Energy Sector Updates

Undersecretary Felix William B. Fuentebella

DEPARTMENT OF ENERGY

13 December 2022

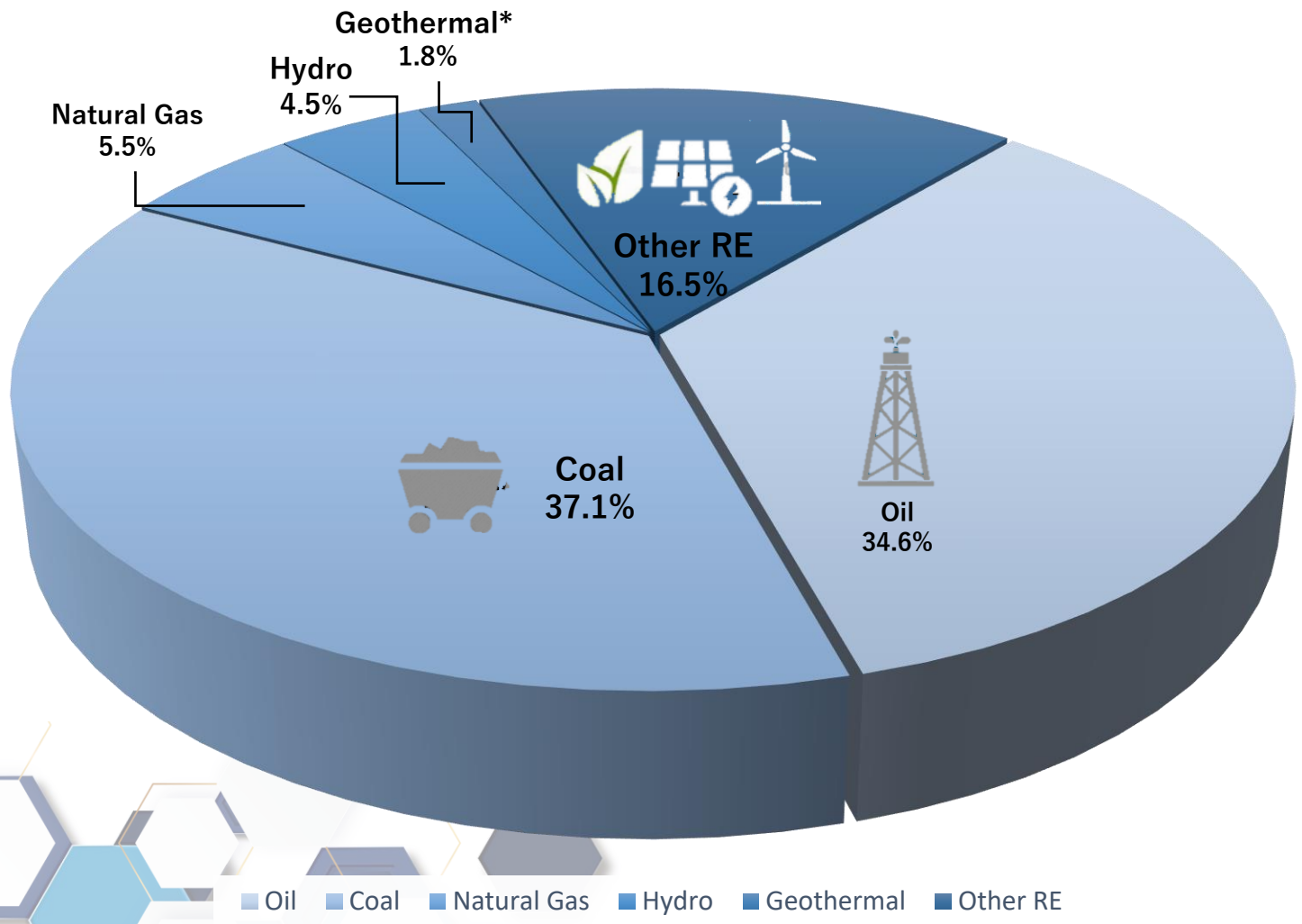
2022 ENERGY INVESTMENT FORUM
Sheraton Manila Hotel

Presentation Outline

- Where are we now?
- Where are we headed?
- How do we get there?
- Energy Investment Opportunities

Where are we now?

Total Primary Energy Supply 2021



50.9 MTOE

2021 TOTAL PRIMARY ENERGY SUPPLY

43.2%

(22.0 MTOE)

INDIGENOUS

56.8%

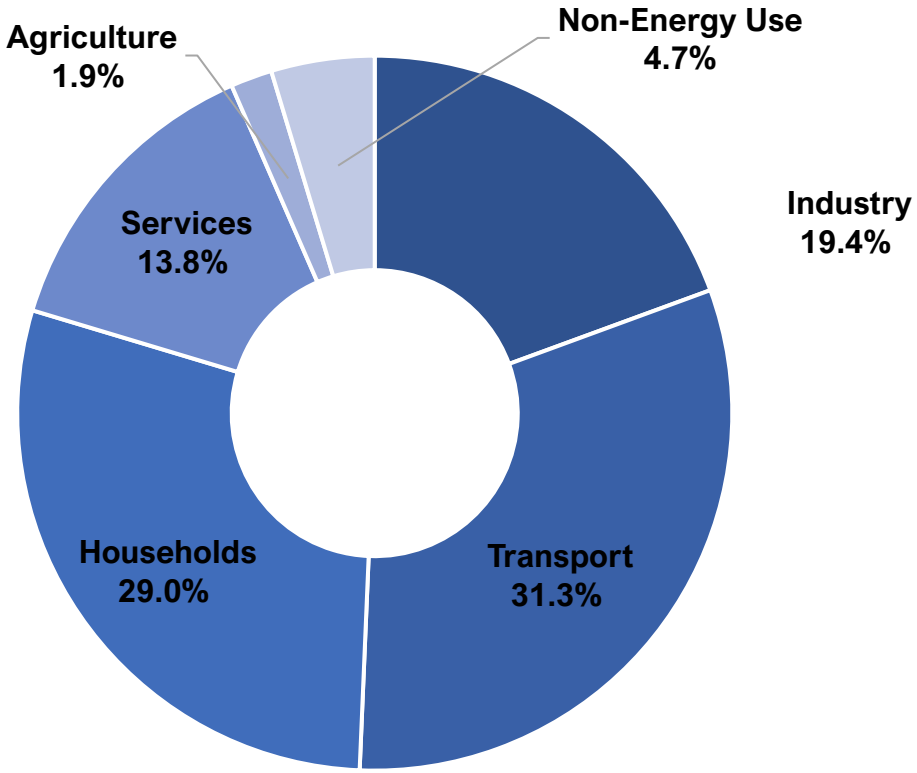
(28.9 MTOE)

NET IMPORTED

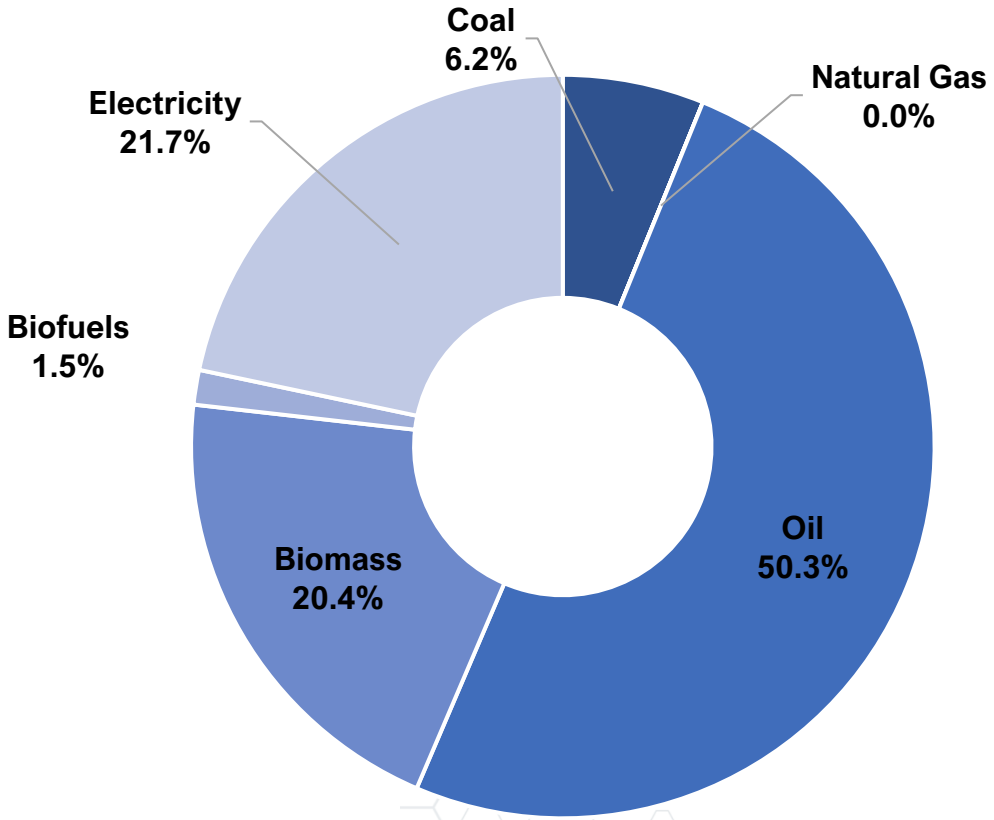
Total Final Energy Consumption 2021

35.1 MTOE*
2021 TFEC

By Sector



By Fuel



*Preliminary data for 2021

On-Grid Power Capacity and Generation Mix 2021

COAL

43%
11,669 MW
INSTALLED CAPACITY

46%
10,913 MW
DEPENDABLE CAPACITY

58%
62,052 GWh
POWER GENERATION

RENEWABLE ENERGY

29%
7,914 MW
INSTALLED CAPACITY

29%
7,005 MW
DEPENDABLE CAPACITY

22%
23,771 GWh
POWER GENERATION

OIL-BASED

14%
3,847 MW
INSTALLED CAPACITY

11%
2,650 MW
DEPENDABLE CAPACITY

2%
1,616 GWh
POWER GENERATION

NATURAL GAS

13%
3,453 MW
INSTALLED CAPACITY

14%
3,286 MW
DEPENDABLE CAPACITY

18%
18,675 GWh
POWER GENERATION

16,036 MW
2021 PEAK DEMAND

LUZON: **11,640 MW**
VISAYAS: **2,252 MW**
MINDANAO: **2,144 MW**

106,114 GWh

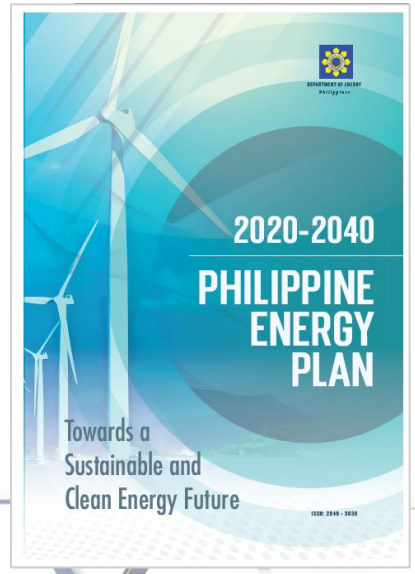
Indigenous: **45.1%**
Imported: **54.9%**

RE Share: **22%**
Fossil Share: **78%**

Where are we headed?

Philippine Energy Plan 2020-2040 Targets

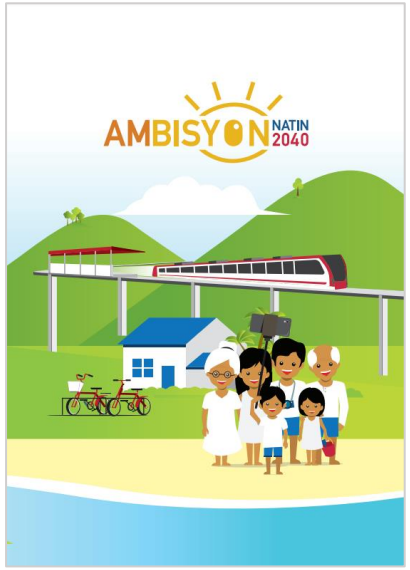
“Sustainable Path Towards Clean Energy”



Reference Scenario
+ RE
+ EE and C
+ Other Energy Technologies
+ ICT
+ Resiliency

Clean Energy Scenario

Energy Security
Sustainable Energy
Resilient Infrastructure
Competitive Energy Sector
Smart Homes and Cities
Empowered Consumers



Future Energy Scenario

Resilient Infrastructure

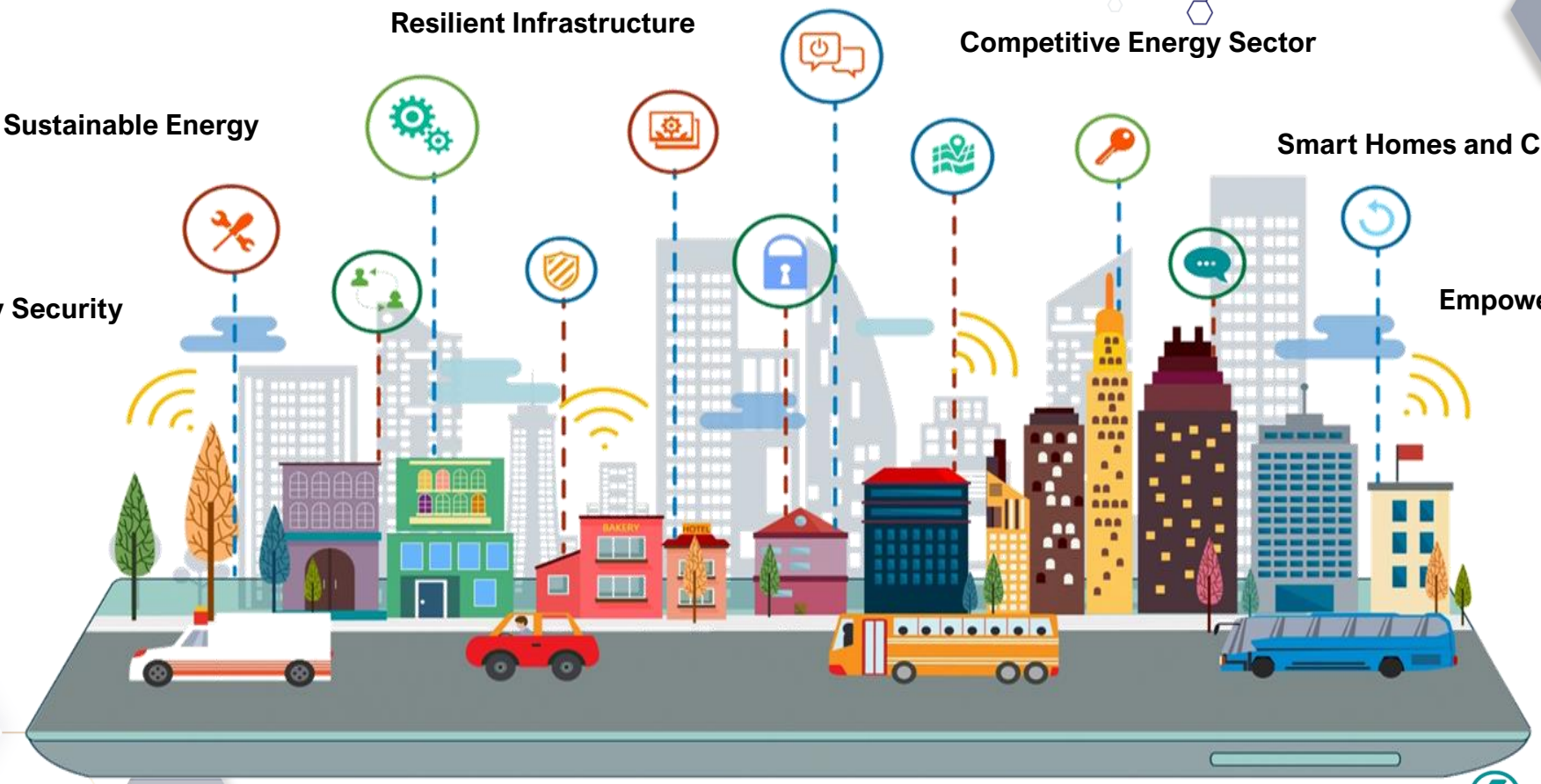
Competitive Energy Sector

Sustainable Energy

Smart Homes and Cities

Energy Security

Empowered Consumers



Renewable Energy

35% of power generation mix by 2030; and 50% by 2040

+

Energy Efficiency and Conservation

5% energy savings on oil products and electricity by 2040

+

Emerging and Innovative Technologies

10% EV penetration rate in road transport by 2040; Exploring new and efficient technologies

+

Information and Communications Technology

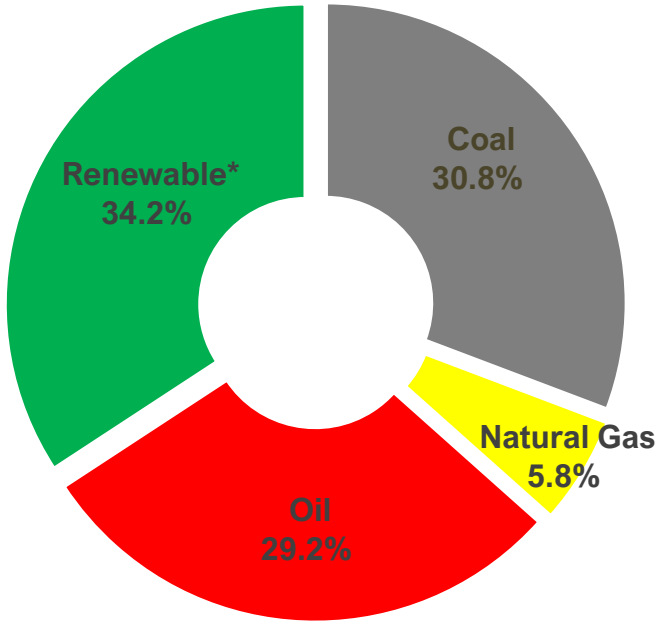
Adopting advanced and interoperable ICT in the energy chain

+

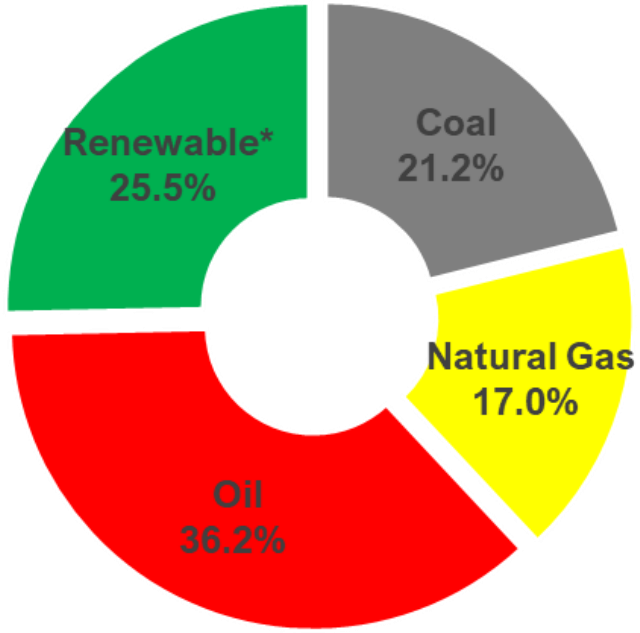
Energy Resiliency

Resilient and climate-proof energy infrastructure

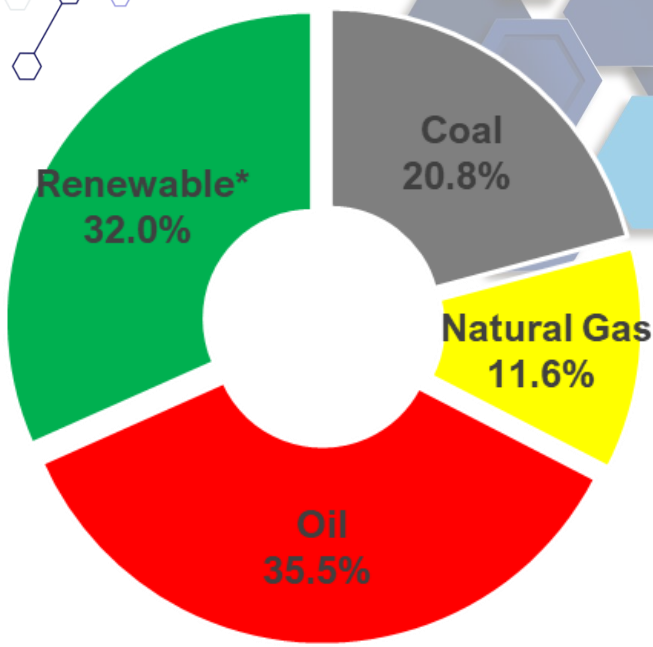
Total Primary Energy Supply, by Fuel



2020 Actual: 56.4 MTOE
Self-Sufficiency: 52.6%



2040 REF: 155.6 MTOE
Self-Sufficiency: 51.1%

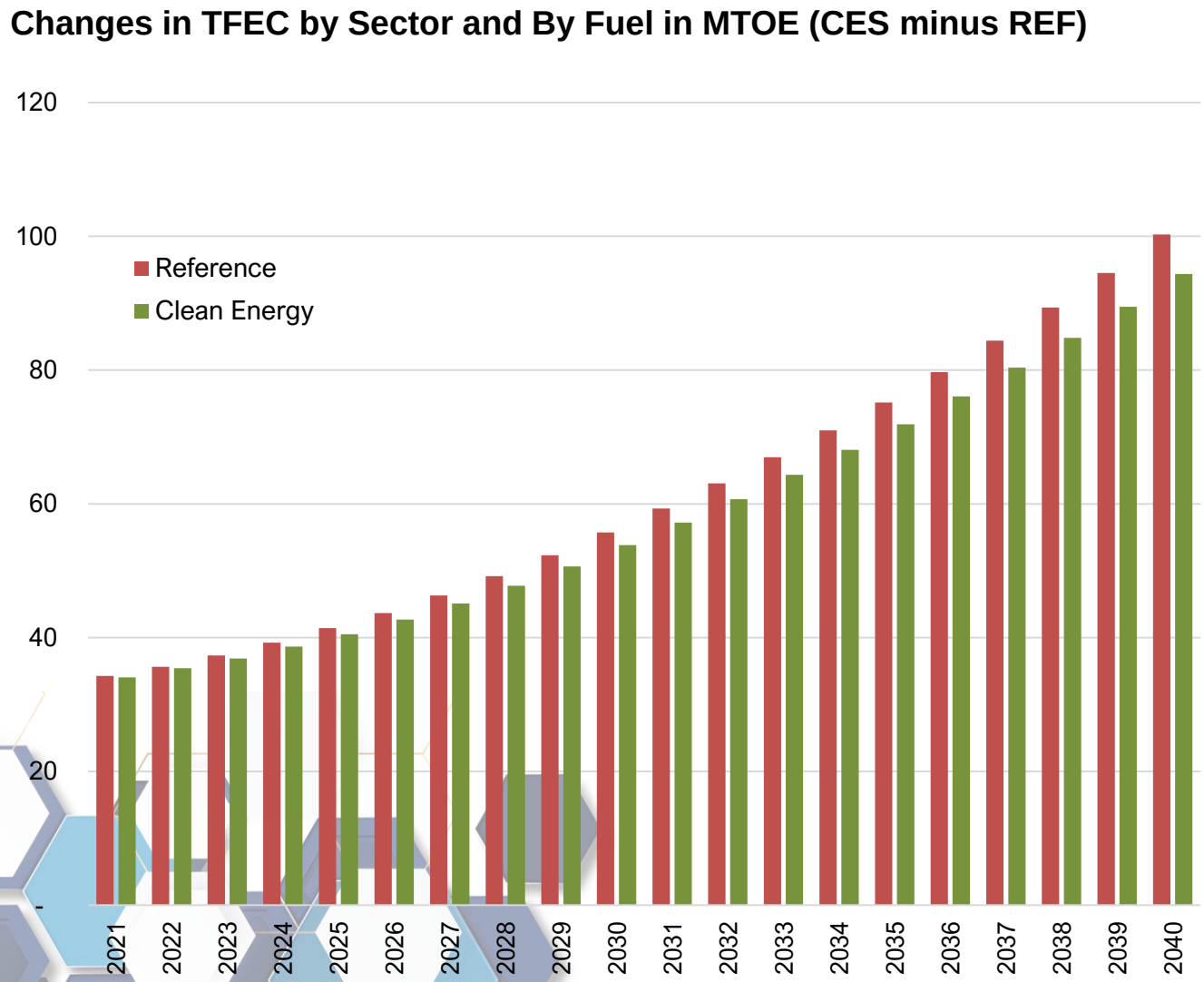


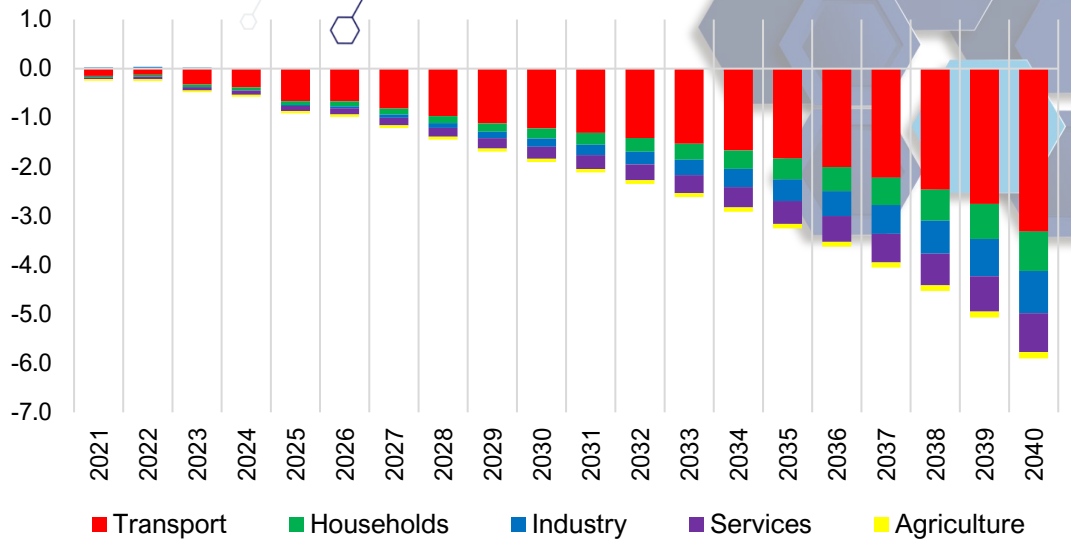
2040 CES: 144.8 MTOE
Self-Sufficiency: 59.9%

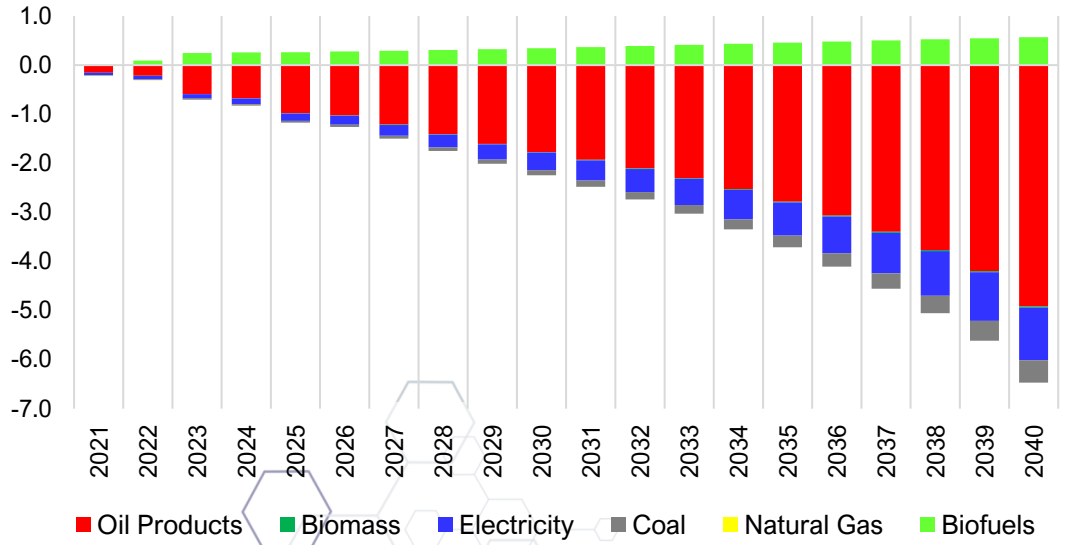
Fuel Type (MTOE)	2020		2040				AAGR 2020-2040	
	Actual	% Shares	REF	% Shares	CES	% Shares	REF	CES
Coal	17.3	30.8	33.1	21.2	30.1	20.8	3.3%	2.8%
Natural Gas	3.3	5.8	26.5	17.0	16.8	11.6	11.0%	8.5%
Oil-based	16.5	29.2	56.4	36.2	51.5	35.5	6.4%	5.9%
Renewable*	19.3	34.2	39.7	25.5	46.4	32.0	3.7%	4.5%
Total	**56.4**	**100.0**	**155.6**	**100.0**	**144.8**	**100.0**	**5.2%**	**4.8%**

*includes geothermal, hydro, wind, solar and biomass

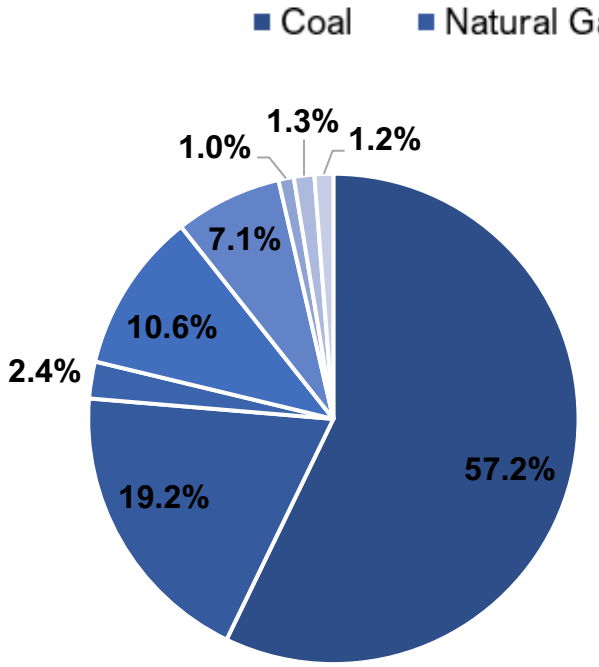
Energy Outlook: Impact of Clean Energy Scenario (CES)



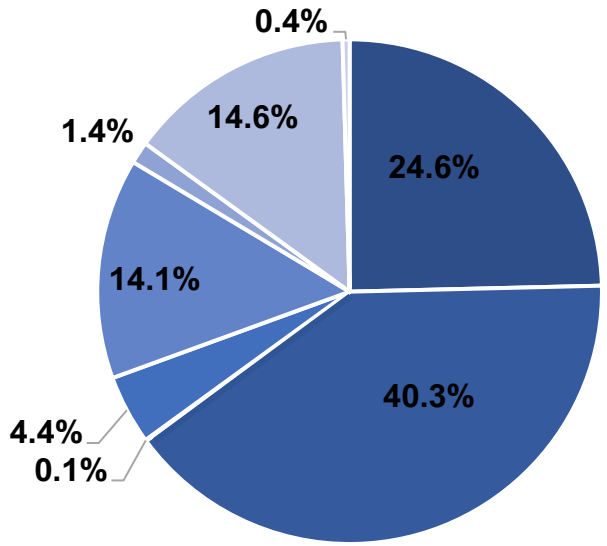




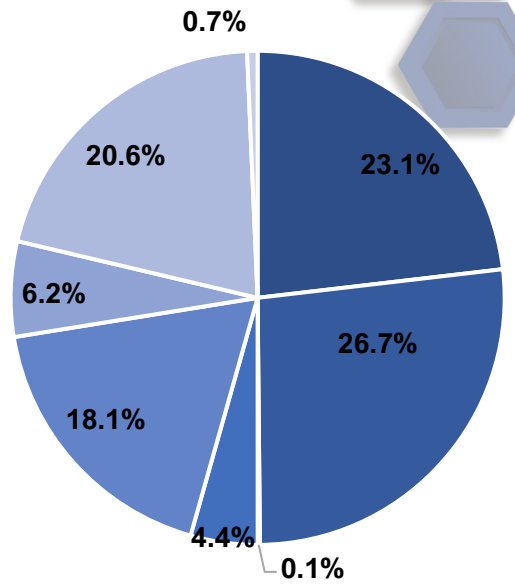
Power Generation, by fuel



2020: 101.8 TWh
RE Share: 21.2%



2040 REF: 364.4 TWh
RE Share: 35.0%

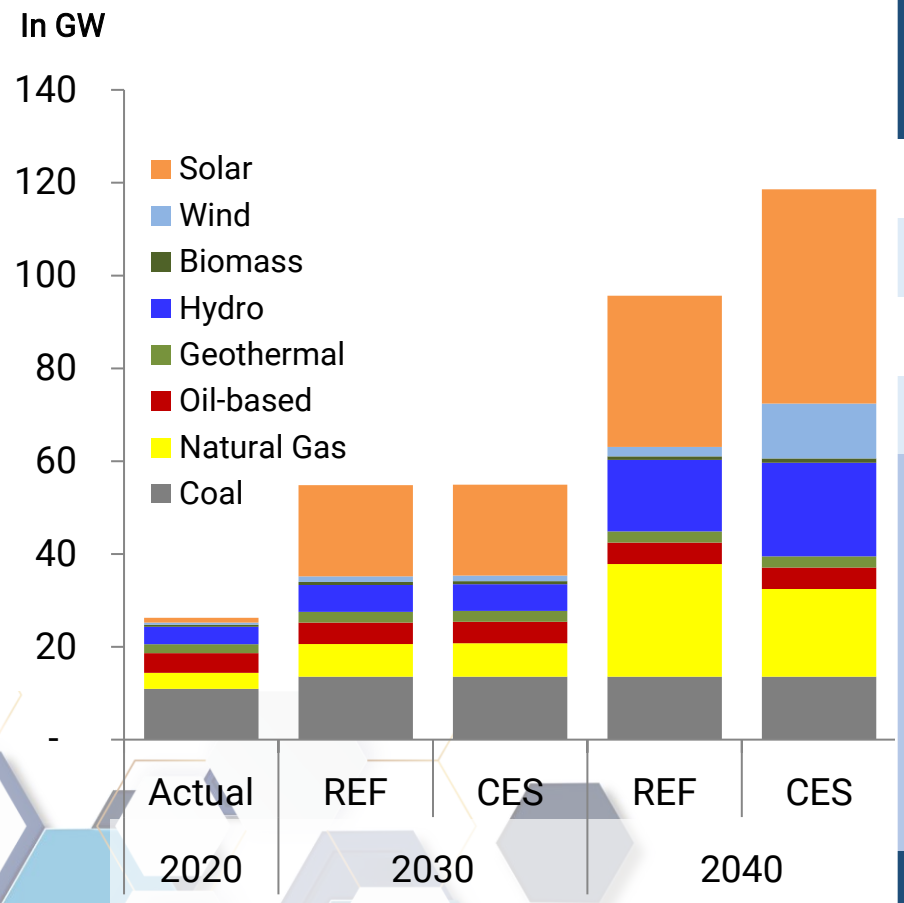


2040 CES: 350.1 TWh
RE Share: 50.0%

Fuel Type (TWh)	2020		2040				AAGR 2020-2040	
	Actual	% Shares	REF	% Shares	CES	% Shares	REF	CES
Coal	58.2	57.2	89.7	24.6	80.8	23.1	2.2%	1.7%
Natural Gas	19.5	19.2	146.9	40.3	93.2	26.6	10.6%	8.1%
Oil-based	2.5	2.4	0.3	0.1	0.5	0.1	-10.4%	-7.5%
Renewable	**21.6**	**21.2**	**127.5**	**35.0**	**175.5**	**50.1**	**9.3%**	**11.0%**
Total	**101.8**	**100.0**	**364.4**	**100.0**	**350.1**	**100.0**	**6.6%**	**6.4%**

Installed Generating Capacity 2040

Capacities by Source: 2020, 2030 and 2040



Fuel Type (MW)	2020		2040				Total Additions by 2040	
	Actual	% Shares	REF	% Shares	CES	% Shares	REF	CES
Coal	10,944	41.7	13,585	14.2	13,585	11.5	2,641	2,641
Natural Gas	3,453	13.2	24,263	25.4	18,883	15.9	20,810	15,430
Oil-based	4,237	16.1	4,618	4.8	4,618	3.9	381	381
Renewable	**7,617**	**29.0**	**53,205**	**55.6**	**81,485**	**68.7**	**45,588**	**73,868**
Geothermal	1,928	7.3	2,408	2.5	2,408	2.0	480	480
Hydro	3,779	14.4	15,426	16.1	20,176	17.0	11,647	16,397
Wind	443	1.7	2,027	2.1	11,830	10.0	1,584	11,387
Solar	1,019	3.9	32,590	34.1	46,137	38.9	31,571	45,118
Biomass	447	1.7	753	0.8	933	0.8	306	486
TOTAL	26,250	100.0	95,670	100.0	118,570	100.0	69,420	92,320

Power Generation Mix 2040

REFERENCE SCENARIO		CLEAN ENERGY SCENARIO
89,717 GWh (24.6%)	COAL	80,827 GWh (23.1%)
276 GWh (0.1%)	OIL-BASED	515 GWh (0.1%)
146,858 GWh (40.3%)	NATURAL GAS	93,240 GWh (26.6%)
111,361 GWh (34.9%)	RENEWABLE ENERGY	175,492 GWh (50.1%)
364.4 TWh (100%)	TOTAL	350 TWh (100%)

How do we get there?

- Policies, plans and programs
- What we have done

Private Sector Initiated Projects

Committed Projects		Indicative Projects
3,685.40 MW (35.93%)	 COAL	1,520.00 MW (2.97%)
41.75 MW (0.41%)	 OIL-BASED	335.00 MW (0.66%)
3,500.00 MW (34.13%)	 NATURAL GAS	6,580.00 MW (12.86%)
3,028.90 MW (29.53%)	 RENEWABLE ENERGY	42,723.53 MW (83.51%)
10,256.05 MW (100%)	TOTAL	51,158.73 MW (100%)

Source: DOE List of Private Sector-Initiated Power Projects as of 31 October 2022

Power Sector Plans and Programs

Smart Grid

The National Smart Grid Policy Framework and Roadmap for Distribution Utilities established in 2020 shall be fully implemented.

Increase Flexiblity in Power Generation

Increasing flexibility in power generation enables the system to synchronously adapt and adjust to dynamic conditions at any given time, resulting to an optimized electricity demand and supply flow.

Interconnection of Major Island Grids

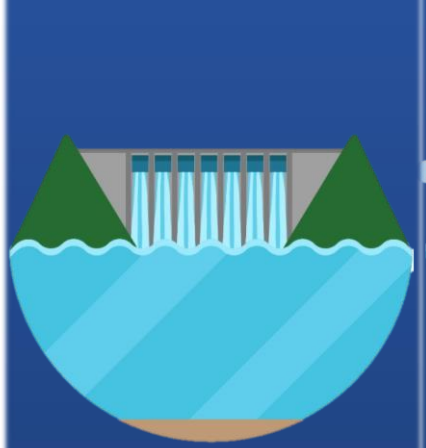
Having an interconnected grid system, which allows optimization of the country's indigenous energy resources and infrastructure, is one of the visions for the Philippines' electric power industry.

Total Electrification

The government shall continually improve its existing electrification strategies, utilize advanced technologies, and adopt innovative solutions to achieve 100% electrification rate in the country.

Awarded Renewable Energy Contracts

HYDROPOWER



431 Awarded Projects

12,050 MW
POTENTIAL CAPACITY

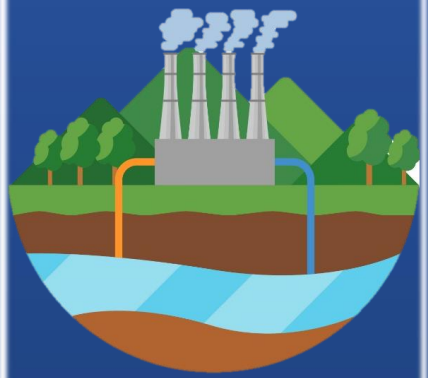
1,109 MW
INSTALLED CAPACITY

OCEAN

8 Awarded Projects

24 MW
POTENTIAL CAPACITY

GEOTHERMAL



36 Awarded Projects

886 MW
POTENTIAL CAPACITY

1,931 MW
INSTALLED CAPACITY

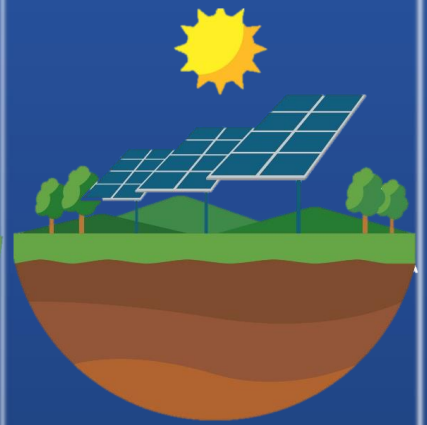
WIND

126 Awarded Projects

31,469 MW
POTENTIAL CAPACITY

443 MW
INSTALLED CAPACITY

SOLAR



334 Awarded Projects

20,183 MWp
POTENTIAL CAPACITY

1,169 MWp
INSTALLED CAPACITY

BIOMASS

81 Awarded Projects

203 MW
POTENTIAL CAPACITY

817 MW
INSTALLED CAPACITY

RE Policies and Programs

RENEWABLE PORTFOLIO STANDARDS (RPS) – GRID AND OFF- GRID

Requires all load-serving entitites to source or produce a specified portion of their supply from eligible RE facilities

RE MARKET (REM)

Serves as the venue for the transparent and fair trading of RE Certificates

PREFERENTIAL DISPATCH OF RE

All RE generating units are given preference in the Wholesale Electricity Spot Market dispatch schedule to ensure its maximum output injection in the grid.

ENHANCED NET-METERING PROGRAM

Allows end-users to generate electricity from RE-based systems up to 100 kW for own use and sell their excess to the grid

GREEN ENERGY OPTION PROGRAM (GEOP)

Provides end-users the option to choose RE resources as their source of energy

GREEN ENERGY AUCTION PROGRAM (GEAP)

Intends to provide additional market for RE through a competitive electronic bidding of RE capacities

RE TRUST FUND

Pursuant to Section 28 of the RE Act, the RETF was established to promote the development and greater utilization of RE

OMNIBUS GUIDELINES FOR RE CONTRACTS

Aims to harmonize and enhance existing guidelines governing the application and awarding of RE Contracts

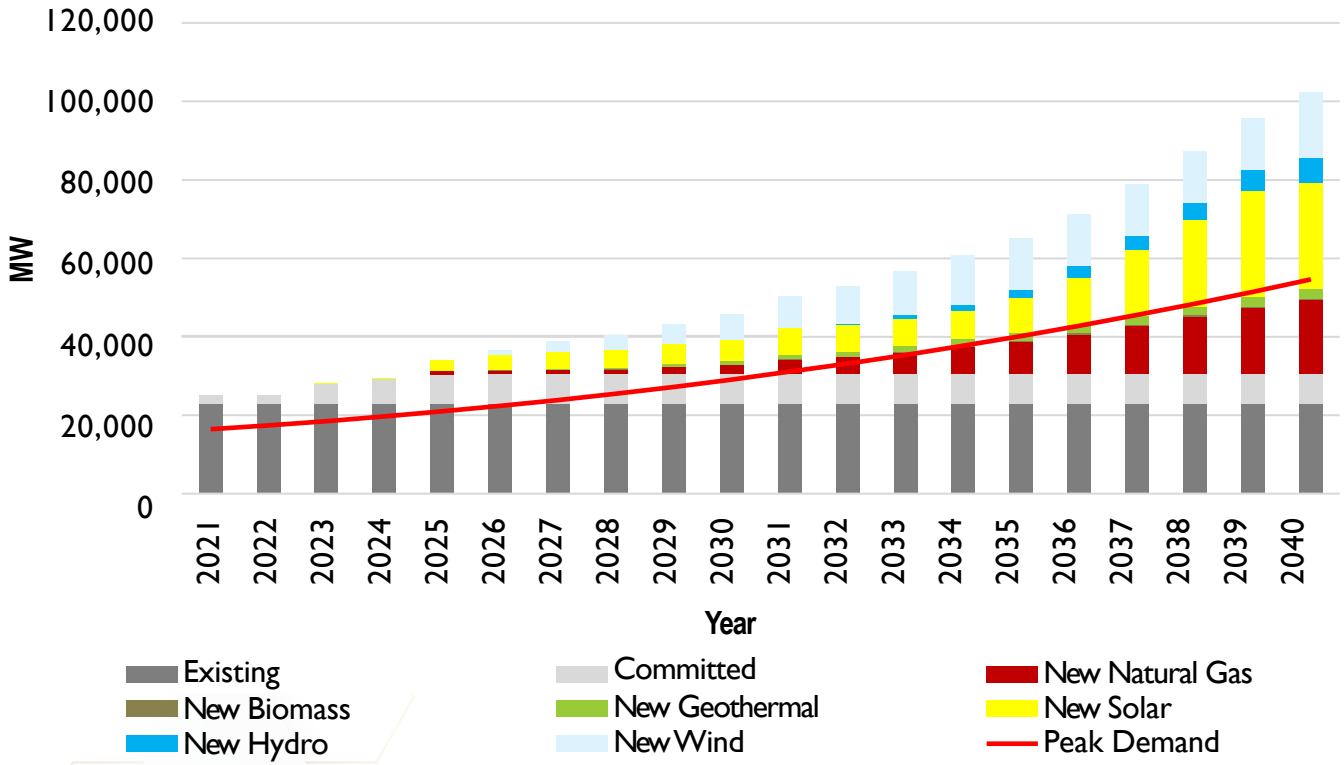
PRODUCTIVE USES OF RE (PURE)

Involve the utilization of RE for activities that enhance income and livelihood, and deliver social services, particularly in rural and off-grid areas.

RE RESOURCE DEVELOPMENT

Geothermal Energy, Offshore Wind, Waste-to-Energy, Ocean and Tidal Energy, Expanded Rooftop Solar Program

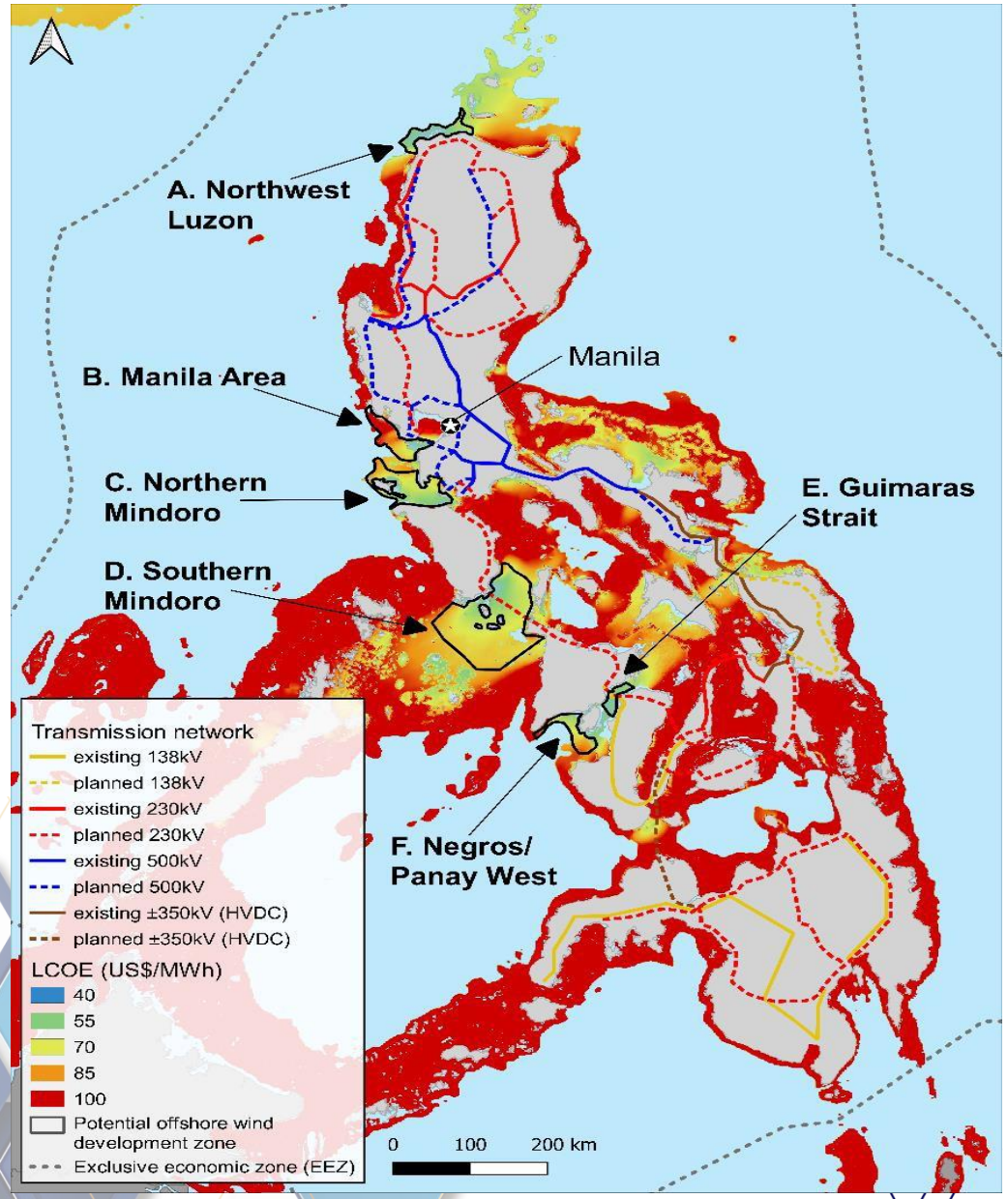
RE Outlook, 2021-2040



Particulars, in MW	2021	2025	2030	2035	2040
New Natural Gas	0	759	2,259	8,159	18,859
New Biomass	0	120	120	360	364
New Geothermal	0	0	850	1,900	2,500
New Solar	0	2,660	5,585	8,910	27,162
New Hydro	0	0	0	2,200	6,150
New Wind	0	0	6,450	13,050	16,650
Committed Capacity	2,066	7,512	7,592	7,592	7,592
Existing Capacity	22,954	22,954	22,954	22,954	22,954
Peak Demand	16,482	21,019	29,128	40,209	54,655

To reach the RE target, a total of 52,826 MW additional RE capacity is needed by 2040, which is almost seven times than the current level at 7,914 MW.

OSW Potentials



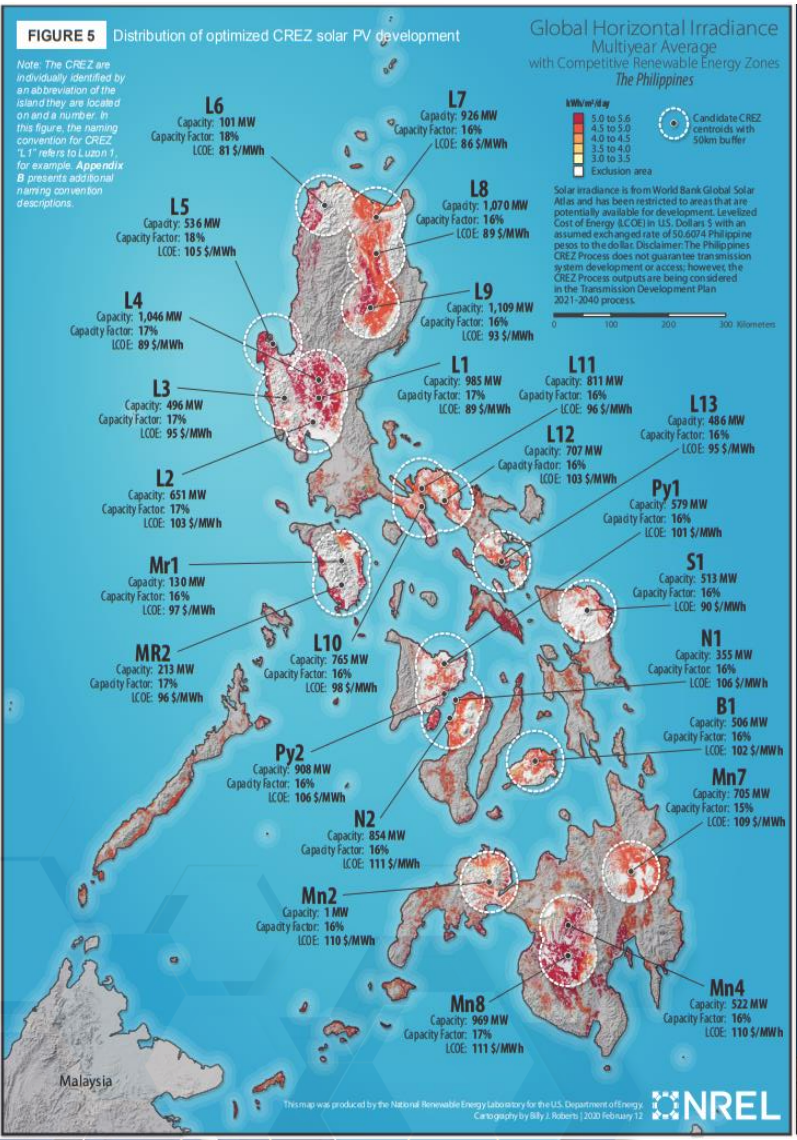
178 GW of OSW Potential

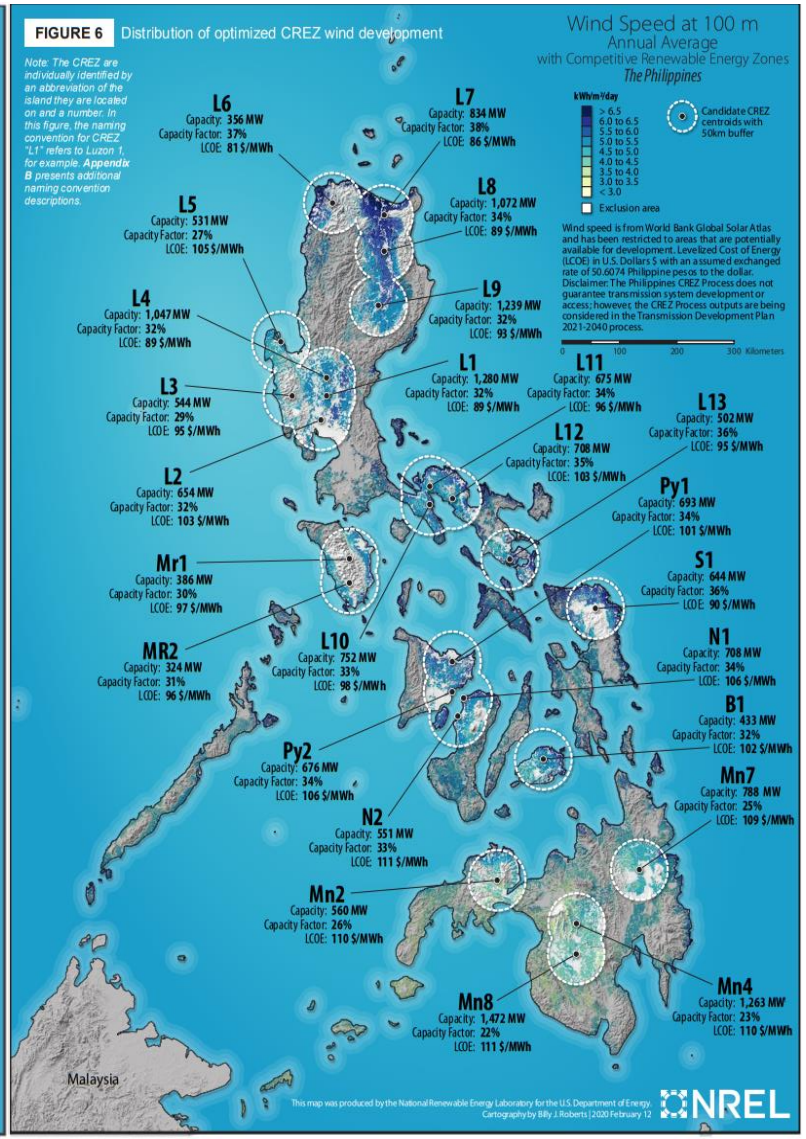
(18 GW Fixed and 160 GW Floating)

- Six (6) potential OSW development zones identified:
  - Environmental and social restrictions and exclusions.
  - Levelized cost of energy (wind speed is critical – consider measurement campaign).
  - Transmission and port infrastructure and demand centers.
- Needed to complete proportionate Marine Spatial Planning and publish final map by end 2023.

Potential Development Zone	Type	Practical Capacity
A: Northwest Luzon	Floating	2 to 5 GW
B: Manila area	Fixed and floating	0 to 3 GW
C: Northern Mindoro	Floating	3 to 10 GW
D: Southern Mindoro	Floating	20 to 36 GW
E: Guimaras Strait	Fixed	0 to 1 GW
F: Negros / Panay area	Floating	2 to 3 GW

Competitive Renewable Energy Zones (CREZ) Solar and Wind Potential





- **DOE** initiated the Competitive Renewable Energy Zones (CREZ) Project in 2018
- Identified **25 Strategic Areas** with high concentration of **solar and wind resources** throughout the country
- **58,110 MW** Solar PV and **93,987 MW** Wind potential capacities

Other Competitive RE Zones Potential Capacity

	Geothermal (MW)	Hydropower (MW)	Biomass (MW)
Luzon	285.00	270,603.00	210.00
Visayas	40.00	1,917.00	71.00
Mindanao	40.00	382,514.00	93.00
Philippines	**365.00**	**655,034.00**	**374.00**

Upstream Energy Development Projects

19 PETROLEUM SERVICE CONTRACTS
(13 Exploration Phase; 6 Production Phase*)

2021 PRODUCTION

632.29 MB	Oil
21.09 BCF	Gas
2.93 MMB	Condensate

** 3 SCs are producing*

6 Applications recommended to the President

27 COAL OPERATING CONTRACTS
(21 Development/Production; 6 Exploration)

12.74 MMT	Production (2021)
6.83 MMT	Consumption
28.84 MMT	Imports
8.45 MMT	Exports

Upstream Sector Plans and Programs

Oil and Gas

Review of provisions of Presidential Decree No. 87 and other policy issuances

Forge partnerships and bilateral/multilateral cooperation to encourage the conduct of more geophysical and geological studies of sedimentary basins

Coordinate with international service companies and private entities for possible conduct of multi-client surveys and update of existing data to guide petroleum exploration

Strict supervision and monitoring of work program and performance commitments of all SC holders

Coal

Strengthen existing coal policies on handling, transport, storage, and distribution to include stricter safety / security and environmental regulation and pollution control protocols.

Attract more investors to participate in upstream coal exploration, development, and production.

Monitor compliance of COC operators with work commitments and relevant regulations.

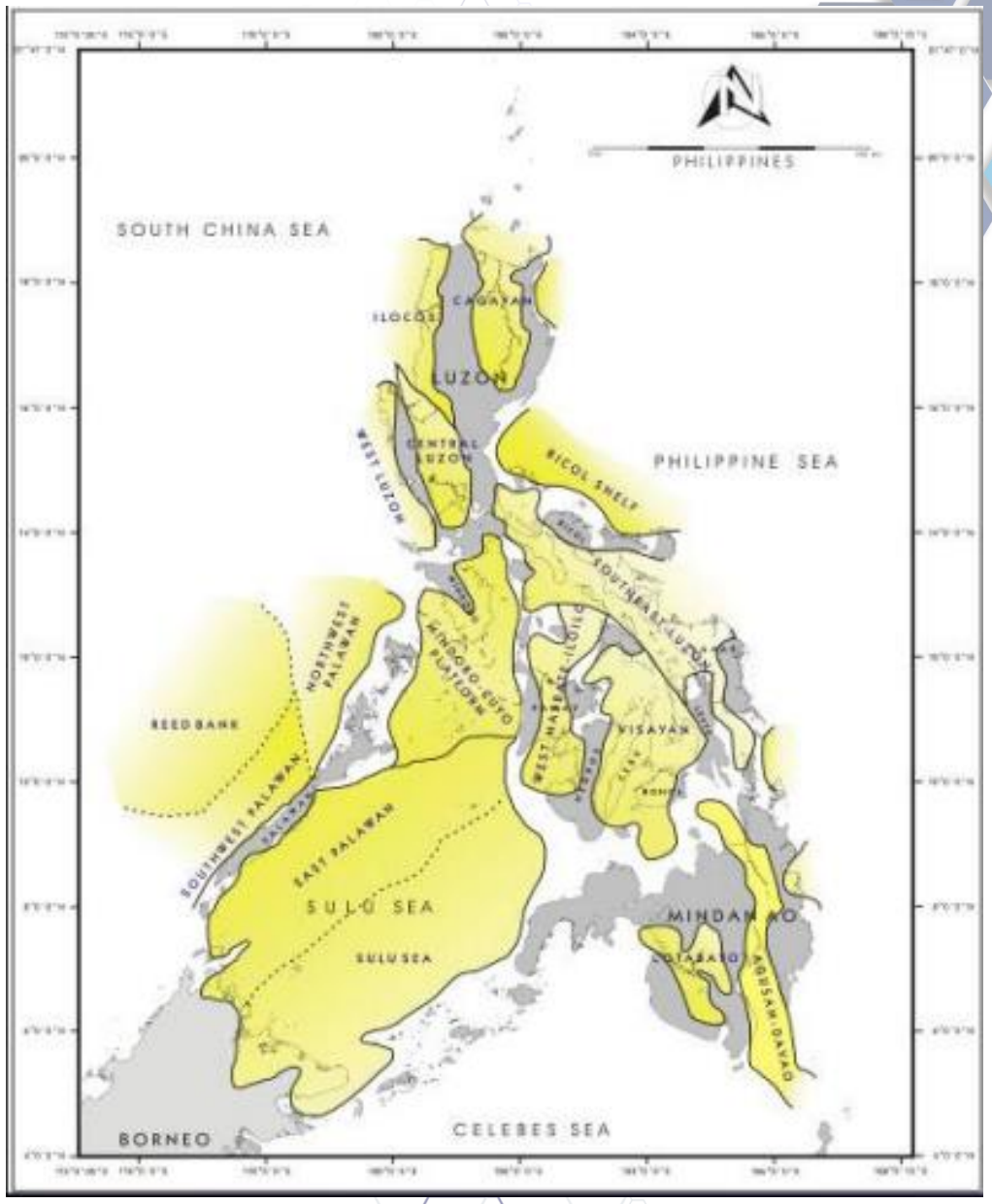
Pursue international cooperation activities to keep abreast with developments in the industry.

Philippine Sedimentary Basins

Total area: 709,000 sq km

Combined Potential: 8,895 MMBFOE

1. Ilocos Shelf
2. Cagayan Basin
3. Central Luzon Basin
4. Bicol Shelf
5. Southeast Luzon Basin
6. Mindoro-Cuyo Basin
7. West Masbate-Iloilo Basin
8. Visayan Basin
9. Agusan-Davao Basin
10. Cotabato Basin
11. Sulu Sea Basin
12. East Palawan Basin
13. Southwest Palawan Basin
14. Reed Bank Basin
15. Northwest Palawan Basin
16. West Luzon Trough



*source: PHILPRA (2002) for update of DOE

Regional Coal Reserves (in Million Metric Ton)

QUEZON
Resource Potential - 2.00
Positive Reserves - 0.09

MINDORO
Resource Potential - 100.00
Positive Reserves - 1.31
Probable Reserves - 0.19

SEMIRARA
Resource Potential - 550.00
Positive Reserves - 139.57
Probable Reserves - 32.82

NEGROS
Resource Potential - 4.50
Positive Reserves - 1.55
Probable Reserves - 1.21

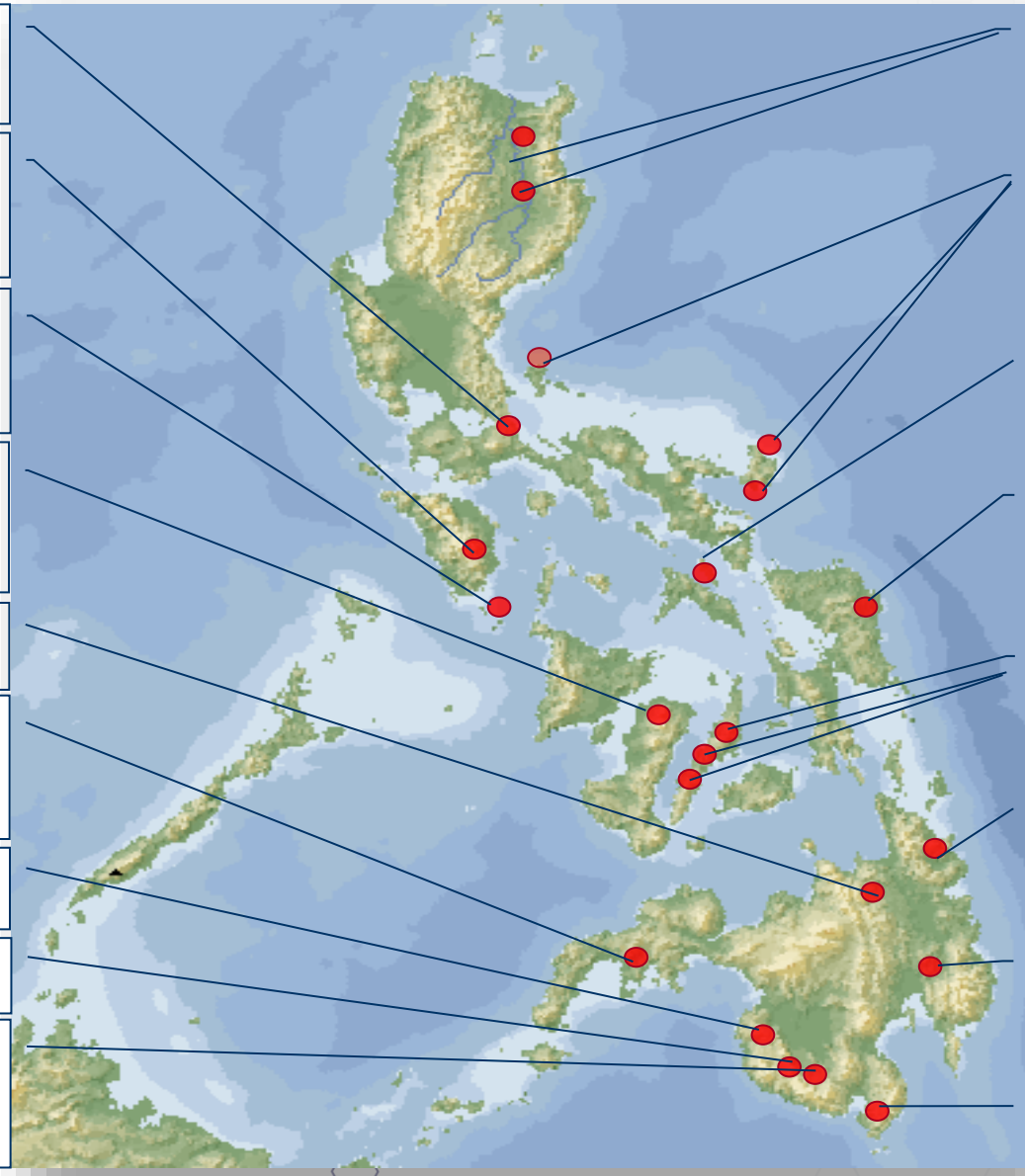
BUKIDNON
Resource Potential - 50.00

ZAMBOANGA
Resource Potential - 45.00
Positive Reserves - 34.22
Probable Reserves - 6.80

MAGUINDANAO
Resource Potential - 108.00

SULTAN KUDARAT
Resource Potential - 300.30

SOUTH COTABATO
Resource Potential - 230.40
Positive Reserves - 35.32
Probable Reserves - 69.49



CAGAYAN VALLEY
Resource Potential - 336.00
Positive Reserves - 80.10
Probable Reserves - 3.69

BATAN-POLILLO-CATANDUANES
Resource Potential - 17.00
Positive Reserves - 5.40
Probable Reserves - 2.42

MASBATE
Resource Potential - 2.50
Positive Reserves - 0.07

SAMAR
Resource Potential - 27.00
Positive Reserves - 7.47
Probable Reserves - 1.66

CEBU
Resource Potential - 165.00
Positive Reserves - 10.87
Probable Reserves - 8.56

SURIGAO
Resource Potential - 209.00
Positive Reserves - 29.94
Probable Reserves - 63.77

DAVAO
Resource Potential - 100.00
Positive Reserves - 1.79
Probable Reserves - 2.37

SARANGANI
Resource Potential - 120.00

* Resource potential for most Coal Regions are based on Robertson Research International Ltd., 1977 evaluation
* Positive and Probable Reserves for Coal Regions (except Cagayan & Semirara) are based on the verified reserves in Coal Operating Contract (COC) areas and Small Scale Coal Mining Permit (SSCMP) applied areas, using DOE standard computation; including the submitted report on production of COCs & SSCMPs

Existing Downstream Oil Facilities

DOI Player Participants	
Refiner	1
Importer-Retailer	20
Importer-Bulk Distributor	53
Bulk Distributor	43
Bunker Trader	5
Terminal Operator/Lessor	17
Bulk Hauler	68
Retailer	4,386
Refiller	178
Grand Total	**4,771**

As of June 30, 2022

DOI Player Participants	*No. of Facility	Storage Working Capacity (kL)
Refinery	1	1,527,890
Import Terminal (LPP)	70	3,772,362
Import terminal (LPG)	21	457,429
Distribution Depot (LPP)	92	852,771
Distribution Depot (LPG)	14	9,489
LPG Refilling Plant	352	-
LF Retail Outlet	11,192	-
Grand Total	**4,771**	**6,619,940**

As of December 31, 2021

* Includes lessees within a terminal depot

Approved LNG Projects

COMPANY	CAPACITY (MTPA)
First GEN LNG Corporation	**5.26**
Linseed Field Corporation	**3.00**
Energy World Gas Operations Philippines, Inc.	**3.00**
Luzon LNG Terminal	**4.40**
Vires Energy Corporation	**3.00**
Shell Energy Philippines Inc.	**3.00**
TOTAL	**21.66**

Downstream Sector Plans and Programs

Oil

Petroleum Products Supply Initiatives

Department Circular (DC) on Strategic Petroleum Reserve (SPR) Program. Enhancement of existing rules and regulations and recommend/implement amendments

Creation of the Oil Contingency Task Force (OCTF)

Memorandum of Agreement (MOA) with Japan Oil, Gas and Metals National Corporation (JOGMEC)

Information Exchange and Data Reconciliation Initiative

DOE-BOC-BIR MOA on information exchange and reconciliation of petroleum products data.

Natural Gas

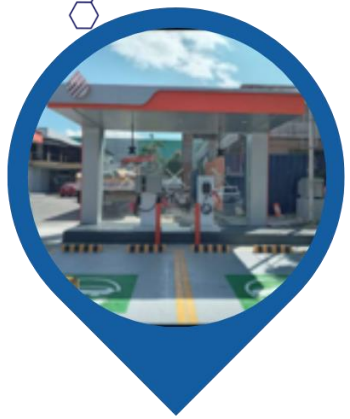
Development / Amendments of Downstream Natural Gas Industry Standards

Strengthening of the implementation of the Philippine Downstream Natural Gas Regulation (PDNGR)

Implementation of the Gas Policy Development Project (GPDP) 2

Promote Natural Gas Market and Infrastructure Development to Potential Investors

Energy Efficiency and Conservation and Alternative Fuels



37 Energy Service Companies (ESCOs)	
Electricity Savings	23.31 GWh
Total Savings	Php 0.21 Billion

Government Energy Management Program (GEMP)	
Electricity Savings	275.32 GWh
Fuel Saved	113,758 Liters
Total Savings	Php 2.7 Billion

4,221 EE Designated Establishments (DEs)	
Electricity Savings	58.09 GWh
Total Savings	Php 459 Million

Filinvest – Battery Swapping Station
Alabang, Muntinlupa

Unioil EVCS (DC Fast Charger)
Subic Bay Freeport Zone, Zambales

UP EEEI (AC Charger)
UP Diliman, Quezon City,

Electric Vehicles (EVs)	
Electric Vehicles Charging Stations (EVCS)	5 Operators
EVCS Locations (As of August 25, 2022)	283 EVCS
AC (Slow Charge)	250
DC (Fast Charge)	15
Battery Swapping Stations	18

** EVCS monitoring started on September 2021 through DOE DC2021-07-0023*

Energy Efficiency and Conservation Plans and Programs

Energy Efficiency and Conservation

Establish cross-sectoral energy performance and rating systems

Collaboration with stakeholders for expanded financing

Enhanced Demand Side Management

Integrate and mainstream Energy Efficiency and Conservation at Local Government Units

Cross-sectoral policy development

Create business tool kit for Energy Service Companies

Energy Database Monitoring System

Alternative Fuels and Emerging Technologies

Establish Necessary Infrastructure and Regulatory Support

EV Charging Stations
Adoption of single EV charging protocol
R&D on EV parts and components
Establishment of testing laboratories, service shops, and training modules
Household / home solar storage batteries

Deployment of Alternative Fuels and Technologies for Transport

Electric Vehicles (EVs)
Hybrid Electric Vehicles (HEVs)
Hydrogen Fuel Cells

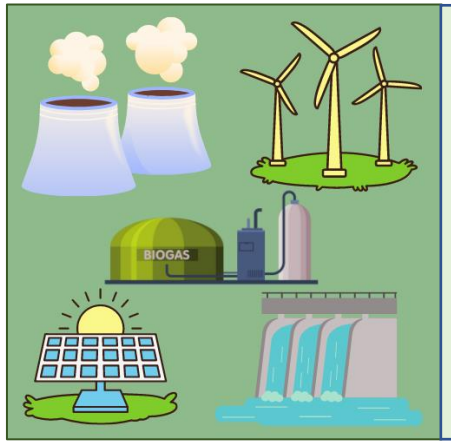
Pursue Other Cleaner Source of Energy and Support Technologies

Hydrogen
Nuclear

2040 Objectives

Power Sector

- Energy Security, Resiliency, Affordability, and Sustainability
- Transparent and Fair Playing Field in the Power Industry
- Electricity Access for All

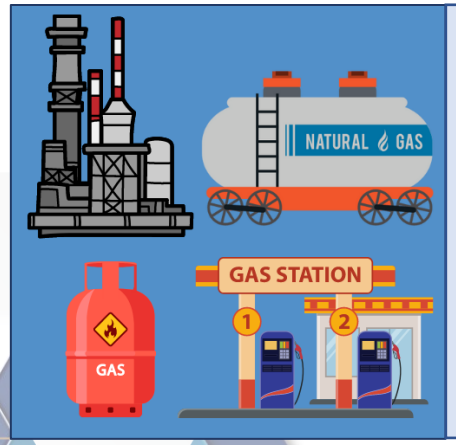


Renewable Energy

Attain the target of at least 35% RE share in the power generation mix by 2030 and 50% by 2040

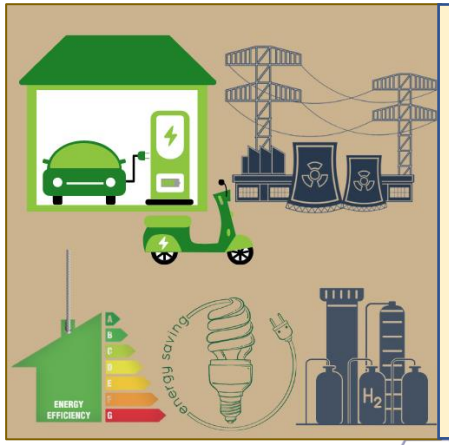
Upstream Sector

Increased indigenous petroleum and coal reserve and production



Downstream Sector

Improved policies governing the downstream oil industry and establishment of a world-class, investment-driven, and efficient natural gas industry



Energy Efficiency

Measurable reduction in energy intensity and consumption per year versus Business-As-Usual

Alternative Fuels and Emerging Technologies

Secured and Stable supply of energy through Technology Responsive Energy Sector

Collaboration with Government Agencies and Entities

EVOSS
ENERGY VIRTUAL ONE-STOP SHOP

Republic Act No. 11234
Energy Virtual One-Stop Shop (EVOSS) Act

Prospective energy companies can apply, monitor, and receive all the necessary permits, and pay for charges and fees, through the EVOSS' online platform

3,661
Total Accepted Applications
(as of November 2022)

3,096
DOE Approved Applications and Endorsements

86 Ongoing Evaluation

479 Disapproved Applications

Investment Requirements

Energy Investment Requirements

USD 153 Billion

Total Required Energy Investments

UPSTREAM

USD 10.05 Billion
Oil and Gas Exploration and Development

USD 13.12 Billion
Coal Exploration and Production

USD 510 Million
Renewable Energy (Pre-Development Activities)

DOWNSTREAM

USD 2.94 Billion
Oil Distribution Depots and Import Terminals

USD 1.78 Billion
Liquefied Natural Gas (LNG) Terminals

USD 2.38 Billion
Biofuels Production

POWER

USD 115.3 Billion
Construction of New Power Plants

Conventional: USD 21.0 Billion
Renewable Energy: USD 94.3 Billion

USD 6.97 Billion
Transmission Projects

(632) 8 479 2900

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