energy Utilization Management Bureau	KM	Kilometer
EV	Electric Vehicle	KMS	Knowledge Management Systems
EVCS	Electric Vehicle Charging Station	kWh	Kilowatt-Hour
EVIDA	Electric Vehicle Industry Development Act	LBP	Land Bank of the Philippines
EVIS	Electric Vehicle Incentive Strategy	LCOE	Levelized Cost of Energy
EVOSS	Energy Virtual One-Stop-Shop	LDF	Lost and Damage Fund
FEPR	Fuel Economy Performance Rating	LED	Light-Emitting Diode
FES	Flywheel Energy Storage	LEV	Light Electric Vehicles
FGD	Focus Group Discussion	LGU	Local Government Unit
FGEN	First Gen Corporation	LGUOU	Local Government Unit - Owned Utility
FIT	Feed-In-Tariff	LLDA	Laguna Lake Development Authority
FIT-All	Feed-In Tariff Allowance	LNG	Liquefied Natural Gas
FPIA	Filipino Participation Incentive	LOI	Letter of Intent
FSRU	Floating Storage and Regasification Unit	LTER	Local Total Electrification Roadmap
FSU	Floating Storage Unit	LTRFB	Land Transportation Franchising and Regulatory Board
G2G	Government-to-Government		
GAD	Gender and Development	LTO	Land Transportation Office
GCF	Green Climate Fund	m	Meters
GEA	Green Energy Auction	m ³	Cubic Meters
GEAP	Green Energy Auction Program	MB	Thousand Barrels
GEAR	Green Energy Auction Reserve	MC	Memorandum Circular
GEEP	Government Energy Efficiency Projects	MDB	Multilateral Development Banks
GEF	Global Environmental Facility	MEDP	Missionary Electrification Development Plan
GEMP	Government Energy Management Program	MENRE	Ministry of Environment, Natural Resources, and Energy
GEOP	Green Energy Option Program		
GFI	Government Financing Institution	MEP	Minimum Energy Performance
GHG	Greenhouse Gas	MEPP	Minimum Energy Performance for Products
GIS	Geographic Information System	MFN	Most-Favored-Nation
GMC	Grid Management Committee	MGSA	Microgrid Systems Act
GOCC	Government-Owned and Controlled Corporation	MGSP	Microgrid System Provider
GOMP	Grid Operating and Maintenance Program	MGSP-CSP	Microgrid System Provider - Competitive Selection Process
GPDP	Gas Policy Development Project		
GSIS	Government Service Insurance System	MHCPC	Maharlika Clean Power Holdings Corporation
GSPA	Gas Sales Purchase Agreement	MLPY	Million Liters per Year
GSS	Green, Social and Sustainability	MMB	Million Barrels
GW	Gigawatt	MMMT	Million Metric Tons
GWEC	Global Wind Energy Council	MMSCF	Million Standard Cubic Feet
GWh	Gigawatt-Hour	MMSU	Mariano Marcos State University
HA	Hectares	MO	Market Operator
HAPUA	Heads of ASEAN Power Utilities/Authorities	MOA	Memorandum of Agreement
HB	House Bill	MOU	Memorandum of Understanding
HEIC	Hydrogen Energy Industry Committee	MSC	Market Surveillance Committee
HEV	Hybrid Electric Vehicle	MSME	Micro, Small, And Medium Enterprises
HFEC	Hydrogen and Fusion Energy Committee	MSS	Minimum Social Safeguard
HSJ	Hermosa-San Jose	MSW	Municipal Solid Wastes
IAEECC	Inter-Agency Energy Efficiency and Conservation Committee	MtCO ₂ e	Million Tons of Co2
		MTPA	Million Ton per Annum
IASCO	Isabel Ancillary Services Co. Ltd.	MVA	Megavolt-Ampere
IC	Insurance Commission	MVE	Monitoring, Verification, and Enforcement
ICAO	International Civil Aviation Organization	MVIP	Mindanao-Visayas Interconnection Project
ICE	Internal Combustion Engine	MW	Megawatt
ICT	Information and Communication Technology	MWh	Megawatt-hour

NAET	New, Advanced, Alternative, and Emerging Technologies	PSC	Petroleum Service Contract
NAMRIA	National Mapping and Resource Information Authority	PSC	Philippine Steering Committee
NBB	National Biofuels Board	PSH	Pumped-Storage Hydropower
NDC	Nationally Determined Contribution	PSPC	Pilipinas Shell Petroleum Corporation
NEDA	National Economic and Development Authority	PSPP	Power Supply Procurement Plan
NEECD	National Energy Efficiency and Conservation Database	PUV	Public Utility Vehicle
NEECO	National Energy Efficiency and Conservation Office	PUVMP	Public Utility Vehicle Modernization Program
NEECP	National Energy Efficiency and Conservation Plan	PVM	Photovoltaic Mainstreaming
NGCP	National Grid Corporation of the Philippines	PV-SHS	Photovoltaic Solar Home System
NGDP	Natural Gas Development Plan	QMIP	Quezon-Marinduque Interconnection Project
NIRC	National Internal Revenue Code	QPL	Quezon Power Ltd.
NPC-SPUG	National Power Corporation-Small Power Utilities Group	QTP	Qualified Third Party
NPP	New Power Provider	R&D	Research and Development
NREP	National Renewable Energy Program	RA	Republic Act
NSEBIO	NSEBIO Co., Ltd. Philippine Branch	RBE	Registered Business Enterprise
NTER	National Total Electrification Roadmap	RCBC	Rizal Commercial Banking Corporation
NTP	Notice to Proceed	RCC	Rules Change Committee
NZE	Net Zero Emission	RCOA	Retail Competition and Open Access
OCSP	Open and Competitive Selection Process	RD&D	Research, Development, and Demonstration
OECD	Organisation for Economic Cooperation and Development	RE	Renewable Energy
OEM	Original Equipment Manufacturer	REC	RE Certificate
OMECCO	Occidental Mindoro Electric Cooperative, Inc.	REF	Reference Scenario
OMSA	Operations and Maintenance Services Agreement	REM	Renewable Energy Market
OP	Office of the President	REMB	Renewable Energy Management Bureau
ORMECO	Oriental Mindoro Electric Cooperative, Inc.	RES	Retail Electricity Supplier
OSW	Offshore Wind	RESHERR	Renewable Energy Safety, Health, and Environment Rules and Regulations
PAA	Performance Assessment and Audit	RETF	Renewable Energy Trust Fund
PAAT-TNPSO	Performance Assessment and Audit Team - Transmission Network Provider and System Operator	RM	Reserve Market
PAGCOR	Philippine Amusement and Gaming Corporation	ROR	Run-of-River
PALECO	Palawan Electric Cooperative, Inc.	ROW	Right-of-Way
PC	Permit to Construct	RPS	Renewable Portfolio Standards
PCA	Philippine Coconut Authority	RSDCP	Registration, Suspension, and De-Registration Criteria and Procedures
PCECP	Philippine Conventional Energy Contracting Program	RTI	Recognized Training Institutions
PCO	Presidential Communications Office	RVAT	Reformed Value Added Tax
PCR	PELP Company Representative	SAF	Sustainable Aviation Fuel
PCSO	Philippine Charity Sweepstakes Office	SB	Senate Bill
PDA	Pre-Determined Area	SBPL	San Buenaventura Power Ltd. Co
PDIC	Philippine Deposit Insurance Corporation	SC	Service Contract
PDM	Price Determination Methodology	SDG	Sustainable Development Goal
PDNGI	Philippine Downstream Natural Gas Industry	SDUR	Smart Distribution Utility Roadmap
PDP	Philippine Development Plan	SEACA	Southeast Asia Carbon Capture and Storage Accelerator
PELP	Philippine Energy Labeling Program	SEAPEX	Southeast Asia Petroleum Exploration Society
PEM	Philippine Electricity Market	SEC	Securities and Exchange Commission
PEMC	Philippine Electricity Market Corporation	SEGF	Sustainable Energy Facility
PEP	Philippine Energy Plan	SEOC	Solar Energy Operating Contract
PETP	Philippine Energy Transition Program	SEP	Sitio Electrification Program
PEZA	Philippine Economic Zone Authority	SEZ	Special Economic Zone
PGC	Philippine Grid Code	SFTG	Philippine Sustainable Finance Taxonomy Guidelines
PHEV	Plug-In Hybrid Electric Vehicles	SGGP	Smart and Green Grid Plan
PHILGUARANTEE	Philippine Guarantee Corporation	SIGSO	Small Island Grid System Operator
PIA-HSSE-IMT	Philippine Inter-Agency Health, Safety, Security, and Environment Inspection Monitoring Team	SIIG	Small Islands and Isolated Grids
PIOU	Private Investor-Owned Utility	SIPA	Sustainable Infrastructure Programme in Asia
PLC	Publicly Listed Company	SIPP	Strategic Investments Priority Plan
PMIP	Palawan-Mindoro Interconnection Project	SIS	System Impact Study
PMS	Preventive Maintenance Services	SLBS	Sustainability-Linked Bond Standards
PNOC	Philippine National Oil Company	SLTEC	South Luzon Thermal Energy Corporation
PNS	Philippine National Standard	SME	Small and Medium Enterprises
POM	Permit to Operate and Maintain	SO	System Operator
PPA	Power Purchase Agreement	SPC	Supreme Power Corporation
PPP	Public-Private Partnership		
PR	Pricing Re-Runs		
PREMS	Philippine Renewable Energy Market System		
PSA	Power Supply Agreement		
PSALM	Power Sector Assets and Liabilities Management Corporation		

SPUG	Small Power Utilities Group
SSCM	Small Scale Coal Mining
SSCMP	Small Scale Coal Mining Permits
SSLNG	Small Scale LNG
STEA	Science and Technology for Energy Application
SUV	Sport Utility Vehicles
TC	Technical Committee
TDP	Transmission Development Plan
TEC	Tax-Exempt Certificate
TESC	Total Electrification Steering Committee
TESDA	Technical Education and Skills Development Authority
TNP	Transmission Network Provider
TOP	Trial Operations Program
TP	Trading Participants
TPA	Third-Party Auctioneer
TPBAC	Third-Party Bids and Awards Committee
TPES	Total Primary Energy Supply
TRAIN	Tax Reform for Acceleration and Inclusion
TransCo	National Transmission Corporation
TWG	Technical Working Group
UAE	United Arab Emirates
UC-ME	Universal Charge for Missionary Electrification
UCOME	Used Cooking Oil Methyl Ester
UN	United Nation
UPLB	University of the Philippines Los Baños
UP-NEC	University of the Philippines - National Engineering Center
UP-SCRFI	University of the Philippines - Statistical Center Research Foundation, Inc.
USAID	United States Agency for International Development
UV	Utility Vehicles
v/v	Volume per Volume
VFDs	Variable Frequency Drives
VFELP	Vehicles Fuel Economy Labeling Program
VPAF	Vehicle Performance Assessment Facility
VPP	Virtual Power Plants
VRE	Variable Renewable Energy
WB	World Bank
WESM	Wholesale Electricity Spot Market
WMCRDS	Waste Management Collection, Recycling, and Disposal Strategy
WTE	Waste-to-Energy





CHAPTER I

ENERGY ROADMAPS

A. CONVENTIONAL ENERGY

The Department of Energy (DOE) recognizes the country's indigenous conventional fuels to address the increasing energy requirements. The development of the upstream sector addresses the country's current exposure to price volatility due to supply issues, geopolitical tensions, and currency fluctuation in the world market. As the Philippines transitions to cleaner fuels, fossil fuels remain to be a reliable source of energy to stimulate economic growth.

As a conduit to wealth creation, the upstream sector contributes significant revenues to the National Government by optimizing the development and production of indigenous petroleum and coal resources and exporting inventories that are not intended for domestic demand. In 2022, government revenues from Malampaya reached PhP26.1 billion, while an additional PhP15.9 billion was generated from the coal sector.

To ensure a stable supply of energy, the DOE oversees and administers the exploration and development of indigenous petroleum and coal resources by strengthening policies that will promote indigenous resource development.

The DOE is aware that an aggressive and sustained campaign is necessary to look for new oil and gas fields to ensure energy security and continue wealth generation and job creation for a resilient energy system despite the capital-intensive nature of carrying out exploration programs and the volatility of fossil fuel prices.

A mechanism regarded to reinvigorate the country's exploration activities is the Philippine Conventional Energy Contracting Program (PCECP). Guided by Department Circulars (DCs) DC2017-12-0017 and DC2017-09-0010, the PCECP promotes a more transparent and competitive licensing for awarding petroleum Service Contracts (SCs) and Coal Operating Contracts (COCs), respectively. It intends to implement a simpler and faster public contracting program while being more strategic and responsive in intensifying development of indigenous petroleum and coal resources.

Since the PCECP's launching in November 2018 until 31 May 2023, the DOE received applications for 16 petroleum SCs comprised of five (5) Pre-Determined Areas (PDAs) and 11 Nominated Areas, generating a total of PhP12.67 million revenues on data and application fees alone.



President Ferdinand Marcos, Jr. witnessed the signing of the IEB Circular between DOE Sec. Raphael P.M. Lotilla and MENRE Chief Minister Ahod Ebrahim on 16 July 2023.

Another significant policy is the Intergovernmental Energy Board (IEB) Circular on the Joint Award of petroleum SCs and COCs in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) between the DOE and the Ministry of Environment, Natural Resources, and Energy (MENRE) of BARMM. The milestone event, held on 06 July 2023, was witnessed by President Ferdinand Marcos, Jr.

The IEB Circular operationalizes the provision of Republic Act No. 11054 or the Organic Law for the BARMM, for the implementation of the joint exercise of the power to grant rights, privileges, and concessions over the exploration, development and utilization of uranium and fossil fuels such as petroleum, natural gas, and coal in the territorial jurisdiction of BARMM.

Oil and Gas

The Malampaya Deep Water Gas-to-Power Project is the largest and only commercially producing gas field in the country. Since its commercial operation in 2001, Malampaya gas field has been the major supplier of natural gas of the five (5) power plants in Luzon (Ilijan¹, Sta. Rita, San Lorenzo, Avion, and San Gabriel).

With the Malampaya contract (SC No. 38) having concluded in February 2024, the government's renewal is imperative to ensure a continued and uninterrupted supply by strengthening the exploration and development of petroleum resources in the country.

¹Gas Sales Purchase Agreement (GSPA) ended in June 2022

The Renewal Agreement signed by President Ferdinand R. Marcos, Jr. on 15 May 2023 extended SC 38 for 15 years until 22 February 2039. This will allow for the continued production of the Malampaya gas field to ensure that the remaining gas reserves, estimated at 147 billion cubic feet (BCF), are further produced.



On 15 May 2023, President Ferdinand Marcos, Jr. signed the Renewal Agreement of SC 38 on 15 May 2023. On photo with the President are (L-R) Chief Presidential Legal Counsel Juan Ponce Enrile, Executive Secretary Lucas Bersamin, House Speaker Martin Romualdez, DOE Secretary Raphael P.M. Lotilla and DOJ Secretary Jesus Crispin Remulla, among others.

Aside from continuing the production operations, the SC 38 Consortium is required to conduct a minimum work program consisting of geological and geophysical

studies and the drilling of at least two (2) deep water wells during the Sub-Phase 1 from 2024 to 2029 under the Renewal Agreement. The firm work program is designed to help unlock the potential of the existing gas field and nearby prospect areas to provide incremental production.

On the other hand, Nido Petroleum Philippines Pty. Ltd., the Operator of SCs 6B and 54 proceeded with the site survey of drilling locations until the last quarter of 2022, which paved the way for the drilling of two wells from the fourth quarter of 2023 to the first quarter of 2024.

For SC 6B, the Cadlao 4 appraisal well for the Cadlao oil field could lead to early oil production by the 1st quarter of 2024, with a potential volume of 6.2 million barrels of oil. Likewise, the drilling target for SC 54 located in the Northwest Palawan basin is the Nandino prospect, with a potential volume of 15 million barrels of oil. The successful development of the Nandino prospect will give way to the possible development and tie up with the existing two discoveries, namely Tindalo and Yakal.

Ratio Petroleum, the operator of SC 76, has also identified two possible petroleum plays within their contract block following the completion of the first phase of their work program in October 2020. The area is located in the northern side of the East Palawan Basin covering an area of 648,000 hectares (ha), with water depths ranging from 80 to 1,700 meters (m). Available seismic datasets show that the basin comprises a well-developed slope-to-basin channel system and its location can provide a potential for large structures and excellent reservoirs.

2022
PRODUCTION

558.27MB
OIL

112.17BCF
GAS

2.71MMB
CONDENSATE

At present, 18 active SCs are being supervised and monitored by the DOE, 12 of which are in the exploration phase while six (6) are in the production phase (*Table 1 and Figure 1*). In 2022 alone, the three (3) producing oil and gas fields - SCs 14 and 38 in offshore Northwest Palawan and SC 49 in onshore/offshore South Cebu, generated 558.27 thousand barrels (MB) of oil, 112.17 BCF of gas, and 2.71 million barrels (MMB) of associated condensate.

Table 1. **Active Service Contracts** (As of 31 December 2023)

	Operator		SC No.	Location	Area (Has.)
	Production Phase	1	Nido Petroleum Philippines Pty. Ltd.	6B	Northwest Palawan
2		NPG Pty. Ltd.	14C1*	Northwest Palawan	70,887,520
		The Philodrill Corporation	14C2*		
3		PNOC Exploration Corporation	37	Cagayan	36,000
4		Prime Energy Resources Development B.V.	38*	Northwest Palawan	63,000
5		Forum Exploration, Inc.	40	Northern Cebu (Visayan)	340,000
6	China Int'l Mining Petroleum Company Ltd.	49*	Southern Cebu (Visayan)	197,000	
Exploration Phase	7	The Philodrill Corporation	53	Onshore Mindoro	43,515
	8	Nido Petroleum Philippines Pty. Ltd.	54	Northwest Palawan	56,000
	9	Palawan55 Exploration and Production Corp.	55	West Palawan	968,000
	10	PNOC-Exploration Corp.	57	Northwest Palawan	712,000
	11	Nido Petroleum Philippines Pty. Ltd.	58	Northwest Palawan	1,344,000
	12	PNOC Exploration Corporation	59	Southwest Palawan	1,478,000
	13	Forum (GSEC 101) Limited	72	Recto Bank	880,000
	14	PXP Energy Corp.	74	Northwest Palawan	426,800
	15	PXP Energy Corp.	75	Northwest Palawan	616,000
	16	Ratio Petroleum Ltd.	76	East Palawan	648,000
	17	SK Liguasan Oil and Gas Corporation	77	Cotabato	72,000
	18	PNOC Exploration Corporation	79	East Palawan	932,000

*Producing

In April 2022, SC 77 was awarded to SK Liguasan Oil and Gas Corporation. The prospective area covers 72,000 ha in the Cotabato basin in Sultan Kudarat, Maguindanao, and North and South Cotabato. SC 79, on the other hand, was awarded to PNOC EC in August 2023. The area located in the East Palawan basin covers 932,000 ha.

As of December 2022, the country's reserves are estimated at 3.74 MMB of oil, 273 BCF of gas, and 6.5 MMB of condensate. On the other hand, the undiscovered resources are at 195 MMB of oil, 4,268 BCF of gas, and 65 MMB of condensate with cumulative production of 80.67 MMB of oil, 2,623 BCF of gas, and 92.26 MMB of condensate (*Table 2*).

Table 2. **Petroleum Reserves, Resources and Production** (As of December 2022)

Classification	Oil (MMB)	Gas (BCF)	Condensate (MMB)
Reserves	3.74	273.00	6.27 ³
Contingent Resources/Reserves ¹	195.00	4,268.00	65.00
Undiscovered Resources ²	11,104.00	54,532.00	291.00
Cumulative Production	80.67	2,623.53	92.26

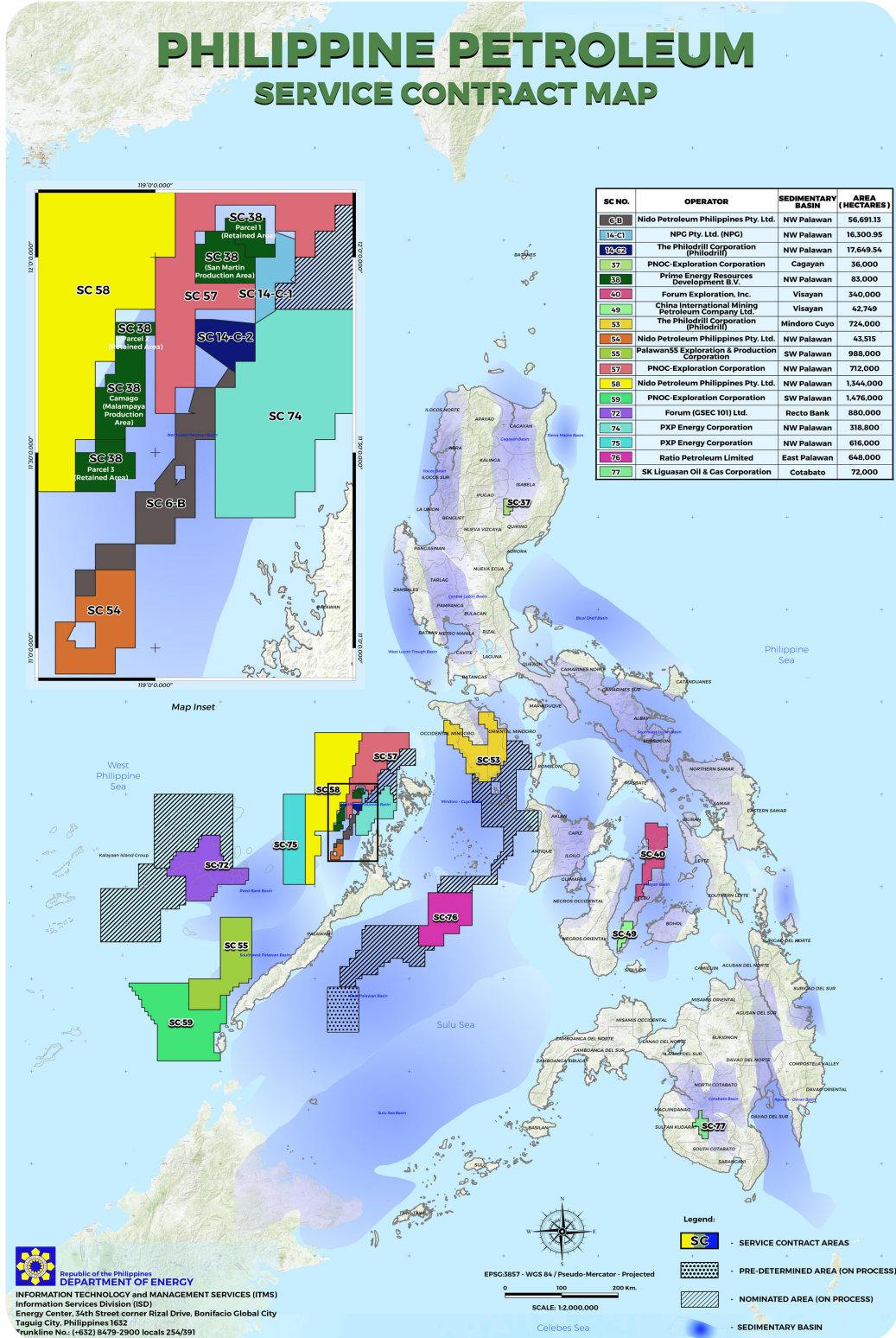
Notes:

¹ Values are in-place volumes based on available information/data from PSCs; Estimates (2C-best estimates of contingent resources) of volumes drilled and discovered with no current plan of development.

² Estimates of volumes (2U-best estimates of prospective resources) of mapped prospects and leads that have not yet been drilled or discovered.

³ Based on 23 barrels/million standard cubic feet (MMSCF) condensate to gas ratio

Figure 1. Philippine Petroleum Service Contract Map

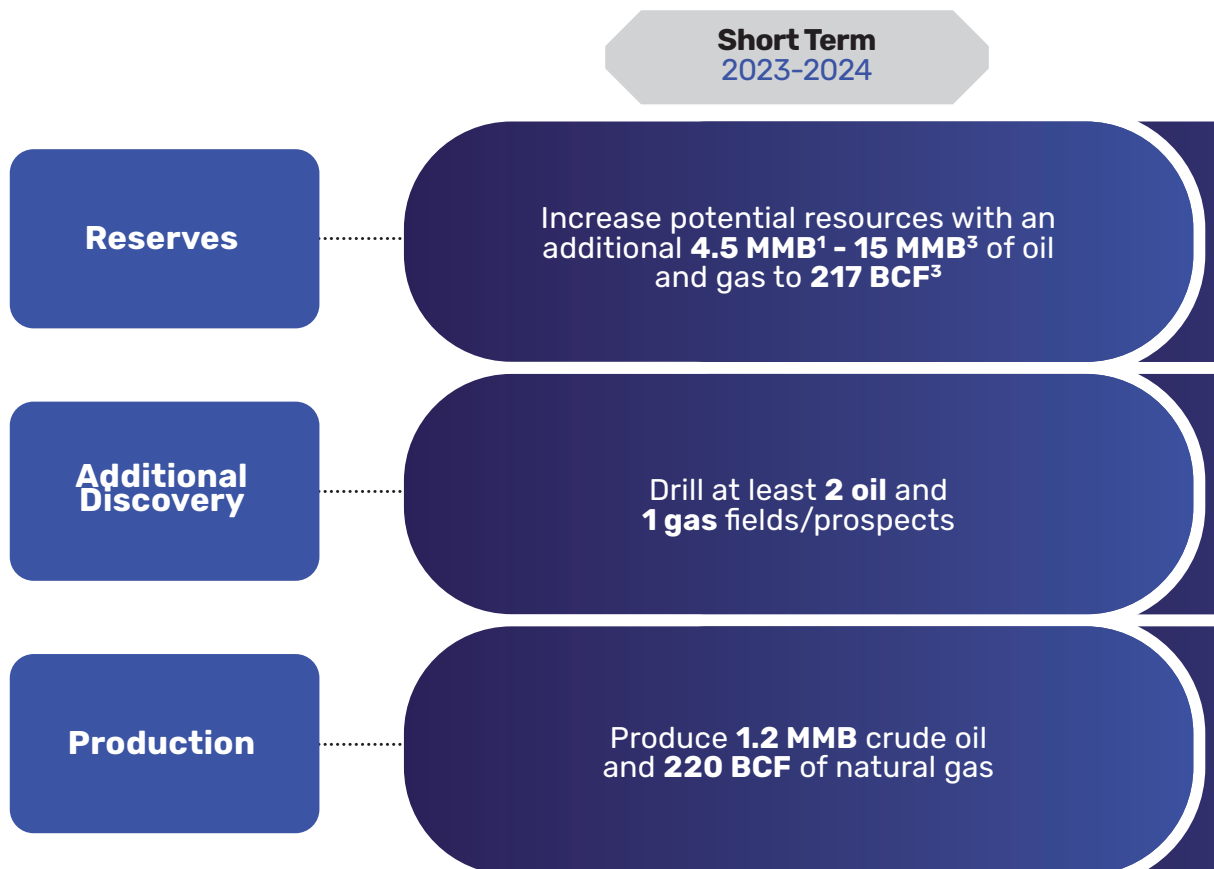




Plans and Programs

In support of the global energy sector’s shift toward energy transition, fossil fuels remain a reliable source of energy. As such, the petroleum sector remains dedicated to fulfilling its roles and obligations to develop its domestic reserves through exploration, development, and utilization of its indigenous petroleum resources.

Figure 2. **Upstream Oil and Gas Roadmap**



² 1C – Low estimate of Contingent Resources in-place
³ 1U – Low estimate of Prospective Resources in-place
⁴ 2C – Best estimate of Contingent Resources in-place
⁵ 2U – Best estimate of Prospective Resources in-place



Medium Term
2025-2028

Increase potential resources with additional **8.77 MMB² - 1,923 MMB⁴** of oil and **2.6 TCF²** and **5 TCF⁴** of gas fields/prospects

Drill at least **2 oil** and **4 gas** fields/prospects

Produce **15.9 MMB** crude oil and **522.4 BCF** of natural gas

Long Term
2029-2050

Increase potential resources with an additional **1,436.5 MMB³ - 4,039 MMB⁴** of oil and **11.7 TCF³ - 24.3 TCF⁴** of gas fields/prospects

Drill at least **6 oil** and **6 gas** fields/prospects

Produce **42.14 MMB** crude oil and **4.6 TCF** of natural gas

The DOE with its critical role in energy supply security, wealth creation, and employment generation, will implement its roadmap for the upstream oil and gas sector in consonance with the attainment of the United Nations (UN) Sustainable Development Goals (SDGs) and energy trilemma. Specifically, the DOE will continue to work on providing energy security, energy equity, and environmental sustainability (Figure 2).

The projections on reserves and production were based on the following considerations:

	MEDIUM - TERM	LONG - TERM
RESERVES	<ol style="list-style-type: none"> Highest rank/mature prospect within the existing program or the target activities by active petroleum service contracts in the next 5 years. Based on tieback potential of existing/previous production wells 	<ol style="list-style-type: none"> Based on the projected commercial volume for oil (≥ 100 MMB) after applying 15% recovery factor (industry standards for oil) and gas ($\geq 2,000$ BCF) applying 80% recovery factor (industry standards for gas) Based on tieback potential of existing/previous production wells
PRODUCTION	Oil: 15 % Recovery Factor; Gas: 80 % Recovery Factor	

For the short-term action plans (2023-2024), the DOE aims to further strengthen exploration and development in the country and foresees an increase of potential resources by an additional of 4.5 MMB² to up to 15 MMB³ of oil and 217³ BCF of gas. This can be achieved by drilling two (2) oil and one (1) gas fields/prospects. Moreover, the DOE aims to produce an estimated 1.2 MMB of crude oil and 220 BCF of natural gas as part of the sector's action plan.

The strategies for the medium-term (2025-2028) to strengthen exploration and development in the country include targeting an increase of potential resources of 8.77 MMB⁴ to up to 1,923⁵ MMB for oil and 2,603⁴ BCF and 5,035⁵ BCF for gas. The achievement of additional resources may be achieved by drilling two oil and four (4) gas fields/prospects.

For the long-term, the forecasted drilling of six each for oil and gas fields/prospects will allow the entry of potential resources of 1,436.5³ MMB up to 4,039⁵ MMB of oil and 11,686 BCF³ up to 24,271⁵ BCF of gas.

Further, the DOE also aims to produce an estimated 15.9 MMB of crude oil and 522 BCF of natural gas for the medium-term while an estimated 42.1 MMB of crude oil and 4,582.4 BCF of natural gas for the long term, including volume from Camago-Malampaya reserves and Malampaya East resources.

These targets aim to further exploration and development and support the country's direction towards achieving energy independence.

As part of its policy-making responsibility, the DOE continues to issue policies to accelerate the exploration, development, and utilization of indigenous petroleum resources, simplify and clarify the implementation of SCs, and provide an enabling environment to attract more investments in oil and gas exploration.

The relevant policies to be issued in the short-term include the following:

- DC providing guidelines on petroleum data declassification and free data access;
- DC providing guidelines for additional incentives to promote oil and gas exploration activities⁶;
- DC providing guidelines on the awarding of new petroleum service contracts (PSCS) through direct negotiation;
- Amendment of DC2014-08-0013 providing guidelines in the registration of all contracts and agreements entered into by the petroleum service contractors and coal operating contract operators;
- Amendment of DC2018-03-0006 or the omnibus rules and regulations governing tax-exempt importations for petroleum operations and coal operations to cover the validity of the taxexempt certificate (TEC); and,
- Amendment of DC 2007-04-0003 providing clarity on the DC for all transfers that may potentially affect the implementation of the SC.

²1C – Low estimate of Contingent Resources in-place

³1U – Low estimate of Prospective Resources in-place

⁴2C – Best estimate of Contingent Resources in-place

⁵2U – Best estimate of Prospective Resources in-place

⁶ An Act Granting New Incentives to Petroleum Service Contractors, and for This Purpose Amending Certain Sections of Presidential Decree 87, As Amended, Otherwise Known as "The Oil Exploration and Development Act of 1972"

To further stimulate the exploration and development of oil and gas resources, the DOE has proposed a project titled “Philippine Gradiometry and Seismic Geophysical Survey Project,” which aims to acquire new geophysical data to provide a comprehensive and in-depth analysis of the country’s underexplored sedimentary basins. This will enable the DOE and the prospective investors, from the upstream petroleum industry, to gather information for better understanding of petroleum prospectivity and geologic features within the coverage area that can lead to identifying potential new oil and gas fields in the country.

For the medium- to long-term, as part of the upstream sector’s efforts on energy transition, exploration studies on other naturally occurring gases, such as hydrogen, will be undertaken by considering the acquired exploration techniques. Likewise, the skills and understanding on the petroleum reservoirs will be good inputs on the Carbon Capture and Storage (CCS) studies on finding good geological storage for carbon capture.

Investment and Employment Opportunities

The DOE aims to further strengthen the petroleum industry through the conduct of local and international roadshows under the PCECP. In March 2023, the DOE participated in the South East Asia Petroleum Exploration Society (SEAPEX) in Singapore to showcase the PCECP. Before the end of 2023, two roadshows were conducted in Calgary, Canada during the World Petroleum Congress in September 2023 and AAPG-International Conference and Exhibition in Madrid, Spain in November 2023 to attract potential investors in North America and Europe, respectively, to boost exploration and development of oil and gas in the country.

The following investment incentives are offered under Presidential Decree No. 87 (PD 87) or the “Oil Exploration and Development Act of 1972”:

- Service fee of up to 40.0 percent of net production;
- Cost reimbursement of up to 70.0 percent gross production with carry-forward of unrecovered costs;
- Filipino Participation Incentive Allowance (FPIA) grants up to 7.5 percent of the gross proceeds for SCs with minimum Filipino company participation of 15.0 percent;
- Exemption from all taxes except income tax;
- Income tax obligation paid out of government’s share;
- Exemption from all taxes and duties for the importation of materials and equipment for petroleum operations;
- Easy repatriation of investments and profits; and
- Free market determination of crude oil prices.

The DOE is optimistic that awarding of new petroleum SCs will result in more drilling activities to augment domestic reserves and production of indigenous oil and gas in the country.

In relation to this, the awarding of PSCs will not only generate significant investments for the country but will also provide employment opportunities to the Filipinos, which is pursuant to Section 31 of PD 87.

Relative to the additional production targets in the sector’s roadmap, the total projected investment by the end of the planning horizon is expected to reach PhP145.2 billion for oil and PhP2.2 trillion for gas (Table 3).

Table 3. Projected Investments from Oil and Gas Development and Production

	Oil		Gas	
	Additional Production (MMB)	Investment (PhP Million)	Additional Production (BCF)	Investment (PhP Million)
Short Term	1.20	2,941	220	90,059
Medium Term	15.90	38,975	522	213,684
Long Term	42.14	103,295	4,582	1,875,674
Total	59.24	145,211	5,324	2,179,417

Note: Assumed offshore gas production at PhP 0.41/cft (development and production), which is adjusted based on inflation
Source: Wall Street - <http://graphics.wsj.com/oil-barrel-breakdown/>

COAL

The International Energy Agency (IEA) reported in December 2022⁷ that the strains caused by the global energy crisis resulted in a spike in coal demand for power generation in the international coal market.

Coal supplies, which is a third of global electricity generation, will continue to play a crucial role in industries, such as cement, iron, and steel until newer technologies are available.⁸

In the Philippines, coal remains an important fuel for electricity generation as it provides a reliable and stable source of energy. In 2022, coal accounted for almost 60.0 percent of the country's power generation. As oversight, the DOE continues to supervise and monitor the 29 existing COCs, including COC 208 of Vintage-21 Coal Mining Corporation (located in Lingig, Surigao del Sur and Boston, Davao Oriental) which was awarded on 20 March 2023. To date, 20 COCs are in the development and production stage, while nine (9) are in the exploration stage (Table 4).

The total coal production in 2022 reached 16.06 million metric tons (MMMT)⁹, with Semirara Mining and Power Corporation as the major contributor domestically. Meanwhile, coal consumption for the same period registered at 36.14 MMMT wherein fuel input for coal-fired power plants comprised 32.45 MMMT (89.8 percent), while cement plants and other industries (i.e., food, metals, and non-metallic, among others) accounted for the remaining 3.69 MMMT (10.2 percent).

2022 STATISTICS

16.06MMMT PRODUCTION

36.14MMMT CONSUMPTION

Table 4. **Active Coal Operating Contracts** (As of 30 June 2023)

	Operator	COC No.	Location	Area (Has)
Development/ Production Phase	1 Semirara Mining and Power Corporation	5*	Antique	13,000
	2 Adlaon Energy Development Corporation	9*	Cebu	2,770
	3 PNOC-Exploration Corporation	41	Zamboanga Sibugay	6,000
	4 Filipinas (Prefab) Systems, Inc.	68	Oriental Mindoro	8,000
	5 Filipinas (Prefab) Systems, Inc.	78	Zamboanga Sibugay	4,000
	6 A Blackstone Energy Corp.	93	Zamboanga Sibugay	1,000
	7 D.M. Wenceslao and Associates, Inc.	116	Cagayan Valley	3,000
	8 PNOC-Exploration Corporation	122	Isabela	9,000
	9 D.M. Wenceslao and Associates, Inc.	123	Cagayan Valley	1,000
	10 Lima Coal Development Corporation	125	Albay	1,542
	11 Daguma Agro Minerals Inc.	126	South Cotabato & Sultan Kudarat	10,000
	12 Samaju Corporation	128	Albay	1,400
	13 Samaju Corporation	129	Albay	547
	14 Sultan Energy Phil. Corp.	134	Sultan Kudarat & South Cotabato	7,000
	15 Great Wall Mining and Power Corp.	145	Surigao del Sur	5,000
	16 Abacus Coal Exploration and Development Corp.	148	Surigao del Sur	7,000
	17 Guidance Management Corp.	151	Negros Occidental	3,000
	18 Lima Coal Development Corp.	153	Sorsogon	3,000
	19 Titan Mining and Exploration Corp.	159	Davao Oriental	7,000
	20 BBB Mining and Energy Corp.	173	Cebu	4,000
Exploration Phase	21 Titan Mining and Exploration Corp.**	166	Zamboanga Sibugay	4,000
	22 Blackgem Resources & Energy Inc.**	169	Davao Oriental	6,000
	23 Dell Equipment & Construction Corp.**	170	Saranggani & South Cotabato	10,000
	24 MEGA Philippines Inc.	188	Sultan Kudarat & Saranggani	3,000
	25 PNOC-Exploration Corporation	204	Zamboanga Sibugay	2,000
	26 EFH Energy Tribe Corporation	205	Cebu	9,000
	27 Sunwest Oil and Gas Incorporated	206	Albay	3,960
	28 Grand Thermal Power Corporation	207	Agusan del Sur	7,000
	29 Vintage 21 Coal Mining Corporation	208	Davao Oriental	4,000

*Producing
**With application for conversion to development/production contracts

⁷ Source: <https://www.iea.org/news/the-world-s-coal-consumption-is-set-to-reach-a-new-high-in-2022-as-the-energy-crisis-shakes-markets>
⁸ Source: <https://www.iea.org/fuels-and-technologies/coal>
⁹ Run of Mine



Two (2) supercritical coal-fired power projects in Masinloc, Zambales (Top) and Mariveles, Bataan (bottom) supply baseload power capacity in Luzon

The commercial operation of the first supercritical coal plant in the Philippines in 2019 - the 528.1-MW San Buenaventura Power Ltd. Co (SBPL) in Mauban, Quezon - paved the way for the other supercritical coal-fired power projects to operate in pursuit of potentially reducing the impact of coal to the environment:

- 351.8-MW plant in Masinloc, Zambales by Masinloc Power Partners Co. Ltd., which started its commercial operation in December 2022; and,
- 2 x 725-MW plant in Mariveles, Bataan by GNPowder Dinginin Ltd. Co. (the two units commenced operation in December 2021 and October 2022).

As a result of the strengthened implementation of PCECP for coal, the DOE awarded the following COCs between 2021 and 2023:

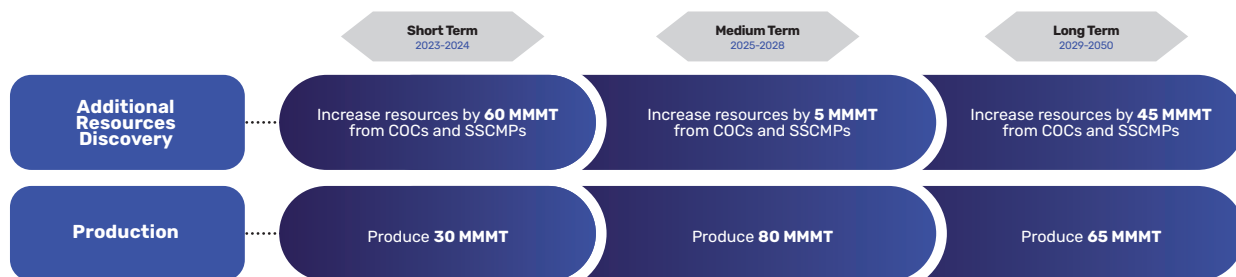
- COC No. 204 of Philippine National Oil Company - Exploration Corporation or PNOC-EC (2 coal blocks in Malangas, Zamboanga Sibugay) effective 03 September 2021;
- COC No. 205 of EFH Energy Tribe Corporation (9 coal blocks in Asturias, Carmen, Compostela and Danao City, Cebu) effective 27 May 2022;
- COC No. 206 of Sunwest Oil and Gas, Inc. (9 coal blocks in Rapu-Rapu, Albay) effective 22 July 2022;
- COC No. 207 of Grand Thermal Power Corporation (7 coal blocks in Trento, Agusan del Sur and Bislig City, Surigao del Sur) effective 22 July 2022; and
- COC No. 208 of Vintage-21 Coal Mining Corporation (4 coal blocks in Boston Davao Oriental and Lingig, Surigao del Sur) effective 20 March 2023.

Plans and Programs

As highlighted in the sector's roadmap (Figure 3), the target is to increase indigenous coal resources by the end of the planning horizon to contribute to the country's energy requirements.

For the planning period 2023–2050, the sector intends to achieve the discovery of additional resources by 110 MMT coming from COCs and small-scale coal mining permits (SSCMPs). This will also be complemented with the production of 175 MMT from the active and producing COCs.

Figure 3. Upstream Coal Sector Roadmap



With the iteration of coal as an important energy source towards a reliable and resilient energy system, the DOE will continue to pursue the issuance of policies to further mitigate the effects of coal mining, trading, transport, distribution, and utilization to the environment.

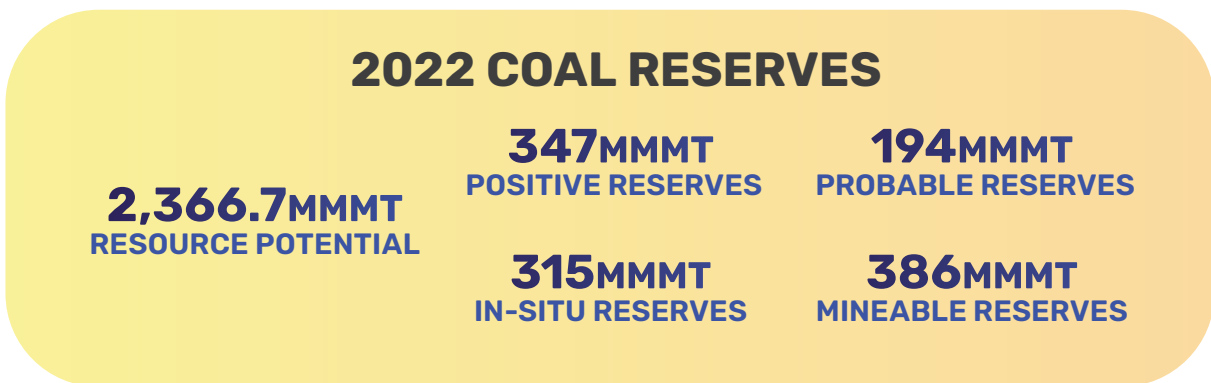
- **Guidelines on Coal Trading, Transport, Distribution, and Utilization in the Philippines.** The objective of the proposed policy is to strengthen the monitoring of coal trading, transport, distribution, and utilization, and to address the issues in the downstream coal sector.
- **Guidelines and Procedures to Implement a Program that will Allow Small-Scale Coal Mining (SSCM)** to address the current situation and conditions in the small-scale coal industry.
- Amendment of DC2018-03-0006 or the **Omnibus Rules and Regulations Governing Tax-Exempt Importations for Petroleum and Coal Operations** to cover the validity of the Tax-Exempt Certificate (TEC).
- **Guidelines in the Registration of all Contracts and Agreements** entered into by the COC Operators with Service Providers.

Since coal remains an integral part of the country’s energy mix in the short-, medium- and long-term scenarios, the DOE will strategize how to source coal should there be another disruption in the coal supply by monitoring world market prices and major coal producers as part of the energy resiliency and security. There is a need to diversify the coal importation sources in order to adapt to the ever-changing supply and demand market.

To further accelerate the PCECP for coal, the DOE will strive to accomplish these strategies in the short- term:

- Attract more potential investors in the Philippine coal industry through the conduct of investment promotion activities;
- Award more COCs; and
- Accelerate the exploration, development, and production of indigenous coal resources in the country.

In an effort to create a more sustainable future, the DOE is also looking into carbon capture, utilization, and storage (CCUS) technology to reduce environmental impacts by removing carbon dioxide (CO₂) emissions from the utilization of coal in power generation and industrial processes. The Philippines participated in the Southeast Asia CCS Accelerator (SEACA) initiative in May 2023, which focused on the near-term commercial deployment of the CCS framework and roadmap. This is aligned with the activities under the ASEAN Forum on Coal (AFOC) that aims to develop guidance on regulations, identify policy gaps, and accelerate investment, among others.



Investment and Employment Opportunities

As of 2022, the country’s 17 coal regions have total resource potential of 2,366.7 MMT with the largest coal resource in Semirara Island, Caluya, Antique estimated at 550 MMT.

The projected investment requirement for exploration activities of COCs that will yield additional resources in the planning period is about PhP5.62 billion. A higher investment requirement of PhP428.63 billion is expected from COCs under the development and production phase as this will contribute to additional coal production of 175 MMT (Table 5).

Table 5. Projected Investments on Coal

	Exploration		Development and Production	
	Additional Resources (MMT)	Investments (PhP Million)	Additional Production (MMT)	Investments (PhP Million)
Short Term	60.00	3,066	30.00	73,479
Medium Term	5.00	256	80.00	195,944
Long Term	45.00	2,300	65.00	159,205
Total	110.00	5,622	175.00	428,628

Notes:
 (a) Investment for exploration ranges from PhP 43.42 to PhP 45.85 per ton
 (b) In estimating investment requirements, the average (PhP 44.63) is used
 (c) The unit investment cost is adjusted based on inflation
 Source: APEC Energy Demand and Supply Outlook 6th Edition

B. DOWNSTREAM INDUSTRY

NATURAL GAS INDUSTRY

Natural gas is considered as the cleanest among fossil fuels having only one (1) carbon atom¹⁰, thus it can contribute to the country’s long-term goal of attaining a low carbon future. In 2001, the Philippine natural gas industry progressed with the discovery of Malampaya, and with its commercial operation and production, the energy supply has been augmented for the next two (2) decades.

With the current Malampaya field’s projected depletion by 2027 and with the end of Service Contract No. 38 (SC 38) by 22 February 2024, President Ferdinand Marcos, Jr. signed the Renewal Agreement on 15 May 2023 extending SC 38 for another 15 years (until 22 February 2039). The renewal is seen to be an enabler in fully maximizing Malampaya’s remaining gas reserves and a move to design a work program that will seek the potential of other prospective areas nearby. Other identified potential basins that indigenous gas can be explored will take a minimum of 20 years from the exploration to commercialization phase. The existing gas power plants will also see the end of its gas sales purchase agreement (GSPA) with Malampaya by 2024.

In 2022, natural gas accounted for 4.2 percent of the country’s total primary energy supply (TPES). In terms of power generation, it supplied 16.0 percent of the country’s electricity needs, specifically fueling five (5) existing gas-fired power plants¹¹ with a combined capacity of 3,730.6 megawatts (MW). The shift in focusing supply to liquefied natural gas (LNG) is a result of Malampaya’s anticipated depletion and the realization of ensuring supply continuity for the large natural gas plants situated in Southern Luzon providing power to the Luzon grid. The expiration of Ilijan’s GSPA in June 2022 with Malampaya resulted in the loss of 1,200 MW capacity in the Luzon grid leaving four (4) gas plants utilizing Malampaya gas.

As part of the DOE’s efforts to diversify the energy resources, the country welcomed the entry of two (2) reception and regasification facilities for imported LNG by Linseed Field Corporation and First Gen Corporation. Their entry will complement domestic natural gas and provide a flexi fuel supporting variable renewable energy (VRE), as well as reduce greenhouse gas (GHG) emissions.

The characteristics of natural gas make it ideal as an energy transition fuel that will bridge the growing needs of the country, while more renewables (such as solar, wind, and hydro projects) are developed together with an energy storage system (ESS). Relatedly, to further its role in energy transition, methane abatement measures (in equipment and operational techniques) including low-carbon hydrogen production with carbon capture, utilization, and storage (CCUS) must be in place.

¹⁰ Compared to solid and liquid with six (6) and above count of carbon atoms per molecule
¹¹ Avion (130.8 MW), Ilijan (1,436.5 MW), San Gabriel (442.9 MW), San Lorenzo (586.5 MW), and Sta. Rita (1,133.9 MW). Installed capacities as of December 2022.

Production and Consumption. In 2022, natural gas production was recorded at 113,611 million standard cubic feet (MMSCF), a 6.2 percent decline from the previous year’s level of 121,089 MMSCF.¹² Meanwhile, consumption was seen at 108,567 MMSCF, also indicating a decrease from 115,871 in 2021 (Figure 4).¹³ The consumption or utilization of natural gas in the country is solely for power generation as it is not utilized for industrial purposes because the Pilipinas Shell Petroleum Corporation’s (PSPC) ceased its oil refinery operation in February 2021.

Natural gas supply from Malampaya can possibly be extended up to 2027 but will not be able to sustain its usual production rate. Considering this, the DOE continues to promote and encourage private sector investment in LNG receiving terminals and other downstream gas related facilities by creating an investor-friendly environment.

Regulations Governing the Natural Gas Industry.

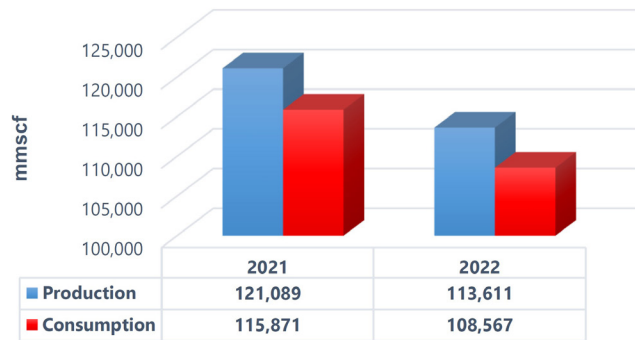
The importation of LNG is one of the strategic solutions the government identified and initiated to ensure supply continuity. With Department Circular (DC) 2017-11-0012 or the *Philippine Downstream Natural Gas Regulation (PDNGR)* in place, LNG investors are guided to initiate and build the corresponding facilities that will help spur the industry’s development.

Currently, the PDNGR is undergoing major revisions covering the provisions for Third Party Access (TPA) and the supply side. The former will no longer be mandatory, while the latter will have two types of supply accreditation to be issued – *supplier accreditation and aggregator accreditation*. As an aggregator, the investor can source natural gas from both local and imported gas. Other changes also include streamlining the documentary requirements for permit applications.

The permits on facilities are clearly defined. Other than the existing Notice to Proceed (NTP), there are also the Permit to Expand, Permit to Rehabilitate, approval of the DOE prior to the transfer of operatorship of gas facility, and approval of decommissioning and abandonment of natural gas facility. The revised PDNGR was issued at the end of 2023.

LNG Projects. Currently, the DOE has approved seven (7) LNG projects with an aggregate capacity of 21.98 million tons per annum (MTPA) through the issuance of the NTP. Three (3) have proceeded with Permit to Construct (PC) and most recently, one of the holders already submitted its application for Permit to Operate, after its mechanical completion and its Floating Storage Unit (FSU) arrived in the country (Table 6). The development of LNG infrastructures is focused on feasible areas in the country, with most ongoing LNG projects located in Luzon (e.g., Batangas, Quezon, and Bataan).

Figure 4. Natural Gas Production and Consumption (2021-2022)



The Linseed Field Corporation received its first LNG delivery in April 2023 through the Ocean Glacier vessel from the United Arab Emirates (UAE). The delivery benefitted Ilijan Power Plant as the gas supply is crucial in the plant’s resumption of operations from its almost eight (8) months of non-operation.

The FSRU of First Gen (FGEN) Corporation arrived in Batangas on 16 June 2023 through BW Batangas. The BW Batangas is part of the Interim Offshore LNG Terminal Project that can hold 162,524 m³ of LNG and can regasify up to 500 MMSCF of gas per day. This will enable utilizing LNG to augment the decreasing supply from Malampaya.¹⁴

Linseed Field Power Corporation’s LNG Receiving Facility with Ocean Glacier vessel.



¹² Production is gradually decreasing because of the gas field’s decreasing pressure over time.
¹³ The difference between production and consumption rates as reported is due to the own use of gas for platform operations.
¹⁴ First Gen Corporation’s Press Release thru their Official Facebook Page dated 23 June 2023

Aside from additional gas supply, FGEN and Linseed also provided job opportunities in the country. FGEN generated 1,025 jobs during its preparation and construction phase, while Linseed hired 880 people for its project. Most of the workers are residing in the province of Batangas and nearby provinces, ensuring that their own professional and skilled workers will be the first to benefit from the job requirements of these energy projects.

Table 6. List of Ongoing LNG Projects with Most Recent Issued DOE Permits as of 07 July 2023

Proponent	Project	Target Operation	Location	Capacity (MTPA)	Most Recent Issued DOE Permit
FGEN LNG Corporation	Interim Floating Storage and Regasification Unit (FSRU)	September 2023	Batangas City	5.26	Permit to Construct issued on 20 Sept. 2020 with a six-month extension already issued on 13 December 2022
Linseed Field Corporation	Floating Storage Unit (FSU) and Onshore Regasification	July 2023	Batangas City	3.00	Permit to Construct issued on 28 December 2021
Energy World Gas Operations Philippines Inc.	LNG Storage and Regasification Terminal	December 2023	Pagbilao, Quezon	3.00	Permit to Construct Extension for one year issued on 31 January 2023
Luzon LNG Terminal Inc.	Floating Storage and Regasification Unit (FSRU)	December 2025	Batangas City	4.40	Permit to Construct issued on 19 December 2022
Vires Energy Corporation	Floating Storage and Regasification Unit (FSRU)	April 2023	Batangas City	3.00	A two-year Notice to Proceed extension was issued on 12 January 2023
Shell Energy Philippines, Inc.	Floating Storage and Regasification Unit (FSRU)	September 2023	Batangas City	3.00	20-month Notice to Proceed extension issued on 06 January 2023
Samat LNG Corporation	Small-Scale LNG Terminal Project	March 2024	Mariveles, Bataan	0.32	Notice to Proceed issued on 09 January 2023
Total				21.98	

Table 7. List of Natural Gas-related House Bills

House Bill No.	Title	Sponsors
17, 29, 4097, 4615	Promoting the Development of the Philippine Downstream Natural Gas Industry, consolidating for the Purpose All Laws Relating to the Transmission, Distribution, and Supply of Natural Gas, and Appropriating Funds Therefor	<ul style="list-style-type: none"> • HB 17 - Rep. Ferdinand Martin G. Romualdez, • Yedda Marie K. Romualdez, and Jude A. Acidre • HB 29 - Rep. Lord Allan Jay Q. Velasco • HB 4097 - Rep. Paolo Z. Duterte, Eric G. Yap, Edvic G. Yap, and Jeffrey Soriano • HB 4615 - Rep. Michael L. Romero
173	Developing the Philippines Natural Gas Industry, and Appropriating Funds for this Purpose	Rep. Caroline L. Tanchay and Rodante D. Marcoleta
3015	Providing for the National Energy Policy and Framework for the Development and Regulation of the Philippine Midstream Natural Gas Industry, and other Purposes	Rep. Joey S. Salceda
4627	Developing the Philippines Natural Gas Industry, and Appropriating Funds for this Purpose	Rep. Gus S. Tambunting

Legislative Agenda. The 19th Congress saw the review of the Committee on Energy on related House Bills (HBs) for natural gas industry development. These HBs filed in the House of Congress are shown in *Table 7*.

On the other hand, Senate Bill (SB) 152 titled “An Act Providing for the National Energy Policy and Framework for the Development and Regulation of the Philippine Midstream Natural Gas Industry, and for Other Purposes,” aims to fill the gaps in the intricacy of the existing natural gas industry. A comprehensive legislation is needed to strengthen and bridge existing policies to unlock the potential of natural gas as a vital source of energy for the country.

The HB on LNG was recently approved by the House of Congress - Technical Working Group (TWG) on 24 May 2023. Said HB consolidates all related HBs on natural gas and the emerging LNG industry. The consolidated HB is titled “An Act Promoting the Development of Philippine Downstream Natural Gas Industry, Consolidating for the Purpose All Laws Relating to the Transmission, Distribution, and Supply of Natural Gas, and Appropriating Funds Therefor” and provides a framework for the development of the Philippine Downstream Natural Gas Industry (PDNGI) and its transition from emerging into mature industry within a competitive natural gas market. It also defines the responsibilities of various government agencies and private entities in furthering the industry’s growth.



Approval of the LNG Bill by the HOR Technical Working Group on 24 May 2023

Gas Policy Development Project. The DOE partnered with the University of the Philippines – Statistical Center Research Foundation, Inc. (UP-SCRFI) and UP National Engineering Center (UP – NEC) for the *Gas Policy Development Project (GPDP)* funded by the United States Department of State. The project was launched in December 2018 to provide technical assistance to the DOE on the implementation of PDNGR, conduct of capacity buildings among government agencies in regulating the importation of LNG into the country, and other potential LNG-related trainings and workshops.

The project also assisted the DOE and the Philippine Inter-Agency Health, Safety, Security, and Environment Inspection Monitoring Team (PIA-HSSE-IMT) in putting up a governance structure for the evaluation of applications for permits of LNG projects. Another output is the conduct of a market study on the potential non-power applications of natural gas other than power generation. The study was conducted among the Philippine Economic Zone Authority’s (PEZA) economic zones, which are potentially huge energy users especially manufacturing companies serving as locators in these zones.

The GPDP resulted in the publication of three research papers. The “Power and Non-Power Applications of Natural Gas,” completed in June 2022, presented the technical and environmental performance of existing gas facilities and summarized process recommendations that could increase efficiency and reduce emissions.



Meanwhile, the “Market Profiling on Potential Natural Gas Users in Economic Zones”, completed in May 2022, updated the profile and activities of the existing economic zones, identified locators with energyintensive operations in CALABARZON and Central Luzon (selected provinces), and determined the interest of locators in Special Economic Zones (SEZ) to convert to natural gas. The study delved into the top considerations for switching to natural gas, knowledge and perception on natural gas, knowledge on environmental issues, and technical requirements for switching from conventional fuel to natural gas.

Further, the “Market Profiling with Emphasis on the Use of Liquefied Natural Gas to Power Economic Zones” focused on the manufacturing and agro-industrial SEZ and recognized its distinct facilities and technologies that contribute to high energy demand and intensity. It also analyzed the willingness of the company locators within these SEZs to shift from its current energy source to LNG.

Moreover, GPDP published two reference documents for the downstream natural gas industry - LNG Investors’ Guide and Financial and Technical Recommendations for the LNG Project Applications. The former would assist investors in processes of business permitting from setting up of the facilities to commercialization. The latter is deemed important for evaluators in the assessment of the technical and financial viability of LNG project applications.



GPDP 2

As GPDP progressed to its second phase, it completed the *Natural Gas Development Plan (NGDP)* to aid regulators, policymakers, and investors in the development of the natural gas industry. The plan likewise provides guidance on the role of natural gas, legal and regulatory framework, and potential areas for development.

GPDP 3

The DOE is working to expand the project into its third phase through a technical assistance. The focus will be on the capacity-building aspect for the HSSE-IMT member agencies for the harmonization of regulations governing the natural gas industry. Currently, the Department is still working on the potential funding for this initiative.

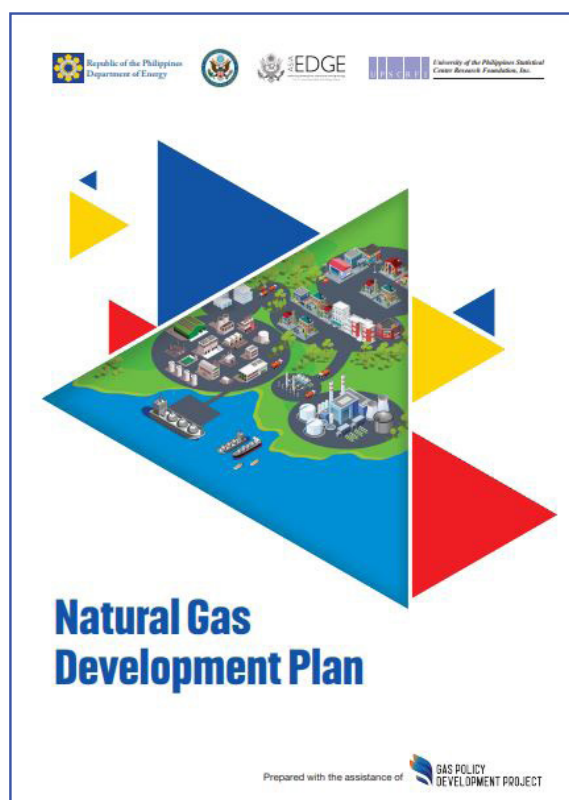
Memorandum of Understanding (MOU) Between DOE and MAN Energy Solutions.

The DOE and MAN Energy Solutions¹⁵ signed an MOU on 22 February 2022 that aims to formalize the establishment of cooperation on a non-exclusive basis for the conduct of a feasibility study for small- and medium scale LNG importation and regasification to power projects. It will also identify applicable technical and business solutions utilizing small- to medium-scale LNG importation and regasification to power projects that can be implemented in Visayas (indicative areas are Cebu, Iloilo, and Bohol) and Mindanao (indicative areas are Davao and General Santos). The MOU will also determine the required mixed modes of land and sea transport to domestically provide natural gas supply in an economical manner including the required infrastructure and transportation facilities that will contribute to the market development of natural gas in these regions. The feasibility study is in the finalization phase and targeted to turn over to the DOE by end-2023.

Natural Gas Taxation. Given its nature as a fossil fuel, natural gas is not subject to excise tax and customs duty tax. As stipulated in the guidelines of the Bureau of Internal Revenue (BIR), imported LNG, although classified as a fossil fuel, is not among those articles enumerated under Title VI, Chapter V of the National Internal Revenue Code (NIRC), as amended, and thus exempted from excise tax.¹⁶

Additionally, based on Republic Act (RA) No. 9337 or the *Reformed Value Added Tax (RVAT) Law* signed in November 2005, locally extracted natural gas and LNG are not subject to the excise tax on mineral products. Prior to the amendment, these products were taxed at the rate of two (2) percent.¹⁷

Imported LNG is not also subject to custom duty tax¹⁸ which indicates that the price of LNG will be competitive among other fuels, considering its reliability and flexibility in terms of technology.



¹⁵ German firm known in the engineering industry as a technology provider for decarbonization.

¹⁶ FOI Portal Inquiry Response to Asst. Commissioner Manuel V. Mapoy, Large Taxpayer Services (LTS)

¹⁷ FOI Portal Inquiry Response to J. Salvo, DOE NGMD 14 Feb 2020

¹⁸ Section V, Chapter 27.11 of the 2017 ASEAN Harmonized Tariff Nomenclature (AHTN), Tariff and Customs Code – Most Favored Nation (MFN) & ASEAN Trade in Goods Agreement (ATIGA)



Plans and Programs

The energy sector's overall goal is to have a "sustainable, stable, secure, sufficient, accessible and reasonably-priced energy" for the country. Corollary to this, the downstream natural gas industry specifically aims to improve its governing policies by establishing a world-class, investment-driven, and efficient natural gas industry.

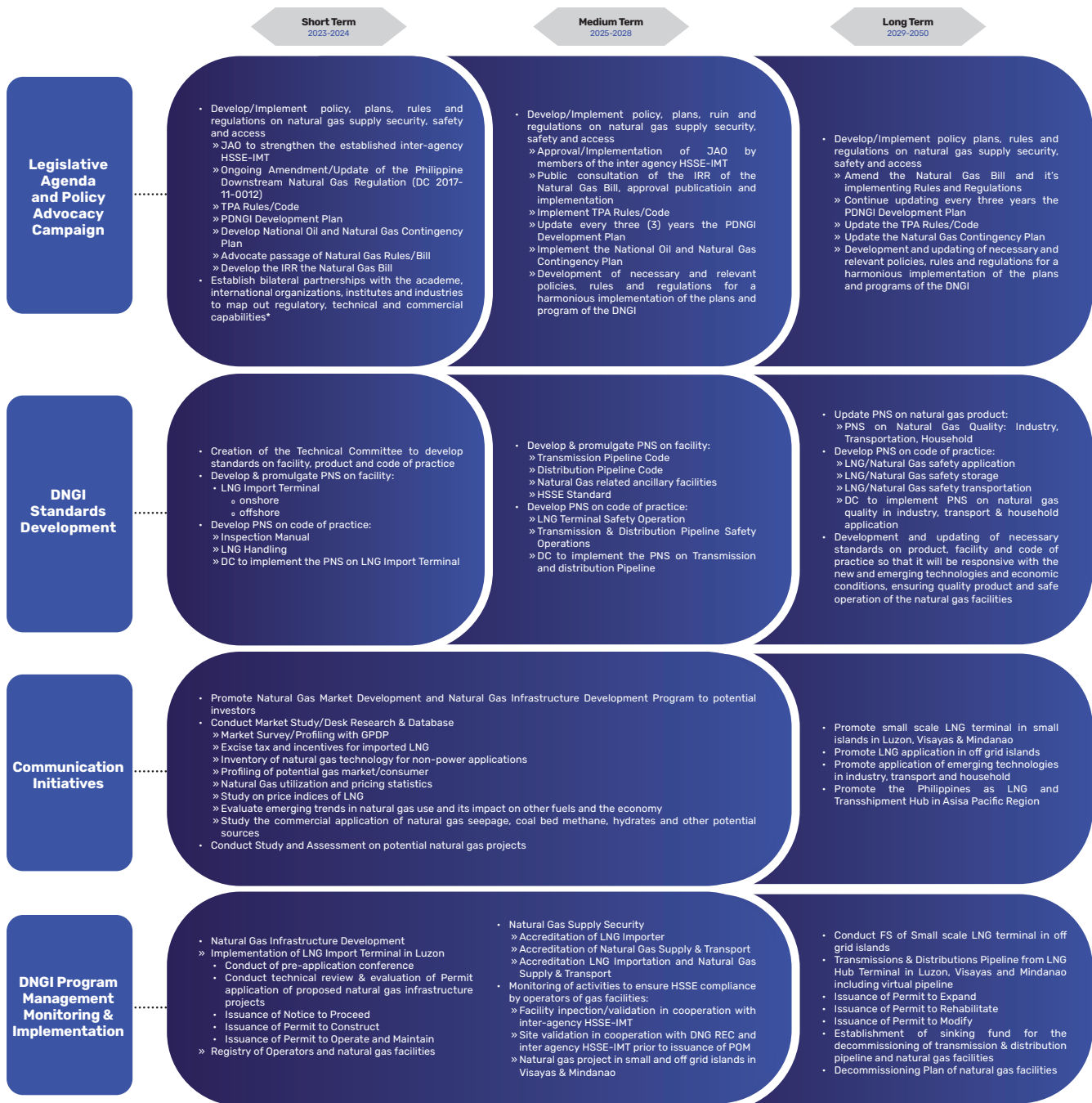
Legislative Agenda and Policy Advocacy Campaign. The foreseen entry of LNG investments and projects in the country entails the DOE to focus on strengthening and formulating relevant policies and regulatory frameworks on natural gas supply security, safety, and access. These policies include the following: a) Joint Administrative Order (JAO) among relevant agencies on the PIA-HSSE-IMT that is responsible for the inspection and permitting of LNG projects; b) ongoing amendment of the existing policy governing the industry, which is the PDNGR; c) Third Party Access Rules; d) NGDP; and e) development of National Oil and Natural Gas Contingency Plan. Forming part of the initiatives is also the establishment of bilateral partnerships between academe, international organizations, institutes, and industries to map out regulatory, technical, and commercial capabilities of natural gas and clearly understand the gas demand in non-power applications.

The policy advocacy campaign specifically pinpoints the support for the passage of the Natural Gas Bill and the preparation of its Implementing Rules and Regulations (IRR) once signed into law. The conduct of market study and research (i.e., market survey and profiling) will be continued through the GPDP. The study on taxes and incentives for imported LNG, inventory of natural gas technology for non-power applications, and natural gas pricing, are all priorities in knowledge-building to effectively assist the DOE in managing the industry. The results of these studies will further support the formulation of necessary policies and regulations for the downstream gas industry.

Standards Development. The establishment of standards for natural gas is an essential move to properly manage the facility and products. The recent creation of a Technical Committee (TC) for Natural Gas Standards Development started with the acceptance of invited TC members. The 13 membership nominations for the TC were formally accepted by the sectoral representatives consisting of the academe, manufacturers, government agencies, industries, professional institutions, and standard government organizations.

The development of a Philippine National Standard (PNS) on LNG Import Terminal (both onshore and offshore) is a top priority. The standards to be formulated will be benchmarked to countries with vast LNG experience in importation such as Japan, which is known to be the largest global LNG importer. The code of practice is also essential as it encompasses inspection procedures, LNG handling, and PNS implementation in LNG terminals (through an issuance of a DC).

Figure 5. Downstream Natural Gas Roadmap



2050 OBJECTIVE

To establish a world class, investment driven and efficient natural gas industry that makes natural gas the preferred fuel by all end use sectors

Program Management, Monitoring, and Implementation. The procedures on the implementation of LNG import terminal projects are still under development. The DOE, through the pre-application conference, creates an avenue to discuss with potential investors their plans in putting up LNG facilities. This also serves as a forum for the investors to inquire and discuss the permitting process for securing the NTP, PC covering facility construction and completion, and Permit to Operate and Maintain (POM), which gives the green light on the operation of the facility. Progress reports are necessary while the proponent secures the next level of permits.

On natural gas supply security, it covers the DOE's issuance of accreditation and acknowledgment. The importation and transportation of gas need to be communicated to the Department and once acknowledged, this will be part of the documentation that is a requirement of other government agencies such as the Bureau of Customs (BOC). It is also essential for an LNG importer to apply for accreditation prior to the arrival of LNG supply in the country.

Another component of this action plan is the monitoring of the facility-related activities to ensure adherence to the requirements of the HSSE. The PIA-HSSE-IMIT is tasked to conduct regular inspection schedules in existing and upcoming gas facilities.

Communication Initiative. The conduct of information, education, and communication campaigns (IEC) is a continuing effort to convey natural gas as a clean and reliable fuel. These campaigns have been conducted to target locators in economic zones, particularly in Southern Luzon (e.g., Laguna, Batangas, and Quezon) where the existing and planned natural gas facilities are located. Accordingly, the DOE's local government counterparts (e.g., city / municipal planning, engineering, health and safety, business permit licensing, etc.) also formed part of the stakeholders in IECs as these offices are responsible for issuing permits to natural gas projects.

The market survey delving on the willingness of converting to natural gas is also included in the IECs. The results likewise provided useful analysis and insights on the possible additional market for natural gas (either local or imported) and in line with market expansion (other than power generation). The plan of continually educating stakeholders on natural gas' non-power applications will include manufacturers that are mostly located in industrial zones. These industries are known to be highly energy intensive especially cement, glass, steel, and food manufacturing, where there is high demand for fuel in the furnaces and boilers. There are manufacturers that rely on pure electricity processes. However, to ensure the uninterrupted supply of electricity, natural gas is a reliable option as it is known to be a fast start-up fuel.

Small-scale LNG. Forming part of the sector's plan is the promotion of small-scale LNG (SSLNG) facilities to provide power in off-grid areas. The SSLNG facilities are seen as a possible replacement to heavy reliance on oil-based generation in missionary areas. One of the advantages of SSLNG is lower initial investment cost compared with conventional LNG. In addition, the supply can come online in a relatively shorter period and the flexibility of logistics and operation will not be relying on the existence of gas pipelines. The SSLNG facilities could make a big difference in setting the goal of efficient and low-carbon power generation in off-grid areas. As defined by the International Gas Union, a small-scale LNG facility has a liquefaction and/ or regasification capacity of 0.05-1.0 MTPA and a vessel with a capacity of 60,000 cubic meters (m³) or less.¹⁹

Investment and Employment Opportunities

The investments in natural gas facilities are critical to the industry's advancement, and to facilitate this, the DOE approved an additional five LNG projects with a total investment cost of USD865.4 million²⁰ (PhP43.3 billion) (Table 8).²¹ Considered a flexible fuel, LNG can support the grid's demand from baseload to mid-merit and peaking. It will also assist the sector in furthering the development of intermittent RE technologies such as solar and wind.

Apart from investments directed by these projects, another tangible benefit is employment generation. A total of 4,507 jobs are expected to be created from these LNG projects, providing a significant contribution to both the local and national economy.

Table 8. List of Ongoing LNG Projects with Job Generation

Proponent	Project	Target Operation	Location	Job Generation	Total Construction Cost (USD Million)	Total Construction Cost (Php Million) ²²
Energy World Gas Operations Philippines Inc.	LNG Storage and Regasification Terminal	December 2023	Pagbilao, Quezon	3,115	145	7,250
Luzon LNG Terminal Inc.	Floating Storage and Regasification Unit (FSRU)	December 2025	Batangas City	160	480	24,000
Vires Energy Corporation	Floating Storage and Regasification Unit (FSRU)	April 2026	Batangas City	782	123	6,150
Shell Energy Philippines, Inc.	Floating Storage and Regasification Unit (FSRU)	September 2025	Batangas City	290	49.40	2,470
Samat LNG Corporation	Small - Scale LNG Terminal Project	Phase 1 - March 2024 Phase 2 - May 2025	Mariveles, Bataan	160	68	3,400
Total				4,507	865.4	43,270

¹⁹ APEC Small-scale LNG in Asia Pacific, APEC Energy Working Group - September 2019

²⁰ Forex used is USD 1 = PhP 50

²¹ DOE NGMD LNG Project Status Matrix Report as of 07 July 2023

²² 1 USD = PhP50. Based on DOE's Project Status Matrix as of 07 July 2023

On top of the ongoing LNG projects, the Reference (REF) scenario needs an additional capacity of 3.98 MTPA of LNG facilities to meet the projected supply requirements by 2050. If this additional capacity is provided by an Onshore LNG Terminal, it will necessitate a total investment of PhP47.3 billion. Alternatively, if sourced from an FSRU, a lower investment cost of PhP11.1 billion is required. The construction of these new LNG facilities is expected to create employment opportunities for 907 Filipinos. In the Clean Energy Scenario (CES), no additional LNG capacity is needed, as ongoing projects are sufficient to meet the country's requirements.

Table 9. **Additional LNG Facilities**

	Capacity Addition (MTPA)	Aggregate Investment (PhP Million)	Job Generation
On-shore LNG Terminal with Storage	3.98	47,322 ²³	907
FSRU with Storage		11,135 ²⁴	
Total	3.98	58,457	907

Oil Industry

The global economy including the oil market is on the path of recapturing what it lost during the COVID-19 pandemic because of lockdowns, mobility restrictions, and supply surplus. The oil prices then were also on a decline, a result of the excess in production of supply. With economies already opening and the easing and lifting of restrictions implemented, supply was met with an uptrend in oil demand. Apart from the pandemic, the geopolitical conflict between Russia and Ukraine also impacted oil prices resulting in competition in securing the required supply from importing countries.

In 2021, oil's share in global primary energy consumption comprised 30.95 percent.²⁵ The International Energy Agency (IEA) in its Global Energy Review 2022²⁶ cited that "global oil demand surpasses 2019 levels by 2023, undeterred by high oil prices. Demand peaks in the mid-2030s at 103 million barrels per day (MB/D)" under its Stated Policies Scenario (STEPS). As indicated in STEPS, road transport will have the biggest demand for oil from 40.5 percent to 41.9 percent in the period 2021 to 2030. This will be followed by industry/petrochemicals and aviation and shipping from 20.5 percent to 23.7 percent and from 9.9 percent to 14.0 percent, respectively.

In the Philippine context, oil accounted for the largest share in the total primary energy supply (TPES) for 2022, registering 32.2 percent equivalent to 19.8 million tonnes of oil equivalent (MTOE) (indigenous at 0.36 MTOE and imported at 19.47 MTOE). As the country remains oil import dependent, the Department of Energy (DOE) is vested with the mandate²⁷ of securing sufficient oil and petroleum products supply, ensuring the product's quality in adherence to the Philippine National Standards (PNS), and overseeing a fair and competitive market for oil industry players.

Downstream Oil Participants

Retail Marketing Business. The number of operating liquid fuel retail outlets (LFROs) or gasoline stations increased by 10.4 percent, from 10,802 in 2021 to 11,923 in 2022. The constant growth in retail facilities can be attributed to the government's policy of modernizing these including the services as contained under Department Circular (DC) No. 2017-11-0011 or the "Revised Retail Rules."

Among the country's major islands, Luzon remains to have the greatest number of LFROs comprising almost 53.0 percent (6,282) of the total in 2022. Mindanao and Visayas both have a share of 24.0 percent and 23.3 percent, respectively (Table 10).

Table 10. **Number of LFROs (cumulative)**

Region	2021	2022
NCR	1,032	1,056
Luzon	5,802	6,282
Visayas	2,423	2,780
Mindanao	2,577	2,861
Total	10,802	11,923

Note: Luzon includes the LFROs in NCR

²³ Onshore Investment per MTPA: PhP11,900 million; Job Generation per MTPA: 228 jobs

²⁴ Offshore Investment per MTPA: PhP2,800 million; Job Generation per MTPA: 228 jobs

²⁵ bp Statistical Review of World Energy 2022 71st edition

²⁶ Source: <https://www.iea.org/reports/global-energy-review-2022>

²⁷ As provided by Republic Act (RA) No. 8479 or the Downstream Oil Industry Deregulation Act of 1998

Table 11. Number of LPG Establishments

Region	2021	2022
NCR	1,237	1,910
Luzon	4,583	6,864
Visayas	2,746	2,751
Mindanao	2,393	2,399
Total	10,959	13,924

Total Country Storage Facility. Forming part of ensuring supply security is having the required storage facilities to maintain the supply inventory needed to support the various economic activities. To date, 151 storage facilities – 58 import terminals, one (1) refinery, and 92 depots serving as distribution facilities/networks – are situated throughout the country. Aggregating these facilities indicates a total storage capacity of 41,634 thousand barrels (MB) in 2022 (Table 12).

The import terminals comprise almost 64.0 percent of the total at 41,634 MB. The sole remaining refinery, Petron’s Bataan Refinery, has a storage capacity of 9,609 MB, and its refinery storage capacity includes crude, intermediate stocks, and finished petroleum products. The 92 oil depots are distribution facilities, which summed up the entirety of the nation’s existing downstream oil storage facilities.

A close look on both storage capacity and sales among the regions implies Luzon’s large overall contribution (Table 13). In 2022, capacity and sales were registered at 22,776.9 MB and 109,513.7 MB, respectively. Region IV-A (CALABARZON) posted the highest storage capacity (12,923.3 MB), while NCR registered the highest sales (36,824.7 MB). This was closely followed by Region III (Central Luzon) with 7,638.8 MB (storage capacity) and 26,430.5 MB (sales). Visayas is purely led by Region VII (Central Visayas) with 1,709.8 MB total storage capacity with 9,678.6 MB of total sales and this can be correlated to the various economic development-related activities present in the provinces of Cebu, Bohol, and Negros Oriental. In the case of Mindanao, both Region X (Northern Mindanao) and Region XI (Davao Region) combine for almost 11.0 percent and 9.0 percent of the capacity and sales on the island.

On the other hand, liquefied petroleum gas (LPG) establishments recorded a growth of 27.1 percent, reaching 13,924 in 2022. Similarly, Luzon posted the highest number of LPG establishments with 6,864 in 2022 (Table 11), which is almost 50.0 percent of the total.

Table 12. Existing Downstream Oil Facilities

Facility Type	No. of Facilities	Capacities, MB	Percent Share
Depots	92	5,422	13.02
Major	34	2,928	7.03
Others	56	2,177	5.23
End-User	2	317	0.76
Import Terminals	58	26,602	63.90
Major	9	8,986	21.58
Others	48	15,723	37.77
End-User	1	1,893	4.55
Refinery	1	9,609	23.08
Petron – Limay, Bataan	1	9,609	23.08
Grand Total	151	41,634	100.00

Table 13. Depot/Storage Facility and Sales per Region

Region	Storage Capacity, MB	Storage Capacity Share (%)	Sales, MB	Share by Region (%)
I. Refineries				
Region III	9,610.14	23.17		
Total	9,610.14			
II. Bulk Plants				
NCR	584.10	1.41	36,824.72	23.85
Region I	1,070.41	2.58	5,566.59	3.60
Region II	-	-	3,955.62	2.56
Region III	7,638.77	18.41	26,430.49	17.12
Region IV-A	12,923.25	31.15	28,850.87	18.68
Region IV-B	262.70	0.63	2,152.88	1.40
Region V	297.43	0.72	4,603.91	2.98
CAR	0.25	0.00	1,128.59	0.73
Total Luzon	22,776.91		109,513.67	
Region VI	1,132.0	2.73	7,090.37	4.60
Region VII	1,709.77	4.12	9,678.62	6.27
Region VIII	519.38	1.25	3,063.64	1.98
Total Visayas	3,361.15		19,832.63	
Region IX	641.21	1.55	4,265.33	2.76
Region X	2,746.41	6.62	7,593.77	4.92
Region XI	1,804.65	4.35	7,011.44	4.54
Region XII	393.99	0.95	3,538.11	2.29
CARAGA	127.09	0.31	1,998.28	1.29
ARMM	22.41	0.05	669.01	0.43
Total Mindanao	5,735.76		25,075.94	
Total Bulk Plants	31,873.82			
Grand Total	41,483.96	100	154,422.24	100



OIMB-OISMD Depot Product Sampling and Testing

Petroleum Products and Facilities Standards

Standards Development. The Philippine National Standards (PNS) for petroleum products and facilities as set by the DOE ensures the applicability and compatibility of fuels to the current requirement of consumers, the public transport sector, and manufacturers served by the downstream oil industry. The PNS also ensures that the Philippines adheres to global harmonization, as well as maintains consonance with international trends towards economic growth and environmental protection i.e., improves fuel composition for increased efficiency and reduced emission, and initiates biofuels and biofuel-blends programs. Further, the PNS serves as an engineering design on safety guide and practices for petroleum facility workers in reference to safety, health, and environmental protection, as well as appropriate mitigation measures as observed and practiced in the downstream oil industry sector. The PNS formulation is anchored on Republic Act (RA) No. 8749 or the Philippine Clean Air Act of 1999, RA 9367 or the Biofuels Act of 2006, and RA 8479 or the Downstream Oil Industry Deregulation Act of 1998 thereby ensuring better fuel quality standards. *Tables 14 to 15* show the PNS for Petroleum Products and Facilities and Department Circulars (DCs) that were developed and issued in 2021 and 2022.

Table 14. Quality of Petroleum Products

Title	PNS Number/ DC Number	Date of PNS/DC Issuance	Description	Purpose/significance
Biofuels -Coconut Methyl Ester (CME) B100 Specification	PNS/DOE QS 002:2021	27 December 2021	This standard specifies the requirements for CME (B100) suitable for blending to diesel fuel for use in various types of compression ignition engines and other similar types of engines.	This standard cancel and replaces PNS/DOE QS 002:2015. The following improvements and revisions were made: a) Inclusion of new property, the Cold Soak Filterability Test (CSFT) - a limit set adopting the ASTM D6751 at 360 seconds maximum; b) Improvement of Monoglyceride content from 0.8 to 0.7 percent maximum; c) Inclusion on provision on good housekeeping; and d) Updating of test methods.
Petroleum Products - CME-blended automotive diesel oil (ADOB3)- Specification	PNS/DOE QS 015:2021	27 December 2021	This standard addresses the technical requirement of automotive diesel oil containing 3.0 percent v/v CME or CME-blended automotive diesel oil (ADOB3) and suitable test methods.	This standard supports future energy policies towards the integration of higher biofuels blends in the petroleum/fuel sector. This is also in line with the continuing program of the government towards the use of cleaner fuels and promoting the use of indigenous and renewable energy resources with the end view of reducing dependence on imported oil.
Petroleum Products - CME-blended industrial diesel oil (IDOB3) -Specification	PNS/DOE QS 016:2021	27 December 2021	This standard addresses the technical requirement of industrial diesel oil containing 3.0 percent v/v CME or CME-blended industrial diesel oil (ADOB3) and suitable test methods.	This standard supports future energy policies towards the integration of higher biofuels blends in the petroleum/fuel sector. This is also in line with the continuing program of the government towards the use of cleaner fuels and promoting the use of indigenous and renewable energy resources with the end view of reducing dependence on imported oil.
Petroleum Products - CME-blended automotive diesel oil (ADOB4) Specification	PNS/DOE QS 017:2021	27 December 2021	This standard addresses the technical requirement of automotive diesel oil containing 4.0 percent v/v CME or CME -blended automotive diesel oil (ADOB4) and suitable test methods.	This standard supports future energy policies towards the integration of higher biofuels blends in the petroleum/fuel sector. This is also in line with the continuing program of the government towards the use of cleaner fuels and promoting the use of indigenous and renewable energy resources with the end view of reducing dependence on imported oil.
Petroleum Products - CME-blended industrial diesel oil (IDOB4) - Specification	PNS/DOE QS 018:2021	27 December 2021		
Implementing the Philippine National Standard Specification for Biofuels - Coconut Methyl Ester (B100), PNS/DOE QS 002:2021	Department Circular No. DC2022-06-0020	20 June 2022 Effective: 27 August 2022	This department circular implements the PNS/DOE QS 002:2021 in which the said PNS cancels and replaces the 2015 version. It includes additional parameters to reduce or eliminate the formation of flakes after production and improve storage conditions and good housekeeping practices	

Table 15. Facility Standards

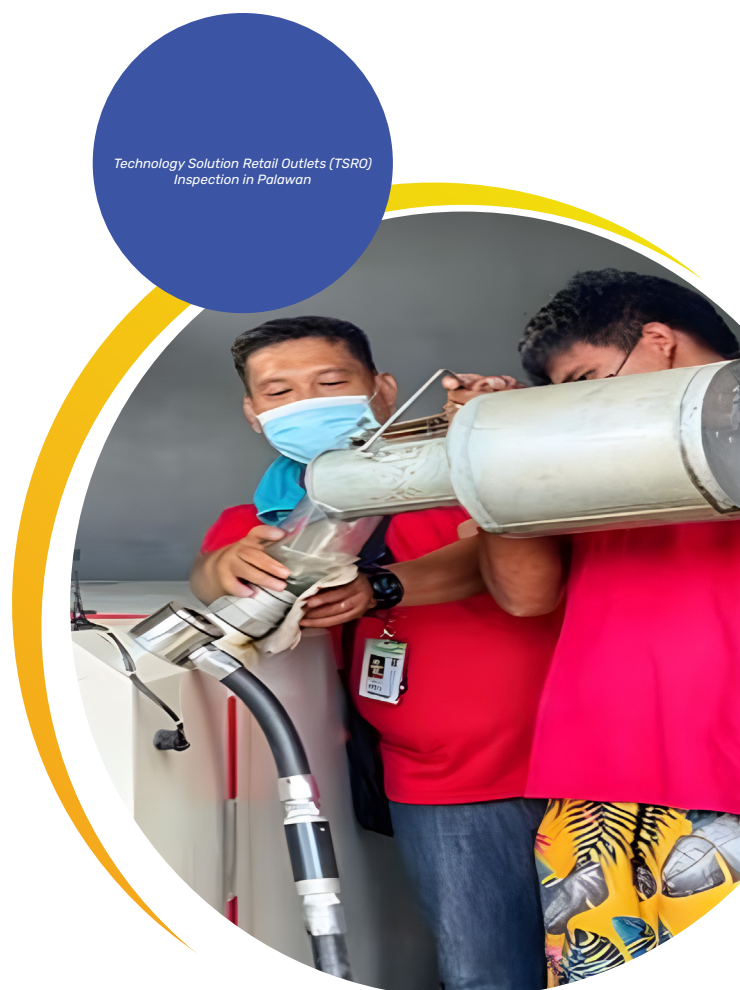
Title	PNS Number	Date of final draft PNS Endorsement for Promulgation/DC Issuance	Description
Tank truck – Bulk liquid fuel – Requirements and safe operating practice	PNS/DOE 01:2023	12 May 2023	This Standard provides for the minimum requirements of tank truck vehicle design and specifications to ensure worker-safe, environment-friendly and quality assured transport of bulk liquid fuels. Additionally, in case of hazardous and similar incidents, emergency response procedures and guidelines are also outlined herewith. Furthermore, this Standard also provides for all existing government regulations and requirements at the time of publication, in the operation and maintenance of tank trucks used for liquid fuels.
LPG transport –Bulk and cylinders –Requirements and safe operating practices	PNS/DOE 02:2023	12 May 2023	This Standard provides for the minimum requirements for vehicle design and specifications to ensure safe, workersafe, environment-friendly and quality assured transport of LPG in Cylinders and in bulk. Additionally, in case of hazardous and similar incidents, emergency response procedures and guidelines are also outlined herewith. Furthermore, this Standard also provides for all existing government regulations and requirements at the time of publication, in the operation and maintenance of Tank Truck used for the transport of LPG in Cylinders and in Bulk.
Tank truck – Mobile liquid fuel dispensing system – Requirements and safe operating practices	PNS/DOE 03:2023	12 May 2023	This Standard covers the minimum requirements for the transportation of Liquid Fuels Mobile Vehicle Dispensing System (LF-MVDS) used for the dispensing of diesel and/or gasoline during emergency situations in the aftermath of such as typhoon, earthquake, flood, etc., when the operations of the existing Retail Outlets are temporarily non-operational. Under this Standard specification, an LF-MVDS shall not be used or deployed to conduct retailing business in areas where existing retail outlets can operate normally even under calamity.
DPNS on LPG Dealer's Showroom And Warehouse Requirements with Safety Practices		On-going development with concerned stakeholders and government agencies (For circulation)	This Standard covers the minimum facility requirements for LPG Dealers to ensure safe and proper storage of LPG cylinders and canisters during retail operations. An LPG Dealer's facility may be a showroom, or a showroom and a warehouse. The Showroom consists of the LPG display area, office space for business transactions, and stock area for LPG cylinders available for sale, and empty or returned cylinders/ canisters. This Standard also incorporates the Safety Practices that must be observed in the operations and upkeep of warehouses and showrooms used for the storage and sale of LPG in cylinders. Covered in the Safety Practices are Cylinder Storage, Cylinder Stacking, Handling of LPG Cylinders, Personnel Safety and Informational Signages.

Supervision and Monitoring. The DOE is carefully monitoring the compliance of all downstream oil participants through the conduct of sampling of liquid petroleum products (LPP) in terminals/depots and LFROs and from various inspections nationwide. Onsite inspection activities are consistently performed to confirm compliance of industry participants with the PNS. The DOE has undertaken the following monitoring and supervision activities in 2022:

- Inspected/monitored 296 LFROs and 319 LPG establishments;
- Gathered 446 samples of liquid fuel products from
- LFROs for further testing of the DOE; and,
- Conducted product sampling/testing for 62 depots.

Communication Initiatives. The DOE consistently conducts information, education, and communication (IEC) activities to improve public awareness, address knowledge gaps, and change behaviors. These activities intend to provide first-hand information on the downstream oil industry (DOI) to its target audience or stakeholders.

In 2022, 18 IEC activities were undertaken by the DOE which focused on the various aspects of downstream oil (e.g. oil supply-demand outlook, DOI rules and regulations, and Safe LPG Project among others). Relatedly, said IECs also covered topics concerning the safe handling of petroleum products, the role of Local Government Units, and investment opportunities for prospective DOI Players and other government agencies.





Policy Advocacy. The DOE crafted several Circulars to support the passage of RA 11592 or the *LPG Industry Regulation Act of 2021* and regulate the domestic LPG industry and ensure consumer protection against malpractices. From 2021 to 2023, the DOE promulgated the following policies:

- **DC2022-11-0037**,²⁸ titled *Guidelines on the Registration and Issuance of License to Operate to Qualified DOE-Regulated LPG Industry Participants and Penalizing Certain Prohibited Acts*, mandates LPG industry players to convert their standards compliance certificate (SCC) into a registration certificate with License to Operate (LTO). Additionally, the responsibilities of LPG industry stakeholders, registration, standards, and reportorial requirements are also included in the Circular.
- **DC2022-11-0033**,²⁹ titled *Rules of Procedure for Administrative Cases in the Downstream Oil Industry*, wherein the DOE can initiate administrative actions against LPG industry participants and liquid fuels industry participants through the issuance of a Show Cause Order.
- **RA 11592- Implementing Rules and Regulations Joint Department Circular (JDC) JDC 2022-05-0001**,³⁰ titled *Implementing Rules and Regulations (IRR) of Republic Act No. 11592*. The JDC establishes the regulatory framework for the safe operations of the liquefied petroleum gas industry, delineating the powers and functions of various government agencies, defining, and penalizing certain prohibited acts.
- **JDC 2022-11-0002**,³¹ titled *LPG Cylinder Exchange, Swapping, and Improvement Programs*. Said Circular expounds the mandatory requirements for the establishment of a Swapping Center and provides a system allowing end-users to exchange or swap their LPG cylinders at authorized Swapping Centers. The program ensures that only safe cylinders will circulate within the consuming public and helps prevent the occurrence of LPG-related accidents.
- **DC 2021-10-0035**,³² titled *Revised Circular for Impounding & Disposal of Philippine Downstream Oil Industry Confiscated Items*. The DC updates the proper handling, labeling, recording storage and disposal of impounded petroleum and paraphernalia to ensure accountability, health, safety, and environmental protection.
- **DC 2023-08-0025**,³³ titled *Guidelines on the Recognition of Training Organizations for Qualified Service Persons Of DOE-Regulated Liquefied Petroleum Gas (LPG) Industry Participants*. The Circular recognizes Training Organization as accredited by the DOE to conduct training courses for individuals who will be working as Qualified Service Persons in any activities or facilities of the DOE-regulated LPG industry participants.

Information Exchange and Data Reconciliation Initiatives. Memorandum of Agreement (MOA) was executed and signed between the DOE, the Bureau of Customs (BOC), and the Bureau of Internal Revenue (BIR) on 27 May 2021 to enhance information exchange among the three (3) agencies regarding the importation of petroleum products. Building on the gains from the prior years, the DOE aims to consistently submit importation acknowledgment to BOC to facilitate advance information on arriving imported petroleum products. The DOE likewise continuously submits a quarterly reconciliation report to BOC and BIR for data uniformity. Inspection activities are also to be conducted by the DOE and BOC for LFROs as part of the coordinated efforts to eradicate petroleum products smuggling and encourage proper tax payments.

Digital Transformation. The Downstream Oil Online Platform (DOOP) is a collaborative project between the DOE and Appentric Solutions Inc. The DOOP shall serve as a platform for the submission of reportorial requirements of DOI participants and function as depository for database monitoring. It is targeted to be implemented early 2024.

On the specifics, the DOOP is also an end-to-end solution that provides the following: a) online registration; b) service application; c) facility profile management; d) inspection report management; e) oil products information management; (f) document processing; g) workflow management; and h) executive dashboard reporting services for the DOE.

²⁸ Issued on 22 November 2022

²⁹ Issued on 08 November 2022

³⁰ Promulgated 20 May 2022 by both Secretaries of DOE and DTI

³¹ Approved by DTI Secretary on 24 November 2022 and signed by DOE on 25 November 2022

³² Issued on 22 October 2021

³³ Promulgated 03 August 2023

Legislative Agenda

Voluntary Implementation of 20.0 percent bioethanol blend for gasoline products. The DOE is advocating for the voluntary use of gasoline with 20.0 percent bioethanol blend (E20). This will serve as a price mitigation measure because ethanol is cheaper than the price of gasoline. Relatedly, the introduction of the voluntary E20 in the market will result in the utilization of a higher percentage share of imported ethanol with a much cheaper price compared to locally produced ethanol. Thus, it is expected to lower pump price as compared to the 10.0 percent bioethanol blend (E10). Additionally, the DOE plans to increase the biodiesel blend (CME) from the current 2.0 percent blend (B2) to 3.0 percent (B3) in 2024, 4.0 percent (B4) in 2025, and 5.0 percent (B5) in 2026 to promote cleaner air and increase the benefits provided to coconut farmers.

Other amendments to be pursued include fair trade practices and safeguards, additional powers for the DOE Secretary, and the authority of the President to suspend or reduce excise taxes on fuels.

On fair trade practices and safeguards, the objective is to apply the provisions of the Philippine Competition Act³⁴ and to ensure fair market competition in the industry with the Philippine Competition Commission (PCC), DTI, and DOE as oversight. The additional power sought for the DOE Secretary pertains to having access to information as there are limits on disclosure being shared by the oil players. The authority of the President will be guided by the recommendations from the Development Budget Coordination Committee (DBCC) and the suspension or reduction will be considered and be triggered by the average Dubai crude price in Mean of Platts Singapore (MOPS) for three consecutive months (greater than USD80/barrel).

Fuel Subsidy Project

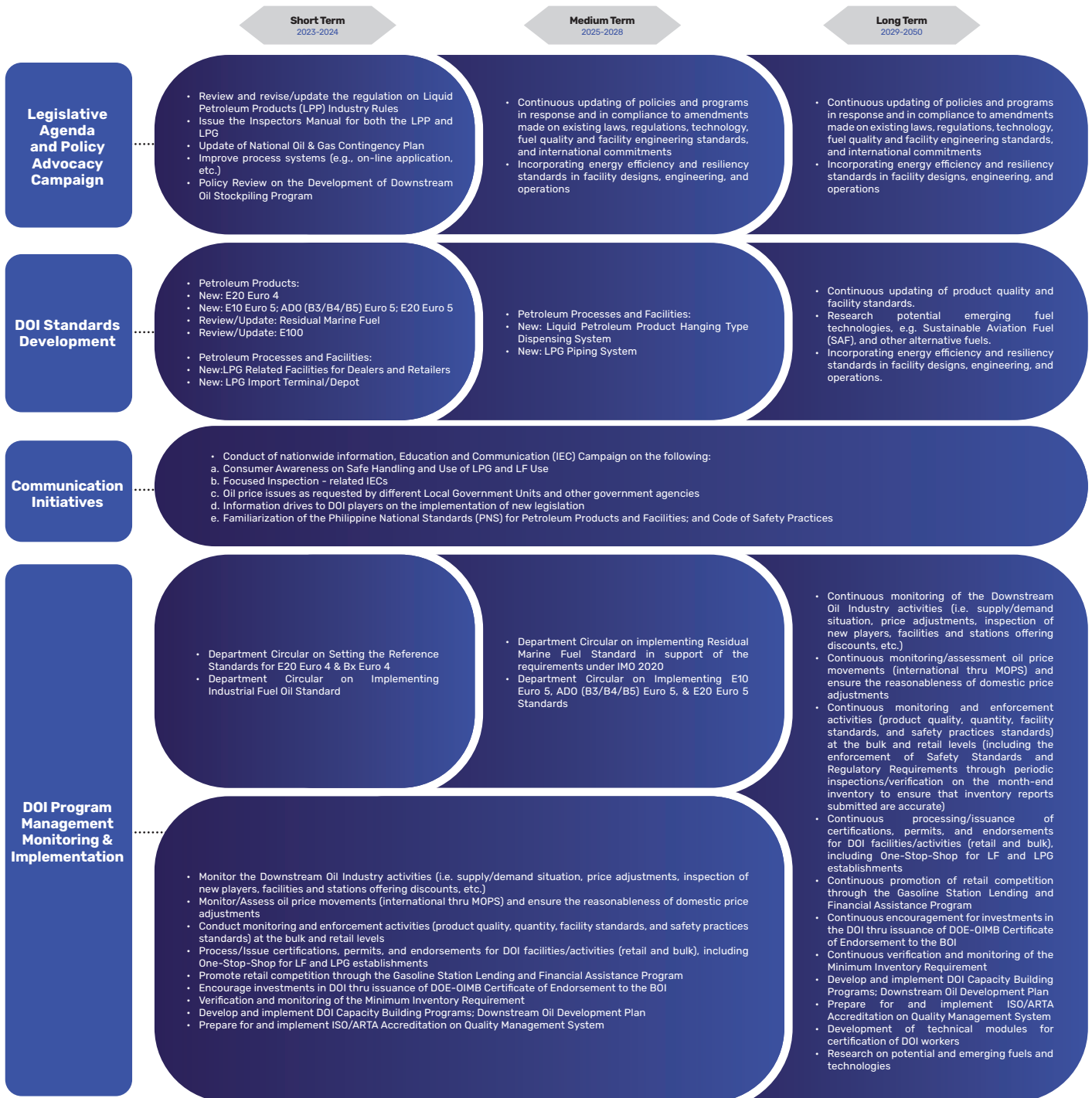
As a continuing project that mitigates the adverse effects of increasing oil prices to the vulnerable sectors, particularly public transport, and agriculture, the government allotted PhP4.0 billion for “Fuel Subsidies”. About PhP3.0 billion would be allotted for the public transport sector (*Pantawid Pasada*), while the remaining PhP1.0 billion would be for farmers and fisherfolks (*fuel discount*). The program’s funding is lodged under the regular budgets of the Department of Transportation (DOTr) and the Department of Agriculture (DA) under the 2023 General Appropriations Act (GAA). The DOE for its part must certify that the average price of crude oil surpassed USD 80/barrel in the past three months to implement the fuel subsidy program. Relative to this, President Ferdinand Marcos, Jr. gave a directive to change the trigger mechanism of the 2024 General Appropriations Act (GAA) provision on fuel subsidies. Said changes aim to shorten the trigger mechanism from the current three months to one (1) month and simplify the release requirements. On the other hand, the guidelines for implementation of the fuel subsidy program will be based on the conditions set by the Department of Budget and Management (DBM), DOTr, and DA.

Plans and Programs

The sector envisions that within the planning horizon, there will be an *improved policy governing the downstream oil industry to ensure continuous supply of high quality and right quantity of petroleum products in the market (Figure 6)*. This will be supported by the action plans on the core areas of legislative agenda and policy advocacy campaign, standards development, program management monitoring and implementation, and communication activities.

³⁴ Republic Act (RA) No. 10667 is the primary competition policy of the Philippines for promoting and protecting competitive market. It will protect the well-being of consumers and preserve the efficiency of competition in the marketplace.

Figure 6. Downstream Oil Roadmap



2030 OBJECTIVE

Improved policy governing the downstream oil industry to ensure continuous supply of high quality and right quantity of petroleum products in the market.

SHORT-TO-MEDIUM TERM

Legislative Agenda and Policy Advocacy Campaign. In the short-term, promulgation of the LPP and LPG inspection manuals to standardize the conduct of onsite inspections will be pursued. The DOE will also work on issuing the Revised LPP Inventory Rules to update the outdated requirements and penalties.

For the medium-term, continuous review and update of policies and programs regulating the downstream oil sector will be undertaken to facilitate private sector participation, mitigate challenges, and align with global trends. The evolution of policies and programs governing the industry will also ensure the security of petroleum products supply in the market and enforce compliance with the country's existing laws and regulations. Relatedly, the government's prevailing rules and regulations must adapt to this fast-paced sector and find complementing technology innovations to attract investors, enabling a more conducive climate for the industry. Further, the updating of the National Oil and Gas Contingency Plan (NOGCP) will focus on continuous supply, particularly in times of calamities and disaster.

Standards Development. As indicated in the roadmap, standards development includes both products and facilities. Several PNS for higher biofuel blends are in the development stage (e.g., E20 Euro 4, E10 Euro 5, ADO (B3/B4/B5) Euro 5, E20 Euro 5, etc.). Further, updates and reviews for PNS covering residual marine fuel, and E100 are also targeted to be done during the short- to medium-term. Meanwhile, facility standards formulation will concentrate on LPG import terminals, depots, and piping systems together with facilities of retailers and dealers for the LPG Sector, and Ceiling Type Dispensers for the Liquid Fuel Sector, during the planning period.

The draft Downstream Oil Resiliency Plan is targeted to be completed in the same period to ensure adequate and continuous fuel supply. Lastly, the DOI Training Institute through the Technical Education and Skills Development Authority (TESDA) will conduct skills training and technical education for Filipinos and contribute to nation-building, particularly by producing individuals with excellent industrial skills.

DOI Program Management. With fuel standards development undertaken in the short-term, the DOE will craft the necessary circulars to provide information, guidance, and rules for E20 Euro 4, Bx Euro 4, and Industrial Fuel Oil Standards. Meanwhile, the policies for implementing the Residual Marine Fuel³⁵ Standard in support of the requirements under International Maritime Organization (IMO) 2020³⁶, E10 Euro 5, ADO (B3/B4/B5) Euro 5, and E20 Euro 5 Standards³⁷ are targeted to be completed until 2028.

Communication Initiatives. Since the passage of the Downstream Oil Industry Deregulation Act, the DOE has been promoting the Gasoline Station Lending and Financial Assistance Program (GSLFAP). The GSLFAP is in line with the deregulated market environment that aims to encourage the entry of new industry participants. It provides credit assistance to prospective participants whose owners have completed a two-fold program on management and skills training in the retailing of petroleum products including LPG. The DOE also plans to issue updated guidelines on the Gasoline Station Training and Loan Fund (GSTLF) to further enhance GSLFAP's availment.

In addition, IEC campaigns are to be conducted nationwide for the safe handling and use of LPG and liquid fuels. Safety is one of the top priorities when using and handling petroleum products. In compliance with RA 11592, the LPG Cylinder Improvement Program (LCIP) will ensure the quality of all cylinders in circulation with the goal of protecting consumers.

³⁵ Target Start of Deliberation: March 2024

³⁶ Source: <https://www.imo.org/en/MediaCentre/PressBriefings/pages/02-IMO-2020.aspx>

³⁷ Emission standards requirements to be set by the DENR through the National Air Quality Action Plan / Target Start of Deliberation: June 2024



LONG-TERM

The foundation built during the short- to medium-term are the necessary steps for the realization of the sector's vision within the planning period. To advance the sector's action plans, the continuous update, revision, and amendment of policies in response to the evolving industry climate in both local and international is critical. Moreover, the DOE will always recognize the importance of protecting consumer welfare thereby ensuring that petroleum products are complying with quality and quantity.

Legislative Agenda and Policy Advocacy Campaign. The DOI environment is constantly evolving and to respond to this, the DOE will continue to update policies and programs to keep abreast with amendments made on existing laws, regulations, technology, international commitments, and best practices. The DOE will also actively participate in the crafting of the NOGCP to gain a better insight in securing national fuel supply, especially during severe interruptions.

Standards Development. For the long-term, the continuous updating of petroleum product quality and facility standards will ensure that the country is at par with international standards. Additionally, new facilities in the industry will have to incorporate resiliency standards in their design to be better equipped in dealing and mitigating the challenges posed by climate change. On the other hand, research studies are to be carried out for potential emerging fuel technologies (i.e., Sustainable Aviation Fuel or SAF) and other alternative fuels to improve efficiency and to reduce harmful emissions. These actions are consistent with the DOE's vision of a low-carbon future, improved energy security, and decrease dependency on imported petroleum products.



DOI Program Management. The DOE will also continue to perform its regular functions in line with the Oil Deregulation Act, LPG Industry Regulation Act, Biofuels Act, and the Comprehensive Recovery and Tax Incentives for Enterprises Act or CREATE. The development of accreditation criteria and technical modules will be pursued for DOI training schools consistent with the certification of DOI workers. The participation in various investment fora will promote and encourage investments for the sector. The DOE will also develop and implement the Downstream Oil Development Plan (DODP). This will further develop the downstream oil industry which includes existing policy framework, legal requirements, oil outlook, standards (e.g. petroleum products, facilities, and code of safety practice), and way forward.

Communication Initiatives. The DOE is of the firm belief that "a well-informed and vigilant consumer is the best-protected consumer" in terms of handling petroleum products. Petroleum products and LPG pose potential hazards from production, distribution, and consumption. In line with this, continuous conduct of IECs to highlight safety of all stakeholders including safety guidelines when using LPG and liquid petroleum products is essential. It is fundamental that all end-users are aware and equipped with safety information to prevent injuries, minimize damage to properties, and avoid the loss of lives due to unsafe practices.

Investment and Employment Opportunities

The projected increase in oil demand within the planning period implies that investments are necessary for additional storage capacity. Putting up these facilities necessitates measures to attract and entice investments that will assist in ensuring security of oil supply.

Oil Storage Capacity Requirement. The DOE is constantly promoting and monitoring downstream oil industry-related activities particularly on supply, logistics, marketing, distribution, and pricing. The additional investments for facilities to be secured in the planning period will shield the country from oil supply disruption in times of disaster (e.g., typhoon, volcanic eruption, etc.) and geopolitical tensions (i.e., Russia-Ukraine War).

The Philippines' total oil requirement (including crude oil) by 2050 under the Clean Energy Scenario (CES) is projected at 384,389 MB, 13.1 percent lower than the Reference Scenario's (REF) total oil requirement of 442,525 MB for the same period (Table 22). It should be noted that the total supply requirement includes jet fuel and marine bunker for international passage, which are not captured in the country's TPES and total final energy consumption (TFEC) but are considered for additional storage capacity requirements. The international aircraft and marine vehicles refueling in the Philippines should be included in the computation of additional depots to be set up in the short- to long-term.

Table 16 shows the additional cumulative depot requirement based on the total oil requirement including its equivalent cumulative investments and job generation from 2025 to 2050. The cumulative depot capacity requirement accelerates by 157.7 percent from the 2025 level of 10,582 MB to 27,268 MB in 2050 under REF. On the other hand, an increase of 133.5 percent from the 2025 level of 9,597 MB to 22,408 MB in 2050 is seen under the CES. Both scenarios will require the country to more than double its depot capacity requirement in the planning period with an additional capacity of 16,686 MB for REF and 12,811 MB for CES. For the additional depots, the inventory level assumption is at 30 days for petroleum products and 15 days for LPG, and with 80.0 percent capacity utilization rate for the storage facilities. However, if the MIR is to be considered, only half of the depot capacity requirement (as shown in Table 16) is needed over the planning horizon.

The estimated investment requirement for the depot capacity additions under REF stands at PhP98.6 billion by 2050 and this is 17.8 percent higher than CES with PhP81.05 billion. Equivalently, these investments will generate jobs totaling 18,474 (REF) and 15,181 (CES), respectively.

Table 16. Additional Depot Requirement, Investment and Job Generation

Year	Total Oil Requirement (MB)		Additional Cumulative Depot Capacity Requirement (MB)		Cumulative Investment (Million PhP)		Cumulative Jobs Generation	
	REF	CES	REF	CES	REF	CES	REF	CES
2023	219,269	217,832	-	-	-	-	-	-
2025	230,243	224,331	10,582	9,597	38,274	34,711	7,169	6,502
2028	253,527	240,001	14,030	11,708	50,748	42,347	9,505	7,932
2030	268,307	249,403	14,030	11,708	50,748	42,347	9,505	7,932
2035	307,567	277,455	17,399	13,895	62,933	50,260	11,788	9,414
2040	352,144	307,842	20,493	16,448	74,123	59,492	13,884	11,143
2045	393,886	342,982	23,786	19,370	86,037	70,063	16,115	13,123
2050	442,525	384,389	27,268	22,408	98,629	81,050	18,474	15,181

The total oil import requirement of the country is set to increase from its 2023 level of 157,272 MB to 341,222 MB in 2050 under REF. For CES, this is seen to escalate to 286,911 MB in 2050. Given the similar assumptions for the oil depot, the country's import terminal is sufficient to accommodate the country's oil requirement within the planning horizon (Table 17).

In consideration of the assumption that import terminals operate at 80.0 percent utilization rate, an additional capacity requirement of 6,913 MB would be needed in the REF by 2050 on the assumption of at least a 30-day inventory. Similarly, half of the additional capacity would be required if MIR is considered. In the REF scenario, the annual growth rate of domestic oil demand is gradually decreasing, from around 5.1 percent in 2023 to 2.7 percent in 2050 or 3.2 percent average annual growth rate (AAGR) due to energy efficiency measures in the transport sector and the 10.0 percent electric vehicle (EV) penetration in road transport. On the other hand, no additional capacity is needed over the planning period for CES considering a lower oil demand in this scenario with 2.6 percent AAGR due to higher energy efficiency impacts on transport and higher EV penetration rate at 50.0 percent.

The country will need an estimated investment requirement of PhP25.0 billion by 2050 under the REF and expected to create additional 1,312 jobs.

Table 17. **Additional Cumulative Import Terminal Requirement, Investment and Job Generation**

Year	Total Oil Import Requirement (MB)		Total Import Terminal Capacity Requirement (MB)		Cumulative Investment (Million PhP)		Cumulative Jobs Generation	
	REF	CES	REF	CES	REF	CES	REF	CES
2023	157,272	155,985	-	-	-	-	-	-
2025	166,317	158,639	-	-	-	-	-	-
2028	186,495	172,021	-	-	-	-	-	-
2030	199,108	179,779	-	-	-	-	-	-
2035	232,269	202,781	-	-	-	-	-	-
2040	269,312	227,168	-	-	-	-	-	-
2045	302,870	254,868	-	-	-	-	-	-
2050	341,222	286,911	6,913	-	25,005	-	1,312	-

ENHANCING CONSUMER AWARENESS AND PROTECTION

The downstream oil sector is cognizant of protecting consumers and this remains a core priority of the DOE. Consumers that are well-informed make better choices and decisions that benefit their day-to-day activities.

Keeping the consuming public informed warrants the DOE to continuously monitor oil supply, demand, and prices. The activities in support of these are: a) oil price monitor, oil supply-demand situationer report, and list of retail stations offering discounts and freebies posted at the price watch tab of the DOE website; b) assessment report submission and presentation to the Cabinet and Senate/Congress' Committee on Energy; c) appearances with the LGUs and other government agencies when warranted; and d) media interviews.

Relatedly, the DOE renewed its partnership with *Angkas* in the monitoring of retail pump prices for the period 07 June to 16 November 2022³⁸ which aimed to inform consumers which LFROs offer better fuel prices and services. Under the program partnership, an estimated 700 LFROs were monitored by *Angkas* riders in the National Capital Region (NCR) and Metro Cebu. Further, authorized *Angkas* riders reported fuel prices and assessed the services and facilities of LFROs via Retail Pump Prices and Quality Service Dashboard 2022 as reflected at the DOE website.

On the promotion of awareness on the health, safety, security, environmental, and quality standards for the proper use of LPP and LPG, the DOE will be unwavering in the conduct of feedback consultation meetings with the local government units (LGUs) regarding the result of focused inspection in their jurisdiction. Moreover, the "Safe Use of LPP and LPG Campaign Program" will be part of this consultation meeting to instill responsiveness and behavior change.

On the other hand, the DOE website reflects the oil companies implementing the fuel discount program, which helps cushion the impact of the increases in fuel prices to consumers. The discount ranges from PhP1.00 – PhP4.00 per liter at participating gasoline station outlets.

³⁸ Retail Pump Prices and Quality Service Dashboard 2022: <https://www.doe.gov.ph/downstream-oil/advisory?q=retail-pump-prices-quality-service-dashboard2022>

PHILIPPINES AS A RISING OIL HUB IN SOUTHEAST ASIA

In recent years, the refining subsector saw a decline in the number of industry participants. Prior to the promulgation of the Oil Deregulation Law, the country had three refineries owned by Petron, Shell, and Caltex. To date, only Petron's refinery stands as both Caltex and Shell converted and transformed their refineries into import terminals. On the other hand, Pilipinas Shell, a subsidiary of Royal Dutch Shell, said that it permanently shut down its Tabangao Refinery in Batangas City, Philippines, and converted it to a full import terminal. The company said that the decision will help streamline its asset portfolio and boost its cost and supply chain competitiveness.

The Philippines, with its strategic location, is envisioned to be an Oil Hub for Southeast Asia. The realization of this vision involves putting in place various policies by the government to encourage investments and promote oil refining again as an industry, such as providing better incentives and attractive market environment (i.e. taxation). The presence of refineries will lessen the impact of global oil price movement since the refining activities for petroleum products are to be done within the country. Additionally, the refining subsector needs to grow and flourish by considering energy resiliency, oil stockpiling, and oil contingency plan, particularly in times of disasters and geopolitical tensions.

Taxation. The pursuit of positioning the country as a refining hub involves taking the first step, which is having a better understanding of how neighboring countries tax petroleum products. The following countries of interest to be studied are China, Korea, and Singapore. The comparative matrix on taxes levied on petroleum products by these countries and the Philippines is shown in *Table 18*.

- **China.** In 2022, the country's estimated refining capacity is at 18.4 MB/D³⁹. The Chinese Central Government primarily collects consumption tax. This constitutes 40.0 percent of the retail price of road fuels in China as this is comprised of a consumption tax of 2,110 Yuan/ton (USD39/barrel) for gasoline and 1,411 Yuan/ton (USD29/barrel) for diesel, 17.0 percent value-added tax (VAT), an urban construction tax and education surcharges.

The consumption tax applies to prescribe nonessential and luxury or resource-intensive goods (e.g., alcohol, fuel oil, motor vehicles, petrol, yachts, golf products, luxury watches). The tax is calculated based on the sales value of the goods, sales volume, or a combination of the two. Categorically, the tax is considered "state tax" with 100 percent of the proceeds going to the central government. On the other hand, VAT is considered a "shared tax" that is collected and shared by both central and local governments. Consequently, a call for reforms in the tax system has been raised to give local governments a substantial portion of the tax receipts.⁴⁰

China implemented a new consumption tax policy in June 2021 thereby affecting its imports of mixed aromatics and light cycle oil, which are used in blending gasoline and diesel. The new tax policy treats mixed aromatics and light cycle oil (previously exempted from consumption taxes) as similar to gasoline and diesel, which are now subject to consumption tax. It also aims to correct a loophole that result in unfair price advantage to some fuel sellers, as well as to help the country meets its emission goals.⁴¹

- **Republic of Korea.** The country has five (5) large refineries with an estimated refining capacity of 3.5 MB/D⁴². Import taxes are imposed on crude oil and refined petroleum products. In Korea's taxation system, finished petroleum products are taxed more by the government. The tax system thereby gives an advantage for Korean refineries compared to product importers. A flat-rate VAT of 10.0 percent is imposed on all sales of fuels and energy services. The imposition of excise taxes is also applied on oil products and gas sales to both households and businesses. Relatedly, transport fuels are subjected also to additional taxes, including an education tax and an array of transport taxes (i.e., traffic, energy, and environmental).⁴³

³⁹ Source: <https://www.reuters.com/business/energy/china-takes-top-spot-global-refining-capacity-output-lags-us-2023-02-17/>

⁴⁰ Source: <https://www.argusmedia.com/en/news/2194921-chinese-majors-push-for-oil-tax-reforms>

⁴¹ Source: https://www.eia.gov/petroleum/weekly/archive/2021/210929/includes/analysis_print.php

⁴² Source: <https://www.iea.org/articles/korea-oil-security-policy>

⁴³ Source: <https://www.oecd.org/fossil-fuels/KOR.pdf>

- **Singapore.** The island city-state has three large refineries with a total crude oil refining capacity of 1.5 (MB/D)⁴⁴. Singapore is a free port and has relatively few excise and import duties. Excise taxes are imposed principally on liquors, tobacco, motor vehicles, and petroleum products. Also, very few products are subject to import duties. According to Inland Revenue Authority of Singapore, the current VAT or Goods and Services Tax (GST) rate is 9.0 percent.⁴⁵ The Singaporean government's vision and provision of a conducive market environment for refining (i.e. supporting infrastructure) establishes the support for the industry to thrive and grow.

Table 18. Taxes Levied on Petroleum Products

Country	VAT (%)	Excise Tax	Import Duty-free (%) ⁴⁶
China	17.0	USD 0.21/liter	94.3
Republic of Korea	10.0	USD 0.25 to 0.36/liter	100.0
Singapore	9.0	USD 0.015 to 0.53/liter	100.0
Philippines	12.0	USD 0.054 to 0.18/liter	100.0

*Conversion rate: USD 1 = PhP 55

Potential Studies. The oil refining industry is a private sector driven activity in the Philippines and the role of the government is to set fair and equitable rules and prepare a conducive investment market environment in the country. In the past years, the country has seen the withdrawal of Caltex and Shell from the refining business and Saudi Aramco from investment in Petron. As the demand for petroleum products is expected to increase steadily, the current refining capacity level and the supply/demand balance will require a constant increase of finished petroleum products importation.

To help the refining sector, the government needs to study its components to set out guidelines regarding the outlook of oil refining in the country. Some of the studies that can be undertaken by research institutions are the following: a) maintenance in the downstream oil industry; b) inspection and maintenance for oil refineries; c) energy conservation in refineries; and d) risk assessment and safety of an oil refinery.

C. RENEWABLE ENERGY

BIOFUELS

Mainstreaming national efforts to reduce oil dependence is among the major priorities in the energy sector. This reflects the government's unwavering commitment in achieving the objective of veering away from oil through research and development (R&D) initiatives. In accordance with Section 5⁴⁷ of the Biofuels Act of 2006, the DOE, in collaboration with the National Biofuels Board (NBB) continues to optimize the utilization of feedstocks as a viable and clean alternative energy source. This collaborative effort has further boosted the country's biofuel production capacity, effectively meeting the escalating demand for sustainable energy solutions.

⁴⁴ Source: <https://www.trade.gov/energy-resource-guide-singapore-oil-and-gas>

⁴⁵ Source: [https://www.iras.gov.sg/taxes/goods-services-tax-\(gst\)/basics-of-gst/current-gst-rates#:~:text=GST%20Registered%20businesses%20are%20required,exempted%20under%20the%20GST%20law.](https://www.iras.gov.sg/taxes/goods-services-tax-(gst)/basics-of-gst/current-gst-rates#:~:text=GST%20Registered%20businesses%20are%20required,exempted%20under%20the%20GST%20law.)

⁴⁶ Source: https://www.wto.org/english/res_e/publications_e/world_tariff_profiles23_e.htm

⁴⁷ Section 5: Mandating all liquid fuels for motors and engines sold in the Philippines shall contain locally sourced biofuel components.



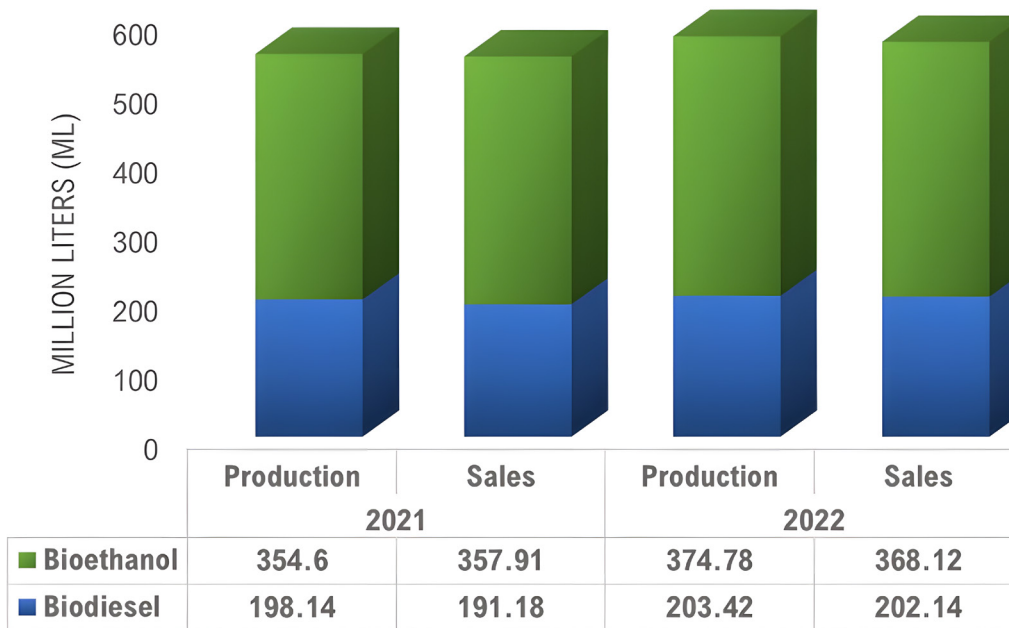


Capacity and Production. As of December 2022, the aggregate production capacity of biofuels was recorded at 1,143.9 million liters per year (MLPY). Of the total, 677.9 MLPY capacity was for biodiesel production from 12 accredited facilities, while the remaining 466 MLPY capacity was for bioethanol provided by 13 accredited facilities as shown in *Table 19*.

Table 19. Accredited Biofuel Facilities
(As of Dec. 2022)

Biofuel	No. of Projects	Capacity (MLPY)
Biodiesel	12	677.9
Bioethanol	13	466.0
Total	25	1,143.9

Figure 7. Biofuel Production and Sales



Biofuels utilization exhibited a positive trend in 2022 primarily attributed to the increased demand for diesel and gasoline following the lifting of mobility restrictions associated with the COVID-19 pandemic. *Figure 7* shows the growth in production outputs for biodiesel and bioethanol, reaching 203.4 million liters (ML) and 374.8 ML, compared to 198.1 ML and 354.6 ML in 2021, respectively. This translated to an increase in production outputs of 2.7 percent for biodiesel and 5.7 percent for bioethanol. On the other hand, sales increased by 5.7 for biodiesel and 2.9 percent for bioethanol. These figures indicate the gradual improvement in biofuel production, highlighting the growing recognition and adoption of RE sources in the transportation sector.

Accreditation. There are six (6) registered facilities with Notice to Proceed with construction comprising four (4) from biodiesel and two (2) bioethanol with production capacities of 288.9 MLPY and 83.0 MLPY, respectively (*Table 20*). Additionally, two biodiesel distributors have a storage capacity of 2.0 ML (*Table 21*).

Table 20. **Registered with Notice to Proceed / Ongoing Construction** (As of Dec. 2022)

Biofuel Facilities	Project Location	Production Capacity (MLPY)
Biodiesel		
Bio Renewable Energy Ventures, Inc.	Jasaan, Misamis Oriental	150.00
Greentech Biodiesel, Inc.	Gumaca, Quezon	100.00
Voice Development Corporation	Tayabas, Quezon	27.65
Seaoil Philippines, Inc.	Pres. M.A. Roxas, Zamboanga del Norte	11.23
Subtotal		288.88
Bioethanol		
Cavite Biofuels Producers, Inc.	Magallanes, Cavite	38.00
Canlaon Alcogreen Agro Industrial, Corp.	Bago City, Negros Occidental	45.00
Subtotal		83.00
Grand Total		371.88

Further, the DOE continuously facilitates the issuance of certificate of accreditation (COA) for construction and commercial operations, and certificate of registration (COR) to biofuel producers and distributors underscoring the commitment to promote biofuels in the country. Such ensures that biofuels being sold, distributed, and used for transport fuel meet the necessary standards.

In parallel, the DOE has also been involved in overseeing the denaturing of locally produced bioethanol amounting to 67.2 ML (based on certifications duly signed by the representatives of the DOE and Bureau of Internal Revenue (BIR) as submitted by the bioethanol produces). The denaturing process guarantees that bioethanol is utilized solely for its intended purpose as a renewable source, aligning with the government's efforts to promote sustainable and environmentally friendly energy alternatives.

Research and Development. Driven by safeguarding energy supply security and sustainability, the DOE is continuously engaging in R&D of other indigenous biofuel feedstocks. The alternative feedstock sources for biodiesel are: (a) jatropha, (b) waste cooking oil, (c) microalgae, and (d) rubber seed. For bioethanol, feedstock sources include sweet sorghum, cassava, microalgae, nipa sap, and cellulosic materials.

The DOE's partnership with other government agencies, academic institutions, and international organizations completed the R&D on the following:

- University of the Philippines Los Baños (UPLB).** The research on *Life Cycle Assessment in terms of Carbon Debt and Payback Analyses, Carbon Savings, and Energetics Studies of Biodiesel Production from Coconut Oil in the Philippines* showed that at the current 2.0 percent biodiesel blending, 1.3 percent GHG reduction potential is achieved. Increasing the blending rate to B5, B10, and B20 will result in an increase in GHG reduction potential by 3.2 percent, 6.4 percent, and 12.9 percent, respectively. In April 2022, the DOE issued a certificate of completion for the project.

Table 21. **Biodiesel Distributor** (As of Dec. 2022)

Biodiesel Facilities	Project Location	Storage Capacity (L)
Emerald Fields Trading, Inc.	Mabini, Batangas	962,341
Seaoil Philippines, Inc.	Pres. M.A. Roxas, Zamboanga del Norte	1,044,302
Total		2,006,643



- **Mariano Marcos State University (MMSU).** The research on the *Establishment of a Community-Based Bioethanol Industry and Continued Research and Development on the Feasibility of Hydrous Bioethanol as a Biofuel Blend using Nipa Sap as Feedstock* resulted in total production of 3,500 liters of anhydrous bioethanol (AHA) with 99.73 percent volume per volume (v/v) purity, and compliant to the existing Philippine National Standards (PNS). The DOE is currently reviewing the Deed of Donation for Capital Equipment.
- **Department of Science and Technology – Industrial Technology Development Institute (DOST-ITDI).** The study on *Characterization/performance testing of the biodiesel/diesel blends from a combined feedstock of various vegetable and used cooking oils* concluded that a binary blend of Coconut Methyl Ester (CME) and Used Cooking Oil Methyl Ester (UCOME) at 4:1 ratio passed all the PNS specification for B100. Correspondingly, engine performance test results determined an increase in power, torque, and motive force at B2 and B5 blends for a 4:1 ratio of CME and UCOME but a decrease was observed for B10.
- **NSEBIO Co., Ltd. Philippine Branch (NSEBIO).** The *1-Dry per day Bagasse and Napier Grass Bioethanol Research Demonstration Facility* obtained an ethanol yield of 292L/dry-ton from fresh bagasse and achieved an average ethanol production of 282L/dry-ton from Napier grass.

The on-road test using B5 covering 30,000 kilometers (km) distance of flat and high altitude/elevated terrains with varying weather conditions was completed in 2021. The test results showed mileage increases of about nine (9) to 10 percent for the test vehicles for manual and automatic transmissions. The NBB-Biodiesel Committee recommended conducting dynamometer testing under a controlled environment to determine the fuel efficiency of B2 and B5, as a supplementary reference to the DOE's actual on-road test.

IEC Campaigns. The DOE also convened IEC campaigns in five (5) Science High Schools in Metro Manila to provide in-depth knowledge and understanding of biofuels, namely: (1) Parañaque Science High School; (2) Sen. Rene Cayetano Memorial Science and Technology High School; (3) Taguig Science High School; (4) Makati Science High School; and (5) Pasig Science High School. The campaign centered on the environmental and economic benefits of biofuels, manufacturing procedures, and accompanying academic research.

Plans and Programs

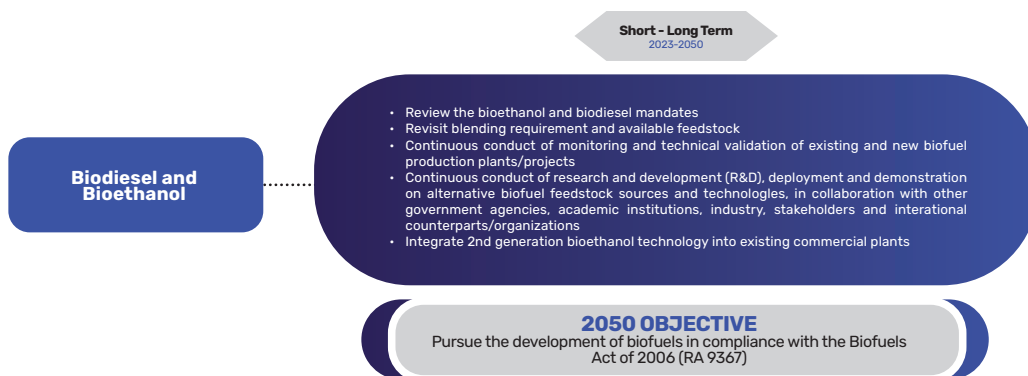
As a move to align with the Biofuels Act of 2006, the DOE intends to expand biofuels' contribution into the country's energy portfolio. This enables the government to achieve its objective of reducing reliance on fossil fuels, thus improving public health and air quality.

The increase in biofuel blend requires expansion of domestically sourced feedstock to ensure sustainable supply. As the Philippine Coconut Authority (PCA) finalizes the guidelines for the equitable distribution of feedstock and benefits for coconut farmers, the DOE remains committed to implementing the Biofuels Roadmap as shown in *Figure 8*. Collaboration with other government agencies and institutions is also being undertaken to conduct various activities, including the identification of promising feedstock sources.



Methyl Ester Samples

Figure 8. Biofuel Roadmap



The action plans needed to align for the review of the biofuel blending mandate are:

- Increase the biodiesel blend from B2 to B5 while taking into consideration the B3 to B5 phased implementation. Initially, the recommended annual blend increase is 1.0 percent to avoid a sudden rise in the market price of coconut oil. The increase in biodiesel blend is subject to the approval of the resolution by the NBB.
- Implement the voluntary 20.0 percent bioethanol blend as a support measure to address the effects of the prolonged Russia-Ukraine conflict on the downstream oil sector and as a possible solution to address the increasing fuel prices.
- Revisit the biofuel blend requirements and available feedstock. The NBB deems it necessary to address these issues through a holistic analysis as the basis for finalizing a decision in increasing biofuel blending. Consistent with the objectives of the Biofuels Act, the DOE will continuously conduct the following:
 - Regular monitoring, inspection, validation, and evaluation of existing and proposed biofuels/biomass projects and facilities nationwide, and sampling laboratory testing of biofuels in all biofuel production facilities and feedstock production areas and biofuelblended gasoline and diesel in all blending/distribution facilities; and
 - R&D activities and studies on biofuels, biofuel-blended gasoline, and diesel, and/or other biomass-derived fuels for use in motors and engines including air transport and other vehicle technologies.
- Encourage investments and provide fiscal incentives to entities engaged in the production of biofuels and biofuel feedstock.
- Continuously embark on Research, Development, and Demonstration (RD&D) activities geared towards identifying viable feedstocks for biofuel production. These initiatives are currently undertaken by academic institutions with support from development partners and other industry stakeholders (Ethanol Producers Association of the Philippines and the Philippine Biodiesel Association).

Capacity Expansion and Production Target. In the medium-term, it is expected that two bioethanol production facilities, with a total potential capacity of 83.0 MLPY, and five⁴⁸ biodiesel facilities, with 288.88 MLPY (all with existing accreditation for construction and projects with the intent to produce) will become operational. Additional four (4) accredited bioethanol producers are expected to increase the rated production capacity by 30 MLPY due to progressive optimization and additional feedstock sources, to wit:

- Far East Alcohol Corp.
- Absolut Distillers, Inc.
- Progreen Agricorp Inc. – Nasugbu
- Kooll Company, Inc.

Research, Design, and Development. This requires pursuing R&D on other alternative biofuel feedstock sources including feedstocks that can be manufactured from various types of non-food biomass (e.g., grass, agricultural wastes, etc.).

As a way forward to the completion of the previous R&D efforts, the MMSU is planning to replicate its technology and deploy it in three (3) sites in Aparri, Cagayan to be funded by the Global Environmental Facility (GEF) of UNDP under the DREAMS Project.

Meanwhile, UPLB is planning to benchmark criteria/checklist as shown in *Figure 9*, to guide proponents for future construction of biodiesel production plants which ensures the environmental sustainability of biodiesel production in the long term, which also supports the reduction of greenhouse gas emissions.

Figure 9. UPLB Criteria/Checklist

1. ↓ NET CARBON EMISSIONS
2. ↑ CARBON SEQUESTRATION
3. ↑ CARBON SAVINGS
4. ↓ CARBON PAYBACK PERIOD
5. ↓ ENVIRONMENTAL LOADING RATIO
6. ↑ NET ENERGY RATIO
7. ↑ EMERGY YIELD
8. ↑ % RENEWABLE ENERGY
9. ↑ VALUE FOR EMERGY SUSTAINABILITY INDICATOR

⁴⁸ Two biodiesel production facilities were already commissioned in June 2023 with a combined capacity of 161.23 MLPY, the Bio Renewable Energy Ventures, Inc. with production capacity of 150 MLPY and Seaoil Philippines, Inc. with 11.23 MLPY production capacity.

Investment and Employment Opportunities

The capacity expansion plan for biofuel facilities is needed to meet the projected increase in biofuel demand over the planning horizon. As presented in the CES of the Energy Demand and Supply Outlook, biodiesel demand is anticipated to exceed 892.1 ML by 2050, more than double the demand in the Reference Scenario (REF) despite the high penetration of electric vehicles (EVs) in total road transport. The high demand for biodiesel in the CES is attributed to the gradual annual increase in the biodiesel blend rate, from the current 2.0 percent to 5.0 percent by 2026.

To fulfill the local supply requirements and meet the biodiesel demand within the planning period, the country needs to put up an additional production capacity of 134.5 MLPY (both in CES), considering an 80.0 percent capacity utilization rate. This is on top of the committed and proposed projects with a Notice to Proceed. As a result, the total production capacity increases to 1,115.1 MLPY by the end of the planning period, as illustrated in *Table 22*.

Similarly, the CES predicts that the demand for bioethanol reaches 1,035.7 ML by 2050. This is 22.5 percent lower than the demand projected in the REF scenario, as a result of the entry of more EVs. Assuming that all bioethanol supply requirements are to be fulfilled through local production, about 760.7 MLPY of additional production capacity under the CES is necessary, considering the 80.0 percent capacity utilization rate (*Table 23*). By 2050, the total production capacity is projected to be 1,294.7 MLPY if only 60.0 percent of the bioethanol supply requirement is produced locally, the additional production capacity requirement reduces by 242.8 MLPY (CES), as presented in *Table 24*.

The expansion of production capacity creates valuable investment and livelihood opportunities, particularly in rural communities. To accommodate the required capacity additions for biodiesel, the estimated total investment of PhP697.5 million (USD12.7 million)⁴⁹ in the CES is necessary, as outlined in *Table 22*.

Table 22. Cumulative Biodiesel Additional Production Capacity and Investment Requirements

Year	Demand (ML)			Total Capacity (MLPY)			Capacity Addition (80% Utilization Rate) (MLPY)			Investment Cost (PhP Million @2022 Prices)			Jobs Generation		
	REF	CES1	CES2	REF	CES1	CES2	REF	CES1	CES2	REF	CES1	CES2	REF	CES1	CES2
2023	221.28	219.17	219.17	617.90	617.90	617.90	-	-	-	-	-	-	-	-	-
2025	237.32	461.62	461.62	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2028	260.83	614.06	614.06	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2030	275.48	635.11	635.11	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2035	313.84	696.42	696.42	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2040	355.18	757.33	757.33	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2045	388.16	823.12	823.12	980.58	1,028.90	1,028.90	-	48.32	48.32	-	250.46	250.46	-	50	50
2050	422.66	892.11	892.11	980.58	1,115.13	1,115.13	-	134.55	134.55	-	697.47	697.47	-	140	140

Note: On the assumption that the average investment cost per MLPY is PhP5.184 million

⁴⁹Forex Rate used PhP55.0/USD

On the other hand, bioethanol production calls for significant investments, with a total estimated investment of PhP64,621.2 million (USD1,174.9 million) in the REF, while the investment requirement for the CES is about 33.0 percent lower equivalent to PhP43,290.6 million (USD787.1 million), as indicated in *Table 23*.

Table 23. Cumulative Bioethanol Additional Production Capacity and Investment Requirements (If All Locally Produced)

Year	Demand (ML)		Total Capacity (MLPY)		Capacity Addition (80% Utilization Rate) (MLPY)		Investment Cost (PhP Million @2022 Prices)		Jobs Generation	
	REF	CES 1&2	REF	CES 1&2	REF	CES 1&2	REF	CES 1&2	REF	CES 1&2
2023	701.00	692.64	876.25	865.80	-	-	-	-	-	-
2025	748.27	716.33	935.34	895.41	401.34	361.41	22,840.70	20,568.28	2,268	2,042
2028	841.75	759.68	1,052.19	949.60	518.19	415.60	29,490.58	23,652.29	2,928	2,348
2030	900.34	782.55	1,125.43	978.19	591.43	444.19	33,658.68	25,279.04	3,342	2,510
2035	1,033.23	862.72	1,291.54	1,078.40	757.54	544.40	43,112.43	30,982.19	4,280	3,076
2040	1,161.86	924.85	1,452.33	1,156.06	918.33	622.06	52,262.85	35,402.15	5,189	3,515
2045	1,252.18	983.46	1,565.23	1,229.33	1,031.23	695.33	58,688.13	39,571.67	5,826	3,929
2050	1,335.58	1,035.74	1,669.48	1,294.67	1,135.48	760.67	64,621.21	43,290.65	6,415	4,298

The assumption of all bioethanol supply requirements is to be produced locally with an estimated investment of PhP56.91 million per MLPY capacity (average).

Table 24. Cumulative Bioethanol Additional Production Capacity and Investment Requirements (If 60% Locally Produced)

Year	Demand (ML)		Total Capacity (MLPY)		Capacity Addition (80% Utilization Rate) (MLPY)		Investment Cost (PhP Million @2022 Prices)		Jobs Generation	
	REF	CES 1&2	REF	CES 1&2	REF	CES 1&2	REF	CES 1&2	REF	CES 1&2
2023	420.60	415.58	525.75	519.48	-	-	-	-	-	-
2025	448.96	429.80	561.20	537.25	27.20	3.25	1,548.25	184.81	154	18
2028	505.05	455.81	631.31	569.76	97.31	35.76	5,538.19	2,035.21	550	202
2030	540.21	469.53	675.26	586.91	141.26	52.91	8,039.04	3,011.26	798	299
2035	619.94	517.63	774.93	647.04	240.93	113.04	13,711.29	6,433.15	1,361	639
2040	697.12	554.91	871.40	693.64	337.40	159.64	19,201.55	9,085.13	1,906	902
2045	751.31	590.08	939.14	737.60	405.14	203.60	23,056.71	11,586.84	2,289	1,150
2050	801.35	621.44	1,001.69	776.80	467.69	242.80	26,616.56	13,818.22	2,642	1,372

The assumption of all bioethanol supply requirements is to be produced locally with an estimated investment of PhP56.91 million per MLPY capacity (average).

These investments in both biodiesel and bioethanol offer employment opportunities. For biodiesel capacity addition, around 140 workers (CES) are required, while for bioethanol, about 6,415 employment opportunities will be created under the REF and 4,298 for the CES. These employment opportunities exclude the additional jobs to be created during the construction phase.

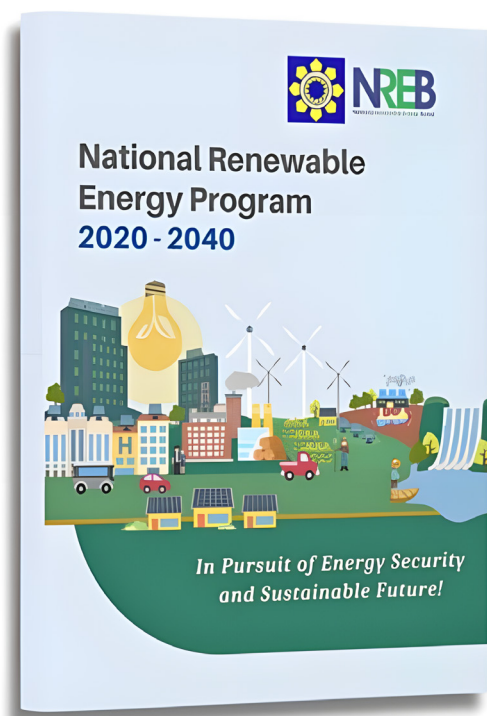
Renewable Energy Systems

The growing global call for countries to transition to a clean economy and embrace the global development framework as espoused in the Sustainable Development Goals (SDGs) has significantly influenced how energy policies are crafted along with energy security, reliability, affordability, and resiliency objectives. Against this backdrop, the Philippine government heightened its focus on prioritizing and strengthening efforts on sustainable renewable energy (RE) development in the country. Acknowledging that renewables present one of the most effective pathways toward energy supply security as well as fostering a low-carbon and resilient economy, the DOE remains unwavering in its commitment to establish a robust and sustainable policy agenda to accelerate RE development and utilization.

The collaborative efforts between the government and private sector are central to creating an enabling environment for investment, promoting the adoption of efficient and cost-effective RE technologies, and driving the successful implementation of RE initiatives.

Over the years, the government made significant headways in strengthening domestic policy frameworks and programs on renewables toward a just and inclusive energy transition. Notably, several major RE policies and programs have been put into motion to advance the country's energy transition initiatives. Among the key policies and programs include the following:

Adoption of the National Renewable Energy Program (NREP) 2020-2040. The National Renewable Energy Program (NREP) 2020-2040's adoption on 19 July 2022, serves as the country's long-term program to hasten RE development and utilization. It sets the target of reaching at least 35.0 percent RE share in the power generation mix by 2030 and strives to increase to 50.0 percent by 2040.



Our gradual transition to a low-carbon economy entails the diversification of our energy sources, such as renewable energy, to intensify decarbonization efforts across all economic sectors as part of our broader national strategy.

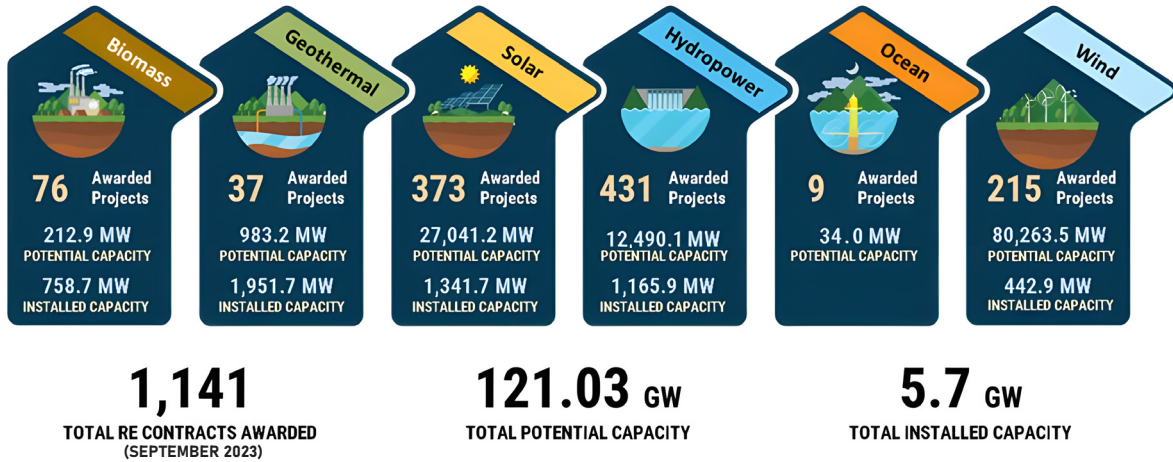
- Raphael P. M. Lotilla
ENERGY SECRETARY

RE Resource Development

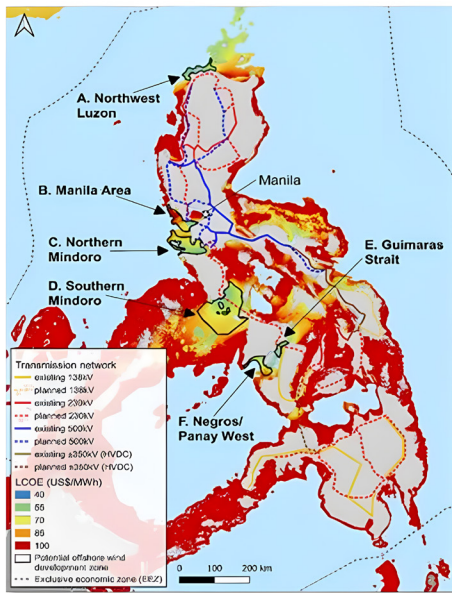
Awarded RE Projects. As of September 2023, the DOE has awarded 1,141 RE Service Contracts⁵⁰ with a total potential capacity of 121.0 gigawatts (GW) and an installed capacity of 5.7 GW. The variable RE technologies (solar and wind) account for 88.7 percent of the total potential capacity, equivalent to 107.3 GW. Said potential capacity includes the newly awarded three Offshore Wind (OSW) contracts with 100 percent foreign ownership.

⁵⁰ The RE Contract refers to the service agreement between the Government, through the DOE, and RE Developer over a period in which the RE Developer has the exclusive right to a particular RE area for exploration and development.

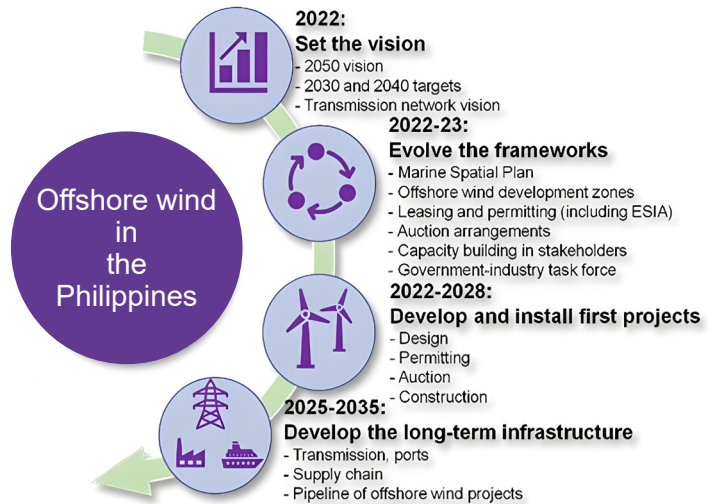
AWARDED RENEWABLE ENERGY CONTRACTS



Offshore Wind (OSW) Development. On 20 April 2022, the DOE in collaboration with the World Bank Group, unveiled the OSW roadmap representing a crucial milestone in the country’s RE development. The roadmap offers a comprehensive strategic analysis of OSW potential covering a wide range of environmental, social, and technical considerations. A total of 178 GW of OSW potential is seen in six (6) prospective zones - *Northwest Luzon, Manila, Northern Mindoro, Southern Mindoro, Guimaras Strait, and Negros/Panay West*. As of December 2023, 81 OSW contracts have been awarded with an aggregate potential capacity of 62.2 GW spread mainly in Luzon and Visayas. This indicates a significant commitment from both the government and private sector to develop OSW projects in these areas.



Total of 178 GW of OSW potential



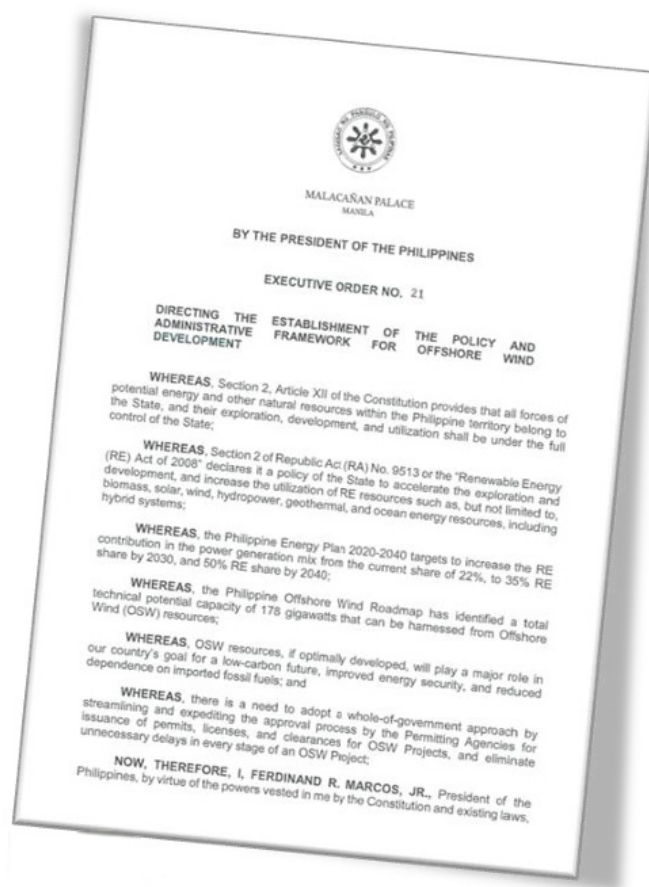
As a complement to the roadmap, the DOE has been collaborating with a development partner⁵¹ in the conduct of a study on permitting and consenting for OSW projects, and implementation of Marine Spatial Planning Tools and Systems which are expected to be concluded in 2024. The DOE together with Carbon Trust and the Global Wind Energy Council (GWEC) established a Joint Industry Platform (JIP) for the OSW sector in the Philippines. The JIP aims to identify and address complex barriers and challenges in the development of OSW in the country.

⁵¹ Energy Transition Partnership

Executive Order No. 21. To further hasten the rollout of OSW projects in the country, President Ferdinand Marcos, Jr. issued Executive Order (EO) No. 21⁵² directing the establishment of a Policy and Administrative Framework for the efficient and optimal development of OSW resources in the country. Under the said EO, a whole-of-government approach is needed to streamline and expedite the approval process by the concerned government agencies and institutions for the issuance of permits, licenses, and clearances for OSW projects, as well as eliminate unnecessary delays in every stage of project development. It also includes the full integration of applicable permits into the Energy Virtual One-Stop Shop (EVOSS) platform.

The implementing guidelines, known as the “EO 21-IG,” were issued on 18 May 2023 through Department Circular (DC) 2023-05-0013, providing the guidepost for the effective implementation and execution of EO 21. This incorporates the different development stages of OSW projects encompassing the corresponding permitting requirements and processes by the permitting agencies.

On 16 June 2023, the DOE subsequently issued DC2023-06-0020 adopting the *Policy and Administrative Framework for the Efficient and Optimal Development of the Country’s Offshore Wind Resources*, also known as “OPAF,” which shall apply to all permitting agencies, departments, bureaus, offices, Government-Owned and Controlled Corporations (GOCCs), Local Government Units (LGUs), and other entities involved in the permitting process of OSW projects.



Onshore Wind Development. Another remarkable achievement was reached on 19 May 2023 wherein the President inaugurated the 160-MW onshore wind farm situated in Barangays Balaoi and Caunayan in Pagudpud, Ilocos Norte. Being the largest wind farm, it began construction in 2021 with PhP11.4 billion worth of investment. Phase 1 of the project boasts a capacity of 80 MW and is undergoing testing and commissioning. An additional capacity of 80 MW is anticipated to come online in June 2024, further enhancing the overall capacity and energy output of the wind farm. This significant development contributes to the Philippines’ growing focus on RE sources and demonstrates the government’s commitment to a sustainable future.

Floating Solar Project. As solar energy continues to advance at a rapid pace, the commercialization of floating solar technology has gained significant traction. This emerging technology offers a cost-effective means of generating renewable energy without the need for valuable land resources that could be utilized for other critical sectors like agriculture. A notable development in 2023 is the awarding of nine (9) Solar Energy Operating Contracts (SEOC), with a combined capacity of 1,135.3 MW, for the construction of large-scale floating solar projects in Laguna Lake. These floating solar projects are within the 2,000 hectares of pre-determined areas (PDAs) of the Laguna Lake Development Authority (LLDA) for RE development.

⁵² Issued on 19 April 2023

President Ferdinand Marcos Jr. with Secretary Raphael P. M. Lotilla during the inauguration of the 160-MW Onshore Wind Farm in Barangays Balaoi and Caunayan, Pagudpud, Ilocos Norte.



Waste-to-Energy (WTE). Issued DC2022-02-0002 on 17 February 2022 titled, “Prescribing the Policies and Programs to Promote and Enhance the Development of Biomass Waste-to-Energy Facilities”. It provides the classifications and conditions for eligible Biomass WTE facilities utilizing locally sourced municipal solid wastes (MSW), as well as the prescribed policies and programs to encourage the power industry in developing Biomass WTE facilities. As of December 2023, there are 12 registered WTE facilities in the country with an aggregate capacity of 60.193 MW. Likewise, the DOE is looking into 113.96 MW WTE potential from seven (7) facilities in the country.



1.5 MW Landfill Methane Recovery and Power Generation Facility in Payatas, Quezon City

8.19 MW Landfill Methane Recovery and Power Generation Facility in Rodriguez, Rizal

Competitive RE Zones (CREZ). The completion of CREZ’s Phase 1 in 2020 served as a milestone for the country as part of its effort to facilitate grid planning and assess the capability of the transmission system to accommodate more RE capacities. The report “Ready for Renewables – Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines” identified 25 CREZ with high-quality solar and wind resources across the country with an estimated total capacity of 152,097 MW. It likewise covers the potential for other RE sources such as geothermal, hydro, and biomass. On the other hand, CREZ Phase 2 covered three activities as follows:

1. CREZ implementation support
2. Enhanced load modeling and forecasting for long-term power sector planning
3. Improved energy storage and modeling consideration

Policy Support Mechanisms

Renewable Portfolio Standards (RPS). To meet the NREP target of at least 35 percent RE share in the country’s total power generation mix by 2030 and 50 percent by 2040, the DOE issued DC2022-09 0030,⁵³ which effectively increased the minimum RPS annual percentage increment from 1.0 percent to 2.52 percent starting 2023. On 23 May 2023, significant amendments to the RPS On-Grid Rules were introduced through DC2023-05-0015,⁵⁴ prescribing, among others, for the Energy Regulatory Commission (ERC) to develop a Regulatory Framework in consideration but not limited to the following:

- a. Potential impacts of the mandated participant’s compliance to the minimum annual RPS obligations;
- b. Attendant costs arising from the mandated participant’s compliance; and
- c. Cost recovery mechanism, if applicable.

On 07 December 2023, DC2023-12-0032⁵⁵ was promulgated to govern the procedure in all matters relating to the inquiry, investigation, and all other proceedings on administrative actions for violations of the RPS Rules for both on-grid and off-grid areas.

To operationalize the RPS Rules in off-grid areas, the DOE issued DC2023-05-0014,⁵⁶ which prescribes, among others, for the ERC to develop a Regulatory Framework in consideration with the following: (1) the impact of compliance with the existing contractual agreements, rationalization of the Universal Charge-Missionary Electrification (UC-ME) subsidy, potential stranded assets, and corresponding stranded contract costs; (2) attendant costs to meet the optimal supply mix per off-grid area; and (3) cost recovery mechanism, if applicable.

Renewable Energy Market (REM). On 10 June 2022, the *Interim Commercial Operations of the Renewable Energy Market* was declared through the issuance of DC2022-06-0019 and subsequently amended the REM Rules in the same month through DC2022-06-0026. During the interim commercial operations of the REM, the RE Registrar, except for functions that involve financial transactions, shall perform the responsibilities which include, among others: (a) the registration of participants; (b) conducting REM awareness activity; (c) performing RPS computations; (d) submitting and validating RE Certificate (REC) data; (e) issuing and validating RECs; (f) submitting REC reports; (g) operating the Philippine Renewable Energy Market System (PREMS); and (h) providing technical and administrative support to the REM Governance Committee (RGC).

⁵³ Titled “Prescribing the Adjusted Annual Percentage Increment to be Imposed on all Mandated Participants of the Renewable Portfolio Standards for On-Grid Areas”

⁵⁴ Titled “Prescribing the Amendments to DC2017-12-0015 or the Renewable Portfolio Standards (RPS) Rules for On-Grid Areas”

⁵⁵ Titled “The Rules and Regulations on Administrative Actions for Violations of the Renewable Portfolio Standards (RPS) Rules”

⁵⁶ Titled “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”

Preferential Dispatch in the Wholesale Electricity Spot Market (WESM). The DOE also issued DC2022-10-0031 titled, “Declaring all RE resources as Preferential dispatch generating units in the WESM amending for this purpose DC2015-03-0001” wherein all RE-generating units were granted preferential dispatch in the WESM (i.e., must or priority dispatch) to ensure their maximum output injection in the grid.

Green Energy Auction Program (GEAP). The 1st Green Energy Auction (GEA) was conducted on 17 June 2022 and offered 2,000 MW of RE capacities enabling the issuance of 18 Certificates of Award totaling 1,866.13 MW. These capacities are considered committed and to be operational by 2023-2025.

On 03 July 2023, the 2nd round of the GEA⁵⁷ was conducted resulting in an additional 3,440.76 MW RE capacities from 105 winning bidders, committed to deliver power from 2024-2026.

Easing Foreign Ownership Limit. Issued amendments⁵⁸ to Section 19 of DC2009-05-0008 allowing foreign investors to hold 100 percent equity in the exploration, development, and utilization of solar, wind, hydro, and ocean or tidal energy resources. The Copenhagen Infrastructure New Markets Fund (CINMF) of Denmark was the first 100 percent foreign-owned company to be awarded with three OSW service contracts in 2023 with a combined potential capacity of 2,000 MW. These projects are located in Camarines Norte and Camarines Sur, Northern Samar, Pangasinan, and La Union.

The DOE further issued additional four OSW service contracts to 100 percent foreign-owned companies with potential capacity of 3,523.2 MW OSW potential as of the end of 2023. These are Earth Sol Energy Corporation, Blue Circle Philippines Cebu Corporation, Blue Circle Philippines Mindoro Corp., and Envision Energy Philippines Corporation.

RE Trust Fund (RETF). The issuance of DC2022-06-0016 on 10 June 2022 covers the fund sourcing, accounting, and audit of the RETF. It also provides guidance to RETF contributors and concerned DOE offices on the process of sourcing, billing, collection, remitting, accounting, and auditing the RETF.

Green Energy Option Program (GEOP). As of December 2023, 19 GEOP Operating Permits were issued to RE Suppliers, while 286 customers have switched to GEOP equivalent to 96.3 MW non-coincidental peak demand (Table 25).

Net Metering. Published the “Guidebook on Net Metering in the Philippines” on 22 April 2022, providing the guidelines, standards, and procedures for all net-metering arrangements from offer to after-sales services by installers and practitioners. As of December 2023, 11,707 end-users are registered under the Net-Metering Program with a total rated capacity of 101.5 MWp.

Table 25. Summary of GEOP End-Users (As of December 2023)

Grid	End-Users	Capacity (kWp)
Luzon	208	66,224
Visayas	78	30,148
Total	286	96,372

Feed-in-Tariff (FiT) System. The DOE issued a certification in June 2022 increasing the installation target for run-of-river (ROR) hydropower from 250 MW to 350 MW. As of December 2023, 174.63 MW of the FiT Installation target remains unsubscribed.

Plans and Programs

The DOE has taken a proactive approach in developing a comprehensive roadmap that serves as a guiding framework for achieving the country’s transition and decarbonization goals. It outlines clear targets, strategies, and actions required to facilitate RE deployment and steer the pathway toward a sustainable and low-carbon future. The roadmap, as shown in Figure 10, also provides a holistic view of the necessary steps and measures needed to accelerate the development and integration of RE into the country’s energy mix. The DOE foresees achieving a 35 percent share by 2030, 50 percent by 2040, and more than 50 percent by 2050 in the power generation mix.

Key actions and strategies have been adopted to improve the positioning of RE in the country’s energy landscape through the creation of a conducive business environment, the establishment of efficient support infrastructure, and continuous promotion and enhancement of research, design, and development agenda for RE in the country.

⁵⁷ The GEA-2 generated a total of 3,440.76 MW RE capacities wherein more than half is from ground-mounted solar with a total of 1,878.98 MW, while 9,390 MW, 90 MW, and 1,462.384 MW are for rooftop solar, floating solar, and onshore wind, respectively.

⁵⁸ DC2022-11-0034 “Prescribing Amendments to Section 19 of DC2009-05-0008” issued on 15 November 2022

Figure 10. Renewable Energy Roadmap



1. Acceleration of RE Positioning

Serving as the foundation for strengthening the RE stance in the energy sector is the continued implementation, assessment, and development of key policies and programs. Underlying strategies must be put into effect to create sustained demand and encourage private-sector investments. For the near term, the DOE will work on realizing the following:

- Full implementation of RPS for both on-grid and off-grid areas;
- Declaration of the full commercial operation of the REM; and,
- Continuous conduct of GEA to encourage greater RE investments by facilitating a centralized, transparent and competitive selection of RE projects through an electronic bidding process. It also supports the RPS by allowing RE generated from winning GEA plants to be eligible for RE Certificates, which Mandated Participants can use to comply with their RPS requirements. The DOE is also revisiting the status of various ongoing ROR hydro projects to enable the determination of the auction capacities for the succeeding GEA rounds. In preparation for GEA-3, the DOE conducted a public consultation on the draft DC to provide specific auction policy guidelines for non-fit eligible RE technologies in the GEAP.

To foster a dynamic and competitive environment for RE development, the DOE is actively engaged in the regular conduct of the **Open and Competitive Selection Process (OCSP)**. The OCSP provides a transparent and fair platform for selecting the most suitable developers for various RE technologies. A series of public consultations and identification of PDAs to be offered to qualified RE developers are being undertaken in preparation for the next rounds of OCSP. The PDAs are carefully evaluated based on various factors such as resource availability, infrastructure accessibility, and environmental considerations. Available technical data of the PDAs will be provided to serve as an initial reference for those interested in acquiring rights to develop the RE resources.

To ensure consistency and adherence to regulations, the DOE issued DC2023-06-0019 or the Guidelines that outline the requirements and procedures governing the 4th OCSP (OCSP4). Said DC is based on the RE Omnibus Guidelines, providing a clear framework to ensure a fair, standardized, and transparent selection process. For the OCSP4, 20 PDAs were offered, three for geothermal, 14 for hydropower, and three for wind resources. Four applications, covering two geothermal and two wind PDAs, were determined to meet the evaluation criteria and were declared as winning bidders.

Another effective mechanism for promoting the efficient and cost-effective commercial application and installation of ROR hydropower projects is the **Feed-in-Tariff (FiT) System**. By offering a guaranteed tariff rate for a specified period, the FiT System provides certainty and financial stability, making it an attractive option for investors. It is expected that the full subscription of the remaining 174.6 MW **FiT installation target** (as of December 2023) for ROR hydropower, under the adjusted FiT target, will be completed by 2025.

The **implementation of the RETF** will provide financial support to projects of qualified entities, further promoting and increasing the utilization of RE. Continued coordination among the RETF obligors, namely, the Philippine National Oil Company (PNOC), the Philippine Amusement and Gaming Corporation (PAGCOR), the Philippine Charity Sweepstakes Office (PCSO), and the government shares collected from the development and use of indigenous non-renewable energy resources will be undertaken to facilitate the transfer of their respective shares to the RETF Trust Account. The procedures for billing, collection, and remittance of the RETF shall apply to the three RETF sources – a) collection from RETF contributors; b) one and one-half percent (1.5%) of the government share collected from conventional energy service contractors; and c) DOE collection from contributions, grants, and donations in the form of cash, any revenues generated from the utilization of the RETF, and proceeds from fines and penalties imposed under the RE law.

The DOE, through the RETF Committee, is looking into tapping the expertise of the DOST to operationalize the RETF. A Memorandum of Agreement (MOA) on the implementation of RETF projects is being considered, with areas of cooperation focusing primarily on research and development and the development and operation of new RE resources, as well as the mechanisms for fund utilization.

The continuous implementation and further promotion of voluntary policies and programs will also be carried out, including **Net Metering** and **GEOP**. Resource-specific policies and programs will also be prioritized to further boost the development of RE resources, which include the following:

- Development and implementation of the **“Roadmap for Geothermal Derisking of the Philippines”**. The project is in partnership with the Asian Development Bank (ADB) and kicked off on 20 September 2022. It aims to identify, evaluate, and recommend de-risking strategies to encourage and accelerate geothermal energy development in the country. The project is expected to produce the reports on the following aspects:
 1. *Geothermal Potential Estimation and Risk Report* – sizing the risks and opportunities of 30 selected geothermal areas in terms of MW capacity and possible challenges for development;
 2. *Market Risk Reduction Report* – analysis of the identified geothermal areas, barriers to development, and the effectiveness of current incentive schemes, including international experience to address barriers will also be provided;
 3. *Drilling Risk Reduction Report* – assessment of the same areas with a focus on possible technical drilling risk mitigations to pass the exploration drilling phase;
 4. *Drilling Risk Sharing Report* – analysis of different approaches to risk mitigation, identifying the most suitable ones for application in the Philippines including input from stakeholders; and,

5. *Geothermal Derisking Roadmap Final Report* – final output, the culmination of all reports and workshops. The report will lay out the recommendations and corresponding timelines to derisk geothermal development.
- Promulgate the **Expanded Roof-mounted Solar Program (ERSP)**. The ERSP provides opportunities to electricity end-users and solar PV developers and installers to contribute to the growth of RE by utilizing available rooftop spaces for solar energy production. It will not only empower electricity end-users to produce electricity but will also enable them to use it or sell the excess generation to the grid, beyond the current limit of 100kW under the net metering program. Taking advantage of the entry of solar technologies, particularly rooftop solar, the DOE issued DC2023-12-0035, “*Prescribing the Policy and General Framework on the Expanded Roof-Mounted Solar Program in the Philippines*,” which introduced three innovative business models: (1) Supply Contingency Option; (2) Lease-to-Generate Option; and (3) Restricted Peer-to-Peer Energy Trading. The ERSP aims to attract more investments in RE leading to an additional supply of electricity through these business models, at the same time empowering electricity endusers/building establishments in using/hosting rooftops for solar photovoltaic technologies and decongest the transmission and distribution networks by increasing electricity demands.
 - Implement the **Policy and Administrative Framework for OSW Development** pursuant to EO 21 for the immediate development of OSW in the country. The implementing guidelines of EO 21⁵⁹ or EO 21-IG shall provide for its effective implementation and execution, which shall include, among others, the different development stages of OSW projects encompassing the corresponding permitting requirements and processes by the concerned government agencies and institutions, as well as support facilities.
 - The DOE will also **encourage the development of the mining sector and the processing of critical minerals and materials, such as copper, nickel, cobalt, aluminum, and iron** as these are essential components in the production of solar panels, wind turbines, and batteries. Copper is extensively used in the electrical wiring and connections for solar panels and wind turbines, while aluminum is utilized in the construction of lightweight frames and components for solar panels and wind turbines, aiding their durability and efficiency.
 - Formulate a policy for other **market mechanisms for large/impounding and pumped storage hydropower projects, and ocean energy facilities**. A comprehensive policy framework should provide clarity, transparency, and supportive measures to facilitate investment, promote deployment, and achieve sustainable energy goals.
 - **Enactment of the Waste-to-Energy Bill** as policy support for further promotion and development of WTE facilities. The DOE encourages the procurement of energy from WTE facilities in recognition of the technology’s twin socio-economic benefits on local government units’ solid waste management and countryside electrification.
 - **Explore co-firing biomass with coal**. Co-firing biomass with coal is a potential transition strategy to diversify the use of RE while reducing greenhouse gas (GHG) emissions in the power generation sector. It also helps tap local biomass resources, promoting sustainable utilization and providing additional income opportunities for farmers and rural communities.

2. Creation of a Conducive Business Environment

A conducive investment climate serves as the backbone for inclusive and sustainable growth in RE development and competitiveness. This involves streamlining regulatory processes, simplifying permitting procedures, and providing clear guidelines and incentives. Enhancing the ease of doing business encourages private sector participation and promotes the growth of the RE market.

To improve domestic enabling conditions in mobilizing finance and investment for RE projects and strengthen the industry, the DOE is looking at amending the “**Omnibus Guidelines on the Award and Administration of RE Contracts and Registration of RE Developers**”. The amendments will streamline the RE project application process including the requirements for possessory rights, roof-mounted solar, and own-use projects.

⁵⁹ DC2023-05-0013 issued on 18 May 2023

The DOE is also committed to complying with Republic Act (RA) 11234 or the “**Energy Virtual One-Stop Shop (EVOSS)**” and RA 11032 or the “**Ease of Doing Business and Efficient Government Service Delivery Act**” to address complex permitting processes which is one of the major hurdles in RE development.

The continuous conduct of IEC campaigns and forums on various RE policies and programs, including investment opportunities and intensifying the promotion of voluntary RE markets (Net-Metering and GEOP), will increase RE literacy and end-user participation in RE programs. Constant coordination with the appropriate government agencies and funding institutions will be made to ease access to RE fiscal incentives and financing.

3. Reliable and Efficient Infrastructure

The DOE continues to work on enforcing internal and external operational safety guidelines for all RE facilities through the stringent implementation of the Renewable Energy Safety, Health, and Environment Rules and Regulations (RESHERR) Code of Practice and ensure compliance of RE developers with the Department’s resiliency policies. The strict enforcement of these regulations is guided by the objective of mitigating potential risks and hazards associated with RE facilities, safeguarding the well-being of both personnel and the environment, and making sure that RE developers adhere to high standards of safety and resilience.

Further, the DOE is prioritizing the establishment of the **Dam Safety Guidelines for the Philippines** to warrant the safety and safe operations of dams and reservoirs under normal and extreme events. This will build the preparedness of the downstream communities from the adverse impacts of dam failure, or an uncontrolled release of the water stored in the reservoir.

4. Promote and Enhance Research, Design, and Development Agenda

Advancement of RE entails the continuing conduct of resource assessment, research, and studies in collaboration with energy stakeholders. These shall focus on WTE potential, optimization studies for hydropower projects, marine spatial planning, permitting and consenting, and grid integration studies for OSW.

The DOE is also committed to collaborating with local and international development organizations to initiate comprehensive studies in the following key areas:

- Geothermal Play Fairway Analysis in major geologic settings in the country to narrow down prospective areas;
- Feasibility studies for policy development on emerging technology and direct use/non-power applications of geothermal energy;
- Inventory of seawater-pumped storage system; and,
- Establishment of a research and knowledge center for ocean energy for the medium- to long-term period.

Investment and Employment Opportunities

Creating enabling policies and regulatory frameworks and intensifying private sector partnerships and support from financial institutions are essential elements for realizing greater RE integration and transition to a clean economy. These are crucial in facilitating access to financing and investments for RE projects. Such will not only drive economic growth but also create job opportunities, as well as contribute to the localization of RE technologies.

The increasing share of RE implies a surge in exploration and development activities during the planning period. An estimated 50.7 percent (REF), 64.9 percent (CES 1), and 70.7 percent (CES 2) of the total additional required power-generating capacity will be sourced from renewables within the planning horizon. This corresponds to an equivalent capacity of 98.5 GW, 106.6 GW, and 106.9 GW, respectively (*Table 26*). Notably, the capacity addition requirement from RE in both CES is about 8.0 percent higher compared with the REF. This signifies the potential to further expand and accelerate RE deployment and underscores the importance of embracing sustainable energy alternatives.

Table 26. Summary of Investment Cost Under the Pre-Development Stage

Resources	Total Capacity Addition (MW)						Investment Cost* (PhP Million @2022 Prices)					
	2023-2028			2029-2050			2023-2028			2029-2050		
	REF	CES 1	CES 2	REF	CES 1	CES 2	REF	CES 1	CES 2	REF	CES 1	CES 2
Biomass	42	122	122	50	16	16	-	-	-	-	-	-
Geothermal	425	425	425	930	580	580	5,197.24	5,197.24	5,197.24	11,372.79	7,092.71	7,092.71
Solar	9,328	6,231	6,231	45,620	46,934	27,890	519.40	346.92	346.92	2,540.15	2,613.30	1,552.93
Hydro	295	770	770	9,970	6,030	5,410	350.93	915.43	915.43	11,848.51	7,166.15	6,429.33
Wind	3,700	5,910	7,371	28,142	39,550	58,137	382.19	665.63	816.54	3,094.36	4,567.84	7,331.78
Onshore Wind	3,700	3,910	5,371	21,342	22,050	10,037	382.19	403.88	554.79	2,204.41	2,277.54	1,036.72
Offshore Wind	-	2,000	2,000	6,800	17,500	48,100	-	261.75	261.75	889.95	2,290.30	6,295.06
Sub-Total	13,791	13,458	14,919	84,712	93,110	92,033	6,449.76	7,125.22	7,276.13	28,855.81	21,440.00	22,406.75
Total	2023 - 2050						2023 - 2050					
REF	98,502						35,305.57					
CES 1	106,568						28,565.23					
CES 2	106,952						29,682.88					

Note: Although biomass and solar are only required to secure operating contracts, pre-development activities are still needed, such as the conduct of feasibility studies and securing of permits. *Average pre-development investment cost per technology based on the service contracts issued.

Table 27. Job Generation

Resources	Jobs Generation		
	REF	CES 1	CES 2
Biomass	-	-	-
Geothermal	6,323	4,690	4,690
Solar	10,074	9,747	6,255
Hydro	15,398	10,200	9,270
Wind	17,616	41,072	94,957
Offshore Wind	12,458	35,724	91,783
Onshore Wind	5,159	5,348	3,174
Total	49,411	65,709	115,173

The envisioned expansion of RE capacities entails an estimated investment of PhP35,306 million (USD641.9 million⁶⁰) for pre-development in the REF as shown in Table 26. The pre-development investment in the CES 1 is 19.1 percent lower than the REF due to the displacement of some hydropower and geothermal capacities, which require higher investment costs, as a result of the entry of 19 GW offshore wind. On the other hand, investment for CES 2 is 15.9 percent lower than the REF and 3.6 percent higher than CES 1 owing to the displacement of onshore wind with lower investment cost because of much higher penetration of offshore wind (50,100 GW).

The investment requirement has the potential to generate an estimated 49,411 job opportunities in the REF, 65,709 in the CES 1, and 115,173 for the CES 2 (Table 27). By channeling funds into RE projects, the country's clean energy supply is not only enhanced but also contributes to the creation of employment opportunities for Filipinos.

⁶⁰ Forex Rate used PhP55.0/USD



D. ENERGY EFFICIENCY AND CONSERVATION

Republic Act (RA) 11285 or the *Energy Efficiency and Conservation Act* provides the policy framework that institutionalizes and mandates the efficient use of energy in the country. It serves as the foundation and guidepost for greater involvement of both national and LGUs and in collaboration with the private sector for its implementation to achieve the desired outcome of significant energy intensity reduction.

Energy efficiency and conservation (EEC), as a fundamental policy, will ease the country's dependence on imported fuels, as well as improve the way energy is used in the economy. With barely four (4) years since the law's enactment, although slighted by the health pandemic in 2020, the DOE has already implemented several measures towards increasing the role of energy efficiency (EE) in the energy agenda and in decarbonizing the energy system.

Likewise, EEC is considered a tool (mitigating measure) to address and soften the impacts of short- to long-term non-food-related inflation. The EEC drives behaviors and practices that result in reducing energy demand and promoting system efficiency. In 2023, the DOE prioritized the following initiatives:

Government Energy Management Program (GEMP)

The DOE continues to call on the government sector to strictly implement the GEMP in order to provide a significant contribution in reducing energy demand, abating greenhouse gas (GHG) emission, and fostering the government's transition to a more sustainable and energy-efficient building infrastructure to address the growing demands of the economy.

This program specifies the government's goal of reducing its monthly electricity and fuel consumption by at least 10 percent. To achieve this goal, the Inter-Agency Energy Efficiency and Conservation Committee (IAEECC) issued a resolution to strengthen the implementation of the GEMP. To date, the Committee has issued a total of nine (9) resolutions (*please see Annex 7*) which provide government entities with strategic direction toward the adoption and implementation of EEC. Such includes strict compliance with the GEMP Guidelines, use of EE light emitting diode (LED) lamps and inverter-type airconditioning units or similar equivalent technologies, among others.

Moreover, the GEMP also allows the implementation of demonstration projects for the installation of rooftop solar photovoltaic (PV in government-owned buildings/facilities) to showcase the viability of renewable energy (RE) technology as one of the many effective and reliable EEC solutions in the country. In 2023, three (3) demonstration projects were completed and resulted in a decrease in the monthly electricity consumption of the following recipient government entities:

1. Mariano Marcos State University with 4,971 kilowatt-hours (kWh);
2. National Economic and Development Authority (NEDA) Region IX with 1,426 kWh; and
3. DOE Luzon Field Office with 2,400 kWh.

In 2023, the IAEECC likewise issued a Resolution⁶¹ to encourage government entities to observe flexible work arrangements to mitigate abrupt increase in power demand, address the effect of steep global prices of petroleum products in the local market, and assist in alleviating traffic congestion.

In terms of monitoring and implementation of GEMP, the DOE conducts energy audits and spot checks to all government entities nationwide. As of 31 December 2023, a total of 1,038 government offices were spot-checked and 938 were audited.

To date, the government was able to save 30,060.58 megawatt-hours (MWh) of electricity and 386,083.59 liters of fuel, equivalent to total savings of PhP325.76 million worth of government funds.

⁶¹ IAEECC Resolution No. 7, s. 2023



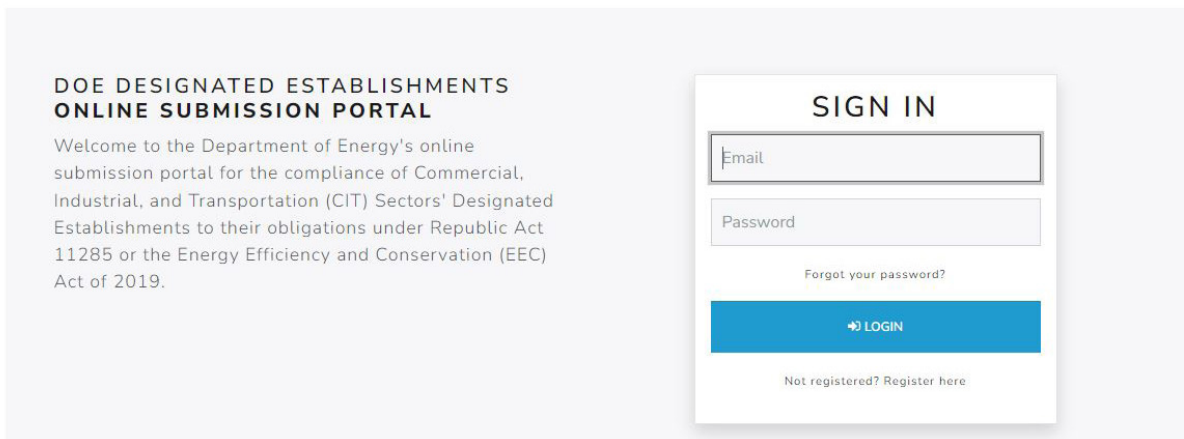
Designated Establishments⁶²

On the compliance of Designated Establishments (DEs), there are 4,730 DEs that have submitted their annual energy consumption reports through the program’s online platform. This is broken down into 3,197 from the commercial sector, 1,501 from the industry sector, and 32 from the transport sector.

These reports showed aggregate electricity savings of about 465.78 GWh from the private sector. Total investments from DEs amounted to Php6.775 billion through the projects on acquisition of new equipment, conversion to efficient lightings, system rehabilitation and upgrade, RE projects, equipment maintenance, process plant automation, and electrical systems improvement.

The DOE DE Online Submission Portal⁶³ (Figure 11) was officially launched in June 2023. It is a one-stop-shop online interactive system for all DE reportorial requirements, which also provides a platform for the evaluation, monitoring, and recording of the energy situation of DEs and their EE projects. Orientation/hands-on workshops were held nationwide to inform users/stakeholders on the functions of the online system.

Figure 11. DE Online Submission Portal



Energy Service Companies⁶⁴

The DOE registered/certified 56 Energy Service Companies (ESCOs), which are juridical entities that offer and provide multi-technology services and goods towards developing and designing EE projects, delivering and guaranteeing energy savings, and ensuring cost-effective and optimal performance. ESCOs continue to play a vital role in our push for the reduction of energy consumption and GHG emissions through the adoption of EEC projects and measures.

As of 31 December 2023, ESCOs generated electricity savings of around 610.61 GWh or Php6.38 billion in investments (Table 28).

⁶² Designated Establishments (DEs) are categorized based on their energy consumption threshold: For commercial and transport sector, 1) Others are those with annual energy consumption of 50,000 kWh and below, 2) Type 1 are those with annual energy consumption of 50,001 to 500,000 kWh; 3) Type 2 are those having annual energy consumption of more than 500,001 kWh to 4,000,000 kWh; and 4) Type 3 are those having annual energy consumption of 4,000,001 kWh or more. For industrial sector, 1) Others are those with annual energy consumption of 50,000 kWh and below, 2) Type 1 are those with annual energy consumption of 50,001 to 1,000,000 kWh; 3) Type 2 are those having annual energy consumption of more than 1,001,001 kWh to 8,000,000 kWh; and 4) Type 3 are those having annual energy consumption of 8,000,001 kWh or more.
⁶³ In partnership with United States Agency for International Development (USAID).
⁶⁴ ESCO services include energy supply and management, energy financing, technical engineering expertise and consultancy, equipment supply, installation, operation, maintenance and upgrade, and monitoring and verification of performance and savings.



Table 28. **Types of EE Projects Implemented**

Project Title	Project Cost (Php)	Energy Saving Values (KWh/Year)
Energy Audit	3,123,396,142.00	260,568,084.62
Preventive Maintenance	1,250,000.00	-
HVAC Installation	9,128,283.00	-
HVAC Retrofitting	210,000,000.00	10,000,000.00
Installation of Capacitor Bank	14,522,573.00	21,246.88
Installation of Energy Efficient Technology	1,860,059,255.00	310,912,312.00
Installation of Energy Monitoring System	2,950,000.00	-
Installation of Smart Power Monitoring	5,358,000.00	-
Installation of Vehicle Fuel Monitoring System	12,000.00	-
Lighting Retrofit	1,105,670.00	9,456.00
Replacement of Capacitors Units	917,500.00	-
Solar PV Systems Installation	1,041,639,350.76	10,856,511.86
Street Lighting	265,000.00	-
Supply, Installation, Testing & Commissioning of Active Harmonic Filters	11,187,220.00	13,306.36
Street Lighting Project	2,000,000.00	-
Vapor Absorption Machine	20,000,000.00	164,250.00
Energy Performance Contract	45,021,077.21	17,671,387.79
Energy Saving System	5,000,000.00	-
Chiller System Upgrade and Replacement	22,018,000.00	395,775.00
Powerplant Cooling Water Antifouling	3,500,000.00	-
Steam line protection	7,000,000.00	-
Main Cooling Water debris filtration system	6,000,000.00	-
Feedwater Heater	64,100,000.00	-
Total	6,375,830,070.97	610,612,330.51

Philippine Energy Labeling Program (PELP)

Under the PELP Guidelines, pursuant to Department Circular (DC) 2020-06-0015, all energy-consuming product (ECP) manufacturers, importers, distributors, and dealers are enjoined to register their products to obtain an energy label.

As of 31 December 2023, a total of 136 companies and 6,926 product models have been approved, 5,890 of which were issued with energy labels (*Table 29*).

To determine compliance with PELP guidelines, regular monitoring of PELP-covered ECPs in the market will be conducted. All registered companies will be prompted for the annual update of their business permits and product inventory reports, as well as the annual renewal of the issued energy labels for their registered product models.

Table 29. **Summary of PELP Registration**

Type of ECPs	No. of Application	Approved Product Registration	Issued Energy Label
Air-Conditioners	2,021	1,995	2,170
Lighting Products	3,054	2,760	1,650
Refrigerating Appliances	932	909	926
Television Sets	1,288	1,262	1,144
Total	7,295	6,926	5,890





Energy Efficiency Practitioners

The DOE issued DC2021-01-0001 or the *Guidelines for the Qualifications, Assessment, Registration and Certification of Energy Conservation Officers (CECO), Energy Managers (CEM), and Energy Auditors (EA)*, which also provides for the training on regulations and certification process for these energy efficiency practitioners. Since the start of implementation, there are now 901 Registered Energy Efficiency Practitioners comprising 488 Certified Energy Managers (CEMs), 184 Certified Energy Conservation Officers (CECOs), and 229 Certified Energy Auditors (CEAs). The training for CEMs, CECO, and CEAs is conducted by the Registry of Recognized Training Institutions (RTIs) as the DOE's partner in the implementation of the EEC Act.

Similarly, the DOE issued DC2023-05-0009 or the *GEMP Guidelines on Strengthening the EEC Professionals, Adoption of Training Module for Capacity Building and Prescribing Certification Process for the Recognition of Training Institutions*, which resulted in two (2) institutions registered as GEMP RTIs (Table 30).

Table 30. **DOE Certified and Recognized Training Institutions**

Energy Managers	MERALCO Power Academy
	PAMAV Training Institute and Technology Center, Inc.
	Philippine Institute of Energy Management Professionals, Inc.
	ENPAP 4.0 INC
	Advance I&P Solutions, Inc.
	Philippine Energy Professionals International Inc.
	TÜV Rheinland Philippines, Inc.
J3 Trainers and Consultants, Inc.	
Energy Auditors	MERALCO Power Academy
	PAMAV Training Institute and Technology Center, Inc.
	Advance I&P Solutions, Inc.
	TÜV Rheinland Philippines, Inc.
GEMP	J3 Trainers and Consultants, Inc.
	MERALCO Power Academy
	PAMAV Training Institute and Technology Center, Inc.

Guidelines on Energy Conserving Design of Buildings

The Guidelines on the Energy Conserving Design of Buildings were developed to encourage and promote the energy conserving design in buildings, including their services, to reduce the use of energy with due regard to the cost-effectiveness, building function, and comfort, health, safety, and productivity of the occupants. The guidelines will also be included in the Philippine Green Building Code.

Further, the DOE is in communication with various stakeholders to inform them of the existing guidelines. Communicating the guidelines to specific stakeholders entailed the conduct of webinars hosted by ENPAP 4.0 Inc. and SEOP Corporation.

Energy Efficiency Excellence Awards

The issuance of Department Order (DO) 2021-09-0014 or the *Guidelines on Energy Efficiency Excellence (EEE) Award* promotes energy management systems and best practices on EEC. In December 2023, the DOE announced the 27 recipients of the 2023 EEE Awards. Said awardees were shortlisted from the 344 entries submitted by both government (16 entries) and private sectors (328 entries). The energy savings generated from these EEE awardees reached 20,148.24 MWh.

Secretary Raphael P. M. Lotilla delivered his welcome message during the EEE Awards held in December 2023 at Pasay City



Fiscal Incentives

The Strategic Investments Priority Plan (SIPP) under the Corporate Recovery and Tax Incentives for Enterprises (CREATE) Act provides incentives to EE projects to beef up investments in the sector. This is made possible through DCs 2021-05-0011⁶⁵ and 2022-03-0004⁶⁶, which specify the guidelines for the endorsement of EE projects to the Board of Investments (BOI) for Fiscal Incentives with a classification of Simple⁶⁷, Complex⁶⁸, and New⁶⁹/Expansion EE projects⁷⁰.

As of December 2023, there are three (3) active applications for endorsement to the BOI composed of two (2) new EE projects and one (1) Simple EE Project.

Stakeholders Engagements

In compliance with the President’s directive, the DOE launched an energy conservation campaign to create collaborative efforts in promoting the role of the public and private sectors on the efficient use of energy, as well as provide guidance for their roles and responsibilities in establishing clear EEC policies, plans, programs, and activities in their respective offices/agencies.

Strategic communication activities on EEC include the conduct of interactive mall activities, orientation workshops, engagement with various social media platforms (e.g., Facebook, Twitter, Instagram, and TikTok), *Kwentong Enerhiyang Atin* YouTube Channel, Earth Hour, EEC Tips, Emerging Energy Campaign via CNN Philippines, Infomercial Campaign via GMA, and radio campaign with the Presidential Communications Office (PCO).

You Have the Power Campaign

To promote all the initiatives under the EEC Roadmap, the DOE launched its **“You Have the Power”** campaign (Figure 12), which encourages Filipinos to adopt an energy-efficient lifestyle and instill a sense of shared responsibility for the environment.

Accordingly, it envisions to empower everyone to change how energy is consumed through simple efforts that will lead to great outcomes. This campaign is part of the President’s call to strengthen EEC efforts to help manage the country’s energy demand, while at the same time generating energy savings to support economic growth, enhance social development, advance environmental sustainability, ensure energy system security, and help build wealth.

The roadshow commenced on 5 May 2023 at SM Southmall in Las Piñas City and followed by other SM malls in Sta. Rosa City, Baguio, Seaside Cebu, and Lanang Premier (Davao), among others.



⁶⁵ “Guidelines for the endorsement of Energy Efficiency Projects to the BOI for Fiscal Incentives” issued on 11 May 2021

⁶⁶ “Guidelines for the endorsement of Energy Efficiency Strategic Investments to the BOI for Fiscal Incentives” issued on 3 March 2022

⁶⁷ Simple EE Projects refer to those projects that involve new installation, upgrading, or retrofitting of specific equipment or devices in the system such as but not limited to lighting retrofit, automated lighting control system or smart control system, HVAC upgrades, boiler replacement, and other similar devices or equipment within a system.

⁶⁸ Complex EE Projects refer to those projects that involve new installation, retrofitting, or upgrading of a system or a combination of systems such as but not limited to Cogeneration System, District Cooling System, Steam System from boiler to the steam load process equipment including its auxiliaries, Pumping System, HVAC System and its distribution line system, Compressed Air System, Process line System for kilns and furnaces, Smart Manufacturing System, Building Energy Management System, etc. This includes Demand Side Management (DSM) Projects or any other innovative DSM schemes with the intention to lower down overall demand consumption in the grid, wherein the project is being implemented by an electric distribution utility or ESCO.

⁶⁹ New EE Projects refer to innovative energy efficiency projects designed to reduce energy consumption or costs by any improvement, repair, alteration, or betterment of any building or facility, or any equipment, fixture, or furnishing to be added to or used in any building, facility, or construction of green buildings, or vehicle including manufacturing and provision of services or will use electric vehicles (EVs) in its operations and will realize energy savings during operation and maintenance.

⁷⁰ Expansion of EE Project refers to additional energy efficiency projects to an existing and/or on-going EE project designed to further increase energy savings.

Energy Labeling Program and Fuel Economy Performance for Transport Vehicles

Figure 12. EEC Social Media Campaign

In 2023, the DOE issued policies for labeling and fuel economy performance ratings of transport vehicles. The following DCs intend to empower consumers by enabling them to validate information provided by vehicle manufacturers, importers, distributors, dealers, and rebuilders, which will facilitate the selection of fuel-efficient transport vehicles, realize fuel savings, eliminate fuel-inefficient vehicles in the market, and reduce of GHG emissions:

a. DC2023-05-0017 titled “Prescribing the Guidelines on the Philippine Transport Vehicles Fuel Economy Labeling Program (VFELP) for Compliance of Vehicle Manufacturers, Importers, Distributors, Dealers, and Rebuilders” covers the mandatory labeling of all transport vehicles; and,

b. DC2023-05-0016 titled “Prescribing the Fuel Economy Performance Rating (FEPR) Guidelines on Road Transport Vehicles under the Philippine Transport Vehicles Fuel Economy Labeling Program (VFELP) for Compliance of Vehicle Manufacturers, Importers, Distributors, Dealers, and Rebuilders” sets the minimum fuel economy performance rating for transport vehicles.

The transport vehicles labeling initially covered the implementing guidelines for registration of companies and vehicles. It was further expanded to fuel economy performance of road transport vehicle categories⁷¹ - Class L, Class M1, Class N1, and vehicles powered by an internal combustion engine (ICE), and EVs.

To accelerate the implementation of the VFELP and FEPR, the DOE is set to establish a web-based application and online database system to facilitate the generation of information and statistics for future policy development in conjunction with the National Energy Efficiency and Conservation Database (NEECD).



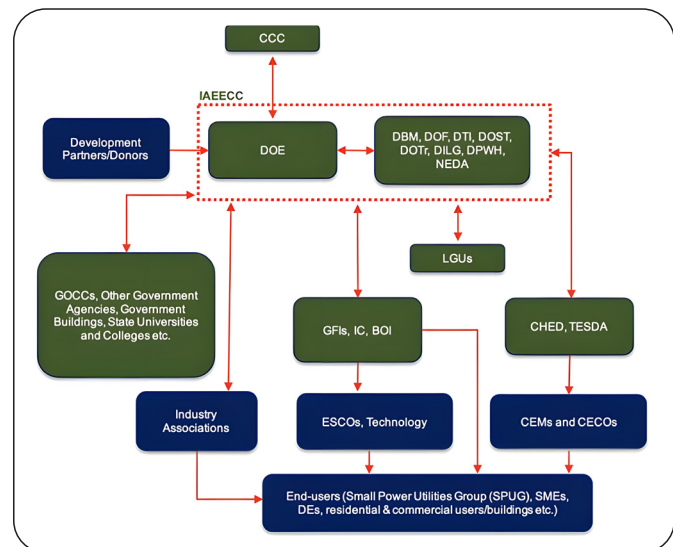
Plans and Programs

Energy Efficiency and Conservation Roadmap

The National Energy Efficiency and Conservation Plan (NEECP) is a comprehensive framework that institutionalizes EEC in the country as a way of life for the Filipinos geared towards the efficient and judicious utilization of energy across all sectors. It shall set out the governance structure (Figure 13) and EEC programs with defined national targets and feasible strategies backed up by regular monitoring and evaluation.

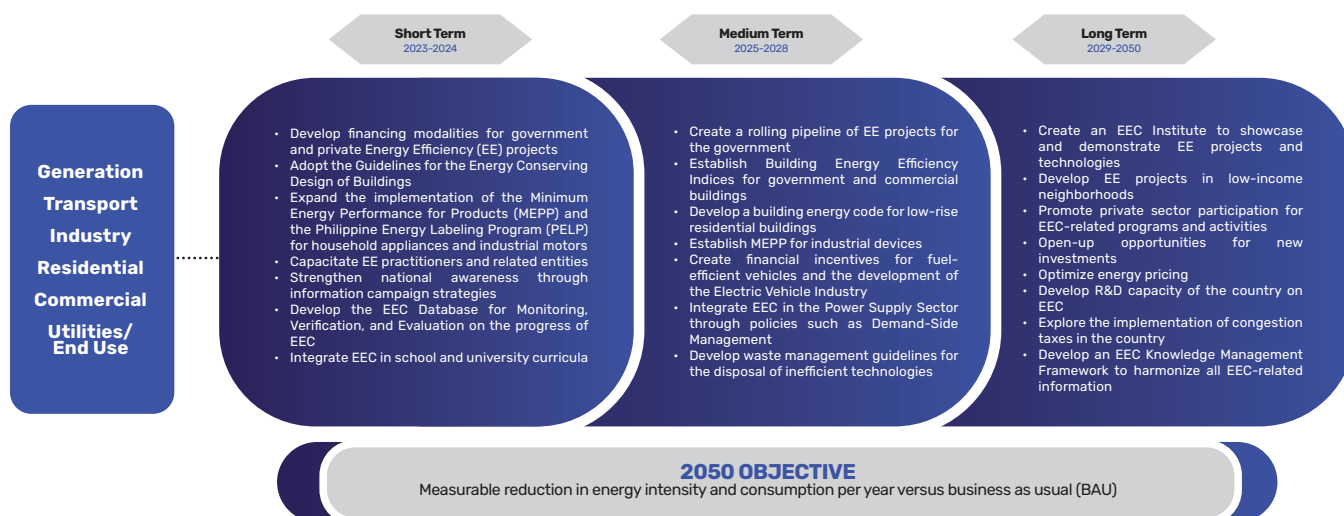
The EEC Roadmap (Figure 14) outlines the important programs across all sectors relative to the implementation of EEC Act. It aims to reach the overarching goal of assisting the country’s economic development by ensuring energy security through a reduction in energy intensity across key economic sectors.

Figure 13. Governance Framework of NEECP and Roadmap 2023-2050



⁷¹Class L: Road motor vehicles with less than 4 wheels and including 4-wheeled vehicles with restrictions on maximum speed, maximum mass and maximum rated power; Class M1: Vehicles used for the carriage of passengers and comprising not more than 8 seats in addition to the driver’s seat, and having a gross vehicle weight not exceeding 5,000 kg.; Class N1: Vehicles used for the carriage of goods and having a maximum gross vehicle weight not exceeding 3,500 kg.

Figure 14. Energy Efficiency and Conservation Roadmap



For the short-term, the DOE recognizes that significant investments are required to implement government and private EE projects to ensure the effective implementation of the EEC Act. Further, IEC campaigns are deemed vital to equip the various sectors, financial institutions, industry groups, and the public on different EEC programs and best practices.

In the medium-term, the establishment of policy guidelines or frameworks for the development and safe operation of EVs and EV Charging Stations (EVCS) will attract investments and promote the widespread use of EVs. The government's current policy measures have already stimulated investors' interest in the EV industry.

The implementation of the GEMP will also be continued in all government agencies in collaboration with stakeholders. Financing models on EEC projects will also be explored to ensure funding for EE projects in the government sector.

In response to IAEECC Resolution No. 5⁷² in 2022 that provides the GEMP Guidelines that detail the components of an EEC Plan (EECP), wherein Government Energy Efficiency Projects (GEEPs) are the modality for implementing projects such as solar power generation and solar heating systems. A DOE-initiated demonstration project will be implemented to pursue accelerated development and utilization of efficient RE technologies as one effective option to reduce dependence on the use of fossil fuels and contribute to the mitigation of GHG emissions.

The DOE shall continue to prioritize the development and rollout of energy standards beyond the appliances industry. As such, partnerships with experts to conduct market research and assessments are essential for the expansion of energy standards to other areas such as industrial devices and transport vehicles.

The long-term goal of the DOE is the establishment of an institute that will highlight examples of best practices for other project developers and government agencies to emulate. Among the different strategies of the DOE is the focus on developing Knowledge Management Systems (KMS) and the development of advanced R&D capacity for EEC. This will be accomplished through institutional capacity building, development of a harmonized information database, strengthening of advocacy initiatives, sharing of EEC best practices, and promotion of consumer engagement.

Improving the country's R&D on EEC is seen as a game-changer in how government can proceed towards its clean energy ambitions. The DOE recognizes the importance of collaboration and networking with international and local partners to ensure synergies on key and innovative energy technologies/practices, as well as financing opportunities for EEC innovations in the country.

Further, the NEECP has set carbon emission avoidance and targets derived from each sector and program across the short-, medium-, and long-term time horizons as shown in *Table 31*.

⁷² IAEECC Resolution No. 5 series of 2022 titled "Directing All Government Entities (GEs), including the Local Government Units (LGUs) and Foreign Service Posts to Observe the Approved GEMP Guidelines."

Table 31. Targets under the NEECP and Roadmap 2023–2050

Sector	Programs	Emissions Avoidance		
		Short-Term (2023 – 2024)	Medium-Term (2025 – 2028)	Long-Term (2029 – 2050)
Government	GEMP	1.87 Mt CO2e 16.15%	3.31 Mt CO2e 15.81%	25.06 Mt CO2e 14.48%
Commercial	PELP / Minimum Energy Performance for Products (MEPP)	7.51 Mt CO2e 16.15%	13.28 Mt CO2e 15.81%	100.50 Mt CO2e 14.48%
Residential	PELP/MEPPs	18.56 Mt CO2e 34.65%	32.79 Mt CO2e 31.66%	248.21 Mt CO2e 23.17%
Industrial	PELP/MEPPs	17.43 Mt CO2e 19.38%	30.81 Mt CO2e 19.17%	233.18 Mt CO2e 18.35%
Transport	VFELP/FEPR	Pending data	Pending data	Pending data
	EVCS	Pending data	Pending data	Pending data
	10% EV penetration by 2040	N/A	N/A	116.54 Mt CO2e 8.22%
Utilities & End-use	Power Sector Efficiency	4.34 Mt CO2e 27.95%	7.53 Mt CO2e 27.95%	54.03 Mt CO2e 27.95%

Strategic Activities and Programs to Support the EEC Roadmap

Energy efficiency plays an essential role in accelerating clean energy transitions and achieving global climate and sustainability goals across all economic sectors of the Philippines. To provide transformative changes in the way we use energy, the DOE developed a set of priority key action plans/activities to achieve the milestone targets of the EEC Roadmap (Table 32). The details of the strategic activities and programs of the NEECP and Roadmap are highlighted in DC2023-05-0018⁷³.

Table 32. EEC Strategic Activities and Programs

Sector	2023-2024	2025-2028	2029-2050
Government	<ul style="list-style-type: none"> Develop financing modalities and criteria for the evaluation of government EE projects Establishment of the National EEC Office (NEECO) Develop guidelines for LGU EEC activities Adopt guidelines for the energy-conserving design of government buildings 	<ul style="list-style-type: none"> Create a rolling pipeline of government EE projects for LGUs and public buildings Establish the building energy efficiency index for the government sector 	<ul style="list-style-type: none"> Develop an EEC Institute to showcase and demonstrate EE technologies and projects to mainstream EEC in the country
Commercial	<ul style="list-style-type: none"> Adopt guidelines for the energy-conserving design of commercial buildings 	<ul style="list-style-type: none"> Establish the building energy efficiency index for the commercial sector 	<ul style="list-style-type: none"> Develop a Building Energy Efficiency Label Scheme
Residential	<ul style="list-style-type: none"> Monitor the annual reportorial obligations of DEs Provide support for the implementation of EE projects in the commercial sector 	<ul style="list-style-type: none"> Improve the PELP Online Registration System Strengthen the monitoring, verification, and enforcement (MVE) framework Increase post-market surveillance monitoring Increase awareness of the public on the MEPP and PELP 	<ul style="list-style-type: none"> Development of MEPP for new-energy consuming products Create a Building Energy Code for low-rise buildings
Industrial	<ul style="list-style-type: none"> Develop MEPP for Motors 	<ul style="list-style-type: none"> Develop EE projects in low-income neighborhoods 	<ul style="list-style-type: none"> Develop EE projects in low-income neighborhoods
Industrial	<ul style="list-style-type: none"> Issue certification of energy efficiency practitioners and recognition of other related entities Optimize energy pricing for all sectors (commercial, industrial, and transport) Monitor the annual reportorial obligations of DEs Open up investment to new players 	<ul style="list-style-type: none"> Develop MEPP for other industrial devices Create programs for EEC for Micro, Small, and Medium Enterprises (MSMEs) Establish a plan to adopt emerging technologies in EEC 	<ul style="list-style-type: none"> Enjoin the private sector to participate as testing facilities for motors and industrial devices Develop R&D capacity of the country
Transport	<ul style="list-style-type: none"> Develop minimum fuel efficiency and label for road transport vehicles 	<ul style="list-style-type: none"> Develop EE projects in low-income neighborhoods 	<ul style="list-style-type: none"> Develop EE projects in low-income neighborhoods
Transport	<ul style="list-style-type: none"> Develop DSM strategies and policies. 	<ul style="list-style-type: none"> Create financial incentives for fuel-efficient vehicles and their related infrastructure Develop the EV industry Expand the vehicle categories in the labeling program 	<ul style="list-style-type: none"> Develop policies for emerging energy efficiency technologies for aviation and shipping Explore the implementation of congestion taxes, which could relieve traffic situation as this leads to inefficiency in fuel consumption Establish testing facilities for vehicle fuel efficiency Develop policies and implement labeling programs for maritime and aviation vehicles
Utilities and End-Use	<ul style="list-style-type: none"> Develop DSM strategies and policies. 	<ul style="list-style-type: none"> Establish EE for the power supply sector 	
Utilities and End-Use	<ul style="list-style-type: none"> Create partnerships with utilities to support end-user decision-making on EEC 		

⁷³ Adoption of the National Energy Efficiency and Conservation Plan and Roadmap 2023 – 2050



Table 32. **EEC Strategic Activities and Programs**

Sector	2023-2024	2025-2028	2029-2050
Cross-Sectors	<ul style="list-style-type: none"> • Develop and further capacitate the ESCO industry • Create an Energy Efficiency Finance Program such as a Guarantee/Revolving Fund for EE projects • Develop the EEC Database for Monitoring, Verification, Enforcement, and Evaluation of the progress of EEC in the country • Mainstream Gender and Development (GAD) in EEC. • Expand the adoption of EEC in school curricula 	<ul style="list-style-type: none"> • Develop the waste management strategy arising from the disposal of inefficient technologies 	<ul style="list-style-type: none"> • Develop an EEC knowledge management framework to harmonize information on EEC across all sectors
		<ul style="list-style-type: none"> • Financial support for EE projects 	
	<ul style="list-style-type: none"> • Conduct IEC Campaigns on EEC • Conduct recognition and awards programs on EEC 		

The programs and initiatives on EEC to be carried out in the planning horizon covering and cutting across the targeted sectors are:

- The successful **implementation of EEC projects** requires significant investments. However, financial and technical barriers constrain EEC project funding as there lacks a commercially attractive EEC financing due to traditional asset-based lending practice of financial institutions. Restrictive loan terms including high collateral requirements mean that local financing institutions do not receive many requests for EE financing despite funding being available. Over the short-term, it is imperative to conduct capacity-building for the financial sector to increase understanding of EEC projects and the related business models.
- **Capacity building of the IAEECC in line with GEMP implementation and promotion** of better coordination with government entities to support LGUs in the identification and evaluation of EEC projects, which shall be coordinated with the to-be-established National Energy Efficiency and Conservation Office (NEECO).
- **Revision of Guidelines on Energy Conserving Design of Buildings** in accordance with the EEC Act, encompassing both new and existing buildings. Accordingly, as stipulated in GEMP, state-owned buildings and facilities will also be in adherence.
- **Development and rollout of energy performance** requirements beyond the appliances sector. The formulation of such requirements is deemed to include industrial devices (i.e., motors) and may include transformers. Expanding the PELP product/technology coverage entails conducting market assessment studies, establishing and harmonizing standards together with ASEAN experts, and having a robust online registration system complemented by a monitoring, verification, and evaluation framework.
- **Development of a Demand-Side Management (DSM) program** tailored for the power industry through load management and other measures that are to be implemented by distribution utilities. Developing and issuing a policy is the first step to be followed by identifying best practices and conducting stakeholder engagements.
- **Prioritization of Power Sector Efficiency** to be pursued within the next five (5) years. This will follow the DSM programs and shall conform to the formulated strategies on prioritizing cost-effective opportunities in systems loss reduction, efficiency improvement, and potential for cost savings.
- Corollary to the **implementation of the VFELP and FEPR**, the DOE will develop the necessary technical requirements, including but not limited to, implementing guidelines, vehicle fuel economy performance testing guidelines, and minimum energy performance for transport vehicles.
- **Exploration of the establishment of a Vehicle Performance Assessment Facility (VPAF)** for gathering accurate and reliable data related to the performance of various road vehicles, including fuel economy and CO2 emission. The said facility shall also equip the DOE in monitoring compliance with the prescribed fuel economy standards.
- **Strengthening of the existing ESCO certification system and development of guidelines and procedures** on the imposition and collection of fees for accreditation and certification services. The Department will develop training modules and provide an ESCO toolkit to support standard processes in streamlining procedures within the planning period.



- **Data collection and implementation of a corresponding monitoring, verification, and enforcement framework** over the planning period. The long-term action is to institutionalize an EEC knowledge management system.
- **Continue IEC campaign** to inculcate energy efficiency within schools and universities.
- **Carrying out GAD programs to support SMEs.** The SMEs were identified by the DOE as a potential group to be supported in the program designed to target low-income households in the EEC roadmap.
- **Pursuant to Section 28 of the EEC Act** on the provision on waste management, recycling, and disposal guidelines, the DOE, together with the DENR and DILG, shall develop a Waste Management Collection, Recycling, and Disposal Strategy (WMCRDS) as this will ensure proper management and disposal of waste.

Investment Requirements

In a generation where modern energy technologies abound, there is a need to engage both public and private investments to take advantage of all the benefits of EEC measures that will support the call for a clean energy future.

As the country recovers from the health pandemic, the government’s budgetary fiscal space has narrowed down to provide more for economic measures that would help the country build back better. As a result, the increase in private investments must be secured to access and implement more energy-efficient technologies and fuels.

For the planning period, a total of PhP147.57 million investment will be allocated for the implementation of GEMP which includes the: a) *Demonstration Project on Promoting Solar PV Technology for Offices*; b) *Conduct of Third-Party Energy Audit of Buildings of Government Entities*; and c) *EVCS Demonstration* (Table 33). These projects have been identified pursuant to the provision of the IAEECC resolutions. For 2023 alone, the program is expected to generate 921 green jobs.

The DOE will also implement programs for the planning, formulation, development, implementation, enforcement, and monitoring of energy management policies and other related EEC plans and programs consistent with the mandate of the EEC Act.

Table 33. **Investment and Job Generation from EEC Programs, 2023 – 2050**

DOE Program	Investments (PhP Million)		No. of Employment Opportunities
	Government	Private	
GEMP	147.57	-	921*
PELP	74.46	184.55	343
VFELP	338.01	92.27	631
Designated Establishments	-	25,296.18	370
Energy Service Companies	-	15,529.66	350
Total	560.04	41,102.66	2,615
	41,662.70		

*2023 data

On the other hand, expected investments that may be generated under PELP will reach PhP74.66 million from the government sector and PhP184.55 million from the private sector. The estimated investment is based on parameters such as the budget for procurement of the PELP System Development (government sector), revenues from the label issuances and PELP Company Representatives (PCR)/PELP Assistant Company Representatives salaries (private sector), as well as infrastructure development.

Moreover, it is expected to create 291 employment opportunities wherein 19 is from the government sector and 272 from the private sector.

For VFELP, the potential investments may reach PhP338.01 million from the government sector with additional PhP92.27 million from the private sector. These cover the development and annual maintenance of the web-based Application and Online Database System for VFELP, revenues from application for company registration, transport vehicle registration, and fuel economy labeling issuance for vehicle manufacturers, importers, distributors, dealers, and rebuilders.

Further, the total investment from DEs within the planning horizon is estimated at PhP25.3 billion and can generate around 370 green jobs for the country. On top of this, PhP15.53 billion worth of investment will come from ESCOs creating 350 job opportunities to come along with this development.

E. ALTERNATIVE FUELS AND ENERGY TECHNOLOGIES

The energy sector is gaining remarkable strides in its extensive campaign and promotion of the country's alternative fuels and energy technologies (AFETs). Among the government agencies, the DOE stands at the forefront of driving the transition to cleaner fuels to effectively veer away from fossil fuel dependence and contribute to the advancement of sustainable and environment-friendly energy technologies. Mainstreaming AFETs complements the sector's support to climate change mitigation as this leads to reduction of GHG emissions, improvement of air quality, and enhancement of energy security and independence.

Partnership Leveraging

The DOE is actively collaborating with various stakeholders and research institutions in the conduct of research and validation of emerging technologies. Partnerships with both domestic and international organizations are pursued to thoroughly assess technology viability and feasibility for local adoption and integration. These forged partnerships encompass various areas such as research and development (R&D), data collection and establishment, policy referencing, pilot demonstrations, technical assistance provision, and effective integration of AFETs.

In 2022, the DOE's engagement with partner agencies in various R&D projects on new, advanced, alternative, and emerging technologies (NAETs) accomplished positive outcomes contributing to accelerated innovation and sustainable energy solutions. A number of projects have been implemented thereby providing valuable information for the development and mainstreaming of NAETs (*Table 34*).



Table 34. Memorandum of Agreement (MOA) with Government Agencies and Academe

Partnership	R&D Project	Resulting Outcome
MOA with DOST-PCIEERD ⁷⁴ , UP-NCTS ⁷⁵ , UP-EEEI ⁷⁶ , Cagayan State University (CSU)	Prototyping of original equipment manufacturer (OEM) autoLPG jeepney	An OEM design that conforms to the Philippine National Standard (PNS) for public transport applications has been successfully fabricated and constructed.
	Development of Certification Protocol for Minimum Energy Performance (MEP) of electric vehicle charging station (EVCS)	An accreditation process requirement on charging infrastructure was developed for investors and a study was conducted on applicable charging modes for local adoption.
	Field demonstration of fast EVCS	Installed three (3) different charging stations intended for e-trikes - one (1) unit slow charger with 3kW capacity, two (2) units fast charger with 5kW capacity, and one unit fast charger with 5kW capacity assisted charger through PV solar grid-tied.
MOA with Cavite State University (CvSU)	Prototyping of gym and playground equipment that can harness energy from human kinetics to produce usable energy	Gym equipment prototypes have been developed and an application for a patent has been filed by CvSU. Likewise, consultations were held with gym owners for a potential MOA engagement toward the integration of the prototypes in their gym facilities.
	Conduct of actual road performance data gathering of DOE-acquired hybrid and EVs	The outcome of the project will further support the promotion of using energy-efficient alternative vehicles based on gathered data. Performance data were also gathered from the actual road testing of Toyota Prius hybrid EV, Mitsubishi Outlander plug-in hybrid EV, and Mitsubishi i-MiEV pure EV.
	Development of a Technical Education and Skills Development Authority (TESDA)-aligned EV technician course module for registration as National Certification-Level II.	A Competency Standards for EV Servicing has been developed (information is available on the TESDA website).
MOA with DOST and UP Diliman	Determination of Optimal Placement of EVCS in a Local Public Transportation System to establish a framework for research collaboration activities between the DOE and DOST-PCIEERD for the review, evaluation, monitoring, and implementation of programs under the Science and Technology for Energy Application (STEA) aimed at identifying appropriate emerging technologies for EVs that are aligned to the needs of the industry	A methodology was developed and piloted a network of charging equipment. Prepared the techno-economic viability and performance analysis, and characterization of e-trikes and fast chargers. Conducted the inauguration of the Quezon City Solar Electric Vehicle Charging Network.
MOA with DOST-PCIEERD and UP Diliman	Development of a prototype of safe and sustainable Solar Assisted Electric Motor-Powered Boat (SESSY E-Boat) for passenger and tourist transport	Prototype of two SESSY E-boat vessels monohull and catamaran. The monohull e-boat was showcased at both PhilMarine 2023 at SMX Convention Center-Manila and the National Science and Technology Week 2023 in Iloilo City on 22-26 November 2023. The prototypes are undergoing testing prior to the actual sea trial. On-going coordination with LGU for a potential partnership for the installation and demonstration of an EV Charger for the ESESSY E-boats.

Another significant milestone in alternative fuels development is the implementation of the MOA between the DOE and the DOST-Industrial Technology Development Institute (DOST-ITDI) on the *Fuel Cell Research and Development and Testing Facility*. The facility was inaugurated on 6 July 2023, which is located at the DOST compound, making it the first of its kind in the country. It is entirely dedicated to fuel cell technology R&D with strong emphasis on advancing materials development, fostering innovation for specific cell components, and addressing the current barriers of fuel cells such as its performance and durability.



The Fuel Cell R&D and Testing Facility is located at the DOST Compound in Taguig City.

⁷⁴ Department of Science and Technology-Philippine Council for Industry, Energy and Emerging Technology Research and Development

⁷⁵ University of the Philippines – National Center for Transportation Studies

⁷⁶ UP-Electrical and Electronics Engineering Institute



DOE Secretary Raphael P.M. Lotilla (3rd from left) and DOST Secretary Renato U. Solidum, Jr. (2nd from left) during the ribbon-cutting of the Fuel Cell R&D and Testing Facility.

This ongoing multi-year partnership is set to be completed in 2024. As the project progresses to the testing phase, validations will be undertaken to check if the advancements made in materials development and component fabrication of the fuel system meet the required standards and can operate effectively under various conditions. Given the expected significant project outcome, the objective is to conduct a pilot demonstration of the locally developed fuel cell for transport vehicles. This will illustrate the actual application and potential advantages of clean energy technology, leading to its broader adoption and integration in the future.

The partnership further seeks to establish a comprehensive testing facility that will leverage the collective expertise and capabilities of the Philippines and accelerate the development and deployment of fuel cells. This will eventually jumpstart and energize hydrogen production and utilization as another clean energy option for the country.

The DOE believes that the integration of fuel cells and RE will play a pivotal role in establishing a robust and diverse energy system for the country. This will support the production of sustainable power without any carbon emission for a wide range of applications, including transportation, industry operation, and electrification of unserved and underserved communities within the country. Ultimately, the utilization of fuel cell technology has the potential to enhance energy access and security.

Prioritization / Promotion. Cognizant of the importance of partnerships, the DOE actively engages with key players to foster knowledge exchange, share best practices, and leverage resources to help accelerate the development and deployment of new and emerging energy technologies. The conduct of rigorous research and analysis is guided with the aim of staying updated on the latest advancements in the field as this will allow for the identification of promising technologies and fuels that have the potential to contribute to the country's energy transition.

The consistent conduct of information, education, and communication (IEC) campaigns on AFETs remains an integral part in raising awareness, educating, and disseminating knowledge to accelerate greater public acceptance. In 2022, 17 IEC campaigns were conducted in different schools and universities, LGUs, national government offices, and transport groups.



DOE and DOST Officials tour around the Fuel Cell R&D and Testing Facility workspace and witness its state-of-the-art equipment.

Plans and Programs

The vision for mainstreaming AFETs is to create a landscape where government and society harmoniously co-exist with the environment, both ecologically and economically. The DOE's commitment demonstrates its drive to stay at the forefront of technological advancements in the transition to a cleaner and more sustainable energy future (Figure 15).

Figure 15. **Alternative Fuels and Emerging Energy Technologies Roadmap**



Determination of Local Feedstocks for AF production. An identified approach that is vital to the national strategy of reducing GHG emissions is the use of viable alternatives to fuel fossils such as *SAF and hydrogen and its derivatives*.

However, the current production methods for both greatly rely on non-renewable sources like petroleum and natural gas. To gain momentum in the shift towards utilizing renewable sources for SAF and hydrogen production in the short-term, the DOE plans to *identify alternative feedstocks* that can be utilized for its production without compromising the existing demand for essential resources (i.e., exploration of feedstocks such as sugarcane and coconut for biofuel production and food consumption). This will be followed with the *formulation of a development plan* in the medium-term that encompasses activities such as plant propagation for organic feedstock or supply chain management for inorganic feedstock.

Moving forward, the DOE will devise the conduct of *pilot demonstration to highlight and provide tangible evidence on the practical utilization and feasibility of produced SAF or hydrogen in transport vehicles*. This is a crucial step in validating the viability and efficiency of the renewable SAF and hydrogen and its derivatives. The insights gained from the pilot demonstration will hold the potential to further guide the optimization efforts and provide valuable data for refining production processes, accelerating the integration and mainstreaming of SAF into the aviation sector.

With this, the DOE is committed to promoting R&D on SAF through collaborations with research institutions and state universities or colleges. The study will focus on ways to maximize GHG reduction in the process of production, while minimizing competition with food production and other essential needs for optimized fuel yield. This will also serve as the basis for developing a comprehensive plan and strategy for SAF production in the country, such as selecting suitable feedstocks and developing resource optimization techniques. The plan will also include assessing environmental impacts, creating a robust supply chain framework, establishing production facilities, advocating for supportive policies, and engaging local communities for environmental and economic sustainability while promoting awareness of the benefits of SAF production.

The adoption of SAF aligns with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), a globally harmonized strategy for curbing emissions from international aviation while minimizing market distortion. As a member state of the International Civil Aviation Organization (ICAO), the Philippines through the DOE, stands committed to ensuring that the aviation industry complies with the CORSIA offsetting requirements on a triennial basis. The development of SAF will further promote eco-friendly practices since it is a renewable alternative to fossil-based jet fuel with similar chemical properties as conventional fuel.

Hydrogen and its Derivatives

The country's energy transition pathway seeks to explore low-carbon fuels and advanced technologies, with the overarching goal of diversifying the energy mix and mitigating GHG emissions. In recent years, there has been an increasing recognition of the extensive potential and diverse applications that hydrogen offers to enhance energy sustainability. These developments underscore the transformative role that hydrogen plays in reshaping the energy landscape. In this context, the development and domestic production of hydrogen and its derivatives emerge as a promising, innovative, and eco-friendly energy solution that can substantially support the ongoing energy transition efforts.

In 2020, the DOE established the Hydrogen and Fusion Energy Committee (HFEC) to study the impact of hydrogen's use for both power generation and transportation in the country's energy mix. The study done by HFEC pointed out the need for policy support and intervention in promoting hydrogen use, due to its high production costs. Additionally, a separate study was undertaken to develop a policy framework and strategic roadmap for hydrogen and ammonia utilization.

Further, the DOE has entered into collaborative agreements with international companies and organizations from Australia, France, Japan, and Germany. These partnerships aim to explore the application of hydrogen as a cleaner energy source for natural gas-fired power plants as well as for fuel cell technology. Some power-generating companies are now also studying the possibility of ammonia (as a derivative of hydrogen) co-firing with coal power plants. The Aboitiz Power Corporation signed an MOU with JERA, and Quezon Power Ltd. Company (QPL) of Thailand's Electricity Generating Public Company Limited (ERGO) Group entered into an MOU with South Korea firm Doosan Enerbility Co. Ltd to study the feasibility of ammonia co-fired generation with coal.

Under the Indo-Pacific Economic Framework for Prosperity (IPEF), the 14 member countries (Australia, Brunei, Fiji, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, Vietnam, and the US) expressed interest in pushing for cooperation on hydrogen and its derivatives.

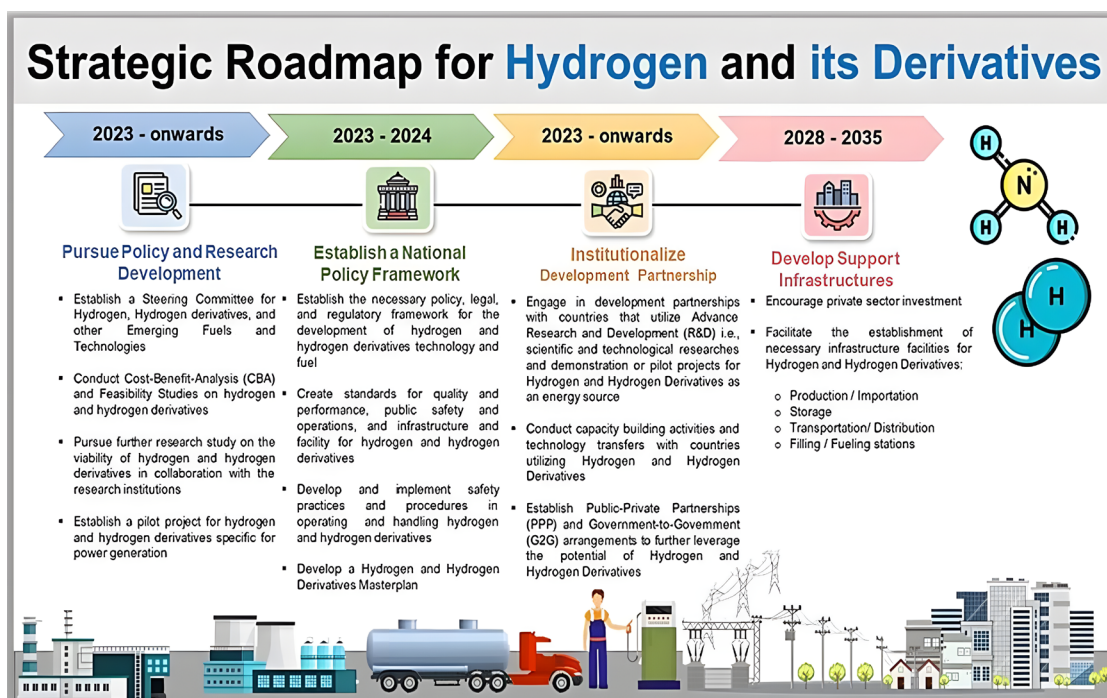
Discussions are ongoing to advance these initiatives, including the establishment of work streams or groups and the convening of fora.

It is necessary to outline these developments in the country's strategic roadmap for hydrogen and its derivatives as presented in *Figure 16*.

- **Pursue Policy and Research Development on Hydrogen and its derivatives as energy sources.** In recognition of the potential of hydrogen and its derivatives, there is a need to evaluate which type offers cost-effective low-carbon energy sources and carriers. Realizing the potential of the said fuel requires in-depth R&D to identify their viability as fuel for transport and power generation sectors. The DOST-PCIEERD also identified hydrogen and its derivatives as a priority project in its call for proposals.
- **Establish a National Policy Framework.** An enabling policy and/or legislation is deemed necessary to provide a strong foundation in accelerating the implementation of the corresponding plans and programs in the roadmap. This will provide a signal to the private sector, investors, as well as development partners to embark on hydrogen and its derivatives as alternative fuels for power and transport, among others.

The DOE is currently working on the issuance of a Department Circular (DC) that will provide a national policy and regulatory framework, and guidelines for implementing projects related to hydrogen. It also covers all activities related to R&D, production, storage, transmission, distribution, utilization, construction, operation, and maintenance of hydrogen project facilities. The policy will also put in place public safety codes and standards to ensure the safe operation, handling, and utilization of hydrogen and its corresponding systems. Likewise, a Hydrogen Energy Industry Committee (HEIC) will be established to oversee the implementation of the outlined guidelines in the DC.

Figure 16. Roadmap for Hydrogen and its Derivatives



Source: Energy Policy and Planning Bureau (EPPB) 2023 Study on "Developing a National Hydrogen-Ammonia Policy Framework and Roadmap for the Philippines"

- **Institutionalize Development Partnership.** Building upon existing collaborations with other countries that utilize advanced R&D, the institutionalization of international development partnerships becomes imperative in advancing the country's hydrogen agenda and initiatives. By strategically leveraging the knowledge, resources, and experience of its international partners, the Philippines is poised to significantly accelerate its efforts in harnessing the vast potential of hydrogen and its derivatives as cleaner and more sustainable energy sources.
- **Infrastructure Support Development.** Establishing the necessary support infrastructure for hydrogen and its derivatives involves encouraging private sector investments, while concurrently facilitating the construction of essential facilities. These facilities encompass the entire value chain spanning from the production and importation stages to storage, transportation, distribution, and utilization. Under the draft DC for hydrogen, the government will offer a range of fiscal and non-fiscal incentives to attract and support prospective stakeholders. Actively encouraging private sector involvement and creating a conducive environment for infrastructure development can effectively promote the widespread adoption and utilization of hydrogen technology in the country.

To further accelerate the development of hydrogen and its derivatives in the country, the following recommendations are proposed:

- Establish an Inter-Agency Committee focused on the development of hydrogen and its derivatives;
- Undertake extensive research and studies;
- Conduct of resource assessment;
- Formulate a clear policy statement and strategy/roadmap on the development of hydrogen and its derivatives;
- Collaborate with local and international development partners;
- Formulate a master plan for the development and/or utilization of hydrogen and its derivatives;
- Direct the Philippine National Oil Company (PNOC) through its subsidiaries to conduct feasibility and technical studies, and possible investment in hydrogen (and its derivatives) projects for power generation

Continuing Initiatives on AFETs

Continuous assessment and evaluation of AFETs and strengthening of partnerships. The DOE will continuously monitor existing AFET projects to assess and evaluate their viability. Correspondingly, the DOE will actively pursue partnerships with both local and international institutions in the conduct of research, validation of emerging energy technologies, and feasibility for local adoption and mainstreaming of AFETs.

Formulation of comprehensive plans, programs, and regulations. The DOE will enhance the implementation of its programs to advance and integrate AFETs by formulating policies and providing vital technical inputs for the establishment of standards and protocols. The provision of a supportive framework for the adoption and integration of new and emerging technologies is essential to foster innovation and ensure successful integration into various sectors. Establishing clear guidelines and policies will assist in creating an enabling environment that encourages investment, innovation, and the widespread deployment of new energy solutions.

Conduct of regular IEC campaigns. To promote the initiatives on AFETs and intensify its public acceptance, continuous conduct of IEC campaigns will be carried out. Targeted communication strategies will be designed with the aim of educating the public, businesses, policymakers, and other relevant stakeholders on the advantages of adopting new and emerging technologies. Additionally, the potential economic, environmental, and social benefits will also be highlighted.

Electric Vehicle (EV) Industry



In 2022, the government took a significant step toward energy transition through the enactment of Republic Act (RA) 11697, known as the *Electric Vehicle Industry Development Act (EVIDA)*, along with its Implementing Rules and Regulations (IRR). The EVIDA-IRR encompasses various aspects of the EV industry, including manufacturing, assembly, importation, construction, installation, maintenance, trade, utilization, R&D, regulation, and incentives related to EVCS, equipment, parts and components, batteries, and support infrastructure as R&D centers, training facilities, and waste treatment facilities.

Following the promulgation of the EVIDA-IRR is the development of the *Comprehensive Roadmap for the Electric Vehicle Industry (CREVI)*, which serves as the national development plan for the EV industry. It seeks to establish harmonized policy directions and programs to accelerate the development, commercialization, and utilization of EVs in the country, including EVCS, manufacturing, R&D, and human resources.

EVIDA Implementation. The transport sector accounts for about a third of the total final energy consumption and around one-seventh of the country's GHG emissions. As global oil prices continue to rise, increasing share of EVs in road transport reduces the country's dependence on oil and the associated impacts of spiraling prices to the economy. Likewise, greater EV penetration enhances energy security and advances clean energy initiatives toward achieving climate objectives.

The EVIDA sets the national objective of EV adoption and diffusion in road transport. The Law mandates EV share in both government and corporate fleets of at least 5.0 percent, building owners and establishments with EVCS to allot proportionate designated parking spaces for EVs, as well as encourages the construction of charging infrastructure in dedicated EV parking slots and in gasoline stations. Further, the distribution utilities (DUs) are expected to provide the necessary power supply for charging stations, which should be included in the Distribution Development Plan (DDP).

As embodied in the EVIDA, the CREVI was formulated through intensive collaboration between government lead agencies – DOE, Department of Science and Technology (DOST), and Department of Trade and Industry (DTI) – and stakeholders. Each of the four (4) main components of the CREVI is led by a specific government agency:

1. EVs and EVCS (DOE in coordination with the Department of Transportation or DOTr);
2. Manufacturing (DTI);
3. R&D (DOST); and,
4. Human Resource Development component (DTI)

The EVIDA-Technical Working Group (TWG) has also been established to ensure the implementation of harmonized policies and standards and streamlined regulations within the EV industry. The TWG is comprised of DOE, DOTr, DTI, DOST, Department of Environment and Natural Resources (DENR), Department of Public Works and Highways (DPWH), Department of Interior and Local Government (DILG), and the National Economic and Development Authority (NEDA).

Establishment of Responsive Policies for the EV Industry. As a move forward, the DOE conducted a series of public consultations to finalize important policies pertaining to the deployment of EVs and EVCS. These policies have been promulgated on 12 May 2023, providing guidance to the industry, namely:

- DC2023-05-0010 titled “*Guidelines on the Unbundling of Electric Vehicle Charging Station Charging Fee Pursuant to Electric Vehicle Industry Development Act*”;
- DC2023-05-0011 titled “*Guidelines in the Accreditation of Electric Vehicle Charging Station Providers and Registration of Electric Vehicle Charging Stations Pursuant to the Electric Vehicle Industry Development Act*”; and
- DC2023-05-0012 titled “*Guidelines on the Electric Vehicle Recognition and Adoption of EV Standard Classification on Road Transport for Incentive Eligibility Pursuant to the Electric Vehicle Industry Development Act*”.


Simultaneously, the DOE with assistance from the United States Agency for International Development (USAID), developed and launched the EV Industry Portal on 21 June 2023. The online platform allows stakeholders to submit their applications for EVCS Provider Accreditation and EVCS registration online (accessible through the link <https://evindustry.ph>). Further, the platform also serves as the national centralized repository of EV and EVCS related data and information, including accredited EVCS Providers offering supply, installation, and maintenance services for EVCS and location of registered EVCS.

Comprehensive Roadmap for the Electric Vehicle Industry.⁷⁷ The EVIDA mandated the formulation of CREVI as a national development plan for the EV industry. The formulation of the CREVI was finalized and unveiled in the second quarter of 2023. It outlines the targets, strategies, and prevailing scenarios within the EV industry, as well as the challenges and individual roadmap for each of the four main components.

Consistent with the EV industry goals, the CREVI sets forth a unified path toward its attainment from 2023 to 2040 (and onwards to 2050):

- Increase the utilization of EVs in the domestic market;
- Deploy a sufficient number of EV charging points across the country between 2023 and 2050;
- Position the Philippine EV industry to become a producer and exporter of EVs by 2050;
- Promote sustainable economic growth and just e-mobility transition by protecting employment in the automotive industry and providing capacity-building activities and EV-specific transition programs; and,
- Support R&D in battery, EVCS technology, and digitalization to spur technological innovations and strengthen the competitiveness of the local EV industry.

The CREVI envisions “to electrify a diverse range of vehicles and establish a domestic EV industry with strong export potential, with the aim of building a sustainable future, where new EVs and the required infrastructure are locally robust with reduced environmental impact”.



EV Local Scenario

The EVs accounted and registered in the country are classified into motorcycles/motorcycles with side car (TC), cars/sedans, and sport utility vehicles (SUVs) / utility vehicles (UVs). In 2022, the DOTr - Land Transportation Office (LTO) recorded around 9,666 cumulative registered EVs, relatively low compared to the nearly 13.9 million total registered motor vehicles (Table 35).

Currently, there are 186 EV models recognized under DC2023-05-0012, which are available in the local market. These comprised 133 models of battery EVs (BEVs), 22 hybrid EVs (HEVs), 10 plug-in HEVs (PHEVs), and 21 light EVs (LEVs). The EVs covered by the EVIDA include BEV, PHEV, HEV, LEVs. The LEVs pertain to EVs weighing less than 50 kilograms (kg) that include personal mobility devices and e-kick-scooters.

⁷⁷ The Handbook for CREVI is available at the DOE website [<https://www.doe.gov.ph/energy-efficiency/comprehensive-roadmap-electric-vehicle-industry-0>].

Table 35. **Cumulative Number of Registered Motor Vehicles in 2022**

Type of Motor Vehicle	No. of ICEV ⁷⁸ Registration in 2022	Cumulative No. of EV registration (2014-2022)
Cars/sedan	1,309,912	347
SUV/UV	3,544,984	1,168
Motorcycles/TC	8,472,466	8,105
Bus	32,470	44
Trucks/trailers	528,232	2
Total	13,888,064	9,666

Source: DOTr-LTO Motor Vehicle Registration

Reference (REF) Scenario

The CREVI sets a minimum target of EVs constituting at least 10.0 percent of the total fleet across all sectors (except for electric trucks) by 2040 (onwards to 2050) (Table 36). This target is modest, but the near-term focus will be on technology advancements and ramping up of the expansion of local EV production, particularly electric jeepney (e-JP) and e-TC manufacturing. Achieving the objective puts emphasis on capacity building and providing technical assistance to public transport cooperatives.

Table 36. **Projected Cumulative Vehicle Segment per EV Fleet and EVCS by 2050 (10% EV Share, REF)**

EV / EVCS Targets		Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050	Total
Vehicle Type	EV Type				
Cars (Sedan, SUV, UV)	HEV	48,348	161,622	238,929	448,899
	PHEV	8,061	26,940	169,594	204,595
	BEV	8,061	26,940	948,194	983,195
Tricycle	BEV	22,258	74,414	399,444	496,116
Motorcycle	BEV	97,818	327,029	2,243,094	2,667,941
Bus	BEV	379	1,263	6,942	8,584
Total EVs		184,925	618,208	4,006,197	4,809,330
EV Charging Stations		5,188	17,338	150,916	173,442

*EV share from the total projected vehicle fleet

The REF scenario necessitates an additional energy demand of 4,748 GWh equivalent to 0.54 GW of power requirement by 2050. The scenario also results in emission reduction in the transport sector by 55.37 million tons of carbon dioxide equivalent (MtCO₂e) in 2050.

Clean Energy Scenario (CES)

The CES is a more aggressive picture for the industry as it sets a target of at least 50.0 percent EV share of total fleet by 2040 (onwards to 2050). This will cover all sectors except for household, which has an indicated target of 10.0 percent share of the total fleet by 2050 (Table 37). The covered sectors including the targets (per vehicle type) are as follows:

- Tricycles/motorcycles – 50.0 percent EV share in the total fleet by 2030 and increasing to 60.0 percent by 2040 (onwards to 2050);
- Cars / SUVs / UVs – 25.0 percent EV share by 2030 and increasing to 50.0 percent by 2040 (onwards to 2050).
- Buses – 10.0 percent EV share by 2030 and increasing to 15.0 percent by 2040 (onwards to 2050).

Motorcycles and tricycles are considered to drive EV adoption in the country because of lower upfront cost, accessible to most consumers, and regarded as a primary mode of transport across all regions in the country.

The CES requires an additional energy demand of 19,377.98 GWh or 2.21 GW of power requirement by 2050. It is also estimated that emission reduction in the transport sector reaches 297.43 MtCO₂e by 2050.

⁷⁸ Internal Combustion Engine Vehicle/ICEV

The DOE E-Trike Project and the introduction of e-JPs in 2019 through the Public Utility Vehicle Modernization Program (PUVMP) created more awareness on EV and contributed to its increasing adoption. Also, the growth in e-TC numbers can be attributed to the initiatives of LGUs. Other factors that trigger the EV usage are the collaborations among Land Transportation Franchising and Regulatory Board (LTFRB), MERALCO, city governments of Makati and Mandaluyong for the "eSakay" route, and the trial of e-JPs in Iloilo City for the viability of its adoption.

Table 37. Projected Cumulative Vehicle Segment per EV Fleet and EVCS by 2050 (50% EV Share, CES)

EV / EVCS Targets		Short Term 2023-2024	Medium Term 2025-2028	Long Term 2029-2050	Total
Vehicle Type	EV Type				
Cars (Sedan, SUV, UV)	HEV	173,985	758,078	1,053,830	1,985,893
	PHEV	28,997	126,349	706,704	862,050
	BEV	28,997	126,349	3,893,042	4,048,388
Tricycle	BEV	172,289	533,991	1,915,517	2,621,797
Motorcycle	BEV	641,027	2,000,197	8,110,516	10,751,740
Bus	BEV	1,313	4,387	13,449	19,149
Total EVs		1,046,608	3,549,351	15,693,058	20,289,017
EV Charging Stations		38,753	139,399	630,329	808,481

*EV share from the total projected vehicle fleet

The private sector, specifically logistics companies, such as DHL Express Philippines and Mober, have taken steps to re-fleet with EVs. DHL's expansion of its fleet with EVs adheres to promotion of green logistics and reduction of environmental impact. Meanwhile, Mober (Ikea's on demand delivery) also introduced EVs in its fleet in line with delivering Ikea purchases from customers. These companies are setting examples in the move toward transport sustainability.

Another key development is the established partnership between Globe's 917 Ventures, Ayala Corporation, and Gogoro. A test fleet of Gogoro Smart scooters, smart batteries, and GoStations in Metro Manila was launched on 24 April 2023. Globe also launched electric-powered shuttles for its employees.⁷⁹

Electric Vehicle Charging Station Local Scenario

The DOE has put in place a monitoring process for EVCS deployment throughout the country. Correspondingly, the DOE consistently emphasizes to stakeholders the importance of registering their EVCS in compliance with DC2023-05-0011. To date, the DOE has registered public EVCS covering 170 charge points nationwide through the EV Industry Portal. A map of the sites can be accessed through the EV Industry Portal (<https://evindustry.ph>). These EVCS are comprised of 152 alternating current (AC) and 15 direct current (DC) charging points and five (5) battery swapping stations. In addition, the DOE has also accredited 40 EVCS providers. Based on the EVCS Providers' Accreditation reports, existing EVCS providers have generated 10,307 new jobs and investments with an estimated value of Php1.64 billion.

The EVCS provider is classified according to its scope of operation, namely: (a) Operator – collects fees from EV users in exchange for the use of facilities of EVCS to charge EVs; (b) Service – collects fees on the construction, installation, data and payment management, and maintenance of EVCS; and (c) Supplier – sells EVCS, or any of its parts/components for a fee. Contact details and further information about the DOE-accredited EVCS providers can be accessed through <https://evindustry.ph/accreditedproviders>.

A noteworthy undertaking on EVCS is the partnership between Pilipinas Shell Petroleum Corporation and SUN Mobility to explore the deployment of advanced battery-swapping technology for two- and three-wheel EVs in the country. This is targeted to be launched in 2023 and will utilize SUN Mobility's Smart Batteries, Quick Interchange Stations, and Smart Network cloud-based Internet of Things (IoT) backend software. Selected Shell mobility stations will allow two- and three-wheeled EVs to swap batteries in under two minutes. This innovative initiative is seen to offer an affordable, practical charging option, longer driving ranges, and zero-emission transportation. Increasing the number of charging stations will be vital to enhance convenience and accessibility of EVs, especially in urban areas.

Manufacturing Component. The country has made advances in attracting investments from original equipment manufacturers (OEMs) and automotive suppliers thereby establishing and furthering the EV industry's development. With a thriving automotive industry consisting of 256 companies serving domestic and export markets, the existing parts-making and assembly capabilities for ICEVs can be utilized in the transition to EVs. This includes not only common parts but also new strategic areas such as automotive electronics, batteries, and EVCS.

The presence of the country's export-oriented electronic industry and the upstream mining resources (e.g., Nickel, Cobalt) are deemed to be beneficial in the local development and manufacturing of parts and components of EVs.

⁷⁹ <https://www.bworldonline.com/velocity/2023/02/27/506820/ayala-group-brings-in-electric-smartscooters/>

On EV manufacturing, a number of companies are venturing in the domestic market. A Chinese company, Jiangsu Fengchuen New Energy Power Technology Co. Ltd., submitted a proposal to the Bacolod City government for the establishment of an EV manufacturing plant with an investment cost of USD 200 million. The intent is to have test units in Bacolod’s public transportation system running and the unit’s design is to be based on the “Sarao Jeepney.” On the other hand, Wyntron Inc., an electronics manufacturer, secured a USD 20 million loan from ADB to expand EV charging equipment production in Cavite. The loan is deemed to be utilized in purchasing and refurbishment of the company’s production facilities and machinery that will increase production capacity for both residential and commercial EVCS.

Human Resources Component. The growth of the EV industry is also dependent on the presence of a skilled workforce, as well as technical competency. The latter requires expertise in the fields of power electronics, control systems, electrical safety, battery technologies, and battery management systems.

The assessment of skills in the industry considers training and educational programs. The Philippine EV Analysis Report mapped out the industry’s skill requirements to further advance the adoption of technology. In response to this, the TESDA developed 10 out of the 26 industry skill requirements and recorded its accomplishments. The DOE’s support entailed developing a TESDA-aligned EV technician course module containing training regulations competency standards for EV and HEV servicing. Likewise, the DOE together with the Bureau of Fire Protection (BFP) developed an Emergency Response Protocol that provides basic and advanced knowledge and skills in firefighting techniques involving public utility vehicles (PUVs) and EVs to ensure public safety in the use of EVs.

The vehicle industry has also taken notice of EVs and started to engage with its stakeholders. Mitsubishi and Ford are some of the car companies that have conducted training. The former on technical service training for after-sales and seminars on handling, operating, and treating EVs safely. Meanwhile, the latter conducted EV emergency response safety training, specifically on preparation for emergency responses for EVs.

The LGU units, such as the Municipality of Malay, focused on the e-TC program of Boracay wherein the aim is to improve the boundary payment system, battery leasing services, financing scheme, and charging of batteries by e-TC suppliers.

Research and Development Component. The country’s academic research institutions such as the UP Diliman’s EEEI (E-Mobility R&D Group) and CSU are supported by the government (i.e., DOST) and are laying the path towards advancing e-mobility.

Several projects are being undertaken by UP-Diliman EEEI, which include e-vehicle deployment in collaboration with CSU. The design for a solar EV charging station under the project was adopted by the Quezon City Government in 2021.

The DOE and DOST in partnership with the academe are spearheading efforts related to developing EVs in marine vessels. This is guided with the goal of providing an alternative mode of transportation using an electric drive system and a more sustainable ferry system.



Secretary Raphael P. M. Lotilla leads the inauguration of the two units of Battery Electric Vehicle Buses and EV Fast Charging Station at the DOE Compound in Taguig City as part of the Department’s initiative in promoting cleaner transportation options.

EV Industry Challenges

The CREVI also identified the barriers faced by the industry – *market-side demand, local industry itself, and charging infrastructure.*

On market development, the industry deals with the perspective of market players regarding EV's reputation. Apart from having limited financing aid available, modern EV technologies will take time for familiarization by established industries. A chain effect ensues as hesitation in the adoption affects demand for supporting industries.

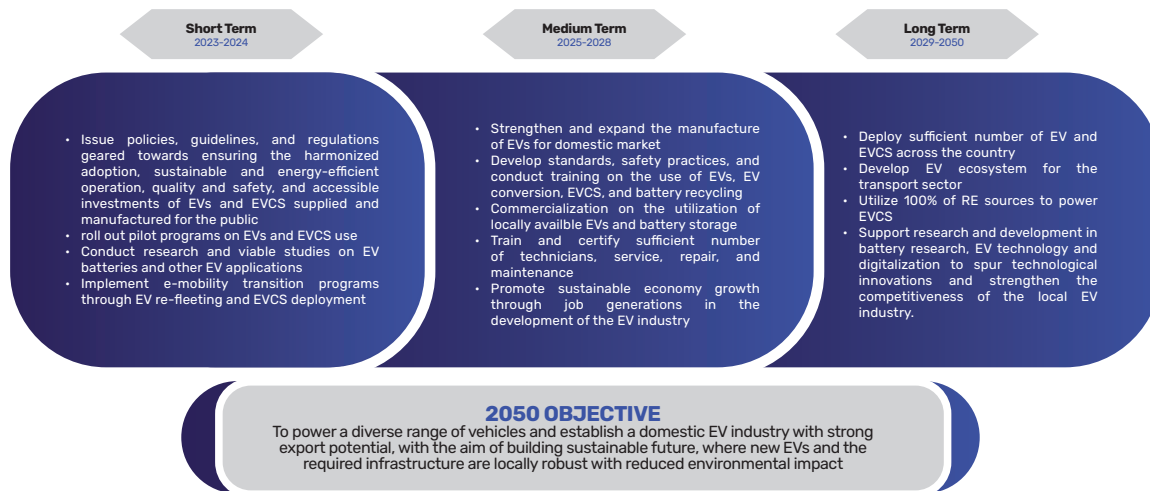
For the local industry, the challenge lies in the limited manufacturing capacity and assembly of EVs of all types. There are also difficulties in the acquisition of EV supply parts and batteries.

The charging infrastructure is integral to the industry's success and has been identified to be one of the major barriers in the full-scale adoption of EVs. Specifically, there is difficulty in attracting investments for charging stations due to the lack of market, as well as the investments needed for grid and distribution utility to support EV charging demand. The unavailability of support infrastructure for all types of vehicles in the industry is also a contributing factor to the slow adoption of EVs.

Plans and Programs

The EV Industry Roadmap (Figure 17) serves as the foundation for the successful and sustainable transition towards a cleaner and more efficient transportation system. The clear vision in place establishes a framework that encourages collaboration, fosters innovation, and promotes long-term sustainability.

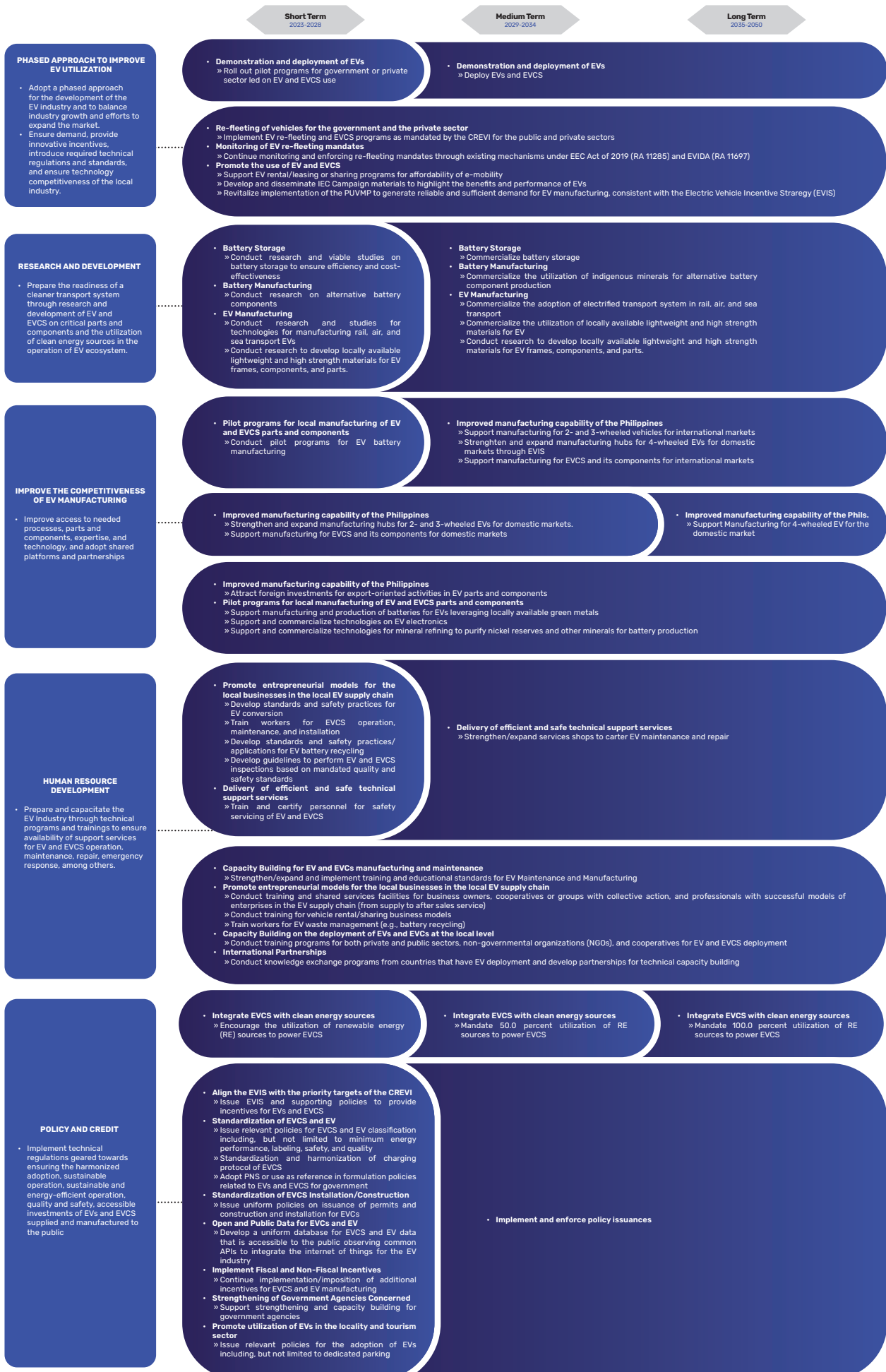
Figure 17. Electric Vehicles Roadmap



Various initiatives are to be conducted to ensure the industry's readiness. The principles of responsibility and accountability in each key player's performance are integrated into the assigned tasks with defined levels of engagement at the start of the roadmap implementation. Regular reviews and updates will also be conducted to assess the progress of the action plans and adjustments will be made based on the results and stakeholder feedback. This iterative approach will assist in monitoring and optimizing the roadmap's implementation, ensuring its effectiveness in driving the growth of the EV industry.

The Roadmap for EVs and the corresponding charging stations are clearly outlined in both REF and CES. Its goal is to improve the penetration rate of EVs in the country. As shown in Figure 18 the CREVI also indicated action plans covering manufacturing, human resource development, and R&D.

Figure 18. CREVI Action Plans



Continuing Government Initiatives and Policies

The country, as guided by President Marcos Jr. administration's industrial strategy (driven by new Science, Technology, and Innovation), is positioning to become a hub for green and modern technology and sustainable manufacturing.

Electric Vehicle Incentive Strategy (EVIS). Section 24 of EVIDA stipulates the government's creation of a targeted incentives program, the same with the comprehensive automotive resurgence strategy (CARS) program, to entice investments that will drive the domestic industry and position the country as a future regional player in EV value chain.

The EVIS is viewed to enhance EV manufacturing with strong domestic market acceptance, strong manufacturing potential, and promising export opportunities. Specifically, this will support four-wheeled commercial vehicles (i.e., e-JP) to accelerate PUVMP's implementation and prospectively support other EV segments (e.g., electric two- and three-wheeled vehicles).

The 2019 Philippine EV Policy Analysis Report identified the four pillars of EV diffusion - *EV cost reduction, industry development, demand generation, and charging infrastructure*.⁸⁰

Policies Supporting EVIDA

Several policies and development plans are now in place which are seen to complement EVIDA's implementation. These include RA 9513 (RE Act of 2008), RA 11534 (CREATE Act), RA 10771 (Green Jobs Act), EO 12 series of 2023, MMDA Memorandum, National Transport Policy, Philippine Development Plan (PDP), and DTI-Bureau of Product Standards (Table 38).

Table 38. Laws and Plans Complementing EVIDA

Law / Policy / Plan	Provisions
RA 9513 (RE Act of 2008)	<ul style="list-style-type: none"> Option for EVCS with a demand of 1 MW or more to directly contract with RE developers. The Green Energy Option Program (GEO) allows EVCS to source its energy demand from RE suppliers.
RA 11534 (CREATE Act)	<ul style="list-style-type: none"> The Strategic Investment Priorities Plan (SIPP) includes EV manufacturing and charging stations. This provides registered business enterprises (RBEs) with income tax holiday and enhanced deductions (e.g., depreciation allowance, labor expenses, R&D expenses, technical training expenses for new hires, domestic input expenses, power expenses, reinvestment allowance for manufacturing industries, and enhanced net operating loss carry over) for registered activities. Provides zero tariffs and customs duty to capital equipment, raw materials, spare parts, or accessories that are directly and exclusively used in these activities.
RA 10771 (Green Jobs Act)	<ul style="list-style-type: none"> Provides incentives and funding for training and research development in the field of renewable energy. RA No. 11285 or the Energy Efficiency and Conservation Act, provides not only regulation through the Minimum Energy Performance (MEP) but also entitlement to investments. This is in consideration of the Omnibus Investments Code (EO 226) and technical assistance from the government for energy efficiency projects related to EVs. This Act serves as an important complement to the Philippine Green Jobs Act of 2016 by promoting the development of a highly skilled workforce capable of meeting the demands of the EV industry.
EO 12 s. 2023	<ul style="list-style-type: none"> Temporarily modifies the rates of import duty on EVs, parts, and components under Section 1611 of RA No. 10863, otherwise known as the "Customs Modernization and Tariff Act." The EO temporarily cuts the most-favored-nation (MFN) tariff rates to zero percent on completely built-up units of certain EVs except for HEVs for a period of five years.⁸¹
MMDA Memorandum	<ul style="list-style-type: none"> Approved non-fiscal incentive is the exemption of EVs from all number coding schemes.
National Transport Policy	<ul style="list-style-type: none"> Among the priorities is the modernization of the country's transport system, largely made up of JPs and buses, by considering environmentally friendly modes of transport that utilize BEVs and HEVs, the introduction of bus rapid systems, and other mass transit options.
Philippine Development Plan	<ul style="list-style-type: none"> The PDP targets to create a more efficient, reliable, and sustainable transportation system in the Philippines.
Philippine National Standards (PNS)	<ul style="list-style-type: none"> Provides various technical standards on safety, performance, operation, and installation relevant to EVs and EVCS. Establishing standards and comprehensive utilization regulations are important in ensuring the safe and efficient operation of EVs, especially in the context of the rapid increase of their use in the country.
Tax Reform for Acceleration and Inclusion (TRAIN) Law	<ul style="list-style-type: none"> Full battery-operated vehicles will be exempted from 100.0 percent excise tax while hybrid vehicles that operate both by fuel and battery will be given 50.0 percent of excise tax exemption.

⁸⁰ Biona, et al. 2019. *Philippine Electric Vehicle Policy Analysis Report - Draft Report*. [Source: https://www.researchgate.net/publication/335464260_Philippine_Electric_Vehicle_Policy_Analysis_Report_-_Draft_Report]

⁸¹ To improve the affordability of EVs, the DOE has also endorsed a position paper dated 08 June 2023 to the Tariff Commission on the temporary removal of the Most-Favor

Investment and Employment Opportunities

The transition towards a green economy is opening significant investment opportunities in clean energy and electric mobility solutions thereby attracting environmentally conscious businesses and investors. The formulation of the CREVI in conjunction with other pertinent government laws and policies, demonstrates the government's unwavering dedication to bolstering the development of the EV industry.

As a developing country with an increasing EV demand, it is imperative to strategically expand the network of charging stations in both public and private spaces. Improving the availability and accessibility of charging infrastructures will undoubtedly encourage potential end-users to adopt EVs for their mobility. Relatedly, the expected increase in investment within the country will not only stimulate economic growth but also create diverse employment opportunities, particularly for the local skilled workers.

Tables 39 and 40 show the projections representing the two re-fleeting scenarios – REF and CES. The REF indicates at least 10.0 percent EV share of the total fleet for all sectors (except for trucks), while the CES specifies at least 50.0 percent of all fleets with EVs by 2050. The projected values in the scenarios are based on rational assumptions that determine investment requirements, as well as job generation. It is also referenced to the projected EV adoption by 2050 and covers the sectors⁸² mandated in the EVIDA on the minimum EV share in fleets except for LEVs and heavy-duty vehicles (trucks).

For the REF scenario, the total investment requirement for the planning period reaches PhP7.97 trillion with EVs consisting of 77.0 percent at PhP6.1 trillion, while the equivalent job generation is seen at 117,243 million (Table 39).

Table 39. Projected Investment Requirements and Job Generation, REF Scenario

Year	EV Type	No. of EVs		Total Number		Total Investment Requirements (PhP Billion)			Job Generation
		Government	Private	EVs	EVCS	(EVs)	(EVCS)	Total	EVs*
Short Term 2023-2024	4W	156	64,314	64,470	806	69.77	0.40	70.18	1,372
	TC	14	22,244	22,258	742	4.27	0.37	4.64	474
	MC	282	97,536	97,818	3,261	10.18	1.63	11.81	2,081
	E-Bus	8	371	379	379	5.20	1.71	6.91	8
	Total	460	184,465	184,925	5,188	89.43	4.11	93.54	3,935
Medium Term 2025-2028	4W	513	214,989	215,502	2,694	161.99	1.35	163.34	4,585
	TC	48	74,366	74,414	2,480	9.91	1.24	11.15	1,583
	MC	940	326,089	327,029	10,901	23.65	5.45	29.10	6,958
	E-Bus	25	1,238	1,263	1,263	12.05	5.68	17.73	27
	Total	1,526.00	616,682	618,208	17,338	207.60	13.72	221.32	13,153
Long Term 2029-2050	4W	4,316	1,352,401	1,356,717	55,889	4,690.38	478.34	5,168.71	33,918
	TC	356	399,088	399,444	13,315	247.97	199.72	447.69	9,986
	MC	6,941	2,236,153	2,243,094	74,770	591.36	1,121.55	1,712.91	56,077
	E-Bus	186	6,756	6,942	6,942	299.62	31.24	330.86	174
	Total	11,799	3,994,398	4,006,197	150,916	5,829.33	1,830.84	7,660.18	100,155
Grand Total		13,785	4,795,545	4,809,330	173,442	6,126.36	1,848.68	7,975.04	117,243

Note: For 4Ws, 20 EVs can be charged by a single EVCS; for TC and MC, approx 30 units can be charged in a day;
 Estimated EV Unit Price: HEV - PhP1.8 million, PHEV/BEV -PhP2.5 million, E-trike - PhP 0.35 million, E-Motorcycles - PhP 0.190 million,
 E-Bus -PhP 25.0 million (plus 3% annual inflation rate)
 Estimated EVCS Investment cost - PhP 0.5 million (4W, TC and MC) and PhP4.5million (e-Bus with 80kWdc charger)
 * Based on 1 job generated per 47 EVs

⁸² Section 16 of RA 11697 and Section 20 of the EVIDA-IRR

In the CES, investment increases by 65.0 percent at PhP13.1 trillion compared to the REF, where EVs account for 97.0 percent of the total (PhP12.8 trillion). Likewise, jobs expected to be created are much higher at 431,681 (Table 40).

Table 40. Projected Investment Requirements and Job Generation, CES

Year	EV Type	No. of EVs		Total Number		Total Investment Requirements (PhP Billion)			Job Generation
		Government	Private	EVs	EVCS	(EVs)	(EVCS)	Total	EVs*
Short Term 2023-2024	4W	753	231,226	231,979	11,599	232.85	1.45	234.30	4,936
	TC	158	172,131	172,289	5,743	42.91	2.87	45.78	3,666
	MC	3,142	637,885	641,027	21,368	82.26	10.68	92.95	13,639
	E-Bus	19	1,294	1,313	44	17.99	0.66	18.65	28
	Total	4,072	1,042,536	1,046,608	38,753	376.01	15.66	391.67	22,268
Medium Term 2025-2028	4W	3,365	1,007,411	1,010,776	50,539	961.12	6.32	967.43	21,506
	TC	485	533,506	533,991	17,800	115.96	8.90	124.86	11,362
	MC	9,657	1,990,540	2,000,197	66,673	222.44	33.34	255.78	42,557
	E-Bus	60	4,327	4,387	4,387	41.78	2.19	43.97	93
	Total	13,567	3,535,784	3,549,351	139,399	1,341.29	50.75	1,392.04	75,518
Long Term 2029-2050	4W	15,258	5,638,318	5,653,576	282,679	9,413.54	114.99	9,528.53	120,289
	TC	1,358	1,914,159	1,915,517	63,851	455.95	31.93	487.87	40,756
	MC	27,180	8,083,336	8,110,516	270,351	932.11	135.18	1,067.29	172,564
	E-Bus	451	12,998	13,449	13,449	270.96	6.72	277.69	286
	Total	44,247	15,648,811	15,693,058	630,329	11,072.56	288.82	11,361.38	333,895
Grand Total		61,886	20,227,131	20,289,017	808,481	12,789.87	355.23	13,145.09	431,681

Note: For 4Ws, 20 EVs can be charged by a single EVCS; for TC and MC, approx 30 units can be charged in a day; Estimated EV Unit Price: HEV - PhP1.8 million, PHEV/BEV - PhP2.5 million, E-trike - PhP 0.35 million, E-Motorcycles - PhP 0.190 million, E-Bus - PhP 25.0 million (plus 3% annual inflation rate)
Estimated EVCS Investment cost - PhP 0.5 million (4W, TC and MC) and PhP4.5 million (e-Bus with 80kWdc charger)
* Based on 1 job generated per 47 EVs

F. POWER DEVELOPMENT

The role of the power industry is central in supporting President Ferdinand Marcos Jr. Administration's 8-point Socioeconomic Agenda, specifically protecting the purchasing power of families (through reduction of energy costs) in the near-term and creating more jobs (ensuring energy security) in the medium-term.

Corollary to this, as energy transition is widely becoming a common parlance, the transformational shift envisioned for the power system is viewed to be a step towards security, reliability, accessibility, and sustainability. Achieving the planned transition requires gradual changes from the industry's sub-sectors - generation, transmission, distribution, and supply. Complementing these significant changes to be undertaken are government commitment and regulation as both will steer the country's path to its intended outcome for the industry in the medium- to long-term.

Existing Power System

The main electricity grids that comprise the country are Luzon, Visayas, and Mindanao. However, there are still areas that are not connected to the main grid which are known as off-grid. The aspiration of a unified grid will come into fruition with the targeted completion of the Mindanao-Visayas Interconnection Project (MVIP) by 2024.

Main Grid. In 2022, the registered peak demand increased by 3.5 percent, reaching 16,596 megawatts (MW) from the previous 16,036 MW. This is an indication that the economy sustained its activities as major industries contributing to local development are already in full operations compared to the drawdown at the height of the pandemic.

The residential and industrial sectors remain the biggest electricity users accounting for 38.7 percent and 31.6 percent of the total electricity sales of 91,333 gigawatt-hours (GWh). On the other hand, the commercial sector comprised around 26.6 percent of the total, while others rounded up the remaining 3.1 percent.

In terms of on-grid installed capacity, this increased to 28,258 MW⁸³ in 2022 from 26,882 MW in 2021 while dependable capacity was observed to slightly decline to 23,598 MW from 23,855 MW in 2021.⁸⁴The decrease in dependable capacity is related to the recorded 0 MW capacity from Ilijan Natural Gas Power Plant as its gas sales purchase agreement (GSPA) with Malampaya ended in June 2022. The country's power generation meanwhile intensified by 5.1 percent registering at 111,516 GWh in 2022 from 106,115 GWh in 2021. Coal remained the most dominant fuel for electricity generation at almost 60.0 percent equivalent to 66,430 GWh. Renewables and natural gas closely followed with 22.1 percent (24,684 GWh) and 16.0 percent (17,884 GWh), respectively.

As the backbone linking electricity generation down to distribution, the transmission substation capacity in 2022 was at 48,801 Megavolt-Ampere (MVA), while the total transmission line length reached 21,027 circuit-kilometers (ckt-km). The transmission system in the main grid is a government asset, owned by the National Transmission Corporation (TransCo). However, the obligation to operate, maintain, and expand the grid was given to the National Grid Corporation of the Philippines (NGCP), a private company that secured the 25-year concession and holds the congressionally granted 50-year franchise, which officially started in 2009.

On the distribution side, 125 distribution utilities (DU) are operating in the main grid. The oversight on the 100 electric cooperatives (ECs) is being exercised by the National Electrification Administration (NEA). The 24 private investor-owned utilities (PIOUs) and one (1) LGU-owned utility (LGUOU) are under DOE's supervision.

Off-Grid. In off-grid areas, installed capacity rose to 673.77 MW in 2022, a 6.0 percent growth from 636 MW in 2021. Dependable capacity also increased by 10.7 percent, registering 548.296 MW in 2022 from only 495 MW in 2021.

The National Power Corporation-Small Power Utilities Group (NPC-SPUG), as asset owner of both transmission and substation facilities in off-grid areas, is responsible for the operation and maintenance. Transmission line length and substation capacity in 2022 totaled 1,137.72 ckt-km. and 215 MVA, respectively.

The NEA remains as oversight of the 21 off-grid ECs, while DOE keeps tab on the single multi-purpose cooperative serving as local utility in small islands and isolated grids (SIIG). Sales and consumption in off-grid areas reached 1,689 GWh in 2022 with the residential sector comprising 54.0 percent of the total.

Generation

Monitoring of Power Generation Projects. As the power sector is mainly private sector driven, the DOE continuously monitors its development including the timely completion of power generation projects. These projects provide the additional generating capacity to enhance the grid's supply stability and reliability and address the country's increasing electricity requirements.

For the period 2022 to June 2023, the additional generating capacities provided an aggregate installed and dependable capacities of 1,111.0 MW and 955.3 MW, respectively (Table 41). Nearly 81.0 percent of the new power generating plants is located in Luzon. Of the total, coal comprised 69.0 percent, solar with 10.0 percent, oil-based with 9.0 percent and the remaining is contributed by hydro, biomass, and geothermal.

⁸³ 2022 DOE Power Statistics

⁸⁴ Ibid



Table 41. List of Newly Commissioned Power Plants from 2022 to June 2023 (On-Grid)

Power Plant	Plant Type	Operator	Location	Date Commissioned/ Commercial Operation Date	Capacity (MW)	
					Installed	Dependable
LUZON					898.44	766.24
Dingin Unit 2	Coal	GN Power Dinginin	Mariveles, Bataan	October 2022	725.00	668.00
Hypergreen	Biomass	Hypergreen Energy Corporation	Bocoue, Bulacan	April 2022	12.00	10.00
Sta. Rita Solar (Phase 3B)	Solar	Jobin-Sqm Inc. (JOBIN)	Subic Bay, Freeport Zone	November 2022	34.40	27.50
Bataan Solar Energy Project	Solar	Bataan Solar Energy, Inc. (BSEI)	Mariveles, Bataan	June 2022	4.40	3.70
Arayat-Mexico Solar Power Plant	Solar	Greencore Power Solutions 3, Inc.	Arayat, Pampanga	July 2022	72.00	51.00
Petron RSFFB PH3 (own-use)	Coal	Petron Corporation	Limay, Bataan	Dec 2022	44.40	0.00
Butao Irrigation Drop	Hydro	Mindoro Grid Corporation	San Manuel, Pangasinan	February 2022	1.40	1.20
Man-Asok	Hydro	Benguet Electric Cooperative	Buguias, Benguet	July 2022	3.24	3.24
Inarihan	Hydro	Bicol Hydropower Corp.	Panicuason, Naga City	April 2022	1.60	1.60
VISAYAS					172.20	149.40
Isabel Modular Diesel Ancillary Service Power Plant	Oil	Isabel Ancillary Services Co. Ltd. (IASCO)	Isabel, Leyte	March 2022	86.30	70.70
Tubig HEPP	Hydro	Taft Hydroenergy Corporation	Taft, Eastern Samar and Hinabangan, Samar	October 2022	15.90	15.90
San Carlos Biopower	Biomass	San Carlos Biopower, Inc.	San Carlos City, Negros Occidental	June 2022	20.00	18.00
South Negros Biopower	Biomass	South Negros Biopower, Inc.	La Carlota City, Negros Occidental	June 2022	25.00	22.40
North Negros Biopower	Biomass	North Negros Biopower, Inc.	Manapla, Negros Occidental	June 2022	25.00	22.40
MINDANAO					40.40	39.70
Mati Bunker C	Oil	Supreme Power Corporation (SPC)	Mati City, Davao Oriental	November 2022	11.00	11.00
Mindanao 3 Binary Geothermal Plant	Geothermal	Energy Development Corporation	Kidapawan, North Cotabato	June 2022	3.70	3.00
Marbel 1 HPP	Hydro	Euro Hydro Power (Asia) Holdings, Inc.	Koronadal City, South Cotabato	June 2022	0.80	0.80
Lake Mainit	Hydro	Agusan Power Corporation	Jabonga, Agusan del Norte	March 2023	24.90	24.90
Total					1,111.04	955.34

Issuance of Power Generation Policies. The DOE's responsibility of supervising the electricity industry involves the formulation of policies to ensure grid security, reliability, and stability.

The issuance of Department Circular (DC) 2022-05-0015 titled "Supplementing Department Circular 2021-06-0013 on the Framework Governing the Test and Commissioning of Generation Facilities for Ensuring Readiness to Deliver Energy to the Grid or Distribution Network" on 20 May 2022 allowed the power plants to continue injecting generated electricity to the grid after successful completion of test and commissioning process. This also enables the power plants to support the anticipated increase in demand, specifically during summer.

On 20 April 2023, the DOE issued DC2023-04-0008 titled *Prescribing the Policy for Energy Storage System in the Electric Power Industry*. Cognizant of the benefits from energy storage system (ESS) given the high influx of variable renewable energy (VRE) in the country's power system, the Circular repealed the earlier ESS policy framework (DC2019-08-0012⁸⁵). The ESS technologies include battery energy storage system (BESS), compressed air energy storage (CAES), flywheel energy storage (FES), and pumped storage hydropower (PSH). The ESS proponents can apply and register their ESS for one or more of the following purposes: a) provision of ancillary service; b) provision of energy through bilateral supply contracts or trading in the Wholesale Electricity Spot Market (WESM); c) manage the variability of renewable energy (RE); d) auxiliary load management for generation companies; e) transmission and distribution facility upgrades deferment; f) transmission and distribution utility power quality management; g) end-user demand management; and h) distribution utility demand management.

Correspondingly, the DOE also issued DC2023-07-0022 on 17 July 2023 titled *Implementing Guidelines for the Decommissioning and Mothballing of a Generating Plant or Unit Pursuant to Section 2.8 of DOE Department Circular 2010-03-0003*.⁸⁶ The policy prescribes the guidelines on the review process and evaluation of applications for decommissioning⁸⁷ or mothballing⁸⁸ of a generating plant or unit including embedded generating facilities regardless of technology and mode of connection. However, it does not apply to self-generation facilities, qualified end-users, and distributed energy resources. More importantly, the Circular excludes the decommissioning and mothballing of a nuclear power plant as this will be covered by a separate Department issuance.

⁸⁵ "Providing a Framework for Energy Storage System in the Electric Power Industry" issued on 1 August 2019

⁸⁶ "Directing all Power Generation Companies, the Transmission Service Provider, and All Distribution Utilities to Ensure Adequate and Reliable Electric Power Supply in the Country" issued on 26 February 2010.

⁸⁷ Refers to the permanent retirement of a generating plant or unit from operation upon reaching its maximum economic life and generation of electricity is no longer technically viable, subject to the confirmation of the DOE under the DC.

⁸⁸ Refers to temporary deactivation or removal from service of a generating plant or unit, within the specified period provided by the applicant and to be restarted and used to supply power at a future date. As stated in the DC, the period within the applicable outage allowance pursuant to the issuances of the Energy Regulatory Commission (ERC) shall not be considered as mothballing activity.



To ensure that the grid has a stable and steady supply of electricity, the DOE continued to accentuate and reiterate to power industry participants their obligations in providing the required Ancillary Services (AS)⁸⁹ and adherence to the Grid Operating and Maintenance Program (GOMP).⁹⁰ The former considers the safe and reliable operation of the grid by having sufficient ancillary services to meet power quality and reliability. Meanwhile, the latter mandates power generating companies (GenCos) to submit to NGCP its three-year planned outage schedules. It also directs the public posting of the approved GOMP and allows hydropower plants to conduct maintenance during the peak months or from April to June.

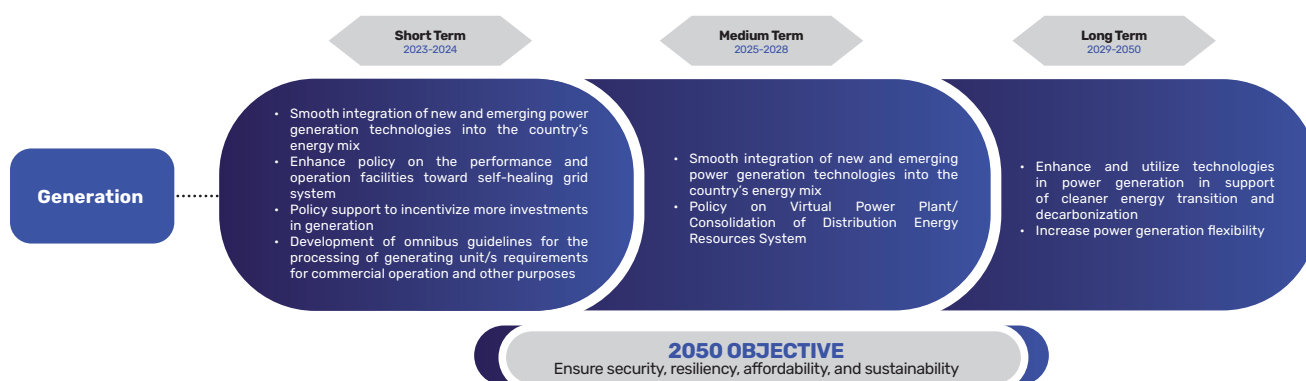
Further, to underpin the energy transition foreseen in the power sector, the coal moratorium policy⁹¹ issued in 2020 remains in effect, encompassing restrictions in the processing of applications for new coal power projects.

Plans and Programs

Power Generation Roadmap

The generation sub-sector’s action plans are in support of the 2050 objective of ensuring energy security, resiliency, affordability, and sustainability.

Figure 19. Power Generation Roadmap



For the short-term (2023-2024), actions to be taken are the integration of new and emerging generation technologies, enhancement of policies on performance and operation, incentivizing generation investments, and development of omnibus guidelines for processing of generating unit/s requirements for commercial operation. In the medium- (2025-2028) to long-term (2029-2050), identified action plans are formulation of a policy on virtual power plant, consolidation of distributed energy resources system, enhancing and utilizing new technologies in power generation to support energy transition, and increasing power generation flexibility.

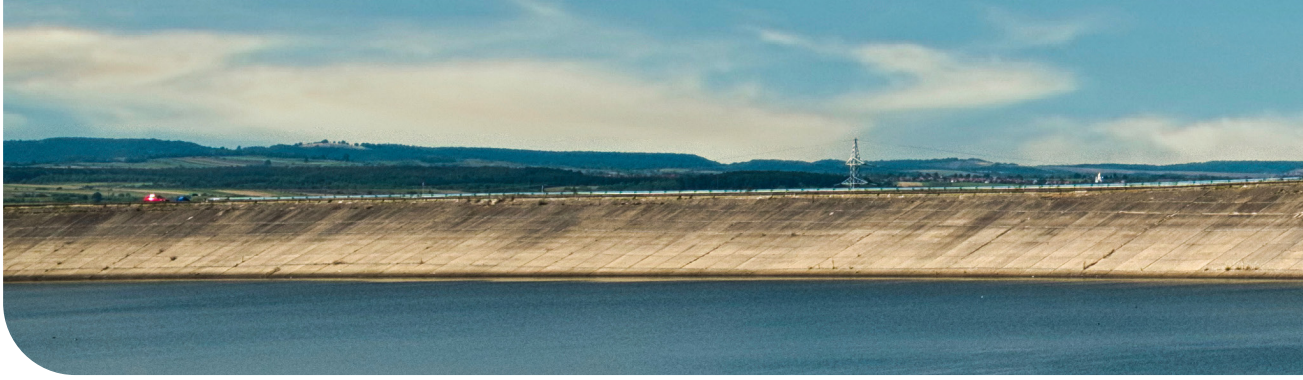
Smooth Integration of new and emerging power generation technologies into the country’s energy mix.

Technological advancements in industry give rise to sustainable electricity production. Pursuing the energy transition points to considering and integrating these emerging technologies into the system once commercially available and viable. The various technologies serving as options are offshore wind, nuclear, hydrogen, ammonia, among others. The move for eventual inclusion of these options in the energy mix requires support in the form of policy formulation.

⁸⁹ DC 2019-12-0018 titled “Adopting a General Framework Governing the Provision and Utilization of Ancillary Services in the Grid”

⁹⁰ DC 2020-02-0004 titled “Providing Guidelines on the Planned Outage Schedules of Power Plants and Transmission Facilities and the Public Posting of the Grid Operating and Maintenance Program (GOMP)”

⁹¹ DOE-AGC-20005580 titled “Advisory on the Moratorium of Endorsements for Greenfield Coal-Fired Power Projects in line with Improving the Sustainability of the Philippines Electric Power Industry” issued on 22 December 2020



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

Realizing a self-healing grid system necessitates investments in advanced technologies for real-time monitoring and automation in generation facilities. The key aspect of the policy enhancement is ensuring that generation facilities are resilient, dependable, and adaptable to abrupt changes in the power system. Achieving interoperability within the generation system enhances the overall flexibility and adaptability of the power network, contributing to a more reliable and efficient energy infrastructure.

Policy support to incentivize more investments in generation. The objective of supply security remains at the core of the energy agenda in the planning period. Augmenting the existing capacity requires the right timing of investments, as well as policies that are facilitative.

To entice the necessary investments, the DOE is keen on designing policy support mechanisms to facilitate greater access to financing for potential power generation projects and incentivizing connections for RE-based capacities as identified in the smart and green grid plan (SGGP).

Enhance and utilize new technologies in power generation in support of cleaner energy transition and decarbonization. In support of the energy transition direction, there is a need to accelerate the development, adoption, and utilization of emerging clean energy technologies for power generation. This action point is in correlation to the integration of offshore wind, hydrogen, ammonia, etc. The DOE is steadily progressing towards this objective by formulating policies, feasible incentives, and development goals that are inclusive, ensuring an equitable environment and a level playing field for the diverse range of emerging technologies.

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 that will consolidate all existing policies, EVOSS application processes, and all other related permitting processes before reaching commercial operation of a project.

Policy on Virtual Power Plant / Consolidation of Distributed Energy Resources System. As technology advances, there is a corresponding need to adapt to changes in the power industry. Distributed Energy Resource (DER) systems and Virtual Power Plants (VPP) are among the potential futures in the power sector.⁹² The DOE is currently looking into potential strategies to promote the deployment and adoption of these technologies by creating a policy framework focusing on market participation, interoperability mechanisms, and grid-readiness. The introduction of incentive programs is also being considered to further support and promote these technologies.

Increase power generation flexibility. The Philippines' power system progresses into having VRE in electricity generation due to the government's enabling laws and policies. This is the foreseen transformation of the system within the planning horizon.

In a power system where VRE is increasing, operations of the system increase in complexity. The gradual integration of VRE introduces additional levels of variability and uncertainty in the net load.⁹³

With energy transition as the driver for redefining the power system, the country is looking at natural gas option to serve as a transition or bridge fuel to increase flexibility of the grid, while waiting for other renewable technologies to develop (e.g., floating solar, pumped hydropower, etc.). These plants can provide the intermediate or mid-merit supply requirements of the country.

⁹² DERs, defined in ERC Resolution No. 17, s.2023, are decentralized power sources connected to distribution system or electrical system of endusers that could be aggregated to meet demand. VPP, on the other hand, is an energy management system optimizing the operation of DERs.

⁹³ Source: International Renewable Energy Agency (IRENA). 2018. Power System Flexibility for the Energy Transition [pdf]. Available at https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Nov/IRENA_Power_system_flexibility_1_2018.pdf.



Monitoring Implementation of Power Generation Projects. Forming part of ensuring grid supply security is the continuous monitoring of the timely completion and implementation of committed and indicative power projects. Coordination with these project proponents is done by the DOE to assist in resolving challenges encountered in operating and providing supply to the grid.

The aggregate capacity of committed power projects as of 3rd quarter of 2023 is around 12,600 MW. Natural gas comprises 48.2 percent of the total followed by RE (32.8 percent) and coal (18.3 percent). Nearly 50.0 percent of the capacity (6,338.7 MW) is seen to operate from 2023 to 2025 (Table 42).

On the indicative power projects, the total capacity for the planning period is 68,912 MW. About 85.5 percent of these projects is RE-based totaling around 58,917 MW, while natural gas with 12.1 percent share or 8,320 MW. Coal and oil account for a meager 2.4 percent aggregate share (Table 43).

Table 42. **Committed Power Projects** (as of 30 September 2023)

Plant Type	Luzon		Visayas		Mindanao		Philippines	
	No. of Projects	Rated Capacity (MW)	No. of Projects	Rated Capacity (MW)	No. of Projects	Rated Capacity (MW)	No. of Projects	Rated Capacity (MW)
Coal	10	1,900.00	1	135.00	1	270.00	12	2,305.00
Oil-Based	1	11.04	4	19.67	2	56.00	7	86.71
Natural Gas	10	6,070.00	-	-	-	-	10	6,070.00
Geothermal	3	66.00	4	55.60	-	-	7	121.60
Hydropower	20	146.87	3	40.20	14	84.42	37	271.49
Solar	36	2,970.14	1	300.00	2	121.00	39	3,391.14
Wind	3	260.00	1	13.20	-	-	4	273.20
Biomass	3	11,282	4	44.00	3	26.00	10	81.28
Total	86	11,435.33	18	607.67	22	557.42	126	12,600.43
BESS	41	1,394.00	17	370.00	11	260.00	69	2,024.00

Table 43. **Indicative Power Projects** (as of 30 September 2023)

Plant Type	Luzon		Visayas		Mindanao		Philippines	
	No. of Projects	Rated Capacity (MW)	No. of Projects	Rated Capacity (MW)	No. of Projects	Rated Capacity (MW)	No. of Projects	Rated Capacity (MW)
Coal	4	1,400.00	0	0.00	1	120.00	5	1,520.00
Oil-Based	1	60.00	1	95.20	0	0.00	2	155.20
Natural Gas	7	7,720.00	0	0.00	1	600.00	8	8,320.00
Geothermal	8	345.00	2	68.00	0	0.00	10	413
Hydropower	66	6,683.56	6	381.60	10	746.70	82	7,811.86
Solar	75	7,368.75	19	1,620.42	8	256.68	102	9,245.84
Wind	63	31,383.40	23	9,850.10	2	136.00	88	41,369.50
Biomass	2	14.40	0	0.00	2	62.00	4	76.40
Total	226	54,975.10	51	12,015.32	24	1,921.38	301	68,911.80
BESS	20	916.60	23	792.00	3	118.00	46	1,826.60

Transmission

The transmission sector is an indispensable pillar of the electricity industry as it links generation to distribution. It is the main backbone and highway for transmitting high voltage electricity from power producers to smaller distribution networks, and eventually to end-users. As the government prioritizes energy transition-centric policies and programs, the successful realization of these initiatives critically depends on the availability of transmission facilities as well.

Over the past decade, the country's electricity grid faced perennial challenges that affected the efficiency and overall performance of the transmission system. These include among others, various right-of-way (ROW) acquisitions, natural calamities and human-induced hazards, contracting of adequate ancillary services (AS), as well as prolonged delays in conducting System Impact Study (SIS), which considerably contributed to the deferred implementation and completion of critical transmission projects.

Consequently, these hurdles resulted in putting a halt in the efficient delivery of electricity services to the consumers, as demonstrated by the occurrence of tight power supply incidences, issuance of several yellow and red alert notices, line congestions, and constrained or stranded power generation capacities that brought unwanted supply disruptions thereby reducing the reliability of the power grid.

Recognizing these longstanding impediments as stumbling blocks for the sector's growth, the government is taking a bold move to implement policy reforms, and necessary interventions that will establish a more proactive approach in improving the initiatives on transmission system planning, strengthening regulatory support, enhancing operational efficiency, and expediting the clockworks governing project implementation.

Complementing government efforts through the Transmission Development Plan (TDP) 2022-2040. As the Transmission Network Provider (TNP) and System Operator (SO) of the country's main electrical grid, the NGCP is mandated to prepare and annually update the TDP, pursuant to Rule 6, Section 10 of the Implementing Rules and Regulations (IRR) of Republic Act (RA) 9136, or the Electric Power Industry Reform Act (EPIRA) of 2001.



On 29 December 2022, the DOE approved and adopted the NGCP's TDP 2022-2040, which should serve as the primary document for transmission development that addresses the increasing electricity requirements and in support of incoming power generating facilities. The TDP should be geared towards the attainment of the Clean Energy Scenario (CES) outlined in the Philippine Energy Plan (PEP) 2020-2040. This strategic alignment much reflect the overarching goals and aspirations set forth within the power sector's transmission roadmap. The NGCP developed the "TRANSMISYON 2040," a strategic framework which stands for "Transmission Resiliency and Augmentation for Nationwide Smart Grid Management through Inter-connected Systems, Organization, and Networks 2040." This blueprint maps out a comprehensive direction for the transmission sector, encompassing the NGCP's priority targets for each Regulatory Period, along with decisive strategies. These include fostering capacity-sharing through interconnected transmission networks, progressively transitioning to smart grid systems, establishing a fully looped grid configuration fortified with mandatory redundancy, reinforcing grid resilience through infrastructure improvements and asset replacements, and attaining full integration of RE sources and emerging technologies.

Moreover, the NGCP's priority thrusts for transmission development should be driven by continuous expansion and development of key transmission backbones and reinforcements, programs and initiatives that strengthen grid resilience, facilitation of transmission projects within Competitive Renewable Energy Zones (CREZ), integration of next-generation technologies, refined strategy for developing 69-kV facilities, and expanded electricity access through off-grid interconnections.

The summary of ongoing and planned transmission projects being implemented by NGCP on a per grid basis are listed in Annexes 13 to 15.⁹⁴

⁹⁴ For comprehensive details, including sub-components of the transmission projects, refer to the NGCP's published TDP 2022-2040, accessible at <https://ngcp.ph/article?cid=16600>.



Tracking progress to expedite the completion of critical transmission projects. The timely completion of transmission projects, which involve line extension, system upgrades, construction of new transmission corridors, or grid interconnection further improves the delivery of electricity service and augments the reliability of the transmission network. Recognizing these as instrumental in ensuring uninterrupted power supply to the consumers, the DOE is keeping track and closely monitoring the progress of the following key transmission infrastructure projects:

- The **Hermosa–San Jose (HSJ) 500-kV Transmission Line Project** is part of the North Luzon 500-kV backbone project aimed at enhancing the resiliency and system reliability of the Luzon grid. The project serves as a new 500-kV corridor for the bulk power generation which will accommodate new capacity additions, especially in the Bataan and Zambales areas. In addition, the project will ease congestion in the Bataan corridor enabling all available power capacity in the North to be delivered to areas with high demand, including Metro Manila.

Meanwhile, the old Hermosa 230-kV Substation will transmit power through the construction of a 230-kV Tie Line to the new Hermosa 500-kV Substation. This involves the installation of shunt reactors, line reactor, and capacitor that will regulate system voltage during periods of both low and peak usage. The original target date of completion of the HSJ 500-kV T/L Project was in June 2019, and has since been moved ten times due to permitting, regulatory, and ROW issues. On 27 May 2023, the NGCP successfully energized the transmission line segment, enabling the flow of 545 MW initial load. At present, the HSJ transmission line is loading at 2,000 MW capacity, with February 2024 as the new target date of completion being eyed by the NGCP.

- The **Cebu–Negros–Panay (CNP) 230-kV Backbone Stage 3 Project** forms part of the initiative to enhance the power transmission system of the Visayas grid. This hinges from the Transmission Master Plan and seeks to augment power transmission capabilities by developing a 230-kV backbone, extending from Cebu and Negros reaching up to Panay Island. The first phase of this project is the interconnection of the Negros and Panay electrical nodes through submarine cables, which was completed and energized in October 2016. The second stage is the construction of 230-kV facilities in the existing Cebu 138-kV Substation that will facilitate the integration of the proposed transmission line from Toledo City.

The CNP Stage 3 Project serves as the final stage for the Cebu–Negros–Panay 230-kV Backbone Project and will construct a 230-kV infrastructure spanning from the Barotac Viejo Substation in Panay to a new Magdugo Substation in Cebu. This proposed network comprises overhead transmission lines, submarine cable connections, and associated new substation facilities.

Designed at 800 MW of transmission line capacity, the CNP Stage 3 Project will ensure the effective transmission of excess power generation from Panay and Negros to Cebu, through a high-capacity transmission corridor. The project is envisaged to address grid congestion that hampers the efficient transfer of energy within the Visayas sub-grid, particularly the RE generation from Negros Island. The CNP Stage 3 Project has undergone seven (7) schedule adjustments since its original target date of completion in December 2020. Currently loading at 270 MW, the CNP Stage 3 Project stands at an overall completion rate of 97.2 percent and is expected to be fully completed by March 2024.

- The **Mindanao–Visayas Interconnection Project (MVIP)** is a flagship project that will realize the country’s vision of “One Grid Philippines”, which aims to integrate the three major transmission networks – Luzon, Visayas, and Mindanao – into a unified grid. Furthermore, the MVIP is the first ever project conferred with a Certificate of Energy Project of National Significance (CEPNS) issued by the Energy Investment Coordinating Council (EICC) on 08 May 2018, in light of its vital contributions towards ensuring power supply security and reliability across the grids.

This priority project will connect Mindanao to the Visayas and Luzon power grids. Such strategic connection serves several key objectives, to include the reduction of power supply interruptions, optimization of local energy resources, integration of sustainable energy sources, and the facilitation of energy resource sharing throughout the country, among others.

Upon its completion, the MVIP will facilitate the exchange of 450 MW of capacity between the Mindanao and Visayas grids, effectively allowing the sharing of reserves between the two grids. Moreover, any surplus power generated by the MVIP will be transmitted to Luzon, enhancing the reliability and stability of the power system, while ensuring a more efficient and secure energy supply for the entire country.

Overall, the implementation status of the MVIP currently stands at 99.3 percent. The testing and commissioning phase commenced on 30 April 2023 with an initial load of 22.5 MW. This capacity is steadily increasing, with a current transfer capacity of 270 MW, as of July 2023. Similar to other transmission projects, the completion of the MVIP exhibited a moving schedule having been adjusted ten times since its original target date of completion in December 2020. Meanwhile, with the DOE's close monitoring and coordination with the NGCP, the MVIP is expected to achieve its full commercial operation at a capacity of 450 MW by January 2024.

In addition to overseeing the HSJ, CNP, and the MVIP backbone and interconnection projects, the DOE is closely monitoring the progress of other significant transmission projects being undertaken by the NGCP.

Reinforcing the grid by building a modern, smart, and green energy system. The government's notable progress in establishing a conducive climate for the sector is aligned with the path towards energy transition. Navigating this direction led to the ambitious goals and targets outlined in the PEP-CES that revolve around diversifying energy sources, intensifying energy efficiency and conservation efforts, and advocating for cleaner energy alternatives to ensure a sustainable path of development.

With the aggressive push for RE, it is imperative to advance a green and smart transmission system. This will efficiently integrate and manage the anticipated capacity increase from renewables that is expected to become operational from 2024 to 2050. Recognizing this importance, the DOE 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 green, smart, and sustainable transmission system in support of the Philippine Energy Transition Program (PETP).

The SGGP is envisioned as a strategic blueprint for the development, deployment, and operation of a modern transmission infrastructure that integrates clean energy sources and emerging technologies and enables a sustainable, reliable, and resilient power grid. Specifically, it aims to address the projected increase in demand, system reliability and security, power quality and technology, market operation support, policy direction, and island interconnections. Further, the SGGP considers the anticipated changes in the energy mix, because of the increasing penetration of RE sources (i.e., offshore wind projects⁹⁵), mainstreaming of electric vehicles (EVs) in the transport sector, and the entry of emerging and other clean technologies such as nuclear energy and ESS.

In pursuit of this goal, the DOE is taking the lead in formulating the SGGP, with support of TransCo, including a group of technical consultants.⁹⁶ Said plan will assist the DOE in making policy decisions, enhancing technical competencies, identifying policy gaps and challenges, as well as recommending appropriate solutions through policy development and government interventions.

The planning process involves conducting thorough assessments of the current transmission system, identifying its strengths and weaknesses, and proposing strategies to address potential issues. Moreover, extensive research and analysis will be performed to determine the feasibility and impact of the proposed strategies and technologies and identify potential risks and challenges that may arise from their implementation. The recommendations generated from these assessments aim to ensure the achievement of the country's energy security and sustainability goals, and guarantee that electricity supply to consumers remains reliable, efficient, and cost-effective.

To guide the overall process, certain specific objectives must be achieved in the transmission expansion planning. Initially, the expansion should support generator entry and accommodate load growth. The grid needs to be capable of accommodating high variable renewable energy (VRE) integration and remain adequate during demand peaks. Additionally, the grid should be prepared to incorporate scenarios, including the integration of offshore wind by 2030, and the implementation of the Mindoro and Palawan interconnection to the Luzon and the Northern Luzon transmission corridor. All of this should be satisfied while ensuring the grid's capability to facilitate least-cost market dispatch.

⁹⁵ Taking into account the findings of the World Bank (WB) transmission planning study, titled, "Technical Assistance on Transmission Development in Support of Offshore Wind Deployment and Improved System Reliability in the Philippines," which identifies the most affordable transmission upgrades and additions to support OSW deployment. Under the gradual deployment portfolio, the WB analysis identified Northern Mindoro, Northwest Luzon, and Manila, as having 6.0 GW of potential OSW capacity with the lowest levelized cost of energy (LCOE) of PhP0.27 per kilowatthour (kWh).
⁹⁶ Funded by the United States Agency for International Development (USAID) under the Energy Secure Philippines (ESP) Project

Part of the planning process involves envisioning the required capacity and performance of the 2050 Philippine Grid to accommodate the entry of new generator capacities, grid enhancement technologies, and the transmission and delivery of the projected electricity demand throughout the country. The development of the 2050 Grid requires a systematic approach, involving the sizing and siting of generators, forecasting and spatial disaggregation of demand, and identification of dispatch scenarios. Generator siting is necessary for the identification of optimal locations of future expansion capacities as outlined in this PEP. This process considers various factors, including RE service contracts, CREZ, the evolving transmission network, petroleum service contracts, LNG terminals and ports, and the topography of target build areas.

The siting process utilizes geographic information system (GIS) layers that encapsulate all relevant data. This integration enables the assessment of the applicability of established site suitability criteria, such as proximity to existing substations, co-location within CREZ areas, etc. The generator sizing process considers typical unit capacity additions for different technology types to determine the appropriate plant size for each designated site.

On the other hand, in demand forecasting, the 2023 Nodal Demand Dispatch Schedule from the Independent Electricity Market Operator of the Philippines (IEMOP) served as a basis for demand disaggregation. This data is employed for the nodal allocation of the total electricity demand based on the power outlook.

Similarly, the determination of the dispatch scenarios is an integral component of the network analysis stage. The scenarios guarantee the adequacy and security of the grid amidst critical and highly probable load and generation distribution variations. This process considers both seasonal and daily changes in demand, as well as the inherent variability in power supply caused by the integration of RE at varying penetration levels and the deployment of battery energy storage systems.

The final steps of the planning process involve the identification of all feasible network expansion projects. These projects are the potential components of the evolution of the current grid to its future state. The projects include capacity expansion and voltage upgrades of existing transmission lines and substations, new transmission corridors, and voltage regulation projects, among others. The final combination and the implementation schedule of these projects are determined through optimization. The selection process considers the minimization of required investments while ensuring the adequacy and security of the network throughout the entire planning horizon.

The groundwork for crafting the SGGP commenced in May 2023 and should be completed by first quarter of 2024 for inclusion in this PEP. The SGGP will serve as a supplementary or auxiliary plan, which the NGCP must adopt including its proposed transmission infrastructure projects. The NGCP needs to come up with an implementation plan (within six (6) months) following the PEP publication to ensure that the identified transmission projects are integrated in the next regulatory period and would be carried out effectively and on schedule.

Instituting due diligence on power grid operations through performance assessment and audit. In a proactive move to assess the overall performance and compliance of the NGCP with its mandate and responsibilities as provided under existing legislations, policies, and operational standards set forth under the Philippine Grid Code (PGC), the DOE promulgated Department Order (DO) 2023-06-0018, titled, *“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”* on 08 June 2023.

The DO complements DC2017-05-0008⁹⁷ and DC2017-12-0016⁹⁸ which laid out the general framework and implementing guidelines for assessing and auditing the operational performance of power generation, transmission, and distribution facilities. On the other hand, the establishment of the performance assessment and audit (PAA) team aims to support government bodies like Congress and the Office of the President (OP) in continuously reviewing energy-related policies and legislations, while providing a foundation for the development of energy policies to ensure a secure, reliable, and affordable electricity supply. It also serves as the basis for recommending actions to Congress regarding the NGCP’s franchise, which serves as the country’s TNP and SO.

⁹⁷ “Establishing Policies and Guidelines for Conducting Performance Assessment and Audit of Power Generation, Transmission, and Distribution Systems and Facilities” issued on 3 May 2017.
⁹⁸ “Adoption of Guidelines for the Performance Assessment and Audit of Power Generation, Transmission, and Distribution Systems and Facilities” issued on 28 December 2017.

Further, this initiative facilitates the assessment of the NGCP's performance in line with its obligations under the concession agreement. In doing so, the PAA will be conducted in a transparent and timely manner, providing a basis for improving operations and ensuring compliance with the TDP. Additionally, this initiative aligns with industry best practices and will support the enforcement of an incentive and penalty system by the Energy Regulatory Commission (ERC) with the aim of holding the NGCP accountable for ensuring grid security and reliability.

The PAA will be led by the DOE, with members from various agencies representing the Grid Management Committee (GMC), Philippine Electricity Market Corporation (PEMC) through its Market Surveillance Committee (MSC), PEMC Audit Committee, TransCo, ERC and the Power Sector Assets and Liabilities Management (PSALM) Corporation. In addition to this, the DOE may authorize qualified entities to conduct these audits and assessments. Meanwhile, the audit committee will assess various areas, including compliance, planning and engineering, environment, health and safety, operational aspects, technical performance, customer services, information technology, and management effectiveness.

Advocating higher policy support through a proposed Executive Order (EO) governing the Philippine Transmission Sector. In addition to the efforts to integrate the power grids and interconnect off-grid areas, the DOE is pursuing another initiative to address the perennial challenges being faced by the transmission sector. This involves proposing two (2) EOs that aim to effectively address the timely implementation of transmission projects and ensure efficient operation of the transmission system.

The first EO will establish transparency in all NGCP arrangements with generation companies for the implementation of projects for transmission. Further, it promotes the interconnection of power plants to distribution systems in cases where transmission facilities are either unavailable or insufficient.

On the other hand, the second EO is geared towards enhancing the acceleration of critical and priority transmission projects by facilitating their implementation through TransCo, or alternatively, by any designated agency or Government-owned and Controlled Corporation (GOCC) acting on behalf of TransCo.

Upon promulgation, the policy instruments will streamline the coordination and cooperation among various stakeholders, thereby ensuring a secured, reliable, and efficient transmission system in the country.

Distribution

The distribution sector connects the electricity producers with end-users and this comes into play once high-voltage electricity is transmitted over long distances to reach the demand centers. From the load centers, the distribution system assumes responsibility for voltage reduction to deliver electricity that is reliable and safe for consumers within the franchise area.

A resilient and responsive distribution system depicts a utility with accountability in providing reliable electricity services. It is along this line that the initiatives of the government and mandated entities primarily focused on sustained efforts in distribution utility planning, policy development, and innovating the electric distribution system. The primary goal is to ensure that this segment of the power supply chain remains armed and adaptable in meeting the electricity needs of the consumers while fostering inclusive economic growth throughout the country.

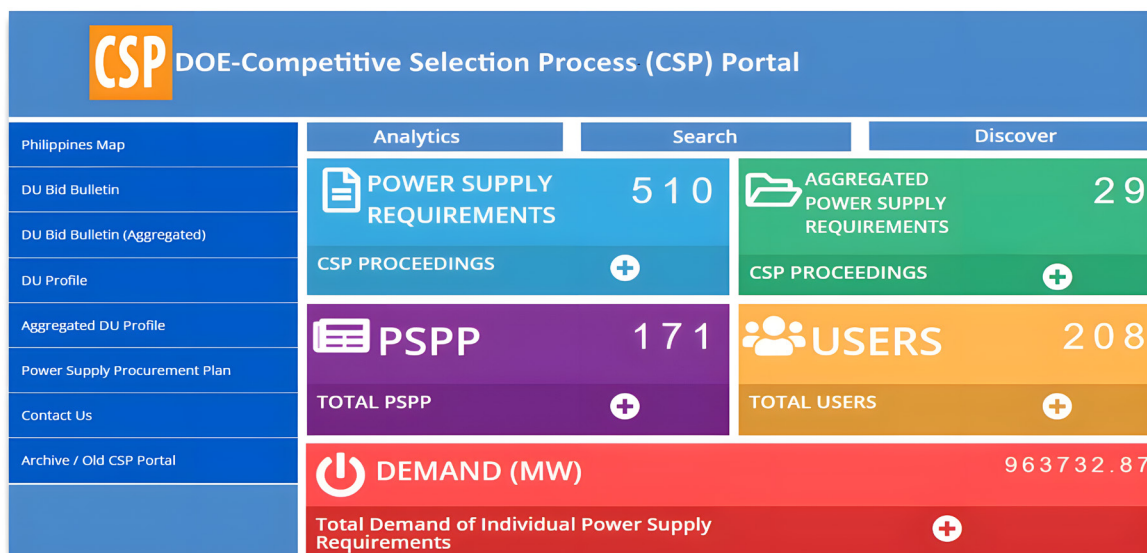
Continuing the efforts to enhance Distribution Development Planning. The promulgation of DC2021-03-0003⁹⁹ on 02 March 2021 brought significant changes in the formulation of the Distribution Development Plan (DDP). Such policy instituted greater transparency and accountability among the distribution utilities (DUs) and facilitated the adoption of a standardized and comprehensive DDP template.

Aligned with this objective, the DOE launched the Competitive Selection Process (CSP) e-based Portal in December 2021, enabling industry stakeholders to access important information on the DU's planned CSP activity in procuring long-term Power Supply Agreement (PSA). Serving as the central hub for all CSP activities of the DUs, the online portal empowers consumers by providing them with comprehensive information at every stage of the competitive bidding process as this is posted on the DOE website. This also allows consumers to gain a better understanding of the generation cost, which is the largest component of the electricity bill.

⁹⁹ "Prescribing the Policy and Guidelines for the Formulation of the Distribution Utilities Distribution Development Plan Integrating the Relevant Laws, Policy Issuances, Rules and Regulations."

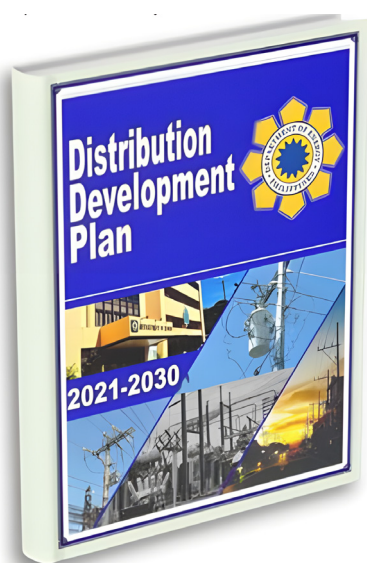
Among the relevant information that are readily accessible in the e-Portal include CSP policy issuances and advisories, DU profile and bid bulletin, individual and aggregated electricity demand and supply requirements by grid, as well as the respective Power Supply Procurement Plan (PSPP) of the DUs (Figure 20).

Figure 20. DOE-CSP Web Portal



In addition, the DOE in its CSP Advisory on 22 September 2022 clarified the provisions outlined in Section 8 of DC2018-02-0003¹⁰⁰ and DC2021-09-0030¹⁰¹, specifically delineating the roles and responsibilities of the DOE, ERC, and NEA considering their distinct powers and functions defined under the EPIRA. The advisory provided valuable guidance to the DUs in conducting the CSP to ensure a fair and transparent process in a manner that promotes competition and accountability within the electric power industry.

On the other hand, the DOE published the 2021-2030 DDP on 26 January 2023, providing detailed information on the DUs annual demand and supply profiles over the next decade. This comprehensive plan encompasses both individual and regional levels for effective planning and operation. At the individual level, it presents a snapshot of the DUs uncontracted requirements based on projected demand, considering existing PSA and those awaiting approval from the ERC.



Meanwhile, the regional profile presents a panoramic view that factors in spatial dimensions and geographical boundaries. This holistic approach enables effective demand planning, optimal operational management, and strategic infrastructure enhancements aimed at establishing a more efficient, reliable, and resilient power grid.

Further, an integral highlight of the 2021 DDP is the comprehensive CSP schedule for each DU. This specifically addresses meeting the uncontracted requirements, assuring a continuous, uninterrupted, and cost-effective electricity service for the end-users.

Instituting further improvements on the CSP Policy. The DOE is continuously working on refining the CSP policy to align with the principles and objectives of EPIRA in promoting a more efficient and competitive energy market.

¹⁰⁰ "Adopting and Prescribing the Policy for the CSP in the Procurement by the Distribution Utilities of Power Supply Agreement for the Captive Market" issued on 01 February 2018.
¹⁰¹ "Amending Certain Provisions of and Supplementing Department Circular No. 2018-02-0003 on the Competitive Selection Process in the Procurement by the Distribution Utilities of Power Supply Agreement for the Captive Market" issued on 24 September 2021

A significant development on this is the issuance of DC2022-06-0027 on 20 June 2022, which outlines the Guidelines for the Accreditation of Third-Party Auctioneer (TPA). The ERC for its part will formulate policies and procedures concerning the submission, evaluation, amendment, and revocation of the TPA's accreditation. This measure was introduced in recognition that some DUs may not have established their Third-Party Bids and Awards Committee (TPBAC) or are not fully prepared in proceeding with CSP for procurement of required power supply. With this, the option to engage a TPA has been stipulated in the policy, allowing the TPA to conduct the CSP on the DU's behalf, especially in cases where a TPBAC or Joint TPBAC is absent or not yet operational. The policy ensures that the CSP can still proceed efficiently and effectively even in the absence of a functioning TPBAC within the DU.

On 30 June 2023, the DOE also issued DC2023-06-0021 titled "*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*," repealing all the previously issued CSP policies. This policy upholds a more streamlined CSP procedure by defining the individual roles and responsibilities of the DOE, ERC, and NEA in the review and approval of the DU's PSA applications. This measure is designed to be adaptive and flexible, catering to the specific needs of the DUs, while facilitating efficient, timely, and transparent procurement of power supply for the benefit of electricity consumers.

Prior to promulgating this policy, the DOE conducted a series of virtual public consultations involving the DUs, GenCos, Civil Society Organizations (CSOs), and consumer groups to solicit their inputs. These consultations were held on 13, 17, and 19 April 2023, engaging the Mindanao, Luzon, and Visayas energy stakeholders, respectively.

One of the main highlights of the recent policy includes a clause on the CSP exemption. This provision states that the supply of electricity through any of the following entities shall be excluded from undergoing CSP: a) the NPC servicing off-grid areas; b) the PSALM through bilateral contracts from undisposed assets with Independent Power Producers (IPPs); c) the DUs exercising the Opt-in Mechanism under the Green Energy Auction Program (GEAP); d) embedded generating plants with contracted capacity of less than 10 MW; e) DUs with negotiated Emergency Power Supply Agreement (EPSA)¹⁰²; and e) New Power Providers (NPPs) with less than 1 MW demand serving the off-grid areas.

Similarly, the policy emphasizes the obligations of the DUs and mandated entities in the conduct of the CSP which are the following: a) preparation and timely submission of the DDP and PSPP to the DOE; b) uploading of the approved PSPPs in the CSP e-Based Portal by 30th of June each year; and c) publication of relevant bid documents, as these will serve as references for the issuance of the Certificate of Conformity by the DOE for private DUs and NEA for ECs in terms of contract quantity and cooperation period.

To support this initiative, the ERC will issue the implementing guidelines and the needed regulatory support for the evaluation of PSAs resulting from the CSP undertaken by the DUs. The ERC, as part of its regulatory oversight function, has been putting efforts to assist the DUs in facilitating power supply contracting in a timely, competitive, and effective manner.

The policy also mandates the NEA to provide guidance and advise all ECs to perform CSP at least one (1) year prior to its existing PSA expiration. To ensure timely execution of the CSP, the NEA shall extend technical assistance to ECs as deemed necessary.

Recognizing the importance of this endeavor, the ERC and DOE entered in a collaborative partnership in pioneering the PSA Caravan. This groundbreaking initiative aimed to assist the DUs in rationalizing and optimizing their power supply sources. The primary objective was to ensure that the supply contracts entered by the DUs follow a least-cost process to the benefit of the consumers and foster overall cost-efficiency in the electricity sector. As part of the campaign, a comprehensive review of power supply contracts was conducted, forming an integral part of the government's extensive efforts to address the persistent issue of high electricity costs in the country. The caravan effectively resulted in putting into action strategic price mitigation measures, spawning tangible relief to consumers.

¹⁰² The negotiated procurement of EPSA shall be filed with the ERC within thirty (30) calendar days after the occurrence of the force majeure/fortuitous events with a maximum and non-extendible period of one (1) year from its execution.



The nationwide PSA Caravan kicked off in Laoag, Ilocos Norte on 10 November 2022, aiding six ECs from Region I and the Cordillera Administrative Region (CAR). Further, the caravan reached Cagayan de Oro City on 15 November 2022, engaging 10 participating DUs and ECs from Region X. The event culminated in Iloilo City on 22 November 2022, pulling together 11 ECs from Region VI. Meanwhile, the ERC and DOE are aiming to roll out the PSA Caravan in the rural regions to assist the off-grid ECs with their power supply contracting.



Among the other notable consumer-centered measures implemented by the ERC include the suspension of the collection of the Feed-in Tariff Allowance (FIT-All)¹⁰³ and the introduction of the Bill Shock Loan Program. The deferment of FIT-All entails temporarily stalling the collection of charges levied on electricity consumers to fund the FIT system. This decision aims to ease the burden on consumers and alleviate the impact of high electricity costs. The ERC initially implemented the suspension of the FIT-All collection for a period of three months (December 2022 to February 2023)¹⁰⁴ and extended it for another six months (March to August 2023)¹⁰⁵. In the ERC Resolution¹⁰⁶ issued in August 2023, the regulator once again extended the suspension stating that it will start by September 2023 until otherwise lifted by the Commission in the event that the FIT-All Fund available shall be deemed insufficient to cover the monthly fund requirements.

On the other hand, the Bill Shock Loan Program was launched by the ERC and the Land Bank of the Philippines (LBP) on 14 April 2023 to protect consumers from unforeseen increases in their electricity bills. By implementing staggered billing by the DUs, the scheme provides flexibility to affected consumers whenever electricity price hikes ranging from 10.0 to 15.0 percent occur. This can effectively manage their obligations and alleviate the impact of bill shocks. The LBP's loan facility will then be used by the DUs to fulfill their contractual obligations to their suppliers. To date, one DU has availed of the bill shock loan program.

Monitoring of Distribution Utility Capital Expenditure (CAPEX) Projects. The continuous upgrading of the distribution system is essential as it directly improves the delivery of electricity service and maintains the seamless operation of the distribution network. Mindful of its importance, power utilities are making concerted efforts to modernize and enhance existing distribution facilities and infrastructure by investing in various capital expenditure projects.

The timely implementation of CAPEX projects reinforces the reliability and efficiency of distribution thereby improving the system's overall performance. It also enables regulatory compliance with the prescribed standards, as well as contributes to reducing energy losses and power service interruptions.

Table 44. 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
Total	2,660	48,509	21,340

Source: 2022-2031 Distribution Development Plan
 Note: Totals may not add up due to rounding-off

In 2021, the efforts and investments made by the ECs and DUs resulted in the extension of 2,660 ckt-km of sub-transmission assets, expanding the reach of the distribution network. Approximately 48,509 ckt-km of distribution lines were constructed or upgraded, contributing to the improved electricity distribution to end users (Table 44).

¹⁰³ The FIT-All is a basic charge imposed on all on-grid electricity consumers, included as a component of the electricity bill to support RE development in the country.
¹⁰⁴ ERC Resolution No. 12 series of 2022 titled "A Resolution Adopting the Suspension of the Collection of Feed-In Tariff Allowance (FIT All)" issued on 16 November 2022.
¹⁰⁵ ERC Resolution No. 2 series of 2023 titled "A Resolution Adopting the Extension of Suspension of the Collection of Feed-In Tariff Allowance (FIT All)" issued on 22 February 2023.
¹⁰⁶ ERC Resolution No. 11 series of 2023 titled "A Resolution Adopting the Extension of Suspension of the Collection of Feed-in-Tariff Allowance (FIT-All)" issued on 4 August 2023.

Aside from line extensions, the DUs have also increased the capacity of their substations by 21,340 MVA for the same period. This will ensure a robust and reliable infrastructure that can meet the growing electricity requirements in their service areas.

Fostering Digitalization in the Electric Power Industry. The DOE is carrying out measures to drive digitalization by actively promoting the adoption of various digital solutions, such as online database management systems within the power sector. This initiative empowers both electric power industry participants and policymakers as access is enabled to accurate and real-time information for effective policy development and better decision-making. This innovative approach fosters collaboration and transparency leading to improved service delivery and a more responsive consumer-oriented industry.

Pursuing the goal of a consumer-oriented power industry led into a remarkable stride by introducing the DOE Electric Power Database Management System (DEPDMS) in 2019. The DEPDMs uses a web portal and serves as a systematic tool designed to facilitate the streamlined submission of various reports, data, and information, associated with the power industry. The portal is seen to create a seamless and efficient submission process, while upholding strict adherence to the reportorial obligations of the DUs pursuant to various policy directives - DC2010-03-0003, DC2013-05-0006, DC2015-04-0002, and DC2017-12-0013.

On 08 February 2022, the DOE promulgated DC2022-02-0001, which outlines the policies for the systematic management of the reportorial requirements for the industry participants. The policy highlighted the roll-out of the online system and the importance of conducting capacity-building activities for mandated entities and stakeholders. To effectively implement the policy, the DOE continuously holds focus group discussions (FGDs) and end-users’ training sessions for power utilities across the regions. These activities provide the industry participants with opportunities to familiarize with the DEPDMs, address queries, and enhance understanding of the features and functionalities of the online system.

Relatedly, the issuance of DC2023-03-0005 on 14 March 2023 provides supplemental guidelines to DC2022-02-0001, specifically for DUs, and DC2023-04-0006 for Retail Electricity Suppliers (RES). The policy directive specified the additional reportorial requirements, particularly information on the Suppliers and DUs’ Monthly Operations Report and the frequency of submission. Moreover, it prescribes the use of standard templates and report uploading on the DEPDMs web portal. Likewise, a provision setting the timeline for the initial submission is also stipulated in the Circular.

Plans and Programs

The updated Distribution Roadmap outlines the refocused plans and programs for the short-, medium- and long-term, each with specific objectives to improve the overall efficiency, reliability, and sustainability of the distribution system (Figure 21).

Figure 21. Distribution Roadmap



SHORT-TERM

Enhance Digitalization of Distribution Development Plans. The government's move to use digitalization is a significant step towards modernizing and optimizing the distribution sector. This initiative involves adopting digital tools and innovative solutions to improve the way distribution projects are planned, executed, and monitored. In line with this, the DOE is aiming to develop an online system for rendering pertinent information, such as historical energy data, electricity demand and supply projections, CAPEX programs, among others, as well as a digital platform for the submission of DDPs by the ECs and DUs.

Ensure timely completion of Distribution Development Plans. Pursuant to Rule 7, Section 4(p) of the EPIRA-IRR and DC2021-03-0003, DUs are mandated to prepare an annual DDP and submit the same to the DOE no later than the 15th of March every year. Considering that the plan is crucial for meeting the energy requirements and having a stable power supply for DUs, the DOE and NEA are enforcing the timely preparation, submission, and consolidation of DDP reports by the power utilities. In doing so, the DOE is seeking to further streamline the planning activities and processes to comply and follow the specified timetable and result to reduction of delays in the conduct of CSP and project implementation.

Enhance the existing Competitive Selection Process Policy. The CSP's implementation objective of being transparent and consumer-centric involves the continuous improvement of existing guidelines to maintain its effectiveness. Achieving this requires the DOE, NEA, and ERC to regularly enhance the CSP rules through policy review and assessment. By instituting improvements on the CSP policy, the government can foster a competitive and efficient electricity market that benefits consumers through reliable and affordable electricity services.

Conduct policy review on the regulation and performance of Distribution Utilities. The DOE is set to review and evaluate the regulations governing the performance of the DUs covering the following: a) appraising existing protocols and performance metrics with the intent of identifying strengths and weaknesses in existing policy and regulatory framework; b) promoting effective governance; and c) ensuring that the operations of the DUs are aligned with best industry practices. Once completed, this initiative entails enhancing and institutionalizing a set of performance standards for the DUs to assess the quality of service provided within their service franchise areas, identify potential areas of improvement to address operational inefficiencies, and propose solutions and recommendations to further improve the delivery of electricity service to all consumers.

Review and develop climate-proof standards for distribution utility infrastructures. In the face of increasing climate change impacts, it is crucial to have a distribution network that can withstand adverse weather condition and reduce disruption in the delivery of electricity services to consumers. The development and review of existing standards for DUs involves analyzing the current state, performance, and vulnerabilities of infrastructure, identifying areas for improvement, and collaborating with relevant stakeholders to establish resiliency standards. These measures will strengthen the system and contribute to mitigating the impacts of extreme weather events and enhance the overall stability and reliability of the grid.

MEDIUM-TERM

Develop policy to incentivize distributed energy resource (DER) and prosumer. The DOE is actively promoting the widespread adoption of DERs (i.e., micro-grid systems and solar rooftop installations) and encouraging third party investors and consumers to become prosumers. A policy will be drafted aimed at promoting the seamless integration of DER and accelerating its adoption into the grid, as well as providing incentives to attract more prosumers.

Among the key components of the proposed policy is the enhanced net-metering program, which allows prosumers to receive credits or fiscal benefits for the surplus energy supplied back to the grid. It will also consider providing grants and rebates that offer direct monetary incentives for prosumers. These incentives are seen to reduce the costs associated with DER acquisition and installation, making it more accessible and affordable. Furthermore, the policy will explore creating market-based incentives by encouraging DUs to purchase RE-based generation from prosumers. This involves setting targets for DUs to procure a certain percentage of their energy supply from distributed sources thereby facilitating market opportunities for prosumers as well as meeting the RPS requirements of the DUs.

Supplement existing policy toward smart grid systems and interoperability. The promulgation of the National Smart Grid policy through DC2020-02-0003 issued on 12 March 2020 establishes the general framework for the electric power industry and the Smart Distribution Utility Roadmap (SDUR). The policy envisions that by 2040, the country's distribution network is fully equipped with modern, smart, and innovative systems that utilize advance technologies capable of optimizing the distribution of electricity, managing energy demand efficiently, and integrating clean and sustainable energy sources into the grid. As part of the government's extensive effort to strengthen smart grid development, a supplemental policy is to be crafted to usher the deployment, installation, and integration of smart, digital technologies and solutions into the existing electrical distribution network. Additionally, it will ensure the interoperability of the various segments of the distribution infrastructure to enable the seamless and smooth operations of the entire power system.

LONG-TERM

Transition to Smart Grid to improve the reliability of distribution facilities. The move to a smart grid system will only be realized once the necessary support measures are in full swing and within stakeholders' reach. This calls for periodic review of policies and regulations, updating of infrastructure standards, overseeing the timely operation of smart grid projects, and most importantly, gaining access to financing facilities to support the DUs.

Increase utilization of RE resources for power generation. A green energy future points to the government laying ambitious plans and bold targets aimed at expanding RE use for power generation. As such, the need for a resilient and responsive power distribution system has become of paramount importance. Aligned with this endeavor, the DOE will steer strategic action plans to secure the sufficiency, reliability, and readiness of power distribution facilities as this will assure that the entirety of the network is capable of accommodating and managing the anticipated influx of RE-based generation to the grid. The DOE will also advocate and strongly push for the modernization, enhancement, and upgrading of the distribution sector reinforced by innovative technologies and solutions.

Encourage consumers to utilize RE for non-power productive application. Apart from generating electricity, RE can also be used for various non-power applications such as heating, drying, and cooling, among others, and this can be beneficial for the different economic sectors. In agriculture for instance, solar and wind energy can run irrigation systems, as well as operate farm equipment and machineries for drying crops, fruits, and other vegetable produce. The health, commercial, and industrial sectors can take advantage of the productive uses of RE specifically heating and cooling solutions. Hospitals and other health institutions may have access to unlimited supply of hot water, while processing plants can deploy boilers needed for industrial processes. Similarly, cold storage facilities may be utilized for storing medical supplies and raw materials as well as processed products in commercial and industrial buildings. Advancing this goal necessitates the DOE to explore the need for developing pertinent policies and support mechanisms to incentivize consumers for harnessing RE for non-power and other productive applications.

Retail Electricity Supply

Retail Competition and Open Access (RCOA)

As an enabling policy associated with transparency and enhancing consumer empowerment, RCOA allows end-users or contestable customers (CCs) to choose their preferred electricity supplier at an arranged contract price. The move for RCOA's effectiveness in the power industry is based on the ERC's declaration that is attributable to meeting the conditions set in the EPIRA.

Over the years, RCOA registered participants substantially grew from 962 in June 2013 to 2,108 in September 2023, recording an increase of 119.1 percent (*Table 45*). The CCs comprised 93.2 percent (1,965) of the total and the remaining from retail metering service providers (RMSP) with 3.04 percent (64), suppliers with 2.56 percent (54), and suppliers of last resort (SOLR) with 1.2 percent (25).

Table 45. Summary of RCOA Registration

Membership Category		Total Registered RCOA Participants						
		June	Sept	June	Sept	June 2013 vs. Sept. 2023	Sept 2022 vs. Sept. 2023	Jun 2023 vs. Sept. 2023
		2013	2022	2023	2023			
Contestable Customers	D ≥ 1 MW	892	1,222	1,240	1,250	40.13%	2.29%	0.81%
	750 kW ≥ D >1 MW	-	426	426	424		-0.47%	-0.47%
	500 kW ≥ D >749 MW	-	275	284	291		5.82%	2.46%
	Total	892	1,923	1,950	1,965	120.29%	2.18%	0.77%
Suppliers	RES ¹⁰⁷	19	38	39	39	105.26%	2.63%	0.00%
	LRES ¹⁰⁸	13	15	15	15	15.38%	0.00%	0.00%
	Total	32	53	54	54	68.75%	1.89%	0.00%
SOLR		9	25	25	25	177.78%	0.00%	0.00%
RMSP		29	63	64	64	120.69%	1.59%	0.00%
Total		962	2,064	2,093	2,108	119.13%	2.13%	0.72%

As of the latest statistical data provided by the ERC on the competitive retail electricity market, following are the number of Prospective Participants as of June 2023 (Table 46).

Table 46. Summary of RCOA Registration (Prospective Participants)

Membership Category		Prospective Participants in the Retail Market						
		June	June	Mar	June	June 2013 vs. June 2023	June 2022 vs. June 2023	Mar. 2023 vs. June 2023
		2013	2022	2023	2023			
Contestable Customers	D ≥ 1 MW	892	289	291	307	-65.58%	6.23%	5.50%
	750 kW ≥ D >1 MW		228	231	233	-	2.19%	0.87%
	500 kW ≥ D >750 MW		589	649	732	-	24.28%	12.79%
Total		892	1,106	1,171	1,272	42.6%	15%	8.63%

On the policy side, the DOE issued DC2024-03-0009¹⁰⁹ on 01 March 2024, declaring 26 March 2024 as the commercial operations date of RCOA and Green Energy Option Program (GEOP) in the Mindanao region. The Circular provides all eligible and interested electricity end-users in the Mindanao grid with greater flexibility in securing their electricity supply. Further, the policy allows for voluntary participation in RCOA and demand aggregation, consistent with existing ERC rules and regulations.

Plans and Programs

Implement RCOA in Mindanao. Given Mindanao's unique conditions, the effective implementation of RCOA requires harmonization of existing policies and the periodic review of pertinent rules and guidelines. In addition, the ERC Resolution No. 18 series of 2018 stipulates that for RCOA to take effect in Mindanao, separate rules and procedures must be developed.

Implement Retail Aggregation in Luzon, Visayas, and Mindanao. The policy on electric retail aggregation came to light with the issuance of the ERC Resolution No. 4 series of 2022.¹¹⁰

¹⁰⁷ Refers to Retail Electricity Supplier

¹⁰⁸ Refers to Local Retail Electricity Supplier

¹⁰⁹ DC titled "Declaring the Commercial Operations Date of Retail Competition and Open Access (RCOA), Retail Aggregation and Green Energy Option Program (GEOP) in Mindanao."

¹¹⁰ Issued on 26 June 2022

According to the ERC, retail aggregation can be done where RCOA is operational and effective. It is primarily a scheme wherein two or more end-users or all end-users within a contiguous area are joined together and treated as a single contestable customer, based on the current threshold demand prescribed under the rules, wherein such customers shall be part of the contestable market, and thus have the same benefits enjoyed by CCs in RCOA.¹¹¹

The ERC further mentioned that aggregation of electricity requirements of end-users whose total monthly average peak demand is at least 500 kilowatts (kW) within a contiguous area shall be implemented effective 26 December 2022.

In addition, aggregation of end-users within the geographical boundaries may be allowed particularly on a) subdivisions, b) villages, c) business districts, d) special economic zones, e) condominium buildings, f) commercial establishments such as malls, g) mixed-used development complexes, and h) such other geographical areas where similarly situated end users are located, and in which supply or electricity can be measured through metering devices.

Comprehensive Review of Retail Rules (switching and disconnection). Contestable customers already supplied by RES are now allowed to switch to other retail SOLR without the burden of securing clearances from current supplier. This is in consonance with the ERC's amendment of its Resolution No. 9 s. 2018 or the *"Rules Supplementing the Switching and Billing Process and Adopting a Disconnection Policy for Contestable Customers."*¹¹²

As contained in the ERC's amended rules (ERC Resolution No. 1, series of 2023)¹¹³, switching of RES of its choice by the end-user should be under the following conditions: a) an eligible end-user will not be allowed to switch to a RES should it have an outstanding balance with the Network Service Provider; b) a CC already served by a RES will be allowed to switch or to be supplied by a new RES or SOLR notwithstanding the existence of an outstanding balance;¹¹⁴ and, c) an eligible end-user that will migrate to the competitive retail electricity market (CREM) is entitled to refund of its security or bill deposit from its DU.

Amendments to WESM and Retail Rules and Manuals regarding Implementation of the Electric Retail Aggregation Program. The policies emanating from the DOE and ERC need to be harmonized with the WESM and Retail Rules and Manuals. The power industry stakeholders are given the opportunity to convey amendments and raise to the Rules Change Committee (RCC) for review and approval of the Philippine Electricity Market (PEM) Board. Accordingly, the DOE gives final approval on the proposed amendments.

Adopt lower thresholds for RCOA in Luzon, Visayas, and Mindanao. The DOE is considering lowering the RCOA threshold to reach the household level for the country's three main grids.

A study is set to be undertaken by the DOE to cover an assessment of the retail market readiness, evaluation of local guidelines and resolutions to support RCOA, analysis of economic and technical impact of lowering RCOA threshold, and comparison of RCOA policy and regulatory framework with other jurisdictions having similar market design.

Continuing review of retail rules and manuals. In both medium- and long-term, the DOE will continue its review of retail rules and manuals with the objective of synchronizing this with newly issued policies.

Develop policy for enhance and digitized customer switching procedure. In the medium-term, the IEMOP, serving as the Central Registration Body (CRB) shall develop and enhance the process of digitizing the switching of CCs. The long-term horizon will dwell on the implementation of the digitalized switching procedure.

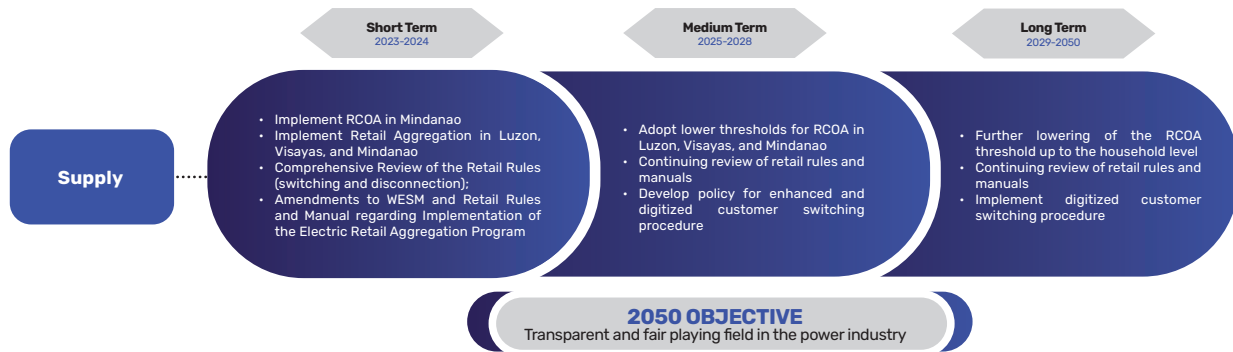
¹¹¹ Source: <https://www.erc.gov.ph/ContentPage/82786>

¹¹² Source: <https://www.erc.gov.ph/ContentPage/82995>

¹¹³ ERC Resolution No. 1, Series of 2023 titled "Amendment to ERC Rules Supplementing the Switching and Billing Process and Adopting a Disconnecting Policy for Contestable Customer" [Available at <https://www.erc.gov.ph/IssuancesPage/1/0>]

¹¹⁴ Refers to the amount due under previous unpaid bills including the amount indicated in its current bill.

Figure 22. Supply Roadmap



Electricity Market

Wholesale Electricity Spot Market (WESM). The electricity market in the country started its operation in 2006 for Luzon and in 2010 for Visayas. Currently, the five-minute trading interval is being implemented from the previous one-hour interval, and this was adopted in June 2021 in adherence to DC2021-06-0015¹⁵. With Luzon and Visayas WESM already in place, preparations have been undertaken to establish the market in Mindanao. The presence of the electricity market in all main grids supports the sector’s goal of “one grid, one market.”

WESM Mindanao. The commercial operation of WESM Mindanao commenced on 26 January 2023. Its ceremonial launch was attended by President Marcos, Jr. on 6 February 2023 at the Malacañang Palace.



Prior to its operation, the DOE issued DC2022-12-0039 titled *Declaring the Commercial Operation of the Wholesale Electricity Spot Market in the Mindanao Grid* on 23 December 2022, and it stated WESM Mindanao’s commercial operation date by 26 January 2023. Some of the Circular’s salient provisions include: a) relaxed dispatch conformance standards in Luzon, Visayas, and Mindanao for the first three months; b) submission of the WESM registration hard requirements; c) compliance with real-time monitoring requirements and scheduling of generators; d) relaxed prudential requirements in Mindanao for the first three months; and e) specified the responsibilities of the NEA, PSALM, WESM Governance Arm, Market Operator (MO), SO, and Network Service Providers.

¹⁵ “Declaring the Commercial Operations of the Enhanced Wholesale Electricity Market Design and Providing Further Policies” issued on 25 June 2021.

WESM Participants. As of October 2023, the WESM in Luzon, Visayas, and Mindanao has a total of 433 registered participants – 202 generation companies, 178 customers (25 private DUs, 99 ECs, and 54 directly connected customers), 37 ancillary service providers, and 16 metering service providers (Table 47). During the reporting period, 32 new participants entered the market, consisting of 18 ancillary service providers, 11 generation companies, two (2) directly connected customers, and one (1) metering service provider.

Table 47. Registration Update in Luzon, Visayas, and Mindanao WESM (October 2023)

Category	Registered												
	Total	Direct				Indirect				Service Providers			
		LUZ	VIS	MIN	LVM	LUZ	VIS	MIN	LVM	LUZ	VIS	MIN	LVM
Generation Companies	202	109	48	40	4	1	0	0	0	-	-	-	-
Customers													
Private DUs & Local Government Utilities	25	11	6	4	0	4	0	0	0	-	-	-	-
Electric Cooperatives	99	34	28	25	0	9	0	3	0	-	-	-	-
Directly Connected Customers	54	6	3	4	1	28	5	7	0	-	-	-	-
Total Customer Trading Participants	178	51	37	33	1	41	5	10	0	-	-	-	-
Ancillary Service Provider	37	17	11	8	1	0	0	0	0	-	-	-	-
Metering Service Providers	16	-	-	-	-	-	-	-	-	4	0	11	1
Total Participants	433	177	96	81	6	42	5	10	0	4	0	11	1

From May to October 2023, customer spot market transactions in Luzon, Visayas, and Mindanao averaged 1,576.3 GWh. Of this total, 67.0 percent was allocated to Luzon, 21.5 percent to Visayas, and 11.5 percent to Mindanao. Generator payments in Luzon decreased by 12.3 percent, dropping from Php8.2 billion in May to Php7.2 billion in October 2023.

Similarly, generator payments in Visayas decreased by 22.0 percent from Php3.6 billion in May to Php2.8 billion in October 2023. Meanwhile, in Mindanao, generator payments surged by 80.2 percent from Php688 million in June to Php1.2 billion in October 2023. Furthermore, the Net Effective Spot Settlement Price for generators averaged Php6,408.3 per MWh, while the Effective Spot Settlement Price for customers averaged Php6,613.8 per MWh.

The various policies issued in line with WESM amendments are reflected in Table 48.





Table 48. **Promulgated DCs on WESM Amendments**

DC No.	Title	Date Issued
2023-08-0024	Adopting Further Amendments to the Wholesale Electricity Spot Market Manual on Billing and Statement	2 August 2023
2023-07-0023	Adopting Further amendments to the Wholesale Electricity Spot Market Rules and Market Manuals (Provisions on Penalty Framework for Test and Commissioning)	20 July 2023
2023-01-0004	Adopting Amendments to the WESM Rules, Retail Rules and Various Market Manuals, and Promulgation of the Retail Manual on the Procedures for the for the Implementation of GEOP	31 January 2023
2023-01-0003	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules, WESM Manual and Retail Manual on Validation Timeline Adjustment in Metering and Billing	12 January 2023
2023-01-0001	Adopting Further Amendments to the Wholesale Electricity Spot Market Manuals for Improvements to The Market Resource Modelling and Monitoring	11 January 2023
2022-12-0039	Declaring the Commercial Operation of the Wholesale Electricity Spot Market in the Mindanao Grid	23 December 2022
2022-12-0038	Adopting Further Amendments to the Wholesale Electricity Spot Market Manual on the Guidelines Governing the Constitutions of the PEM Board Committees	21 December 2022
2022-11-0033	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules and Market Manuals for the Implementation of Reserve Market	5 October 2022
2022-06-0029	Providing Policies for the Market Operator Performance Standards	20 June 2022
2022-06-0025	Adopting Further Amendments to the Wholesale Electricity Spot Market Manual on Billing and Settlement	20 June 2022
2022-06-0024	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules and its Market Manual on Constraint Violation Coefficients (CVC) and Pricing Re-Runs (PR)	20 June 2022
2022-06-0023	Adopting General Amendments to the WESM Rules and Various Market Manuals on the Enhancements to Market Operator and System Operator Procedures	20 June 2022
2022-06-0022	Adopting Further Amendments to the Wholesale Electricity Spot Market Manual on Registration, Suspension and De-Registration Criteria and Procedures (RSDCP)	20 June 2022
2022-06-0021	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules and Market Manual on Dispute Resolution Administration (DRA)	20 June 2022
2022-03-0012	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules, Retail and Market Manual (Provisions for Audit and Performance Monitoring)	25 March 2022
2022-03-0011	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules and its Market Manual on Information Disclosure and Confidentiality (Exceptions for Confidentiality Undertakings for DOE and ERC)	22 March 2022
2022-03-0010	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 March 2022
2022-03-0009	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules and WESM Registration Manual (Provision for De-Registration and Cessation of Registration)	17 March 2022
2022-03-0003	Adopting Further Amendments to the Wholesale Electricity Spot Market Rules and its Market Manual on Billing and Settlement for the Implementation of Enhancements to WESM Design and Operations	3 March 2022

Plans and Programs

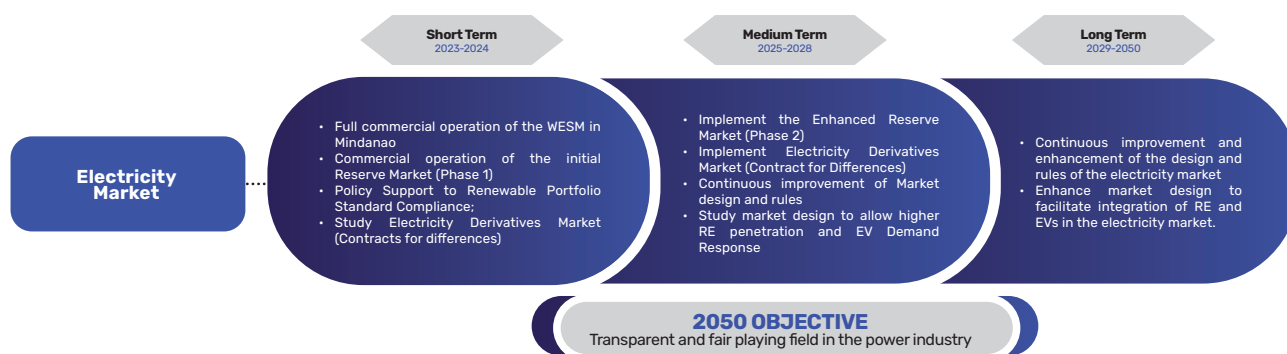
Full commercial operation of WESM Mindanao. The issuance of DC2022-12-0039 set WESM Mindanao’s commercial operation date on 26 January 2023. As stipulated in the Circular, all trading participants (TPs) with pending requirements are deemed registered provided that full compliance is in effect not later than 25 April 2023.

Given the timeline, there are still TPs which have not completed registration in the WESM based on the report received from the MO in April 2023. In response, the DOE issued an Advisory¹¹⁶ on 27 April 2023 extending the relaxation of submission of requirements until 25 June 2023.

With the assumption that all TPs complete and comply with the requirements, the short-term action plan is having the WESM Mindanao in full commercial swing by 2023.

¹¹⁶ Advisory on the “Extension on the Implementation of Sections 4 and 5 of DC2022-12-0039” issued and posted in the DOE website on 27 April 2023

Figure 23. Electricity Market Roadmap



Commercial operation of the initial Reserve Market (Phase 1). The Ancillary Service (AS) policy that is already in place touched on the co-optimization of energy and reserves in the WESM through the Reserve Market (RM).

The DOE, in its Advisory dated 26 June 2023, directed the MO for the Trial Operations Program (TOP) of the RM. The successful conduct of TOP by the MO, SO, and WESM participants is one of the conditions for the commercial operation of the RM apart from the ERC's approval of the price determination methodology (PDM). The Advisory also clarified that the TOP is a non-binding exercise for the RM participants, meaning that the results shall not be used commercially for scheduling, dispatch, settlement, and cost recovery.

With the issuance of DC2023-09-0026¹¹⁷, the RM is targeted to be fully operational by 26 March 2024. The operation of the RM in the short-term (2023-2024) is deemed to be its initial phase and plans to further enhance the market are to be conducted in the medium-term (2025-2028).

Policy support to RPS Compliance. The Renewable Energy Market (REM) is viewed to encourage compliance of power industry participants with the mandated Renewable Portfolio Standard (RPS) obligation. Among the objectives of the REM is to establish a fair and transparent market for the trading of RE Certificates (RECs), equivalent to an amount of power generated from RE resources.

The REM is under interim commercial operations with the issuance of DC2022-06-0019 and there are already 265 participants as of July 2023.

Study Electricity Derivatives (Contracts for Differences). An ongoing study is being undertaken by IEMOP on Electricity Derivatives Market (EDM) specifically Contracts for Difference (CfD).

A contract for difference refers to a contract between a buyer and a seller wherein the buyer must pay the seller the difference between the current value of an asset and its value at the time of contract. Its advantages are access to the underlying asset at a lower cost than buying the asset outright, ease of execution, and the ability to go long or short.¹¹⁸

One of the countries that adopted CfD is the United Kingdom which introduced it in October 2014. It was designed to support deployment of large scale RE projects which are more than five MW. The CfD is based on the difference between the market price and an agreed *strike price*¹¹⁹. If the strike price is higher than the market price, the CfD counterparty pays the RE generator the difference between the strike and market price. If the market price is higher than the agreed strike price, the RE generator pays back the CfD counterparty the difference.¹²⁰

Based on the PEMC Study in 2020, establishing the regulatory and market structure for the EDM in the Philippines must take into consideration existing legislation and legal challenges. Currently, only banks and insurance companies are authorized to deal in derivatives in "over-the-counter" markets. The Bangko Sentral ng Pilipinas (BSP) authorizes banks to trade derivatives particularly interest rate and foreign exchange-based derivatives. Similarly, the Insurance Commission authorizes qualified insurance companies to engage in derivative transactions but only with banks also. To date, only equity, interest rate, and currency derivatives are known to be traded in the Philippines.¹²¹

¹¹⁷ "Declaring the Commercial Operations of the Reserve Market and Providing Further Policies" issued on 26 September 2023

¹¹⁸ Source: <https://www.investopedia.com/articles/stocks/09/trade-a-cfd.asp>

¹¹⁹ Strike Price is the fixed price a generator will earn per MWh of electricity generated for the lifetime of the contract

¹²⁰ Source: <https://www.iea.org/policies/5731-contract-for-difference-cfd>

¹²¹ PEMC, Nord Pool Legal Memorandum Executive Summary, March 2020. Available at <https://www.wesm.ph/library/downloads/viewdownload/documents/other-documents/electricity-derivatives-ma>

Implement enhanced Reserve Market (Phase 2). In the medium-term, the succeeding action plan to be undertaken after the RM's commercial operation is Phase 2. Specifically, this refers to integrating all enhancements in the RM (i.e., classification of reserves, technical specifications) including the amendment of the WESM rules and Market Manuals.

Implement Electricity Derivatives Market (Contracts for Differences). The EDM's implementation serves as an avenue for market participants to secure their additional power supply requirements. It will also promote further competition and function as catalyst for enticing investments in power supply generation.

Implement Capacity Market. The DOE in its effort to attain sustainability, reliability, and security in the power sector, proposed an Independent Impact Assessment of the costs and benefits of the proposed establishment of a Philippines Capacity Market. The opening of a new market other than the energy market will also support the government's initiatives on the transition to sustainable and clean energy. A capacity market adds another layer to a wholesale market, and they exist to increase the certainty that there will be enough electricity supply to meet expected demand based on the forecast. The market works with generators and retail electric providers in determining how much electricity supply is needed in the future but relies on market forces to incentivize generators to build and maintain generation to meet long-term demand needs.

Continuous improvement and enhancement of the design and rules of the electricity market. As dynamic changes occur in the power industry, enhancing the market design as well as the rules ensures that it will support the overall objective of a transparent and fair playing field. Correspondingly, the refinement of rules and design implies being mindful of the market's needs to synchronize with the recent policy updates.

Off-Grid Development

Missionary electrification is indispensable in the government's pursuit for attaining total electrification. The DOE is keen to continuously develop critical policies, pioneer initiatives, and form strategic measures to demonstrate commitment in ensuring reliable and cost-efficient electricity access that is seen to usher inclusive development in unserved and underserved areas in the country.

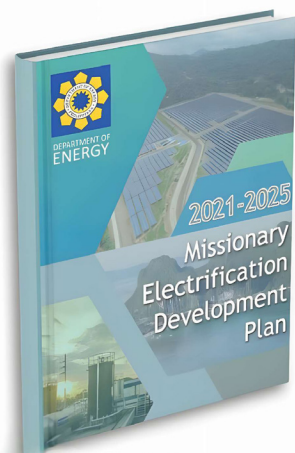
Parallel to the comprehensive electrification agenda, efforts to improve the economic viability of missionary regions are carried out through the implementation of island interconnection projects embodied in the TDP 2022-2040. This aims to facilitate the sharing of excess capacity to prevent supply shortages, increase the electrification rate in far-flung communities, and reduce reliance on traditional fossil fuel-based for island power generation.

Graduation and rationalization of the Universal Charge for Missionary Electrification (UC-ME) subsidy. The issuance of DC2022-05-0016 titled *"Adopting and Integrating the Policies and Programs for the Graduation and Rationalization of the Universal Charge for Missionary Electrification Subsidy"* on 24 May 2022 prescribes customer level rationalization of the UC-ME within off-grid areas. Specifically, the Circular is guided with the following objectives:

- a. Empower the DUs/ECs in off-grid areas to formulate plans and programs for the rationalization of UC-ME subsidy in their franchise areas;
- b. Incorporate the interconnection plan to the grid in the UC-ME subsidy rationalization plans and programs of the DUs/ECs in off-grid areas;
- c. Institutionalize least-cost generation planning to enable entry of low-cost generation technologies in small grids and off-grid power systems;
- d. Encourage distribution utilities to promote and practice energy efficiency and conservation measures in off-grid areas;
- e. Optimize the recovery of cost of electricity services through innovative tariff mechanisms that reflect the capacity to pay of the electricity end-users;
- f. Set the timeline for the reduction of UC-ME subsidy in consideration of the actual and foreseen socio-economic conditions of the consumers in off-grid areas; and,
- g. Harmonize the policies and regulations with respect to the setting of tariffs and subsidies in offgrid areas.

The formulation of the Circular meant reviewing all pertinent policies and requesting for valuable inputs from stakeholders through a series of FGDs and public consultations. Under this policy, the TransCo and NEA are tasked with crafting a comprehensive 10-year graduation and rationalization plan, which shall outline the socially acceptable reduction and potential phase out of UC-ME subsidy.

TransCo as the Small Island Grid System Operator (SIGSO). A significant step has been taken by TransCo when it entered into a Memorandum of Agreement (MOA) with various off-grid ECs – *Palawan Electric Cooperative (PALECO)*, *Occidental Mindoro Electric Cooperative (OMECCO)*, and *Oriental Mindoro Electric Cooperative (ORMECCO)* – to operationalize the DC2021-11-0039, which designates the agency as the SO for off-grid power systems that have two or more suppliers.



In August 2023, TransCo commenced its stand-alone system operation in Mindoro Grid and is currently conducting capacity building activities for the ECs in the province. This strategic effort intends to enhance the capabilities and competencies of the ECs for a stronger and more resilient energy infrastructure in Mindoro.

Publication of the Missionary Electrification Development Plan (MEDP). Guided with the goal of ensuring quality, reliable, secure, and affordable electricity services in unelectrified and off-grid areas in the country, the DOE published the MEDP 2021-2025 on 17 February 2023. The plan spells out the government strategies in increasing access to sustainable energy in missionary areas, integrates the submission from industry players and concerned stakeholders, and aligns with the EPIRA objectives for missionary and off-grid areas.

Additional financing for National Power Corporation. To ensure uninterrupted power service delivery in the off-grid areas, the government is actively addressing the NPC's funding gaps. In relation to this, the President has authorized a credit loan facility amounting to PhP5.0 billion with LBP, and there are efforts to secure an additional PhP10.0 billion short-term loan credit facility with the LBP¹²², in coordination with the Department of Finance (DOF) and DOE. The requested additional funding will cater to the needs of NPC, as well as for the NPPs for the continued electricity provision in the off-grid areas.

Additionally, the ERC has recently given the green light to two of the NPC's UC-ME True-up petitions totaling around PhP4.8 billion. Likewise, in a bid to address the impact of soaring fuel prices, the NPC is developing a comprehensive long-term sustainability plan, which includes expediting the hybridization of SPUG power plants with RE sources.

Addressing the Occidental Mindoro power crisis. The power crisis in Occidental Mindoro has been a lingering issue for decades, severely impeding the progress of the province and deeply affecting the lives of its residents. On 20 April 2023, the crisis reached a critical point necessitating the declaration of a State of Calamity. During this period, the province could only be provided a mere four (4) hours of electricity daily due to significant shortage in power supply.

With a daily power demand of about 29 MW, the Occidental Mindoro Consolidated Power Corporation (OMCPC), the lone power supplier of the province, could only then supply up to 12 MW primarily attributed to the OMCPC's failure to secure provisional authority application for one of its three power plants. To address this, the DOE and NEA intervened and directed the OMCPC to operate all its power plants at a capacity of 30 MW. Further, the province has alternative power sources, including the 1.07-MW biomass power plant operated by the Pag-Asa Renewable Energy Corporation and a 5-MW power plant owned by Power Systems, Inc.

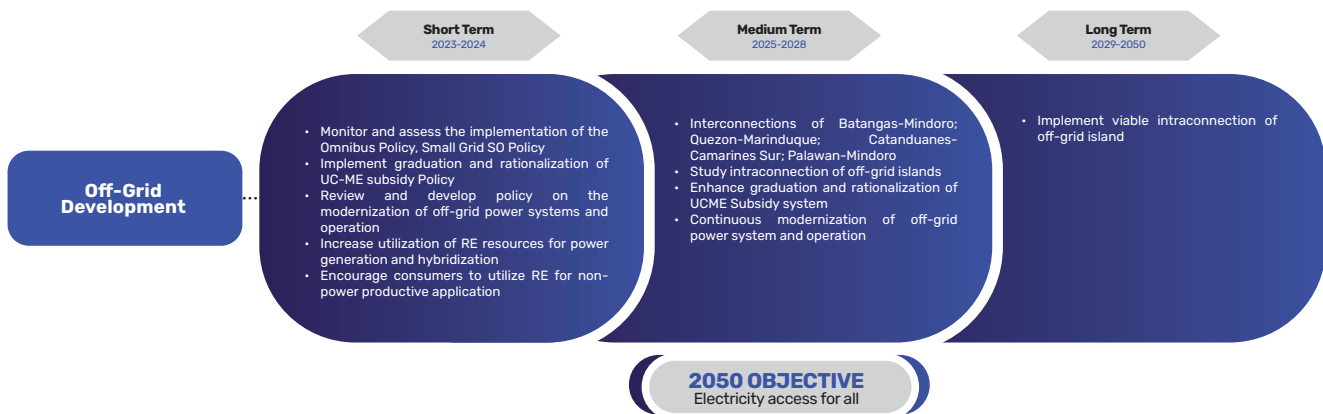
Looking ahead, the DOE is committed to implement measures in enhancing the province's power supply, which includes conducting CSP, with a particular emphasis on prioritizing RE sources.

Plans and Programs

As part of the government's thrust to foster inclusive development throughout the country, the DOE is actively pursuing initiatives that accentuate the enhancement of service delivery and expanding electricity access in remote and small islands that remain isolated from the main power grid. Within the planning horizon, the DOE will also push for strategic actions to include the rationalization and graduation from the UC-ME subsidy, modernization of off-grid power systems and operations through the deployment of smart grids and hybrid solutions, and the interconnection of off-grid islands to the national power grid.

¹²² The NPC was able to secure the approval on the additional PhP10 billion loan on 5 October 2023.

Figure 24. Off-Grid Development Roadmap



SHORT-TERM

Monitor and assess the implementation of the Omnibus Policy and Small Grid System Operator (SGSO) policy. The introduction of the Omnibus Policy¹²³ on 25 January 2019 laid out the overall framework for advancing off-grid development by streamlining existing legislations, governing policies, and extensive strategies, plans, and programs to enhance electric power services in missionary areas. Key components of this effort include, among others, connecting off-grid islands to the main grid through inter- and intra-connection transmission projects, ensuring adequate capacity across small island grids, optimizing generation planning for improved operational efficiency, and rationalizing electricity tariffs and the removal of the UC-ME subsidy to the benefit of all electricity consumers.

Relatedly, the SGSO Policy¹²⁴ which designated TransCo as the SO in off-grid areas with multiple power suppliers aimed to optimize the operations and administration of off-grid power systems. This is to establish the systematic control and efficient dispatch of power supply sources leading to improved electricity service and reduced electricity costs and subsidies to the end-users.

In line with this, the DOE will continue to oversee, evaluate, and refine standing policies to ensure that these remain effective and adaptable to the distinct needs of the off-grid areas. Such include updating the MEDP to incorporate new policies, programs, and strategies, along with the integration of the DDP of the DUs, the NPC's Missionary Electrification Plan, as well as RE and energy efficiency targets. The DOE will develop an off-grid power monitoring system to improve data management and analysis, including the regular conduct of capacity building activities, planning workshops, and dialogues with the off-grid DUs, LGUs, and other stakeholders to support these goals.

Implement graduation and rationalization of UC-ME subsidy policy. Forming part of the government's initiative to ease the financial burden of rising electricity costs to consumers is the enforcement of the UC-ME subsidy rationalization and graduation policy. The primary approach for the subsidy rationalization involves capacitating DU's serving off-grid areas to prepare a UC-ME Subsidy Rationalization Plan. The rationalization plan outlines the specific actions to be taken by the DUs and local power stakeholders to effectively manage and optimize the use of the UC-ME subsidy within their franchise area. Subsequently, the UC-ME rationalization plan will become an integral component of the DDP and PSPP of the off-grid DUs, which are annually submitted to the DOE.

The strategies for subsidy rationalization encompass several key components which are: a) connecting small islands to the primary grid; b) promoting the integration of RE and emerging technologies; c) prioritizing the provision of subsidies to marginalized consumers; and e) implementing energy efficiency and conservation programs at the consumer level to avert the high generation costs in off-grid areas.

Review and develop policy on the modernization of off-grid power systems and operation. This initiative seeks to improve the efficiency, reliability, and resiliency of the existing energy infrastructure by employing innovative technologies and integrating sustainable energy sources.

To realize this vision, the DOE is set to develop a policy for the upgrading and modernization of island power grids. This policy advocates for the adoption and deployment of advanced technologies, such as smart grid systems and information and communication technology (ICT) solutions geared towards enhancing the delivery of electricity services to remote islands, while optimizing the performance of off-grid power systems.

¹²³ DC2019-01-0001 titled "Prescribing the Omnibus Guidelines on Enhancing Off-Grid Power Development and Operation".

¹²⁴ DC2021-11-0039 titled "Mandating the National Transmission Corporation as Small Grid System Operator in Specific Off-Grid Areas" issued on 9 November 2021

Increase utilization of RE resources for power generation and hybridization. Recognizing that a sizeable portion of the country's missionary areas continue to rely heavily on oil-based fuels, these small islands and isolated grids are extremely susceptible to price volatilities in the world energy market, contributing to higher generation costs of electricity.

To address this concern, the DOE is firmly encouraging the increased utilization and deployment of RE technologies for off-grid power generation. By tapping into these clean energy sources, off-grid communities can reduce their dependence on oil for power generation.

To complement this effort, both the DOE and NPC will push for the integration of hybrid systems by combining multiple RE sources with energy storage solutions and oil-based generators, which is seen to improve energy supply sufficiency, reliability, and sustainability in off-grid areas. This strategic move towards a clean and hybridized energy system enables the country to achieve its broader objectives under the CES of this PEP.

Encourage consumers to utilize RE for non-power productive application. Aside from generating electricity, indigenous energy from renewable sources may also be used productively for heating, drying, and cooling purposes, which can be tapped across a range of industries. To maximize the advantages of harnessing these clean energy technologies, the DOE has been promoting the wider use of RE for non-power applications. This creates opportunities for the expanded use of renewables (e.g., solar and wind) for post-harvest facilities in the agri-fishery sector, especially in rural parts of the country where farming, fishing, aquaculture, and livestock production are the primary sources of income for the locals.

MEDIUM-TERM

Interconnection of Camarines Sur-Catanduanes, Batangas-Mindoro, Quezon-Marinduque, and Palawan-Mindoro. Interconnecting off-grid islands to the main grid is one of the most effective strategies for phasing out the UC-ME subsidy. Among the smaller islands that are programmed for interconnection to Luzon grid include Catanduanes, which can be linked to Camarines Sur; Mindoro Island via Batangas; Marinduque to Quezon; and Palawan, benefiting from a connection point from Mindoro. The DOE will constantly monitor the implementation of these interconnection projects and steer NGCP to expedite their completion.

- The **Camarines Sur-Catanduanes 69-kV Interconnection Project (CCIP)** will connect Catanduanes to the main grid via Camarines Sur, providing reliable and cost-effective power generating sources. The CCIP has been filed with the ERC on 09 June 2022 under ERC Case No. 2022-044 RC and is currently awaiting approval from the Commission. The project is expected to be completed by December 2030.
- The **Batangas-Mindoro Interconnection Project (BMIP)** is a priority investment in the NGCP's TDP 2022-2040. The project aims to connect Mindoro Island with the Luzon grid through Batangas, thereby providing access to bulk generation sources and enabling the potential export of surplus electricity. The planned interconnection will involve linking the Pinamucan 500-kV Substation in the Luzon grid with Calapan serving as the connection point in Mindoro Island. On 23 November 2022, the ERC granted approval for the project under ERC Case No. 2021-051 RC, with completion date by September 2027. The NGCP recently announced an accelerated timeline targeting the project completion by 2025.
- The **Quezon-Marinduque Interconnection Project (QMIP)** aims to address the long-term development needs of Marinduque and improve the energy mix of the province by gaining access to more reliable and competitive power generation sources from the Luzon grid. On 08 July 2021, the proposed project was filed by the NGCP under ERC Case No. 2021-049 RC. With the project still pending regulatory approval, the NGCP is aiming for its completion by December 2030.
- The **Palawan-Mindoro Interconnection Project (PMIP)** is a two-stage initiative focused on enhancing power supply reliability and addressing power quality issues within Mainland Palawan. Additionally, the PMIP is designed to position the country for future interconnections with other ASEAN Member States (AMS), aligning with the vision of the ASEAN Power Grid (APG) outlined by the Heads of ASEAN Power Utilities/Authorities (HAPUA). This initiative also complements regional efforts for power grid interconnection, particularly within the framework of the Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA). On 18 March 2019, the NGCP filed the application for the PMIP Stage 1 through ERC Case No. 2019-022 RC. As the project currently awaits approval from the ERC, the NGCP has set its sights on achieving project completion by February 2033.

Study intra-connection of off-grid islands. In addition to off-grid interconnection, the government is likewise exploring the feasibility of intra-connection among distant islands to enable the sharing of excess power generation. The DOE, in collaboration with TransCo, is poised to undertake comprehensive studies to assess the viability of intra-island power connections. This will be done by extending electricity access from small island and stand-alone grids to nearby islets using submarine power cables.

Enhance graduation and rationalization of UC-ME subsidy system. The enhancement of the UC-ME graduation and rationalization policy is one of the continuing measures that will be pursued by the DOE throughout the medium-term planning horizon. This involves performing a comprehensive review and assessment of the UC-ME subsidy program to warrant the effectiveness of the policy mechanism. As part of this endeavor, the DOE will actively support NPC in formulating effective strategies for administering the UC-ME subsidy. Parallel to this, the DOE will collaborate closely with NEA and ERC in updating the individual UC-ME Rationalization Plans of the off-grid DUs.

Continuous modernization of off-grid power system and operation. In an effort to sustain efficient operations of the entire power system, the Department will continue to encourage all DUs, including off-grid ECs, to initiate the upgrading and modernization of their existing facilities and infrastructure towards building a smart and resilient distribution system. The DOE and NEA will proactively engage with the DUs to ensure the seamless integration of CAPEX programs into their DDPs. Likewise, the DOE will strengthen its partnership with ERC to secure regulatory support to facilitate the timely approval and implementation of the proposed CAPEX projects.

LONG-TERM

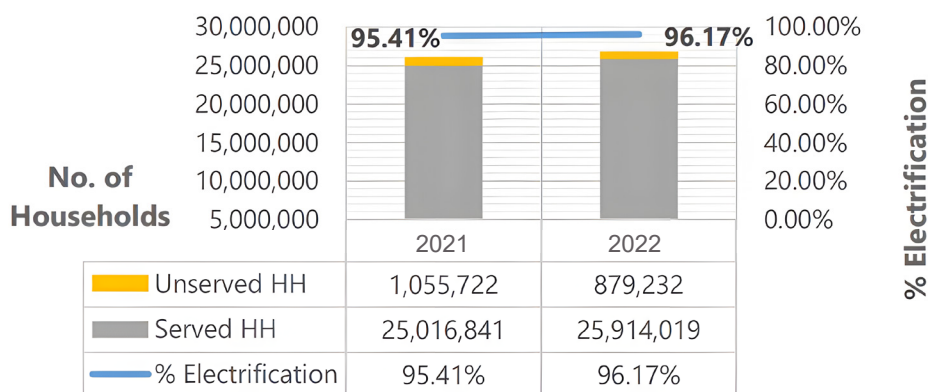
Implement viable intra-connection of off-grid island. An overarching priority to promote off-grid power development in the long-term is the implementation of viable intra-connection projects. The DOE is committed to support off-grid ECs by providing strategic policy directions, to include other support mechanisms, such as securing regulatory approval, facilitating access to financing, leveraging government subsidies and incentives, as well as streamlining of permitting procedures.

Total Electrification

Electricity access, one that has long been a priority of the government, is always associated with the improvement of quality of life especially in remote and far-flung areas. By 2028, the energy sector envisions every household in the country to benefit from having access to electricity services. The commitment to expanding electricity access demonstrates it as a necessity that empowers communities and stimulates economic growth. The realization of total electrification requires a whole-of-government approach and innovative collaboration to surmount challenges in the implementation of the various electrification programs. This also calls for united and unwavering effort of the DOE, NEA, NPC, and DUs/ECs.

Household Electrification Status. Looking at the national level, the country’s household electrification increased to 96.2 percent in 2022 from the 95.4 percent recorded in 2021. Accordingly, 25.91 million Filipino households have already been energized, while 0.88 million households are yet to be provided with electricity services (*Figure 25*).

Figure 25. Household Electrification, 2021-2022

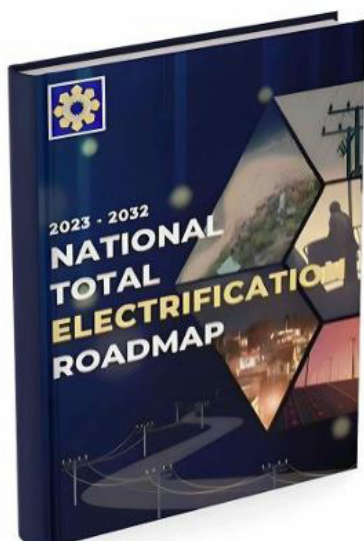


The country's household electrification rate varies by grid (Table 49). Of the three (3) major island groups, Luzon registered the highest electrification level at 98.9 percent with 16.1 million households energized, followed by Visayas at 97.6 percent with 4.8 million households given access to electricity services. Mindanao is currently lagging at 88.1 percent with approximately 5.0 million households energized and more than 0.6 million households yet to be energized.

Table 49. **Household Electrification by Grid** (as of December 2022)

	Potential HHs*	Served HHs	Unserved HHs per DU/ Province**	Electrification Level (%)
Luzon	13,318,261	16,092,459	148,435	98.89
Visayas	4,401,698	4,834,595	105,110	97.61
Mindanao	5,265,012	4,987,019	625,687	88.12
Philippines	22,984,971	25,914,073	879,232	96.17

Note. *Potential HH based on 2015 PSA Census
** Unserved HHs is the actual unserved HH from the DUs/ECs



National Total Electrification Roadmap (NTER) 2023-2032¹²⁵. The NTER primarily consolidates and rationalizes the government's initiatives, interventions, and strategies in bringing sustainable electricity services to unserved and underserved areas throughout the country.

As reflected in the NTER, the electrification level as of June 2023 is at 91.2 percent with 25.3 million households with electricity access compared to the potential 27.7 million households (Table 50).¹²⁶ By end of 2023, the outlook for the country's electrification level reaches 93.1 percent as the target number of households to be energized for the remaining half of the year is at 0.54 million households bringing the total households energized to 25.8 million (Table 51).

Table 50. **Household Electrification as of June 2023** (based on NTER)

	Potential	Served	Unserved	Electrification Level
Luzon	16,415,201	15,800,632	614,569	96.26
Visayas	5,161,182	4,612,844	548,338	89.38
Mindanao	6,150,849	4,859,912	1,290,937	79.01
Philippines	27,727,232	25,273,388	2,453,844	91.15

Table 51 **Household Electrification by December 2023** (based on NTER)

	Potential	Households to be Served	Served	Unserved	Electrification Level
Luzon	16,415,201	123,711	15,924,343	490,858	97.01
Visayas	5,161,182	192,427	4,805,271	355,911	93.10
Mindanao	6,150,849	220,375	5,080,287	1,070,562	82.59
Philippines	27,727,232	536,513	25,809,901	1,917,331	93.09

Enactment of the Microgrid Systems Act of 2022. The signing into law of RA 11646 or the *Microgrid Systems Act (MGSA)* of 2022 on 24 January 2022 is intended to bolster the government's efforts toward total electrification by promoting the use of microgrid systems in both unserved and underserved areas. Its goal of accelerating total electrification also includes areas without electricity access, distribution lines, home power systems, or areas receiving less than 24 hours of electricity services. Likewise, the law provides the regulatory framework for the development and operation of microgrid system, thus ensuring its safety, reliability, and efficiency.

¹²⁵ The NTER was published on 27 October 2023.

¹²⁶ The glaring difference with the December 2022 household electrification level is attributable to the household baseline considered for arriving at the electrification level as the NTER adopted the 2020 Census of Population and Housing (CPH).



The MGSA's issuance is seen to promote private sector participation in electrification as it provides a competitive environment and level playing field for various kind of energy resources to be utilized with preference for low-cost, indigenous, renewable, and environment friendly.

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

The declaration of unserved and underserved areas to be offered to the MGSP are classified into three: *a) DOE – declared; b) DU – identified; and c) unsolicited proposals*. All prospective MGSPs for the identified areas are required to undergo CSP and will be deemed successful upon receipt of at least one bid. In instances that there are no interested participants or a failed CSP, the NPC and DU shall continue to energize the area until a contract for the MGSP is awarded in the next CSP for the DOE declared and DU identified areas, respectively. On the other hand, the MGSP proponents can also submit unsolicited proposals subject to Swiss challenge of interested third parties.

The corresponding IRR of the MGSA was issued on 24 May 2022 through DC2022-05-0017.

Creation of the Total Electrification Steering Committee (TESC). Recognizing the need for a resolute committee to supervise the implementation of various electrification plans and programs, the DOE issued DO 2022-12-0016¹²⁷ on 21 December 2022. The TESC is mandated to act as the oversight body in formulating and consolidating various programs and activities in the provision of electricity to the unserved and underserved areas identified by the DUs and other responsible entities. The DOE chairs the TESC with members composed of NEA, NPC, and TransCo.

Communication Initiatives. The DOE conducted IEC campaigns to roll out MGSA's implementation including its IRR. These activities were also supported by a series of workshops for the DUs on the local total electrification roadmap (LTER) template in collaboration with the NPC and NEA. The template includes the 10-year Electrification Master Plan of the DUs and the list and inventory of all unserved households and/or underserved areas within their respective jurisdictions targeted for electrification. To better equip the DUs in the use of the LTER, the workshop also detailed the data requirements, guidelines in filling out the template, and the submission protocol.

TOTAL ELECTRIFICATION PROJECTS

Grid-Connected

Sitio Electrification Program (SEP). The SEP is a government initiative that serves as the primary component of the broader efforts toward equitable development and ensuring that even the most remote sitios of the country have access to essential services and opportunities. It contributes to bridging the gap between urban and rural areas, fostering overall socioeconomic progress in the country.

As of November 2023, the NEA already energized 1,006 out of its targeted 1,085 sitios for the year. To further accelerate its electrification efforts, the NEA committed to energize the remaining sitios earmarked for the year. Looking ahead, the NEA targets to energize 10,535 sitios by the end of President Marcos, Jr. Administration.

¹²⁷ Creating the Total Electrification Steering Committee to Accelerate the National Total Electrification



Together with the representatives from various agencies and LGUs, Asst. Secretary Mario C. Marasigan and Director Araceli A. S. Soluta led the distribution of the Portable PV Solar Home Units to the concerned Residents Beneficiaries of Barangay Buenavista in Coron, Palawan

Energy Regulations 1-94 (ER 1-94). During the onset of the COVID-19 pandemic, the DOE issued DC2020-04-0008¹²⁸ enabling the use of the existing ER 1-94 funds for projects intended to contain and mitigate the spread of COVID-19, particularly in the communities hosting energy projects until the lifting of the public health emergency.

Without an official extension to the public health emergency from the President and the country's apparent path to normalcy, the DOE issued an Advisory on 8 May 2023 invoking Section 10 (Sunset Clause) of DC2020-04-0008. The advisory stipulated that the Electrification Fund (EF) component of ER 1-94 is now reverted to its original purpose, which is for the total electrification of the remaining unserved and underserved areas in the country.

To compensate and provide for financial benefits to communities hosting energy resources and power generating facilities, the DOE already disbursed 79.2 percent of the available ER 1-94 funds to host communities and beneficiaries, amounting to PhP5.1 billion out of the total PhP6.4 billion. At present, there is approximately PhP1.3 billion of remaining ER 1-94 funds that need to be transferred and remitted, as indicated in *Table 52*.

Table 52. **Status of Reconciled vs. Remitted Funds to Host Beneficiaries (as of June 2023)**

Fund Type	Reconciled Available ER 1-94 Fund with DOE (PhP Billion)	Disbursed ER 1-94 Fund (PhP Billion)	Remaining ER 1-94 Fund (PhP Billion)	Disbursed Percentage
EF	3.436	2.436	0.9995	70.91%
DLF	1.474	1.319	0.155	89.50%
RWMHEEF	1.516	1.336	0.180	88.12%
Total	6.425	5.091	1.334	79.23%

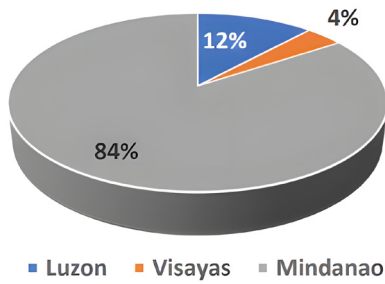
Off-Grid

Solar Photovoltaic Mainstreaming (PVM). In support of the government's electrification initiatives particularly for unserved households, the DOE distributed 10,000 units of portable photovoltaic solar home system (PV-SHS) units within the franchise areas of Busuanga Island Electric Cooperative, Inc. (BISELCO), Palawan Electric Cooperative (PALECO), Oriental Mindoro Electric Cooperative, Inc. (ORMECO), Occidental Mindoro Electric Cooperative, Inc. (OMECO) and Agusan Del Norte Electric Cooperative, Inc. (ANECO).

The DOE also signed a MOA with the NEA and NPC to implement electrification projects totaling PhP 811 million within the service coverage areas of the ECs and NPC-SPUG. The project's implementation is under the TEP, one of the DOE's locally funded projects.

¹²⁸ Rationalizing the Utilization of Energy Regulations No. 1-94 (ER 1-94) Funds by Host Local Government Units (LGUs) in response to Coronavirus Disease 2019 (COVID-19) Public Health Emergency

Figure 26. PV-SHS Installations, LVM



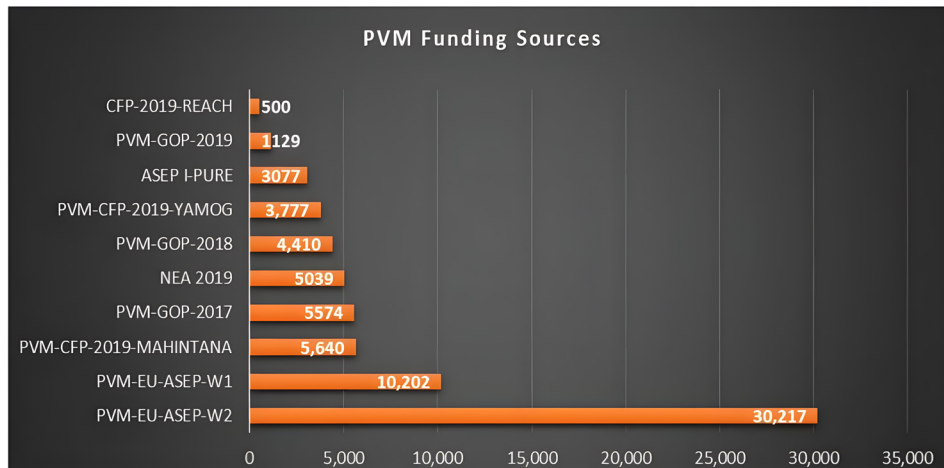
The PVM is a joint undertaking by the DOE and the European Union through its Access to Sustainable Energy Programme (EU-ASEP) that aims to accelerate rural electrification through the provisions of SHS to households in remote areas. As of the first half of 2023, more than 69,000 PV-SHS were already installed in remote areas in the country (Figure 26 and Table 53). The NEA is the implementing agency for the PV-SHS installation.

Table 53. No. of PV-SHS Installations in the major island grids (June 2023)

	Total of PV-SHS
Luzon	8,251
Visayas	2,667
Mindanao	58,647
Total	69,565

As shown in Figure 27, the implementation of the PVM program was carried out through several funding sources. More than half of the total installations were funded through EU-ASEP (Windows 1 & 2).

Figure 27. PVM-SHS Installations per funding sources



Source: PVM Dashboard of DOE-EPIMB

Table 54. Existing Microgrid Systems Providers (as of June 2023)

Area	DU	MGSP	Installed Capacity	Status/Remarks
Lahuy Island, Haponan Island in Municipality of Caramoan and Quinasalag Island in the Municipality of Garchitorena, Camarines Sur	CASURECO IV	FP Island Energy Corporation	Lahuy Island: 246 kWp Solar + 400 kW Diesel + 79kWh Battery Haponan Island: 51.4 kWp Solar + 100 kW Diesel + 19 kWh Battery Quinasalag Island: 331 kWp Solar + 500 kW Diesel + 80kWh Battery	Started Commercial Operations 10 December 2021
Brgy. Cabayugan, Puerto Princesa, Palawan	PALECO	Sabang Renewable Energy Corporation	Hybrid: 1.4 MW Solar + 1.2 MW Diesel + 2.3 MWh Battery	Authority to Operate (ATO) 05 October 2016
Brgys. Candawaga & Culasian, Rizal, Palawan	PALECO	PowerSource Philippines Inc.	268 kW Diesel	Interim Relief April 2018
Brgy. Liminangcong, Taytay, Palawan	PALECO	PowerSource Philippines Inc.	108 kW Diesel	Provisional ATO issued by ERC, 2016
Malapascua Island, Daanbantayan, Cebu	CEBECO	PowerSource Philippines Inc.	750 kW	Operational Permanent ATO 2016
Brgy. Poblacion, Dumaran, Palawan	PALECO	PowerSource Philippines Inc.	Hybrid: 132.8 kWp Solar + 144 kW Diesel + 351.1 kWh Battery	Interim Relief to Operate July 2022
Brgy. Manamoc, Cuyo, Palawan	PALECO	PowerSource Philippines Inc.	216 kW	Interim Relief to Operate July 2022
Brgy. Port Barton, San Vicente, Palawan	PALECO	PowerSource Philippines Inc.	Hybrid: 200 kWp Solar + 609.5 kW Diesel + 200 kWh Battery	Interim Relief to Operate July 2022
Balut Island	DASURECO	PowerSource Philippines Inc.	0.71 MW Diesel	Started commercial operations 08 June 2022

Existing Microgrid System Providers. All existing Qualified Third Parties (QTP) providing alternative services are now referred to as the MGSPs as stipulated under Section 6 of the MGSA. These MGSPs are mandated to carry out the missionary electrification function on behalf of the NPC and provide integrated power generation and distribution services in unserved and underserved areas. All the incentives extended to the QTPs under existing laws not amended or repealed by the MGSA shall remain in full force and effect.

Prior to the issuance of the IRR for RA 11646, PALECO conducted a CSP in April 2022 for 63 unserved areas in Palawan, in accordance with Department Circular No. DC 2019-11-0015. As a result, a Notice of Award was given to Maharlika Clean Power Holdings Corporation (MHCPHC) 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 shown in Table 55.

Table 55. QTP Service Areas Awarded to ARC

MGSP Service Areas	DU	Potential HHs	MGSP	Capacity/ Technology
Sto. Tomas, Dumarán	PALECO	678	ARC	Solar – 151 kWp BSS – 193 kWh Diesel – 83 kW
Bohol, Dumarán	PALECO		ARC	Solar – 227 kWp 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	1,400	ARC	Solar – 365 kWp BSS – 411 kWh Diesel – 224 kW
Canipaán, Rizal	PALECO	645	ARC	Solar – 151 kWp BSS – 193 kWh Diesel – 83 kW
Latud, Rizal	PALECO	560	ARC	Solar – 227 kWp BSS – 226 kWh Diesel – 112 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		ARC	Solar – 227 kWp BSS – 226 kWh Diesel – 112 kW
Caruray, San Vicente	PALECO	980	ARC	Solar – 365 kWp BSS – 411 kWh Diesel – 168 kW
Binga, San Vicente	PALECO	351	ARC	Solar – 151 kWp BSS – 193 kWh Diesel – 83 kW
				Solar – 302 kWp BSS – 275 kWh Diesel – 168 kW

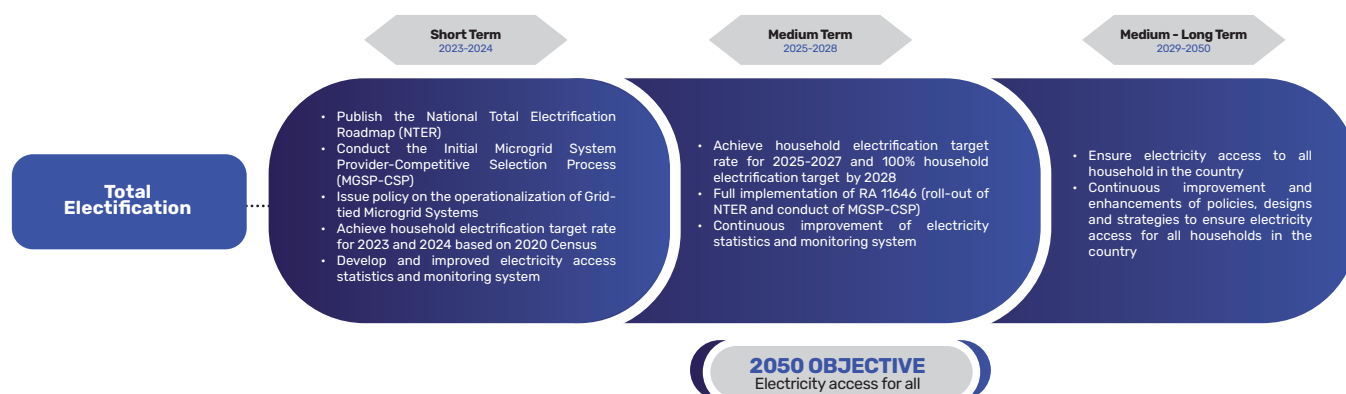
Plans and Programs

The electrification roadmap details the plans and programs to be undertaken over the planning period with the objective of providing electricity access for all. Among the critical deliverables are the full implementation of the MGSA and associated activities, and the continuous improvement of policies and strategies to ensure the effective implementation of the government’s electrification initiatives.

SHORT-TERM

Publish the National Total Electrification Roadmap (NTER). In accordance with the MGSA-IRR, the DOE is targeting to publish the National Total Electrification Roadmap within the first half of 2023. The NTER is a comprehensive national strategic plan to accelerate the country’s total electrification and a consolidation of the various Local Total Electrification Roadmap (LTER) and DDPs. It will also include the MEDP and to be integrated in the PEP.

Figure 28. **Electrification Roadmap**



The NTER 2023–2032 was officially published by the DOE on 27 October 2023. For the period 2024–2028, approximately 3.677 million households would require electricity services – 2.706 million within the franchise area of ECs and 0.971 million within the PIOUTs and LGOUs.

Table 56. **National Level Electrification Targets 2023-2028 (NTER)**

	2023	2024	2025	2026	2027	2028
Potential Households	27,727,232	27,953,853	28,345,104	28,726,822	29,106,499	29,487,334
Unserviced Households	2,453,916	2,143,952	1,836,971	1,280,773	770,270	394,891
Total Households Served	25,809,901	26,508,133	27,446,048	28,336,228	29,092,441	29,487,334
Target Households	536,585	698,232	937,915	890,180	756,213	394,893
Target Electrification Level	93.09	94.83	96.83	98.64	99.95	100.00

Conduct the initial Microgrid System Provider – Competitive Selection Process (MGSP-CSP). A CSP for prospective MGSPs will be conducted unless the DOE authorizes the NPC and NEA to do such on its behalf. Under the CSP, the entity will be awarded a contract to deliver integrated power generation and distribution services to an unserved or underserved area through a transparent and competitive procedure, such as but not limited to an auction, unsolicited proposal, or Swiss Challenge, in accordance with the provisions under the MGSA. The initial conduct of CSP for MGSPs is scheduled within the fourth quarter of 2023¹²⁹.

An invitation to bid for the CSP on MGSP covering 98 areas (having a total of 15,645 households) was released by the DOE on 27 October 2023. The prioritization of these areas is based on evaluation in coordination with the DUs, NPC, and NEA. The identified areas also represent 39.0 percent of the total households in unserved and underserved areas, which are viewed to be viable for microgrid systems because of the number of households and density, and demand.

Policy on the operationalization of grid-tied microgrid system. In line with the MGSA’s implementation, the DOE is targeting the issuance of a circular that will define the framework for the operationalization of microgrid system connected to the DU’s distribution system. This will enable the operation of grid-tied microgrid system both in synchronized and island mode.

Achieve household electrification target rate for 2023 and 2024 based on 2020 Census. Once the updated NTER is finalized, the DOE will release the revised projected household electrification targets based on the 2020 Census of Population. 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 on the strategies stipulated under the NTER, the energy sector’s goal is to meet its annual household electrification target in the short-term period.

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 system. As an initial step in this undertaking, the DOE recently launched a Microgrid and PVM dashboard, which contains the microgrid system and PVM database, relevant statistics, and a comprehensive listing of existing microgrid and PVM installations.

¹²⁹ The initial MGSP CSP commenced in November 2023 with the issuance of Notice of Awards expected towards the end of March 2024.

MEDIUM-TERM

Attain 100 percent household electrification target by 2028. The DOE is targeting to attain total electrification within the current administration's term. With the policies and programs already in place, the DOE is setting its sight track to achieve 100 percent electrification by 2028 through the provision of electricity access to about 31,143,804¹³⁰ potential households nationwide.

One of the priority areas of the National Government to address the challenge of a relatively low level of electrification is to assist the Bangsamoro Government in expanding electricity access to areas that are still unserved and underserved. Among the regions in Mindanao, the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) recorded the lowest household electrification level at 43.1 percent (as of December 2023), wherein 339,985 out of the potential 789,013 households have access to electricity. The NTER outlines various electrification strategies to be implemented from 2023-2028 to achieve total electrification in BARMM.

As complement to the electrification efforts, the government through the NEA continues to seek ways of assisting the Bangsamoro Government in its transition to operate its own DUs and in promoting international interest to further mobilize technical and financial assistance for the region's power sector. Specifically, the NEA facilitated the following initiatives: a) engaged with ELECNOR, a Spanish company, to conduct a feasibility study on the rehabilitation of the Maguindanao Electric Cooperative (MAGELCO) distribution system; b) raised Php24.0 million worth of funds to support substation facilities for MAGELCO in cooperation with Mindanao ECs; and c) agreed to be part of the EC Management of MAGELCO. Also, plans are underway for the NEA to convene a power summit in the Lanao del Sur Electric Cooperative (LASURECO) franchise area with BARMM on-board in all activities.

Full implementation of RA 11646. With the goal of accelerating total electrification in unserved and underserved areas, the DOE will ensure full and effective implementation of the provisions under the MGSA. As such, the DOE intends to successfully carry out the strategies under the NTER, as well as the timely conduct of CSP for the prospective MGSPs.

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 system 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 bases for policy formulation.

LONG-TERM

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 DOE will be firm in its total electrification agenda, and this will be pursued and guided with the latest available information on census as a reference in implementing policies and programs.

Continuous improvement and enhancement of policies and strategies. 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 programs to be implemented are pragmatic and aligned with current trends and developments thereby facilitating expansion of access to reliable electricity services.

Investment and Employment Opportunities

The envisioned energy sector transition is depicted in the CES as it reflects the straightforward shift towards a robust power system supported and driven by clean and low-carbon technologies. Realizing this move to a more sustainable energy landscape necessitates attracting significant investments in the electric power industry to expand and decarbonize the country's power supply.

Relatedly, augmenting power generation capacity to ensure energy supply security and sustainability requires capacity additions as represented in the outlook scenarios. Over the course of President Marcos Jr. Administration, total capacity additions in the Reference (REF), CES 1, and CES 2 are projected to reach 18.5 GW, 18.2 GW, and 19.7 GW, respectively (Table 57). These additional power generation projects entail capital investments amounting to Php1.6 trillion for the REF scenario, Php1.9 trillion for CES 1, and Php2.0 trillion for CES 2.

¹³⁰ Forecasted 2028 HH population based on the 2020 Census of Population

Table 57. Total Investment Requirements for Power Generation Projects

Technology	Capacity Addition, in MW						Investment Cost (PhP Billion @2022 Prices)					
	2023-2028			2029-2050			2023-2028			2029-2050		
	REF	CES 1	CES 2	REF	CES 1	CES 2	REF	CES 1	CES 2	REF	CES 1	CES 2
Coal	2,305	2,305	2,305	-	-	-	350.55	334.38	334.38	-	-	-
Natural Gas	2,413	2,413	2,413	19,468	13,576	16,444	253.42	253.42	253.42	1,447.04	977.32	1,201.88
Oil-based	20	20	20	-	-	-	2.18	2.18	2.18	-	-	-
Other Technologies	-	-	-	-	4,800	4,800	-	-	-	-	1,738.60	1,738.60
Renewables	13,791	13,458	14,919	84,712	93,110	92,033	928.13	1,197.25	1,291.68	5,526.23	6,392.23	9,441.83
Biomass	42	122	122	50	16	16	5.27	20.37	20.37	2.33	4.88	4.88
Geothermal	425	425	425	930	580	580	143.62	143.62	143.62	271.85	172.56	169.08
Solar	9,328	6,231	6,231	45,620	46,934	27,890	500.80	340.59	340.59	1,790.70	1,834.40	1,101.05
Hydropower	295	770	770	9,970	6,030	5,410	41.82	111.05	111.05	1,473.08	849.67	759.85
Onshore Wind	3,700	3,910	5,371	21,342	22,050	10,037	236.62	252.26	346.69	1,023.49	1,047.54	482.91
Offshore Wind	-	2,000	2,000	6,800	17,500	48,100	-	329.37	329.37	964.78	2,483.18	6,924.06
BESS ⁶	2,080	2,080	2,080	1,544	19,779	22,426	63.60	63.60	63.60	56.35	744.05	899.88
Total	18,528	18,195	19,656	104,180	111,486	113,277	1,597.87	1,850.82	1,945.26	7,029.62	9,852.20	13,282.18

*For accounting purposes, BESS are not included in the total capacity additions

Table 58. Estimated Job Generation in Power Generation Projects

Type of Plant	Estimated Job / MW		Additional Jobs					
			2023-2028			2029-2050		
	Construction	Operation and Maintenance	REF	CES 1	CES 2	REF	CES 1	CES 2
Coal	2.5	0.65	7,261	7,261	7,261	-	-	-
Natural Gas	2.73	0.13	6,901	6,901	6,901	55,678	38,827	47,030
Oil-based	2.73	0.13	57	57	57	-	-	-
Other Technologies ⁴		5.1	-	-	-	-	24,480	24,480
Biomass	9.8	7.75	737	2,141	2,141	878	281	281
Geothermal	24.55	1.85	11,220	11,220	11,220	24,552	15,312	15,312
Solar	10.83	1.7	116,880	78,074	78,074	571,619	588,083	588,083
Hydropower	8.33	0.55	2,620	6,838	6,838	88,534	53,546	48,041
Onshore Wind ⁵	4.83	0.21	18,633	19,691	27,048	107,478	111,044	50,546
Offshore Wind ⁵	12.28	4.82	-	34,204	34,204	116,292	299,282	822,597
BESS ⁶	4.9	1.5	13,312	13,312	13,312	9,882	126,586	143,526
Total			177,621	179,699	187,056	974,912	1,257,440	1,501,274

Notes:

1. Construction multiplier based on EPNS submission except for biomass, onshore and offshore wind, BESS, and other technology (nuclear) plant.

Estimate based on 2013 Research Study by EPPB titled "The Contribution of the Power Generation Industry to Employment Generation."

2. Operation and maintenance multiplier based on the 2013 DOE-EPPB Study except for biomass, onshore and offshore wind, BESS, and other technology (nuclear).

3. Construction period varies per plant technology.

4. Based on the U.S. job creation multiplier from nuclear programs, NREL report titled, "Nuclear Energy—Providing Power, Building Economies"

5. Job multipliers for onshore and offshore wind based on IRENA, 2018.

6. Job multipliers for BESS based on NREL.

Within the medium- to long-term planning horizon, total capacity addition by 2050 under REF reaches 104.2 GW, necessitating PhP7.0 trillion of private investments. On the other hand, as the country actively pursues renewables, the CES, which is the government's roadmap towards the energy transition, requires a capacity addition of 111.5 GW under CES 1 and 113.3 GW for CES 2. These aggressive RE targets, notably propelled by OSW potential resources, push investment requirements to PhP9.9 trillion and PhP13.3 trillion, under CES 1 and CES 2, respectively. The total investments to be made in CES 1 and CES 2 are 35.6 percent and 76.5 percent higher when compared to REF as these are dominantly driven by RE-based technologies.

The investments resulting from the additional power generation capacities also yields to the creation of job opportunities for the Filipino people. Among the scenarios, CES 2 indicates the highest number of additional jobs to be created between 2023 and 2050, estimated at 1.7 million (Table 58). This is closely followed by CES 1, which is projected to generate 1.4 million employment opportunities, while close to 1.2 million potential jobs are estimated under REF throughout the planning period.



CHAPTER II TRANSITION FINANCE

Transforming to a more sustainable society is faced with significant challenges due to the limited resources, growing population, and adverse effects of climate change. The environmental and social dimensions of climate change are expected to have the hardest impact to the poorest and most vulnerable communities. This issue has long been recognized as a developmental challenge, directly and indirectly affecting the attainment of objectives outlined in the United Nation's Sustainable Development Goals (SDGs).

Such challenges that add burden in sustainably meeting public needs impede the individual and collective efforts toward the realization of energy and environmental goals. In response, **a smooth transition into a circular economy warrants efficient, effective, and sustainable finance** that would not only generate substantial investments and employment but also restore value creation in ecological ecosystems. To ensure that sustainability-linked practices underpin a circular economy, **it is imperative to mobilize a financial ecosystem through a stream of extensive investment in sustainable energy projects.**

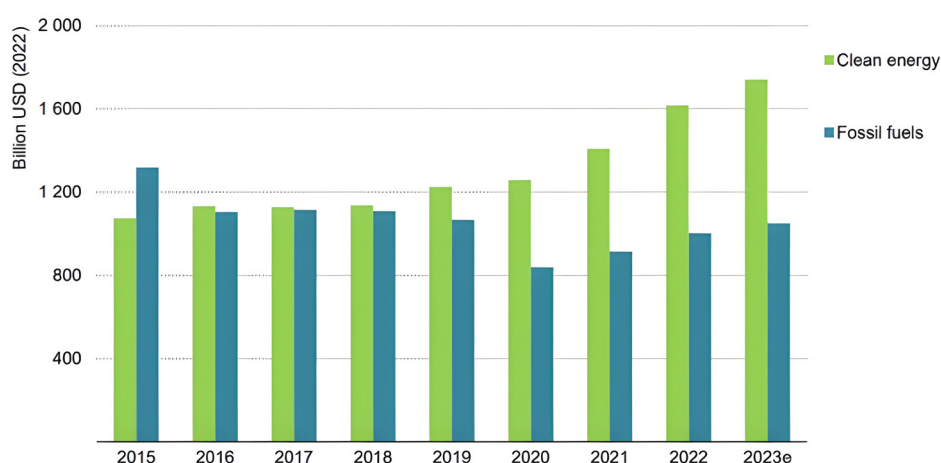
International organizations firmly emphasize that sustainable finance involves a strategic process of considering environmental, social, and governance impacts in the financial sectors' investment decisionmaking where **mainstreaming climate mitigation strategies and private finance mobilization for clean and resilient growth must be championed.** Hence, ecological, climate, and social finance with a broader focus on the long-term viability of the entire financial system must be incorporated.

The Philippines Economic Update (PEU) by the World Bank in June 2023 recognized the importance of enhancing the ambition of the country's decarbonization efforts to optimize additional local and global environmental benefits.¹³¹ It emphasized the importance of securing international assistance and establishing cost-sharing arrangements to support this endeavor. Specific areas identified for further assessment to guide decarbonization policies and actions include:

¹³¹ Source: *The World Bank Philippines Economic Update: Securing a Clean Energy Future – June 2023*

- Evaluating the impact of accelerated electrification within the transport sector, taking into account the growing utilization of electric vehicles (EVs) in the Philippines. A higher utilization of EVs could significantly raise the electricity demand and require extensive rehabilitation of power distribution networks increasing investment needs in power supply.
- Assessing the implications of energy transition on resilience, including a comprehensive understanding of the geospatial aspects of climate risks and their impact on the expansion of the power system, as well as the costs and benefits of strengthening resilience. This would help enhance power system planning and implementation of suitable risk-mitigation strategies.
- Understanding the financial requirements essential for an energy transition and effectively allocating risks between the private and public sectors. Insights into the different sources of capital would help avoid unnecessary delays and costs of inaction.
- Leveraging analytics to optimize the planning and execution of initiatives related to renewable energy (RE) and energy efficiency and conservation (EEC). Assessment of the needs and gaps for implementing the NREP should be undertaken to identify critical bottlenecks (transmission capacity and grid flexibility, land use, permits, labor, and skills needs, equipment standards, procurement rules, financing constraints, among others).
- Evaluating the effectiveness of carbon pricing as a facilitative tool for advancing the energy transition. The introduction of carbon pricing, either as a carbon tax or an emissions trading system, could incentivize firms and individuals to adopt low-carbon technologies while raising revenues, which could be used to support the energy transition.
- Analyzing the socioeconomic implications with the gradual reduction of coal-fired power utilization in the Philippines. The need to conduct a better assessment of the economic, social, and financial risks of stranded assets (not only coal but also natural gas infrastructure).

Figure 29. **Global Energy Investment in Clean Energy and Fossil Fuels, 2015-2023**



Source: International Energy Agency <https://www.iea.org/reports/world-energy-investment-2023>

According to the International Energy Agency (IEA) Net Zero Emissions by 2050 Scenario (NZE),¹³² approximately 70.0 percent of clean energy investment in the coming decade must be driven by private developers, consumers, and financiers. The rapid escalation of investments in clean technologies is dependent on improving access to affordable financing, particularly in emerging and developing economies. Transitioning to clean energy requires a substantial increase in both equity and debt, with capital structures relying on the broad mobilization of low-cost debt. This is exemplified in the case of new capital-intensive, utility-scale solar projects, which are underpinned by long-term power purchase agreements.

¹³² <https://www.iea.org/reports/world-energy-investment-2023>



Based on the IEA estimates, the world must invest approximately USD 2.8 trillion in energy in 2023, with more than USD 1.7 trillion (*Figure 29*) allocated to clean energy initiatives. This underscores the need to gradually transition towards a cleaner and more sustainable energy future. The projected USD 1.7 trillion in key investment is comprised of the following components:

- RE for power with USD 501 billion (29.0 percent);
- Nuclear power USD 103 to 125 billion per year¹³³ (6.0 percent);
- Electricity grids with USD 472 to 600 billion per year¹³⁴ (28.0 percent);
- Energy storage with USD 117 billion (7.0 percent);
- Low-emission fuels¹³⁵ with USD 194 billion (10.0 percent);
- Efficiency improvements with USD 232 billion (14.0 percent); and,
- End-use renewables and electrification with USD 107 billion (6.0 percent):

The IEA's investment projection is based on a scenario that would put the world on track to achieve net-zero emissions by 2050. It also aligns with other assessments of the investment costs of the energy transition. The **International Renewable Energy Agency (IRENA)** estimates¹³⁶ that the world needs to invest around USD 131.0 trillion in RE by 2050 to achieve a net-zero emission future.

Clean Energy Finance Initiatives in the Philippines

The Philippines for its part proactively embarked on initiatives to foster investment in clean energy. In the 2023 Climatescope Report by Bloomberg New Energy Finance, **the Philippines ranks fourth among the most appealing emerging markets** for RE, a testament of the country's robust clean energy programs and initiatives.

The Bangko Sentral ng Pilipinas (BSP), recognizing the risks encountered by financial institutions, introduced the **Sustainable Finance Framework**¹³⁷ on 29 April 2020. The framework is intended to be integrated by financial institutions in their sustainability principles and embedded in their corporate governance framework, risk management systems, and strategic objectives. Correspondingly, the **Philippine Sustainable Finance Roadmap**, formulated through the efforts of the Inter-Agency Technical Working Group for Sustainable Finance (Green Force) and launched on 20 October 2021, takes a comprehensive approach by delineating and facilitating holistic strategies for sustainable finance. The three (3) pillars that focus on policy, financing, and investment are:

- **Creating a conducive environment** that aims to strengthen policies in improving transparency on climate-related finance, develop policies to promote sustainability risk management, conduct capacity building to raise awareness regarding sustainable finance, and enhance reporting of green and climate finance flows;
- **Mainstreaming development finance** which encourages sustainable financial products via penalties and incentives, leverage on available financing, and establishing a sustainable insurance mechanism; and
- **Developing a sustainable pipeline** whose purpose is to establish a sustainable pipeline database for the public and private sectors, monitor progress, and provide regular updates, including linking the sustainable pipeline to SDGs, Philippine Development Plan (PDP), and Nationally Determined Contribution (NDC) targets.

It is noteworthy that each pillar lays out specific strategic plans consistent with current initiatives and policies regulated.

¹³³ <https://www.iea.org/energy-system/electricity/nuclear-power>

¹³⁴ <https://www.iea.org/energy-system/electricity/smart-grids>

¹³⁵ "Low-emission fuels" include modern liquid and gaseous bioenergy, low-emission hydrogen, and low-emission hydrogen-based fuels; "Other end use" refers to renewables for end use and electrification in the buildings, transport, and industrial sectors.

¹³⁶ <https://www.irena.org/publications/2021/Jun/World-Energy-Transitions-Outlook>

¹³⁷ BSP Circular No. 1085 series of 2020

The Securities and Exchange Commission (SEC) is one of the government agencies that aligned its efforts with the Sustainable Finance Roadmap. As oversight of corporations and securities including capital market institutions and its participants, it issued corresponding guidelines to promote good governance and support the deepening of the capital market through sustainable investment products.

These guidelines include SEC Memorandum Circular (MC) No. 4 s. 2019 or the Sustainability Reporting Guidelines for Publicly Listed Companies (PLCs) and SEC MC No. 11 s. 2022 or the Rules on Sustainable and Responsible Investment Funds. The former primarily aids PLCs in assessing its non-financial performance and monitoring of its contributions towards achieving universal targets of sustainability set by various initiatives (i.e., UN SDGs). The latter sets the guidelines for the newly formed and existing investment companies that are qualified as Sustainable and Responsible Investment (SRI) Funds.

In 2023, the SEC issued MC No. 3. s. 2023 or the Guidelines on the Issuance of Sustainability-Linked Bonds under the ASEAN Sustainability-Linked Bond Standards (SLBS) in the Philippines. The guidelines intend to primarily govern the issuance of the sustainability-linked bonds¹³⁸ where the proceeds are to be used for general purposes.

In December 2022, the Philippines issued USD 6.58 billion of Green, Social and Sustainability (GSS) bond as part of the initiatives on Green and Sustainable Capital Market. Said amount accounted for 21.0 percent of the total ASEAN-Labelled GSS of USD 30.64 billion in the same year.¹³⁹

The other SEC initiatives related with sustainable finance are its involvement in the ASEAN Capital Markets Forum (ACMF) and ASEAN Taxonomy Board.

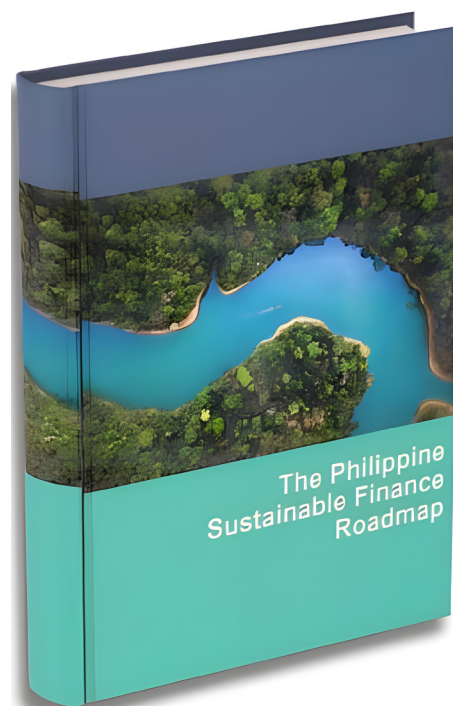
The Philippine Guarantee Corporation (PHILGUARANTEE), as part of its mandate, provides credit guarantees for financial to support trade and investment, infrastructure, agricultural modernization, and energy, among others. PHILGUARANTEE extends such for financing sustainable energy projects including those under the National Renewable Energy Program (NREP) through the Sustainable Energy Credit Guarantee Facility (SEGF).¹⁴⁰

Sustainable Finance Roadmap

The Roadmap along with its Guiding Principles for the adoption of low-carbon energy solutions is expected to stimulate investments that will support the country's NDC and align financial and economic strategies with environmental objectives.

It underscores the activities for both the greening of the financial system and the financing of sustainable activities, with a focus on climate change as a critical contributor to the achievement of the SDGs. It also provides the strategic action plan of the government to promote sustainable finance in the Philippines and address climate change and other environmental and social risks. It was prepared to:

- Outline the goals that will support the current initiatives and policies to create a supportive environment for the widespread adoption of sustainable finance in the country;
- Determine priority areas and acknowledge the basis for improvements relating to sustainable finance;
- Provide strategic direction and recommendations to accelerate sustainable finance; and,
- Provide investment and policy signals to support the transition to a sustainable economy.



¹³⁸ Sustainability-linked bonds are any type of bond instrument for which the financial and/or structural characteristics can vary depending on whether the issuer achieves predefined sustainability/environmental, social, and governance objectives. Issuers are thereby committing explicitly to future improvements in sustainability outcomes within a predefined timeline. Sustainability-linked bonds are also forward looking. The sustainability/ESG objectives are measured through predefined key performance indicators (KPIs) and assessed against predefined sustainability performance targets (SPTs) (ASEAN Capital Markets Forum, 2022. ASEAN Sustainability-Linked Bond Standards. Available at <https://www.theacmf.org/sustainable-finance/publications/asean-sustainability-linked-bond-standards>)

¹³⁹ In Dec 2023, the Philippines issued USD10.11 billion of GSS, about 22.0 percent of total ASEAN-Labelled GSS. Securities and Exchange Commission. <https://www.sec.gov.ph/cm-sustainable-2022/sustainable-finance-market-update-as-of-december-2022/#gsc.tab=0>

¹⁴⁰ Sustainable Energy Credit Guarantee Facility (SEGF). (n.d.). Philippine Guarantee Corporation. <https://www.philguarantee.gov.ph/programs/guarantee-programs/corporate-msme/sustainable-energy-credit-guarantee-facility-segf/>



The heightened interest in pursuing green projects, as well as adherence to the 11-Point Sustainable Central Banking Strategy, prompted the BSP to scale up sustainable finance in the country with the issuance of the **BSP Circular 1185 series of 2023** on 13 December 2023. The policy amended the regulation on credit exposure limits to a single borrower and rates of required reserves as provided under Sections 362 and 251 of the Manual of Regulations for Banks (MORB). Specifically, the said Circular stipulated the following: a) grant of additional single borrower’s limit (SBL) of 15.0 percent of net worth of loans, credit accommodation, and guarantees for the purpose of financing eligible green or sustainable projects including transitional activities to decarbonization; and b) gradual reduction of the reserve requirement (RR) rate to zero percent against new and outstanding sustainable bonds issued by banks. The objective of these measures is to assist in the financing of eligible projects that contribute to the government’s climate commitments and SDGs as articulated in the PDP and NDC.

In support of the commitments outlined in the roadmap, the BSP through the Financial Sector Forum (FSF)¹⁴¹ issued the **Philippine Sustainable Finance Taxonomy Guidelines (SFTG)** through BSP Circular No. 1187 series of 2024 on 21 February 2024. The SFTG serves as a tool for determining whether an economic activity is environmentally and socially sustainable, as well as guides stakeholders in their investment and financing decisions.

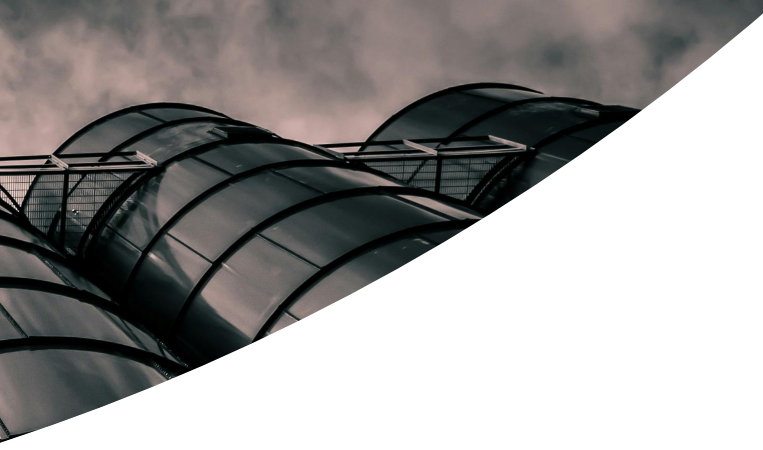
The SFTG is a dynamic document denoting that it is responsive to changes and can be subjected to periodic review. It also adopted a phased approach, designed for inclusivity, and relates to key government policies and regional frameworks. A phased approach allows for effective, iterative, cooperative, and user-focused development. It is inclusive in the sense that it offers direction to the financial sector and other potential users with respect to categorizing sustainable finance and investment activities. Moreover, inclusivity means that the taxonomy can be continuously tested, adjusted, and improved to better fit the demand of users.

It also offers a more detailed technique for evaluating economic operations based on the criteria outlined in the **Philippine Sustainable Finance Guiding Principles** (shown in Table 59). Further, the SFTG aims to direct and increase capital flows to economic activities including greenhouse gas (GHG) emission reduction and building climate resilience, which promotes transparency and credibility by minimizing the risk of greenwashing and supports a just transition to a sustainable economy. The guideline also highlights the country’s key priorities for reducing GHG emissions and lessening the effects of climate change. It encompasses various objectives for both adaptation and mitigation of climate change.

Table 59. **The Philippine Sustainable Finance Guiding Principles**

Guiding Principle 1:	Climate Change Mitigation and Adaptation
Guiding Principle 2:	Promoting Transition to a Low-Carbon Economy
Guiding Principle 3:	Resilient Food Systems
Guiding Principle 4:	Sustainable Cities
Guiding Principle 5:	Sustainable and Resilient Infrastructure for Inclusive Growth and Poverty Reduction
Guiding Principle 6:	Environmental Management and Conservation
Guiding Principle 7:	Prohibited Activities

¹⁴¹ The FSF is a voluntary interagency body comprised of the Bangko Sentral ng Pilipinas (BSP), Securities and Exchange Commission (SEC), Insurance Commission (IC), and the Philippine Deposit Insurance Corporation (PDIC) aimed at (i) facilitating consultations and exchange of information among its members on matters relating to the supervision and regulation of financial institutions, and (ii) coordinating the regulatory and supervisory policies and efforts of the member agencies.



One of the significant aspects of the SFTG is the **“Traffic Light” Classification System** which uses a set of guidelines, questions, and decision trees to evaluate activities and assign a classification of **“Green,” “Amber”** or **“Red”** as shown in *Figure 30*. This principle-based method of activity classification seeks to provide simplicity by first applying the Essential Criteria, followed by a qualitative evaluation of an entity’s activity in relation to the pertinent Environmental Objectives (EO). These classifications are intended to accommodate various SFTG users. When an activity is categorized as **“Red”**, it does not necessarily indicate that the activity is unsustainable, but rather it failed to meet the SFTG sustainability ambition or pass the **“do no significant harm” (DNSH)** or **“minimum social safeguards” (MSS)** tests.

Figure 30. **Traffic Light Classification System**

CATEGORY	DEFINITION
Green	The activity is making a substantial contribution to an EO and meets the Essential Criteria of DNSH and MSS.
Amber	The activity makes a substantial contribution to an EO but causes significant harm to another EO. However, that harm can be remediated within five (5) years, or an independent verification supports a claim that remediation will take less than 10 years. It must also meet the Essential Criteria of DNSH and MSS.
Red	The Activity does not serve any EO or meet the Essential Criteria.

Note: EO - Environmental Objectives - DNSH - Do No Significant Harm; MSS - Minimum Social Safeguards

Accordingly, intergovernmental organizations, such as the Organization for Economic Cooperation and Development (OECD) initiated programs such as the Sustainable Infrastructure Programme in Asia (SIPA)¹⁴² wherein the Clean Energy Finance and Investment Mobilisation (CEFIM) Programme is one of its outputs that centers on sustainable finance of clean energy projects particularly renewables and energy efficiency.

Clean Energy Finance and Investment Mobilisation Program

The CEFIM Program serves as the energy arm of SIPA. It aims to help accelerate finance and investment in emerging economies (including the Philippines) in RE and energy efficiency (clean energy) projects. In support of its implementation and to strengthen domestic enabling conditions for both sectors, the DOE issued Department Order (DO) 2022-02-0003¹⁴³ and Special Order (SO) 2022-02-0005¹⁴⁴ creating the CEFIM Philippine Steering Committee (PSC) and the Technical Working Groups (TWGs) for RE and EEC.



The PSC is headed by the DOE Undersecretary for Planning, while NEDA serves as the Vice-Chairperson. The members include the BSP, Department of Finance (DOF), Department of Environment and Natural Resources (DENR), Board of Investments (BOI), Development Bank of the Philippines (DBP), Philippine Economic Zone Authority (PEZA), and SEC. Meanwhile, the TWGs for RE and EEC are led by the Directors of DOE’s Renewable Energy Management Bureau (REMB) and Energy Utilization Management Bureau (EUMB).

¹⁴² SIPA is an ambitious policy support and capacity development program that aims to support selected Central and Southeast Asian countries channel investment flows into infrastructure investments aligned with their climate goals, international standards, and SDGs.

¹⁴³ Issued on 21 February 2022.

¹⁴⁴ Issued on 21 February 2022.



The PSC and TWG Members with OECD during the 1st CEFI Consultation Workshop held on 31 May 2022 at Makati Diamond Hotel, Makati City

The CEFIM Program aims to develop a **Clean Energy Finance and Investment (CEFI) Roadmap for the Philippines**, which will bring government and private sector stakeholders together to agree upon a clear action plan that identifies and addresses bottlenecks complicating or constraining finance and investment in the country’s clean energy sector. This also complements the financial sector’s priorities to promote sustainable practices through corporate social responsibility and business responsibility reporting. Through the CEFI roadmap, innovative financing solutions and effective investment actions will be identified to deepen local capital markets, bring in investors, and attract international capital on clean energy, specifically for the two (2) clean energy thematic areas: *i) Offshore Wind (OSW) power and ii) energy efficiency focusing on the public building sector.*

Two consultation workshops were jointly organized by the DOE and OECD under the CEFIM Program, held in May and November 2022 in Makati City and Panglao, Bohol, respectively. The first workshop identified and discussed key barriers to scaling up finance and investment for clean energy in the Philippines, while the second workshop identified potential policy and financial solutions, including actions to unlock finance and investment in OSW and EEC in public buildings.



Clean Energy Finance Framework

In recent years, the Philippines significantly ramped up its endeavors to gradually transition the country’s energy system. In April 2021, the government took a notable step by submitting its initial NDC target, pledging to achieve a 75.0 percent reduction in emissions from 2020 to 2030. While the Philippines does not have a specific net-zero GHG goal, the conditional commitment of the NDC is well-aligned with the stringent one point five degrees Celsius (1.5°C) limit established in the Paris Agreement.

The 2nd CEFI Consultation Workshop held on 24 November 2022 in Panglao, Bohol brought together key public and private stakeholders.

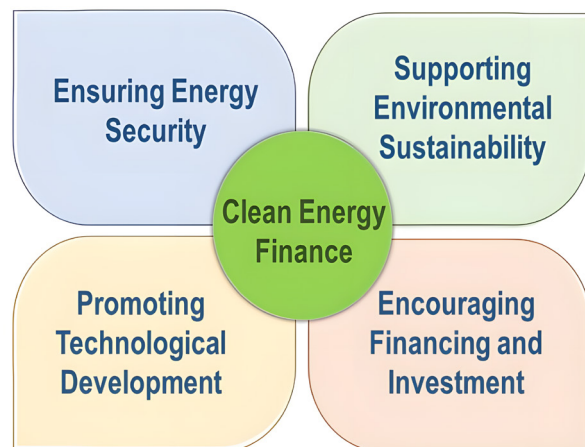


The government is actively fostering RE adoption through the implementation of RA 9513 or the RE Act of 2008, and the NREP 2020–2040. The policy and program initiatives are directed towards bridging a notable deficiency in the low-carbon energy spectrum, with a goal of achieving a 35.0 percent RE contribution to the power generation mix by 2030, and 50.0 percent by 2040 onwards (2050) under the Reference Scenario (REF), while the Clean Energy Scenario (CES) adopts an aggressive target of more than 50.0 percent RE share by 2050.

Energy efficiency also holds a pivotal role in the country’s emission reduction efforts. The government deems that effectively implementing EEC measures lead to a decrease in the energy intensity of the production of goods and services and lower GHG emissions across various sectors. The adoption of the Government Energy Management Program (GEMP) also advances efficiency in the way the public sector consumes electricity and petroleum.

Given the promising potential of OSW and EEC in achieving the government’s aspiration of a sustainable supply and curbing demand, it is critical to establish a **Clean Energy Finance Framework** to instigate development and unlock investments that can deliver benefits to local communities and the economy. The framework as shown in *Figure 31* is built around four (4) cornerstones: **attaining energy security, supporting environmental sustainability, encouraging technological development, and providing access to financing and investments**, capitalizing on the potential commercial applications of OSW and EEC. It also encourages private sector investment through the establishment of funding channels and support programs by leveraging smart local and global relationships.

Figure 31. Clean Energy Finance Framework



Ensuring Energy Security. Energy security has emerged as a significant global concern due to the rising demand for energy, geopolitical tensions, and the environmental repercussions associated with conventional energy sources. Addressing the challenge requires RE and EEC measures as these are critical in reducing dependence on imported fuels and enhancing the economy’s energy utilization.

Supporting Environmental Sustainability. Recognizing the potential of OSW and EEC measures as contributory to the path towards attaining a low-carbon future, it is essential to enable the mobilization of financial resources and investments toward achieving clean energy targets and sustainable finance goals. These will aid in reducing carbon footprints and achieving the target RE contribution to the power generation mix.

Promoting Technological Development. Pursuing technological advancement is deemed to drive innovation and improve the use of efficient technologies. Technological progress can be achieved through continuous research and development (R&D) and collaboration with local and foreign institutions.

Encouraging Financing and Investment. The major impediments to funding RE and EEC projects in the public building sector include the absence of standards, issues with adequate work staff capacity, a dearth of skills, and budgetary constraints of the local government units (LGUs). Thus, increased access to capital and investment is necessary to mobilize the financial resources required for these projects. This will accelerate the development of clean energy projects, as well as promote potential job creation for Filipinos. One effective approach is to benchmark foreign investors' programs and consider issuing ordinances or circulars that encourage banks to invest in local projects.

Mobilizing Finance and Investment Roadmap

The CEFI Roadmap outlines critical actions to help unlock finance and investment in the Philippines for the identified thematic areas. Ensuring a sound policy framework and investment environment are essential to mobilize domestic and foreign sources of capital to a level commensurate with the country's clean energy ambitions.

Enabling Finance and Investment in Offshore Wind Power

The Philippines, with its extensive coastlines and favorable wind conditions, stands as a nation with significant potential for OSW development. This technology emerged as a frontrunner in the pursuit of clean, reliable, and abundant energy generation. As countries worldwide commit to achieving climate objectives and curbing carbon emissions, the importance of financial investment in OSW has taken center stage. *Figure 32* outlines the key actions to ensure the rapid development of OSW in the country.

- **Long-term vision and common guiding principles.** The creation of an all-inclusive OSW strategy should encompass a vision for local supply chain infrastructure development, cost reduction plans, and improved incentives to encourage private initiatives.

The formulation of clear, specific, and time-bound targets can enable both the government and the industry to make informed investment decisions on the country's future electricity mix. Different targets and roles for fixed-bottom and floating OSW technologies can be considered to reflect the different stages of maturity, cost structures, and revenue potential for both technologies.

- **Enhanced cross-government collaboration** is needed to convert the high OSW potential into bankable projects and broader socio-economic benefits for the Philippines. Strengthening the coordination between the different government agencies can also guarantee supply chain resilience, develop the needed onshore support infrastructure, and facilitate economies of scale.

Defining a clear role for fixed-bottom and floating OSW in the future generation mix can guide target-setting for installed capacity over the planning period. Quantifiable targets ensure that development plans, which include the provisions for licensing, permitting, grid connection, and supply chain infrastructure (such as ports, roads, and manufacturing capacity), are coherent and well-coordinated. It is important that this coherence is reflected in aligned Maritime Spatial Planning, Power Development Plan, and Transmission Development Plan, and NREP.

- **Data collection and integration with the permitting process.** In collaboration with the National Mapping and Resource Information Authority (NAMRIA), an inter-departmental effort would be beneficial to locate, consolidate, and publish existing bathymetric and geological data collected from previous offshore oil and gas field projects. The database can be supplemented with other relevant topographical data, such as information about exposure to earthquake or typhoon risks. Further, spatial maps of areas currently unavailable for commercial development, including shipping or trade routes, military zones, and areas already under contract, should be included, especially if they are not already accessible on NAMRIA digital platforms.
- **Offshore wind permitting, planning and one-stop shop.** The integration of OSW into the country's Energy Virtual one-stop-shop (EVOSS) and the creation of a unified permitting process can simplify early project development, avoid the risk of permit duplication, and reduce administrative barriers to entry. A clear configuration of roles and responsibilities for all the government agencies involved in OSW planning and permitting would allow for its successful rollout in the EVOSS. Likewise, investing in digital tools, human resources and talent development for the OSW one-stop shop will ensure that the process is efficient, transparent, and consistent.

Figure 32. Offshore Wind Roadmap



- **Auction Design and Regulatory Framework.** The Green Energy Auction Program (GEAP) serves as a valuable tool in fostering a competitive procurement environment for OSW projects. Enhancing its effectiveness hinges on granting the industry clear insights into timing, project volumes, and pricing. Parallel to this, the government may also adopt an open-door policy for a developer-driven market contingent upon proper planning and permitting for projects.

Achieving economic viability for capital-intensive OSW projects requires revenue stabilization measures during the initial stages of market development to attract affordable and long-term financing. The entry of early projects is facilitative in building the supply chain, establishing a track record, and instilling investor confidence, all of which contribute to lowering the financing cost. In this context, it is essential to establish a transparent costing methodology for offshore wind prior to setting the ceiling prices (Green Energy Auction Reserve / GEAR Price) in the current auction design. Moreover, maintaining an inflation-indexed tariff is vital to mitigate some of the macroeconomic risks associated with projects.

In addition to policy support, corporate Power Purchase Agreements (PPAs) can serve as supplementary revenue stabilization tools. However, it is imperative that the policies governing these contracts provide clear, unambiguous rules, roles, and responsibilities for the contracting parties.

- **Transmission planning.** Efforts in developing OSW must be complemented by advancements in transmission grid infrastructure. Expediting grid expansion and optimizing its utilization is of paramount importance for integrating OSW into the generation mix as it mitigates congestion, reduces curtailed power, and enhances the economic viability of OSW projects. This is dependent upon the timely realization of the centralized national grid project which interconnects the three main grids of the country.

Further, simplifying the process of project inclusion in the Transmission Development Plan and ensuring the DOE and National Transmission Corporation's (TransCo) active participation in its formulation can prevent delays in connections. Proactive grid planning, jointly undertaken by the DOE, TransCo, and the National Grid Corporation of the Philippines (NGCP), for accommodating larger volumes of OSW capacity additions can result in reduced project costs and lessen the required investments for onshore grid upgrades.

- **Onshore support facilities and Port Upgrades.** Investing in onshore support facilities including port infrastructure will assist in unlocking the country's OSW potential. This encompasses the development of efficient transportation systems and well-equipped port terminals as well as establishing storage and assembly facilities (for wind components), training areas, and dedicated spaces for operation and maintenance facilities.

Conducting assessments to gauge the readiness of these ports and the broader onshore support infrastructure can be undertaken in collaboration with the Department of Transportation (DOTr). Such assessments should be factored into the future planning and development of policies for offshore-related infrastructure.

- **Financial Considerations.** An inclusive project finance mechanism is crucial for achieving the optimization required to lower the cost of finance and capital. Bringing in a variety of financiers with diverse risk profiles at different stages of project development can support the industry in recycling capital and freeing up resources for new projects.

Multilateral development banks (MDBs), international financial institutions (IFIs), and Export Credit Agencies (ECAs) are key in advancing OSW development. Success relies on their complementary and collaborative efforts. The Regional MDBs can bridge the investment gap in enabling infrastructure and onshore support facilities,

while the IFIs can establish first-loss guarantee¹⁴⁵ financial instruments to stimulate private sector investments. On the other hand, the ECAs can intervene at the project level to enhance the risk absorption structure of transactions.

- **Capacity Building.** A well-trained workforce with the requisite skills enhances the competitiveness of the OSW sector and fosters local supply chain growth. Both government and international organizations can augment these efforts by offering support for human capacity development (i.e., rightskilling and retraining of Filipino workers to prepare them for careers across the OSW supply chain).

Additionally, incentives can be introduced to facilitate the transfer of skills from the oil and gas sector leveraging existing expertise. Another approach is to incentivize overseas Filipino professionals to return home, bringing their valuable international experience to contribute to the domestic offshore wind industry. These measures collectively contribute to a well-prepared and skilled workforce in the sector.

Innovative Funding and Business Models for Energy Efficiency in Public Buildings

In line with the country's dedication to achieving sustainable development goals and complying with the Paris Agreement, the government continues its commitment to executing programs and advocating for the merits and advantages of EEC, particularly in the building sector. This approach aims to expedite financial support and investments in the sector. To facilitate these endeavors, *Figure 33* outlines essential actions and recommendations, forming the cornerstone of the CEFI Roadmap on EEC in public buildings.

- **Enhanced Cross-Government Collaboration and Integrated Planning.** An enhanced collaboration and integrated planning between national and local government should be guided with a clear statement of targets and goals, as well as a strategy that involves relevant stakeholders that can help mainstream implementation of EEC strategies. The creation of a working group focused on EEC in public buildings can facilitate this thereby strengthening the foundation of EEC plans and programs, expanding performance standards, fostering innovation, and unlocking new opportunities and networks.
- **Regulatory Reforms.** One of the primary objectives of regulatory reform is to enhance the efficiency and effectiveness of national economies, resulting in improved productivity and services that benefit both consumers and industries. Thus, the adjustment of public procurement and accounting rules and regulations in the Philippines serve as a crucial mechanism to encourage energy efficiency projects within public buildings.

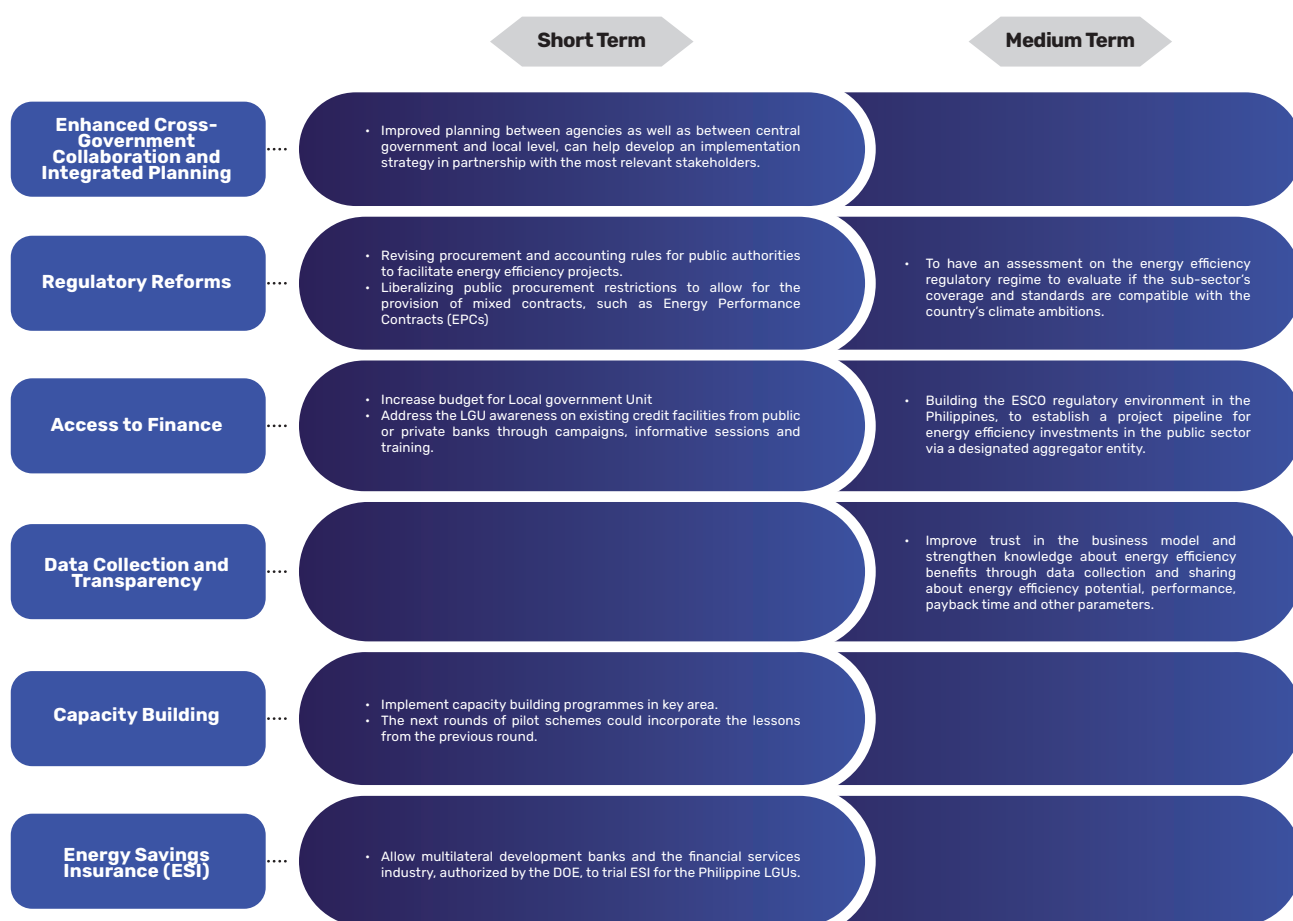
This can be achieved through the implementation of specific carve-outs or by revisiting procurement rules to accommodate projects that enable the use of mixed contracts, such as Energy Performance Contracts (EPCs). This flexibility allows service providers to independently fund the initial outlays without depending on mobilization payments.

Likewise, to effectively monitor the benefit of the reforms, a broader assessment of EEC regulations may be implemented to evaluate if the sub-sector coverage and standards are compatible with the Philippines' ambition.

¹⁴⁵First loss guarantee is a technique commonly used in the securitization of assets to provide credit enhancement where a third party agrees to indemnify holders for a given amount or percentage of any losses from the asset pool.

(https://books.google.com/books?id=xyL2Uw0sc5IC&pg=PA223&lpg=PA223&dq=First+loss+guarantee+is+a+technique+commonly+used+in+the+securitization+of+assets+to+provide+credit+enhancement+where+a+third+party+agrees+to+indemnify+holders+for+a+given+amount+or+percentage+of+any+losses+from+the+asset+pool.&source=bl&ots=NEC88gFUVu&sig=ACFU3U3Z5RZJSCN3XDj_861WKWbVt_-w&hl=en&sa=X&ved=2ahUKewiiq6GJtayEAvSe_UHhcJDAIoO6AF6BAgJEAM#v=onepage&q=First%20loss%20guarantee%20is%20a%20technique%20commonly%20used%20in%20the%20securitization%20of%20assets%20to%20provide%20credit%20enhancement%20where%20a%20third%20party%20agrees%20to%20indemnify%20holders%20for%20a%20given%20amount%20or%20percentage%20of%20any%20losses%20from%20the%20asset%20pool.&f=false)

Figure 33. Energy Efficiency and Conservation Roadmap



- **Access to Finance.** Budgetary constraints represent a significant hurdle to EEC implementation in the building sector. Addressing this issue requires the government to consider assessing and evaluating the potential increase in budget allocations for LGU's EEC projects. This will ensure that the necessary resources and technical expertise are in place before project formulation and execution.

Likewise, collaboration with international development partners and the private sector is vital for the advancement of EEC in public buildings. Such collaboration can provide support to LGUs in terms of i) designing a robust and realistic strategy for EEC projects; ii) enhancing LGU's awareness of available commercial funding options; and iii) facilitating open dialogues between lenders and EEC project promoters within the LGUs.

These efforts are instrumental in overcoming budgetary constraints and promoting the successful implementation of energy efficiency projects.

- **Data Collection and Transparency** are crucial in engaging stakeholders and crafting successful projects. Effective data collection that is focused on pertinent information enhances the security and efficiency of developing an EEC business model. This process also broadens stakeholders' comprehension of the project and can serve as an input for the Building Energy Efficiency Index (BEEI), which measures a building's energy performance.
- **Capacity Building.** Sustained implementation of capacity-building and awareness-raising programs is essential for assisting LGUs in identifying and capitalizing on EEC opportunities. These programs serve as the building blocks for stakeholders' knowledge and expertise.

Capacity building can encompass the entire EEC project supply chain, covering aspects like policy and regulations, project origination, implementation, financing, incentives, and performance data and analytics.

Moreover, with the collaboration of international partners, capacity-building efforts can target a diverse range of groups, including policymakers, LGUs, technology providers, industry professionals, financial institutions, commercial end-users, and civil society. These initiatives collectively strengthen the foundation for effective EEC implementation and promote sustainable energy practices.

- **Energy Saving Insurance** is a valuable mechanism that ensures revenue from energy savings by way of an insurance policy. Further, permitting multilateral banks to employ this mechanism and work in collaboration with LGUs can enhance investor confidence and facilitate improved access to low-cost financing for EEC projects. This approach can offer added financial security and attractiveness to potential EEC investors and stakeholders.

Private Sector Initiative on Energy Transition Finance

Navigating the energy transition path requires policy and finance as levers to assist in its realization. As the government continues to lay out the required directions, the private sector refers to this as guidance on a proactive and flexible approach to achieving sustainability and transition efforts.

Pioneering ETM Initiative

The Energy Transition Mechanism (ETM), which combines public and private investments, is promoted by the **Asian Development Bank (ADB)** with the intent of retiring coal power plants earlier than scheduled. The ADB is implementing its ETM for the Mindanao Coal-fired Power Plant, which operates under a build-operate-transfer (BOT) arrangement. It will finance the plant's retirement as early as 2026, five (5) years before the BOT agreement ends.

One of the companies in the country to successfully implement the first market based ETM is **ACEN**¹⁴⁶. The company is pioneering initiatives in the early retirement of fossil-fuel plants specifically coal-fired power plants (CFPPs) and diesel-based plants. Its venture is also guided by the corporate objectives and vision of 100 percent renewables generation by 2025, increasing RE capacity to 20 gigawatts (GW) by 2030, and committing to achieve net-zero emissions by 2050.¹⁴⁷

The ETM concept facilitated the divestment and early retirement of its 246-MW South Luzon Thermal Energy Corporation (SLTEC) CFPP in Batangas. This move to gradually transition its coal-based plant to cleaner technology is scheduled for completion by 2040, aligning with the plant's 25 years of operation. Among the benefits to be derived from the ETM implementation is the expected reduction of 50.0 million tons of carbon emissions. The company is also set to apply the same approach in its remaining diesel power plants.

This mechanism is underpinned by debt and equity investors – *local private banks covering the debt with equity coming from the Government Service Insurance System (GSIS) and private companies*. The three (3) enabling contracts that supported the ETM structure are the *Administrative and Management Agreement (AMA)*, *Operations and Maintenance Services Agreement (OMSA)*, and *Call Option* (shown in Figure 34).

Figure 34. Key Imperatives for a Successful TC Pilot



1. **Administrative and Management Agreement (AMA)** is also known as the offtake contract. In the current setup, ACEN remains to be the offtaker of SLTEC for a period of 25 years or until 2040. The AMA was then amended to allocate key risks to the offtaker, which includes technical, operating and capital costs, market, and fuel. The risk allocation is designed to ensure a consistent and predictable cash flow to the CFPP, thereby decreasing the cost of capital and enabling the ETM transaction.

2. **Operations and Maintenance Services Agreement (OMSA)** ensures that the plant operates in a safe, reliable, and efficient manner. The agreement signed between SLTEC and ACEN addresses three important matters:

- Provides comfort to the investors and lenders on asset management and operations.
- Helps SLTEC attain desired outcomes and realize the upside that ACEN has taken on.
- Enables ACEN to help CFPP workers transition into green jobs by integrating them into its rapidly growing RE ecosystem.

¹⁴⁶ RE platform of the Ayala Group and has 4,500 MW of capacity from owned facilities in the Philippines, Australia, Vietnam, Indonesia, and India.
¹⁴⁷ ACEN – Pioneering Early Coal Retirement



3. **Call Option** grants ACEN the right to repurchase the plant between 2030 and 2040. This allows ACEN to facilitate the early retirement of SLTEC and its transition to cleaner technology by 2040.

Through these enabling contracts, ACEN can further expedite the timeline for retiring the CFPP to as early as 2030 and accelerate coal retirement through transition credits.

Accelerating Coal Retirement Through Transition Credit

In addition to spearheading the market based ETM initiative, private companies are also exploring alternative mechanisms, such as the transition credit to facilitate the early retirement of coal. This mechanism considers the integration of transition credit into the ETM framework. By establishing transition credit, it aims to leverage carbon finance for the gradual replacement of CFPP with RE, ensuring a fair transition. This includes guaranteeing the cost of substitute energy and facilitating fair transitions for impacted workers and the local community.

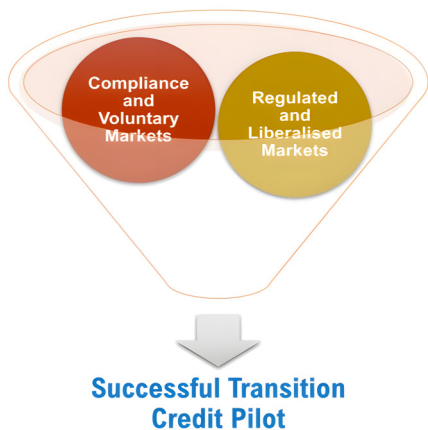
By aggressively developing RE sources, transition credit enables the replacement of lost generation from the CFPP. In a parallel effort, ACEN can expedite its plans to repurpose the asset, considering converting it into a large battery to support the Luzon grid, establishing a green manufacturing facility, or exploring other applications in close collaboration with LGU and other stakeholders.

Key Imperatives for a Successful Transition Credit Pilot

Figure 35 illustrates the crucial steps necessary for establishing the foundation of successful outcomes and ensuring the delivery of high-integrity transition credits. Currently, emerging methodologies place emphasis on the remaining term of the PPA as the basis for quantifying financial value and mitigating carbon emissions. This approach is suitable for regulated markets, such as Vietnam and Indonesia. However, PPAs can also be signed with retail clients, such as commercial and industrial entities, as well as other utilities in countries with liberalized markets, such as the Philippines.

On the other hand, addressing both compliance and voluntary markets strengthens the transition credit's integrity, presenting an opportunity to leverage Article 6.2 of the Paris Agreement¹⁴⁸ for establishing corresponding adjustments and entering into bilateral agreements with other countries.

Figure 35. Key Imperatives for a Successful TC Pilot CL



Carbon Market and Carbon Credits

A **carbon market** is primarily a trading system wherein carbon credits are bought and sold. The market can be used by companies, as well as individuals to compensate for their GHG emissions by purchasing carbon credits from entities that remove or reduce GHG emissions.¹⁴⁹

Two broad types of carbon markets exist – compliance and voluntary. Compliance markets are a result of national, regional, and/or international policy or regulatory environment. Meanwhile, voluntary (national and international) markets pertain to the issuance, buying, and selling of carbon credits voluntarily. The supply of carbon credits is mainly from private entities involved

¹⁴⁸ Article 6.2 allows countries to exchange carbon credits and other units, like renewable power in GW, directly with each other through bilateral agreements.

¹⁴⁹ Source: <https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important>

in developing carbon reduction projects or governments that developed programs on certified carbon standards. On the other hand, demand emanates from individuals wanting to compensate for their carbon footprints, corporations with corporate sustainability targets, and other actors aiming to trade credits at higher prices to earn a profit.¹⁵⁰

An example of a compliance market is the emissions trading system (ETS). One of the mature markets in Asia is the Korea ETS (K-ETS). Launched in 2015, the K-ETS is East Asia's first nationwide, mandatory ETS covering around 74.0 percent of South Korea's national GHG emissions. It is seen to aid the country in becoming carbon neutral by 2050 as espoused in the Carbon Neutral Framework Act of 2021. The K-ETS covers 684 of South Korea's largest emitters in the power, industrial, buildings, waste, transport, and domestic aviation sectors.¹⁵¹

A **carbon credit** is generated by a project that has avoided or removed GHG emissions. A credit is normally represented by one ton of carbon dioxide or another GHG equivalent in the atmosphere. Projects normally rely on the sale of carbon credits to operate and are independently audited to verify the tons of carbon emissions avoided or reduced. Carbon credits are also enablers for critical finance to flow to decarbonization projects which are important in ensuring that global climate goals are met.¹⁵²

The carbon credit issued to a particular company or organization is a representation of its emissions limit ("cap" in a cap-and-trade system). If a company or organization can limit its emissions below its cap, then there is effectively a surplus of carbon credits, which can be retained for future use or sold into the compliance carbon market. Companies or organizations that are unable to keep emissions under its limit are considered non-compliant and must make up for the difference. This paves for overemitters to get from the carbon market by purchasing carbon credits from under-emitters within the cap-and-trade network.¹⁵³

As countries transition to sustainability, carbon credits are viewed to contribute to reducing energy costs. This is because it can help support the development of clean energy sources thereby making these more affordable. Accordingly, a carbon credit market paves for a mechanism that leverages the financing sector and drives more investments into renewables.¹⁵⁴

Relatedly, carbon credit incentivizes companies or organizations to reduce their carbon footprint thereby allowing them to invest in sustainable practices which include RE projects, energy efficiency improvements, and carbon capture and storage technologies.¹⁵⁵

Energy Resiliency Financing

Strengthening resilience of energy infrastructure and facilities necessitates prioritizing investments in adaptation and mitigation strategies. Harnessing a range of funding mechanisms, including Public-Private Partnerships (PPPs) and innovative financing platforms, allows energy stakeholders and development partners to pool resources in building a robust and resilient energy sector. This collaborative approach is crucial for navigating the challenges posed by climate change and ensuring the sustainability of the country's energy systems.

To catalyze investments in energy resiliency, the DOE is committed to foster stronger partnership with other government agencies, development partners, and international funding institutions to tap viable international climate finance options. This involves accessing and leveraging resources from Green Climate Fund (GCF), Global Environment Facility (GEF), Adaptation Fund (AF), Climate Technology Center and Network (CTCN), and the Loss and Damage Fund (LDF), among others. Such collaboration has the potential to securing crucial funding streams that will significantly enhance efforts in strengthening the resilience of the energy sector against climate-related challenges.

Moreover, the Disaster Risk Financing and Insurance (DRFI) presents itself as a crucial innovative approach to mitigate the financial impacts of various hazards. The DRFI not only shields the energy infrastructure and systems from potential disruptions but also cushions the rate impact on consumers. The DOE shall establish mechanisms and guidelines to further strengthen DRFI practices within the energy sector. These measures will ensure accessible funding sources necessary for promoting resilience while incorporating safeguards to prevent any potential misuse or abuse of these financial resources.

¹⁵⁰ *Ibid*

¹⁵¹ Source: <https://icapcarbonaction.com/en/ets/korea-emissions-trading-scheme>

¹⁵² Source: <https://www.climateimpact.com/services-projects/carbon-credits-explained-what-they-are-and-how-they-work/>

¹⁵³ Source: <https://corporatefinanceinstitute.com/resources/esg/carbon-credit/>

¹⁵⁴ Source: <https://carboncredits.com/the-impact-of-carbon-credits-on-renewable-energy-development/>

¹⁵⁵ Source: <https://www.green.earth/carbon-credits>

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Annex 1 Cumulative Biodiesel Additional Production Capacity and Investment Requirements

Year	Demand (ML)			Total Capacity (MLPY)			Capacity Addition (80% Utilization Rate (MLPY))			Investment Cost (PhP Million @2022 Prices)			Jobs Generation		
	REF	CES1	CES2	REF	CES1	CES2	REF	CES1	CES2	REF	CES1	CES2	REF	CES1	CES2
2023	221.28	219.17	219.17	617.90	617.90	617.90	-	-	-	-	-	-	-	-	-
2024	229.29	337.76	337.76	806.78	806.78	806.78	-	-	-	-	-	-	-	-	-
2025	237.32	461.62	461.62	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2026	245.55	590.76	590.76	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2027	253.29	602.82	602.82	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2028	260.83	614.06	614.06	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2029	268.20	624.74	624.74	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2030	275.48	635.11	635.11	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2031	282.92	647.25	647.25	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2032	290.48	659.52	659.52	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2033	298.16	671.82	671.82	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2034	305.94	684.14	684.14	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2035	313.84	696.42	696.42	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2036	321.85	708.71	708.71	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2037	329.98	721.02	721.02	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2038	338.24	733.06	733.06	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2039	346.64	745.15	745.15	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2040	355.18	757.33	757.33	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2041	361.66	770.24	770.24	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2042	368.20	783.26	783.26	980.58	980.58	980.58	-	-	-	-	-	-	-	-	-
2043	374.79	796.42	796.42	980.58	995.52	995.52	-	14.94	14.94	-	77.44	77.44	-	16	16
2044	381.44	809.70	809.70	980.58	1,012.12	1,012.12	-	31.54	31.54	-	163.51	163.51	-	33	33
2045	388.16	823.12	823.12	980.58	1,028.90	1,028.90	-	48.32	48.32	-	250.46	250.46	-	50	50
2046	394.94	836.66	836.66	980.58	1,045.82	1,045.82	-	65.24	65.24	-	338.19	338.19	-	68	68
2047	401.77	850.32	850.32	980.58	1,062.90	1,062.90	-	82.32	82.32	-	426.72	426.72	-	86	86
2048	408.67	864.12	864.12	980.58	1,080.15	1,080.15	-	99.57	99.57	-	516.11	516.11	-	104	104
2049	415.63	878.04	878.04	980.58	1,097.56	1,097.56	-	116.98	116.98	-	606.35	606.35	-	122	122
2050	422.66	892.11	892.11	980.58	1,115.13	1,115.13	-	134.55	134.55	-	697.47	697.47	-	140	140

Note: On the assumption that the average investment cost per MLPY is PhP5,184 million

Annex 2. **Cumulative Bioethanol Additional Production Capacity and Investment Requirements (If All Locally Produced)**

Year	Demand (ML)		Total Capacity (MLPY)		Capacity Addition (80% Utilization Rate) (MLPY)		Investment Cost (PhP Million @2022 Prices)		Jobs Generation	
	REF	CES 1 & 2	REF	CES 1 & 2	REF	CES 1 & 2	REF	CES 1 & 2	REF	CES 1 & 2
2023	701.00	692.64	876.25	865.80	-	-	-	-	-	-
2024	722.59	703.71	903.23	879.63	399.23	375.63	22,720.73	21,377.67	2,256	2,122
2025	748.27	716.33	935.34	895.41	401.34	361.41	22,840.70	20,568.28	2,268	2,042
2026	777.91	730.43	972.39	913.03	438.39	379.03	24,949.21	21,571.15	2,477	2,142
2027	809.81	745.50	1,012.26	931.88	478.26	397.88	27,218.02	22,643.71	2,702	2,248
2028	841.75	759.68	1,052.19	949.60	518.19	415.60	29,490.58	23,652.29	2,928	2,348
2029	872.07	772.08	1,090.09	965.10	556.09	431.10	31,647.50	24,534.54	3,142	2,436
2030	900.34	782.55	1,125.43	978.19	591.43	444.19	33,658.68	25,279.04	3,342	2,510
2031	928.10	800.40	1,160.12	1,000.49	626.12	466.49	35,633.00	26,548.61	3,538	2,636
2032	954.87	817.15	1,193.58	1,021.44	659.58	487.44	37,537.45	27,740.76	3,727	2,754
2033	981.16	833.00	1,226.45	1,041.25	692.45	507.25	39,408.18	28,867.94	3,912	2,866
2034	1,007.25	848.16	1,259.07	1,060.20	725.07	526.20	41,264.15	29,946.36	4,097	2,973
2035	1,033.23	862.72	1,291.54	1,078.40	757.54	544.40	43,112.43	30,982.19	4,280	3,076
2036	1,059.13	876.70	1,323.91	1,095.88	789.91	561.88	44,954.72	31,977.14	4,463	3,175
2037	1,084.94	890.12	1,356.18	1,112.65	822.18	578.65	46,790.96	32,931.54	4,645	3,269
2038	1,110.67	902.39	1,388.34	1,127.99	854.34	593.99	48,621.04	33,804.67	4,827	3,356
2039	1,136.31	914.14	1,420.38	1,142.68	886.38	608.68	50,444.89	34,640.30	5,008	3,439
2040	1,161.86	924.85	1,452.33	1,156.06	918.33	622.06	52,262.85	35,402.15	5,189	3,515
2041	1,180.55	937.13	1,475.68	1,171.42	941.68	637.42	53,592.09	36,275.91	5,321	3,601
2042	1,198.91	949.13	1,498.64	1,186.41	964.64	652.41	54,898.68	37,129.28	5,450	3,686
2043	1,216.97	960.84	1,521.21	1,201.05	987.21	667.05	56,182.99	37,962.59	5,578	3,769
2044	1,234.72	972.28	1,543.40	1,215.35	1,009.40	681.35	57,445.83	38,776.47	5,703	3,850
2045	1,252.18	983.46	1,565.23	1,229.33	1,031.23	695.33	58,688.13	39,571.67	5,826	3,929
2046	1,269.37	994.39	1,586.71	1,242.98	1,052.71	708.98	59,910.83	40,348.94	5,948	4,006
2047	1,286.29	1,005.07	1,607.87	1,256.34	1,073.87	722.34	61,114.79	41,108.92	6,067	4,081
2048	1,302.97	1,015.52	1,628.71	1,269.40	1,094.71	735.40	62,300.74	41,852.21	6,185	4,155
2049	1,319.39	1,025.74	1,649.24	1,282.18	1,115.24	748.18	63,469.35	42,579.31	6,301	4,227
2050	1,335.58	1,035.74	1,669.48	1,294.67	1,135.48	760.67	64,621.21	43,290.65	6,415	4,298

The assumption of all bioethanol supply requirements is to be produced locally with an estimated investment of PhP56.91 million per MLPY capacity (average).

Annex 3. Cumulative Bioethanol Additional Production Capacity and Investment Requirements (If 60% Locally Produced)

Year	Demand (ML)		Total Capacity (MLPY)		Capacity Addition (80% Utilization Rate) (MLPY)		Investment Cost (PhP Million @2022 Prices)		Jobs Generation	
	REF	CES 1 & 2	REF	CES 1 & 2	REF	CES 1 & 2	REF	CES 1 & 2	REF	CES 1 & 2
2023	420.60	415.58	525.75	519.48	-	-	-	-	-	-
2024	433.55	422.22	541.94	527.78	37.94	23.78	2,159.21	1,353.37	214	134
2025	448.96	429.80	561.20	537.25	27.20	3.25	1,548.25	184.81	154	18
2026	466.75	438.26	583.43	547.82	49.43	13.82	2,813.36	786.52	279	78
2027	485.88	447.30	607.35	559.13	73.35	25.13	4,174.64	1,430.06	414	142
2028	505.05	455.81	631.31	569.76	97.31	35.76	5,538.19	2,035.21	550	202
2029	523.24	463.25	654.05	579.06	120.05	45.06	6,832.34	2,564.56	678	255
2030	540.21	469.53	675.26	586.91	141.26	52.91	8,039.04	3,011.26	798	299
2031	556.86	480.24	696.07	600.30	162.07	66.30	9,223.64	3,773.00	916	375
2032	572.92	490.29	716.15	612.87	182.15	78.87	10,366.30	4,488.29	1,029	446
2033	588.70	499.80	735.87	624.75	201.87	90.75	11,488.75	5,164.60	1,141	513
2034	604.35	508.89	755.44	636.12	221.44	102.12	12,602.33	5,811.65	1,251	577
2035	619.94	517.63	774.93	647.04	240.93	113.04	13,711.29	6,433.15	1,361	639
2036	635.48	526.02	794.35	657.53	260.35	123.53	14,816.66	7,030.12	1,471	698
2037	650.97	534.07	813.71	667.59	279.71	133.59	15,918.41	7,602.76	1,580	755
2038	666.40	541.44	833.00	676.80	299.00	142.80	17,016.46	8,126.63	1,689	807
2039	681.78	548.48	852.23	685.61	318.23	151.61	18,110.77	8,628.01	1,798	857
2040	697.12	554.91	871.40	693.64	337.40	159.64	19,201.55	9,085.13	1,906	902
2041	708.33	562.28	885.41	702.85	351.41	168.85	19,999.09	9,609.38	1,985	954
2042	719.35	569.48	899.19	711.85	365.19	177.85	20,783.04	10,121.40	2,063	1,005
2043	730.18	576.51	912.73	720.63	378.73	186.63	21,553.63	10,621.39	2,140	1,054
2044	740.83	583.37	926.04	729.21	392.04	195.21	22,311.33	11,109.72	2,215	1,103
2045	751.31	590.08	939.14	737.60	405.14	203.60	23,056.71	11,586.84	2,289	1,150
2046	761.62	596.63	952.03	745.79	418.03	211.79	23,790.34	12,053.20	2,362	1,197
2047	771.78	603.04	964.72	753.80	430.72	219.80	24,512.71	12,509.19	2,434	1,242
2048	781.78	609.31	977.22	761.64	443.22	227.64	25,224.28	12,955.16	2,504	1,286
2049	791.64	615.44	989.54	769.31	455.54	235.31	25,925.44	13,391.42	2,574	1,329
2050	801.35	621.44	1,001.69	776.80	467.69	242.80	26,616.56	13,818.22	2,642	1,372

The assumption of all bioethanol supply requirements is to be produced locally with an estimated investment of PhP56.91 million per MLPY capacity (average).

Annex 4. Renewable Energy (Pre-Development) Investment Requirement, Reference Scenario

Technology	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2025-2030	2031-2039	Total	
Geothermal	6533	6312	14676	3333	15330	-	-	4995	-	4995	-	8812	-	-	-	-	-	53256	-	-	-	-	-	-	-	-	-	-	-	-	-	631013
Solar	2489	2556	14339	6101	-	1029	4441	1424	9833	986	6069	1122	746	10348	1109	1039	15649	1624	2656	3240	557	228	7129	4683	18993	5141	6100	9427	99420	236015	3,05955	
Hydro	1427	3184	1651	-	-	2971	-	-	4974	-	-	6516	6533	6533	2631	4516	4533	4533	4213	-	-	16378	2377	47329	-	-	59421	32018	1134851	2,9244		
Wind	-	712	826	2135	-	9534	4936	12191	12291	4937	1219	1188	1188	21654	1188	13965	79239	24274	24524	24714	5035	3769	21232	615	18788	5481	5481	38354	38219	310936	3,49355	
Other Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	10430	-	1319	8632	10387	3126	-	-	-	51297	-	32619	-	-	-	-	88995	88995	
Other Wind	-	712	816	2135	-	9534	4936	12291	12291	4937	1219	1188	1188	1188	1188	13965	79239	24274	24524	24714	5035	3769	21232	615	18788	5481	5481	38219	32019	223441	2,58040	
Total	7749	10733	18330	9239	15330	2971	9237	27100	6136	5483	23341	17923	88876	97287	51036	8747	100271	45047	1,08832	34144	6162	6034	335656	95174	4,00108	14122	32441	235421	6,64976	2838581	3536557	

Annex 5. Renewable Energy (Pre-Development) Investment Requirement, Clean Energy Scenario - 1

Technology	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2025-2030	2031-2039	Total	
Geothermal	6533	6312	14676	3333	15330	-	-	4995	-	4995	-	8812	-	-	-	-	-	53256	-	-	-	-	-	-	-	-	-	-	-	-	-	631013
Solar	2489	1678	12836	6101	-	1670	3341	8472	9038	551	9820	1922	-	8495	1130	8065	1816	1220	9039	1721	8742	2623	1439	19105	612	832	619	-	34692	2,6830	2,9012	
Hydro	1427	3184	1651	-	-	9421	-	-	4636	-	6049	6634	-	6516	6533	4232	2316	39421	-	3814	2376	2138	23148	23148	4337	2316	134.0	9564	71665	810839	810839	
Wind	-	929	929	2135	-	3011	4132	983	9813	9813	9813	9813	9813	1121	9248	9813	20282	33987	34092	5105	1461	3079	4997	1461	6483	1919	104	3928	66653	4,5084	523347	
Other Wind	-	-	-	-	-	2615	-	-	-	-	-	-	-	1039	9235	-	13470	2615	1913	3646	-	2248	3933	-	4932	1039	1319	3928	3615	12030	235035	
Other Wind	-	929	929	2135	-	3011	4132	983	9813	9813	9813	9813	9813	1121	9248	9813	20282	33987	34092	5105	1461	3079	4997	1461	6483	1919	104	3928	66653	4,5084	523347	
Total	7749	10733	18342	9239	218228	33382	7472	137104	76518	59279	48241	151842	9813	9437	238107	222787	179235	106428	53181	94449	19488	110158	81034	57934	96484	78489	49101	75159	73232	214400	2836823	

Annex 6. Renewable Energy (Pre-Development) Investment Requirement, Clean Energy Scenario - 2

Technology	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2025-2030	2031-2039	Total	
Geothermal	6533	6312	14676	3333	15330	-	-	4995	-	4995	-	8812	-	-	-	-	-	53256	-	-	-	-	-	-	-	-	-	-	-	-	631013	
Solar	2489	1678	12836	6101	-	1670	3341	3335	632	638	1135	4019	-	5696	234	-	1830	1938	1000	1101	1101	1010	1010	912	891	812	-	34692	1,55293	1,89195		
Hydro	1427	3184	1651	-	-	9421	-	-	7105	-	8108	8108	-	8108	8108	2108	2108	3563	2619	2278	2038	2038	2038	2038	2038	2038	2038	2038	2038	2038	2038	810839
Wind	-	929	929	2135	-	3011	4132	983	9813	9813	9813	9813	9813	1121	9248	9813	20282	33987	34092	5105	1461	3079	4997	1461	6483	1919	104	3928	66653	4,5084	523347	
Other Wind	-	-	-	-	-	2615	-	-	-	-	-	-	-	1039	9235	-	13470	2615	1913	3646	-	2248	3933	-	4932	1039	1319	3928	3615	12030	235035	
Other Wind	-	929	929	2135	-	3011	4132	983	9813	9813	9813	9813	9813	1121	9248	9813	20282	33987	34092	5105	1461	3079	4997	1461	6483	1919	104	3928	66653	4,5084	523347	
Total	7749	10733	18330	10165	220037	31152	23239	158461	65818	74831	60839	151143	24175	49784	10818	9444	20178	12938	53271	15458	23818	68144	249246	79101	5977	23584	14828	78525	121318	224075	298288	

Annex 7. IAEECC Resolutions

Resolution	Title
IAEECC Resolution No. 1, s. 2020	Directing All Government Agencies, Including the Local Government Units (LGUs) and Foreign Service Posts, to Comply with the Government Energy Management Program (GEMP), Ordering the Department of Energy to Conduct Energy Audits and Spot Checks, and Submit Proposed Improvements to the GEMP
IAEECC Resolution No. 2, s. 2021	Directing All Government Agencies, Including the Local Government Units (LGUs) and Foreign Service Posts, to Use Energy Efficient Light Emitting Diode (LED) Lamps in Government Buildings and Facilities as a Requirement for Compliance to the Government Energy Management Program (GEMP)
IAEECC Resolution No. 3, s. 2021	Directing All Government Agencies, Including the Local Government Units (LGUs) and Foreign Service Posts, to Use Inverter Type Air-Conditioning Units or Similar Equipment Technologies in Government Buildings and Facilities as a Requirement for Compliance to the Government Energy Management Program (GEMP)
IAEECC Resolution No. 4, s. 2022	Enjoining the Council of Good Local Governance to Consider, Include and Adopt the Energy Efficiency and Conservation (EEC) as one of the Areas in the Criteria per Section 7 of Republic Act No. 11292 - The Seal of Good Local Governance Act of 2019
IAEECC Resolution No. 5, s. 2022	Directing All Government Agencies, Including the Local Government Units (LGUs) and Foreign Service Posts, to Observe the Approved Government Energy Management Program (GEMP) Guidelines
IAEECC Resolution No. 6, s. 2022	Recommending the Governance Commission for Government-Owned or Controlled Corporation (GCG) to Consider, Include, and Adopt Energy Efficiency and Conservation (EEC) as One of the Criteria in the Performance Evaluation System for Government-Owned or Controlled Corporation (GOCs) in the Grant of Performance-Based Incentives
IAEECC Resolution No. 7, s. 2023	Encouraging the Adoption of Flexible Work Arrangements for All Government Entities as Part of the Government's Energy Efficiency and Conservation (EEC) Measures Under the Government Energy Management Program (GEMP)
IAEECC Resolution No. 8, s. 2023	Encouraging All Government Entities (Ges) to Install and Utilize Solar Photovoltaic (PV) System or Any Equivalent Renewable Energy Technology in Their Government-Owned Facilities and/or Office Buildings in a Form of Self-Generating Facilities, Distributed Energy Resources (DER), or Net Metering Agreement with Host Distribution Utility (DU)
IAEECC Resolution No. 9, s. 2023	Inclusion of the Climate Change Commission (CCC) as a Regular Resource Institution in the IAEECC in an Advisory Capacity to Harmonize the Approval and Implementation of Government Energy Efficiency Projects (GEEPs) Classified as Climate Change Expenditures

Annex 8. Capacity Additions (MW), Reference Scenario

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2023-2028	2029-2050		
Coal	3000.0	3000.0	850.0	950.0	2100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,305.00	-	
Oil-Based	1117	850	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	767	-	
Natural Gas	-	13,250	-	-	100,000	-	-	-	-	-	-	5,980.0	55,400.0	418,000.0	1,254,000.0	4,800.0	85,400.0	85,400.0	128,400.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	-	2,422.50	19,468.00	
Other Technologies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Renewable Energy	658.69	3,171.44	3,594.00	2,423.60	17,700.0	3,868.00	1,275.50	3,294.20	5,070.00	6,950.00	4,076.00	4,778.00	2,852.20	4,275.00	3,848.00	3,545.00	5,083.00	6,076.00	6,829.00	4,358.00	6,330.00	7,610.00	8,890.00	1,453.00	1,581.00	1,784.00	4,889.00	13,790.24	8,472.10	93.00		
Geothermal	49.50	68.50	120.00	60.00	67.00	-	40.00	-	-	40.00	-	70.00	-	-	-	-	45.00	-	-	-	-	-	-	10.00	-	-	-	-	-	45.00	93.00	
Hydropower	12,440	25,79	12,210	-	-	25.00	-	-	40,000	-	-	59,000	59,000	59,000	215,000	59,000	59,000	59,000	99,500	68,900	140,000	-	-	20,000	3,600,000	-	-	500,000	500,000	99,000	5,000	
Biomass	40.80	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.00	-	-	-	-	-	-	42.00	
Solar	445.97	2,254.55	2,354.70	-	-	2,322.00	8,535.00	2,044.20	5,620.00	7,770.00	2,886.00	3,075.00	1,397.20	1,842.00	2,550.00	1,812.00	2,850.00	2,850.00	3,844.00	2,279.00	100.00	42.00	4,890.00	841.00	3,400.00	1,031.00	1,246.00	1,729.00	3,928.25	4,642.00		
Onshore Wind	-	784.00	779.20	-	-	923.00	4,450.00	119,000.00	119,000.00	47,800.00	119,000.00	108,300.00	108,300.00	108,300.00	108,300.00	100,000.00	108,300.00	219,000.00	207,900.00	533.00	34,400	1,350.00	992.00	590.00	590.00	3,702.20	21,342.00	5,800.00	3,702.20	21,342.00	6,800.00	
Offshore Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800.00	100,000	30,000	30,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	9,69.87	4,758.44	4,444.60	3,008.60	14,971.00	3,868.00	1,275.50	3,294.20	5,070.00	6,950.00	4,076.00	4,778.00	2,852.20	4,275.00	3,848.00	3,545.00	5,083.00	6,076.00	6,829.00	4,358.00	6,330.00	7,610.00	8,890.00	1,453.00	1,581.00	1,784.00	4,889.00	13,790.24	8,472.10	93.00		
ESS	10,800.00	480.00	520.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,880.00	15,440.00

Annex 9. Capacity Additions (MW), Clean Energy Scenario - 1

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2023-2028	2029-2050		
Coal	3000.0	3000.0	850.0	950.0	2700.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,305.00		
Oil-Based	1117	850	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	767		
Natural Gas	-	13,250	-	-	100,000	-	-	-	-	-	-	5,980.0	55,400.0	418,000.0	1,254,000.0	4,800.0	85,400.0	85,400.0	128,400.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	-	2,422.50	19,468.00	
Other Technologies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Renewable Energy	658.69	3,154.44	3,423.55	2,423.55	984.00	2,832.00	1,000.00	3,543.00	4,730.00	1,098.00	4,450.00	4,650.00	5,900.00	4,872.00	5,070.00	4,407.00	4,920.00	4,870.00	4,870.00	4,870.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	
Geothermal	49.50	68.50	120.00	60.00	72.00	-	40.00	-	-	40.00	-	70.00	-	-	-	-	45.00	-	-	-	-	-	-	10.00	-	-	-	-	-	45.00	93.00	
Hydropower	12,440	25,79	12,210	-	-	25.00	-	-	40,000	-	-	59,000	59,000	59,000	215,000	59,000	59,000	59,000	99,500	68,900	140,000	-	-	20,000	3,600,000	-	-	500,000	500,000	99,000	5,000	
Biomass	40.80	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.00	-	-	-	-	-	42.00	-	
Solar	445.97	2,096.95	2,255.05	131.60	-	3,000.00	6,000.00	7,300.00	3,420.00	9,900.00	3,800.00	3,460.00	3,380.00	3,302.00	3,080.00	2,883.00	2,400.00	2,075.00	3,423.00	3,090.00	3,640.00	4,530.00	1,350.00	3,590.00	1,640.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	
Onshore Wind	-	900.00	903.20	-	-	5,600.00	40,000.00	95,000.00	95,000.00	95,000.00	95,000.00	95,000.00	95,000.00	95,000.00	95,000.00	80,000.00	95,000.00	200,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	140,000.00	
Offshore Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	9,69.87	4,754.44	4,262.55	3,008.60	2,354.00	2,854.00	1,000.00	3,543.00	4,730.00	2,289.00	4,450.00	4,450.00	5,900.00	4,872.00	5,070.00	4,407.00	4,920.00	4,870.00	4,870.00	4,870.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	5,070.00	
ESS	10,800.00	480.00	520.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,880.00	17,920.00

Annex 10. Capacity Additions (MW), Clean Energy Scenario - 2

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2023-2028	2029-2050	
Coal	3000.0	3000.0	850.0	950.0	2700.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,305.00		
Oil-Based	1117	850	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	767		
Natural Gas	-	13,250	-	-	100,000	-	-	-	-	-	-	5,980.0	55,400.0	418,000.0	1,254,000.0	4,800.0	85,400.0	85,400.0	128,400.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	1,672,000.0	-	2,422.50	19,468.00
Other Technologies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Renewable Energy	658.69	3,143.44	3,592.35	3,323.60	1,144.00	2,717.00	3,554.00	3,953.00	2,800.00	2,139.00	3,770.00	4,758.00	2,000.00	2,155.00	4,123.00	3,358.00	2,000.00	5,540.00	2,944.00	4,673.00	4,707.00	4,580.00	4,730.00	5,580.00	3,490.00	7,360.00	8,280.00	6,000.00	14,970.99	92,333.00	
Geothermal	49.50	68.50	120.00	60.00	72.00	-	40.00	-	-	40.00	-	70.00	-	-	-	-	45.00	-	-	-	-	-	-	10.00	-	-	-	-	-	45.00	93.00
Hydropower	12,440	25,79	12,210	-	-	25.00	-	-	40,000	-	-	59,000	59,000	59,000	215,000	59,000	59,000	59,000	99,500	68,900	140,000	-	-	20,000	3,600,000	-	-	500,000	500,000	99,000	5,000
Biomass	40.80	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.00	-	-	-	-	-	42.00	-
Solar	445.97	2,096.95	2,255.05	131.60	-	3,000.00	6,000.00	7,300.00	3,420.00	9,900.00	3,800.00	3,460.00	3,380.00	3,302.00	3,080.00	2,883.00	2,400.00	2,075.00	3,423.00	3,090.00	3,640.00	4,530.00	1,350.00	3,590.00	1,640.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00
Onshore Wind	-	900.00	903.20</																												

Annex 11. Investment Requirements for Generation Projects (PhP Billion) at 2022 Prices, Reference Scenario

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2023 to 2028	2029 to 2050		
Coal	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	
Oil-Based	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	
Natural Gas		14144																														
Other Technologies																																
Renewable Energy	6617	209.33	250.24	157.83	41.61	202.95	64.26	163.76	271.30	45.21	181.40	283.23	185.78	327.10	183.42	276.34	330.47	578.61	361.10	182.69	297.16	317.5	656.02	597.1	874.72	593.5	454.58	928.15	5526.23	27195		
Geothermal	745	23.72	40.80	20.03	41.61			12.37				21.25						132.40														
Hydropower	1719	379	72.29			3.65			59383			78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35		
Biomass	513	0.04																														
Solar	2640	128.72	140.46	594.6		145.77	339.53	888.82	149.54	833	1207.1	1207.1	5334	74.81	99.84	70.82	112.27	185.15	146.72	84.50	478	1529	183.55	302.3	123.97	359.72	421.3	5924	500.80	139070		
Offshore Wind		5297	51.88	78.35		53.62	24.63	62.56	6194	24.63	60.99	54.66	54.09	53.52	52.95	52.38	51.81	51.25	100.60	96.79	24.98	16.46	40.33	26.14	24.00	23.71	23.42	23.13	23.62	1023.49	9647.8	
Onshore Wind																																
Total	151.52	4157.0	3901.7	246.67	190.64	202.95	64.26	163.76	271.30	45.21	181.40	355.18	266.24	361.33	283.01	248.56	394.35	582.93	453.26	276.01	183.47	172.50	733.94	833.30	993.50	177.40	182.32	454.58	1597.87	7029.42		
BESS	34.61	14.48	14.51																													

Annex 12. Investment Requirements for Generation Projects (PhP Billion) at 2022 Prices, Clean Energy Scenario - 1

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2023 to 2028	2029 to 2050			
Coal	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950			
Oil-Based	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124		
Natural Gas		14144																															
Other Technologies																																	
Renewable Energy	6617	244.27	243.93	157.83	140.99	374.46	48.54	226.84	251.60	65.23	271.69	291.01	474.6	279.04	343.08	268.59	304.00	480.68	470.39	522.41	247.09	501.87	57.62	216.40	672.08	182.99	256.85	56.68	1197.25	6392.22			
Geothermal	745	23.72	40.80	20.03	41.61			12.37				15.16						132.55	151.6		23.50	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35		
Hydropower	1719	379	72.29			3.65			5095			78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35			
Biomass	513	0.03	374			5.57			488																								
Solar	2640	118.60	122.79	594.6		13.95	26.40	72.07	5119	4.03	145.74	132.55	138.69	125.25	115.16	83.10	76.16	128.11	114.5	123.82	164.84	48.02	126.22	58.83	52.26	53.02		340.99	1834.40				
Offshore Wind		6223	59.91	78.35		20.63	31.14	22.14	4995	49.45	48.95	47.95	47.45	46.95	46.45	45.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95		
Onshore Wind																																	
Total	151.52	420.64	375.78	238.59	289.84	374.46	48.54	226.84	251.60	65.23	271.69	313.25	497.71	279.04	448.43	403.08	380.24	480.68	470.39	522.41	247.09	501.87	267.32	672.08	593.48	549.25	852.17	1850.82	9852.20				
BESS	34.61	14.48	14.51																														

Annex 13. Investment Requirements for Generation Projects (PhP Billion) at 2022 Prices, Clean Energy Scenario - 2

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2023 to 2028	2029 to 2050			
Coal	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950	4950			
Oil-Based	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124		
Natural Gas		14144																															
Other Technologies																																	
Renewable Energy	6617	244.27	277.09	215.06	151.54	350.55	161.84	487.91	241.38	244.19	295.20	489.86	303.87	324.55	448.33	400.78	293.47	492.40	453.42	434.53	448.41	404.33	445.04	538.99	283.16	823.32	926.21	879.15	1297.88	9441.83			
Geothermal	745	23.72	40.80	20.03	41.61			12.37				12.13						2.94		20.39	37.48		43.04			28.27							
Hydropower	1719	379	72.29			3.79		8746	43.83		31.34	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35	78.35			
Biomass	513	0.03	374			5.57		488																									
Solar	2640	118.60	122.79	594.6		13.95	26.26	24.85	10.28	46.82	80.77	64.74						101.02	86.65	70.96	72.25	69.54	68.82	66.11	59.02	53.60	57.00		340.59	1101.05			
Offshore Wind		6223	63.07	153.98		31.98	24.23	31.98	24.23	31.98	24.23	31.98	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	
Onshore Wind																																	
Total	151.52	420.64	408.94	295.82	300.79	367.55	161.84	487.91	241.38	244.19	295.20	569.23	748.13	324.55	720.86	530.72	293.47	492.40	453.42	571.45	842.47	484.33	671.60	647.86	243.16	1403.25	1653.77	1644.53	1945.26	13282.18			
BESS	34.61	14.48	14.51																														

Annex 14. Ongoing Transmission Projects - Luzon Grid as October 2023

Project	Stage	PercentCompletion	Target Completion Date
Binga-San Manuel 230kV T/L Project, Stage 1	Construction	-	28-Feb-24
Tuguegarao-Lal-lo (Magapit) 230kV T/L Project	Construction	93.17%	30-Sep-24
Manila (Navotas) 230kV S/S Project	Construction	35.58%	31-Dec-24
Taguig 500kV S/S Project	Construction	23.52%	31-Dec-24
Balsik (Hermosa)-San Jose 500kV T/L Project*	Construction	98.72%	31-Jan-24
Antipolo 230kV S/S Project	Construction	93.38%	TBA
Tiwi S/S Upgrading Project	Construction	96.84%	31-Dec-23
Relocation of Steel Pole of Hermosa-Duhat 230kV T/L (along JASA Road)	Construction	67.89%	31-Dec-23
Clark-Mabiga 69kV T/L Project	Construction	88.70%	28-Feb-25
Tuy (Calaca)-Dasmarinas 500kV T/L Project	Construction	84.95%	31-Dec-24
Mariveles-Balsik (Hermosa) 500kV T/L Project	Construction	93.69%	31-Dec-23
North Luzon S/S Upgrading Project, Stage 1	Construction	94.00%	31-Dec-23
North Luzon S/S Upgrading Project, Stage 2	Construction	93.72%	31-Dec-23
South Luzon S/S Upgrading Project	Construction	77.26%	31-Dec-24
Nagsaag-Tumana 69kV T/L Project	Construction	62.17%	31-Mar-24
Concepcion-Sta. Ignacia 69kV T/L Project	Construction	38.08%	31-Mar-24
Marilao 500kV S/S Project	Construction	76.82%	30-Sep-24
Pinili 230kV S/S Project	Construction	26.23%	31-Aug-24
San Simon 230kV S/S Project	Construction	21.57%	30-Sep-24
Luzon Voltage Improvement Project 4: Stage 1	Construction	65.40%	30-Apr-24
Ambuklao-Binga 230kV T/L Project	Construction	3.57%	31-Aug-24
Binga-San Manuel 230kV T/L Project, Stage 2	Construction	5.86%	31-Aug-24
North Luzon S/S Upgrading Project 2	Construction	47.88%	31-Jul-24
South Luzon S/S Upgrading Project 2	Construction	27.39%	31-Dec-24
Abuyog 230kV S/S Project	Construction	19.98%	31-Mar-25
Porac 230kV S/S Project	Construction	16.20%	30-Jun-24
Western Luzon 500kV Backbone Project, Stage 2	Construction	1.82%	31-Dec-25
Castillejos 230kV S/S Project	Construction	6.38%	31-Dec-25
Pinamucan 500kV S/S Project	Construction	-	31-Dec-25
Ilijan 500kV S/S Upgrading Project	Construction	-	31-May-25
Grid Protection Relay Replacement Project, Phase 3	Construction	-	31-Dec-25
Eastern Albay 69kV T/L Project, Stage 2	Tendering	-	01-Sep-24
Santiago-Magat 230kV T/L Reconductoring Project	Tendering	-	01-Jun-25
Batangas-Mindoro Interconnection Project*	Tendering	-	01-Dec-25
Bataan-Cavite 500kV T/L (Feasibility Study)	Pre-Construction	-	TBA
La Trinidad-Calot 69kV T/L Project	Pre-Construction	-	01-Dec-28
Manila/Navotas-Doña Imelda 230kV T/L Project	Pre-Construction	-	01-May-33
Pasay 230kV S/S Project	Pre-Construction	-	01-Dec-29
Tanauan 230kV S/S Project	Pre-Construction	-	01-Jan-28
Taguig-Taytay 230kV T/L Project	Pre-Construction	-	01-Dec-30
Pagbilao-Tayabas 500kV T/L Project	Pre-Construction	-	01-Mar-28
Palawan-Mindoro Interconnection Project, Stage 1	Pre-Construction	-	01-Feb-33
Daraga-Bitano 69kV T/L Project	Pre-Construction	-	01-Dec-30
Tuguegarao-Enrile 69kV T/L Project	Pre-Construction	-	01-Oct-30
Dasol 230kV S/S Project	Pre-Construction	-	01-Dec-30
Sampaloc 230kV S/S Project	Pre-Construction	-	01-Dec-28
Baler 230kV S/S Project	Pre-Construction	-	01-Apr-30
San Fabian 230kV S/S Project	Pre-Construction	-	01-Oct-32
Minuyan 115kV S/S Project	Pre-Construction	-	01-Feb-30
Plaridel 230kV S/S Project	Pre-Construction	-	01-Feb-30
Kawit 230kV S/S Project	Pre-Construction	-	01-May-28
Olongapo 230kV S/S Upgrading Project	Pre-Construction	-	01-Oct-33
Luzon Voltage Improvement Project 5	Pre-Construction	-	01-Dec-30
Marilao-Mexico 230kV T/L Project	Pre-Construction	-	01-Aug-32
Northern Luzon 230kV Loop Project	Pre-Construction	-	01-Dec-31
Nagsaag-Santiago 500kV T/L Project	Pre-Construction	-	01-Oct-31
Bolo-Balaoan 500kV T/L Project	Pre-Construction	-	01-Apr-32
Balaoan-Laoag 500kV T/L Project	Pre-Construction	-	01-Apr-34
Cabanatuan-Sampaloc-Nagsaag 230kV T/L Upgrading Project	Pre-Construction	-	01-Jul-33
Capas 230kV S/S Project	Pre-Construction	-	01-Dec-29
Silang 500kV S/S Project	Pre-Construction	-	01-Feb-28
Pinamucan 500kV S/S Project	Pre-Construction	-	01-Dec-27
Tagkawayan 500kV S/S Project	Pre-Construction	-	01-Feb-33
Taguig-Silang 500kV T/L Project	Pre-Construction	-	01-Feb-31
Tuy 500kV S/S Project, Stage 2	Pre-Construction	-	01-Oct-30
Quezon-Marinduque Interconnection Project	Pre-Construction	-	01-Dec-30
Luzon Voltage Improvement Project-6	Pre-Construction	-	01-Mar-29
Pinamucan-Tuy 500kV T/L Project	Pre-Construction	-	01-Dec-31
Camarines Sur-Catanduanes Interconnection Project	Pre-Construction	-	01-Dec-30

Source: NCCP's October 2023 Transmission Project Status Report
 Notes: *Updates are from the Inter-Agency Meeting with NCCP last 14 November 2023
 TBA - to be assessed; if blank, not yet available
 T/L - Transmission L

Annex 15. **Ongoing Transmission Projects - Visayas Grid as of October 2023**

Project	Stage	Percent Completion	Target Completion Date
Visayas S/S Reliability Project 2	Construction	99.13%	31-Dec-23
Cebu-Negros-Panay 230kV Backbone Project, Stage 1	Construction	99.64%	TBA
Cebu-Lapu Lapu 230kV T/L Project	Construction	60.17%	30-Apr-24
Cebu-Negros-Panay 230kV Backbone Project, Stage 2	Construction	98.42%	TBA
Cebu-Negros-Panay 230kV Backbone Project, Stage 3*	Construction	96.49%	28-Feb-24
Nabas-Caticlan-Boracay Transmission Project	Construction	73.70%	30-Jun-24
Permanent Restoration of Colon-Samboan 138kV Line 1 & 2 Affected by Land	Construction	-	TBA
Cebu-Bohol 230kV Interconnection Project	Construction	87.09%	30-Jun-24
Visayas S/S Upgrading Project 1	Construction	80.75%	31-Dec-23
Panay-Guimaras 138kV Interconnection Project	Construction	46.81%	31-Dec-24
Tigbauan 138kV S/S Project	Construction	-	31-Dec-23
Lapu Lapu 230kV S/S Project	Construction	26.89%	31-Dec-24
Amlan-Dumaguete 138kV T/L Project	Construction	6.53%	31-Mar-25
Visayas S/S Upgrading Project 2	Construction	52.87%	31-Dec-25
Negros-Panay Interconnection Project, Line 2	Construction	98.99%	TBA
Visayas Voltage Improvement Project 2	Construction	4.95%	31-Dec-25
Visayas Voltage Improvement Project, Stage 2	Construction	99.90%	31-Dec-23
Grid Protection Relay Replacement Project, Phase 3	Construction	-	31-Dec-25
Visayas S/S Upgrading Project 2	Tendering	-	01-Dec-25
Amlan-Dumaguete 138kV T/L Project	Tendering	-	01-Mar-25
Visayas Mobile Capacitor Bank Project	Tendering	-	01-Jun-24
Calbayog-Allen 69kV T/L Project	Pre-Construction	-	01-Jun-26
Laray 230kV S/S Project	Pre-Construction	-	01-Nov-28
Barotac Viejo-Natividad 69kV T/L Project	Pre-Construction	-	01-Feb-28
Babatngon-Palo 138kV T/L Project	Pre-Construction	-	01-Dec-30
Tigbauan 138kV S/S Project	Pre-Construction	-	01-Sep-30
Bool 138kV S/S Project	Pre-Construction	-	01-Dec-32
Granada 230kV S/S Project	Pre-Construction	-	01-Jun-30
La Carlota 138kV S/S Project	Pre-Construction	-	01-Dec-32
Sumangga 138kV S/S Project	Pre-Construction	-	01-Dec-33
Nivel Hills 230kV S/S Project	Pre-Construction	-	01-Dec-33
Visayas Voltage Improvement Project 2	Pre-Construction	-	01-Dec-33

Source: NGCP's October 2023 Transmission Project Status Report
 Notes: *Updates are from the Inter-Agency Meeting with NGCP last 14 November 2023
 TBA - to be assessed; if blank, not yet available
 T/L - Transmission Line
 S/S - Substation

Annex 15. Ongoing Transmission Projects - Mindanao Grid as of October 2023

Project	Stage	Percent Completion	Target Completion Date
Mindanao-Visayas Interconnection Project*	Construction	99.23%	15-Dec-23
Mindanao S/S Upgrading Project, Stage 1	Construction	98.93%	28-Feb-24
Mindanao S/S Rehabilitation Project, Stage 1	Construction	96.00%	30-Jun-24
Tacurong-Kalamansig 69kV T/L Project	Construction	75.19%	31-Dec-24
Kabacan 138kV S/S Project	Construction	67.20%	31-Dec-24
Mindanao S/S Rehabilitation Project, Stage 2	Construction	64.33%	31-Dec-26
Laguindingan 230kV S/S Project	Construction	53.03%	31-Dec-24
Mindanao S/S Upgrading 2 Project	Construction	50.88%	31-Dec-25
Mindanao S/S Expansion 4 Project	Construction	72.80%	31-Dec-25
Eastern Mindanao Voltage Improvement Project	Construction	66.35%	31-Mar-24
San Francisco-Tago 138kV T/L Project	Construction	43.15%	31-May-25
Zamboanga Peninsula Voltage Improvement Project	Construction	43.42%	30-Jun-24
Mindanao S/S Expansion 3 Project	Construction	59.35%	31-Mar-24
Nasipit 138kV S/S Bus-in Project	Construction	60.30%	30-Jun-24
Grid Protection Relay Replacement Project, Phase 3	Construction	-	31-Dec-25
Mindanao S/S Expansion 3 Project	Tendering	-	01-Mar-24
Mindanao S/S Upgrading Project	Tendering	-	01-May-26
Mindanao S/S Upgrading 2 Project	Tendering	-	01-May-26
Eastern Mindanao Voltage Improvement Project	Tendering	-	01-Jan-26
Kabacan 138kV S/S Project (T/L Portion)	Pre-Construction	-	01-Dec-25
Maco-Mati 138kV T/L Project	Pre-Construction	-	01-Dec-28
Polanco-Oroquieta 138kV T/L Project	Pre-Construction	-	01-Feb-28
Villanueva-Kinamlutan 230kV T/L Project	Pre-Construction	-	01-Jan-33
Agus 6-Kiwalan-Lugait 69kV T/L Upgrading Project	Pre-Construction	-	01-Oct-32
Maco-Tagum 69kV T/L Project	Pre-Construction	-	01-Dec-32
Sultan Kudarat-Tacurong 230kV T/L Project	Pre-Construction	-	01-Oct-33
Opol S/S Bus-in Project	Pre-Construction	-	01-Sep-27
Lala-Naga-Zamboanga 230kV T/L Project	Pre-Construction	-	01-Jul-34
Sultan Kudarat-Pinaring 69kV T/L and Upgrading Project	Pre-Construction	-	01-Jun-28
Malaybalay 138 kV S/S Project	Pre-Construction	-	01-Dec-32
Tumaga 138 kV S/S Project	Pre-Construction	-	01-Jan-32

Source: NGCP's October 2023 Transmission Project Status Report

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T/L – Transmission Line

S/S – Substation



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