



## PHILIPPINES ENERGY TRANSITION DEEPDIVES

Enabling an Increased Share of Renewable Energy in  
the Philippines' Electricity Mix

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# Philippine Power Sector Baseline Review

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# Outline

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- Evolution of the PH power sector
- The PH Power Sector Characteristics
- RE potential and plans for decarbonisation
- The Barriers, Risks and Opportunities to ET
- Conclusion

# Evolution of the Philippine Power Sector

- Electricity reached the country in 1890 through the Sociedad Mercantil and the La Electricista in 1892.
- In 1925, MERALCO expanded their services. In 1936, National Power Corporation (NPC) was tasked with hydroelectric resources.
- In 1966, the rural electric cooperative model used in the US
- President Ferdinand Marcos, Sr. issued Presidential Decree No. 40, which granted monopoly powers over the NPC.
- President Corazon Aquino repealed PD 40 and privatization of the energy industry became the buzzword.
- In 1992, President Fidel Ramos was granted by the Congress special emergency powers to solve the power crisis in the country.
- The Philippine power industry was vertically integrated generation and transmission sectors through the NPC.
- The Philippines faced intermittent blackouts and power shortages during the late 1980s to early 1990s due to the Bataan Nuclear Power Plant and the inadequate power supply.



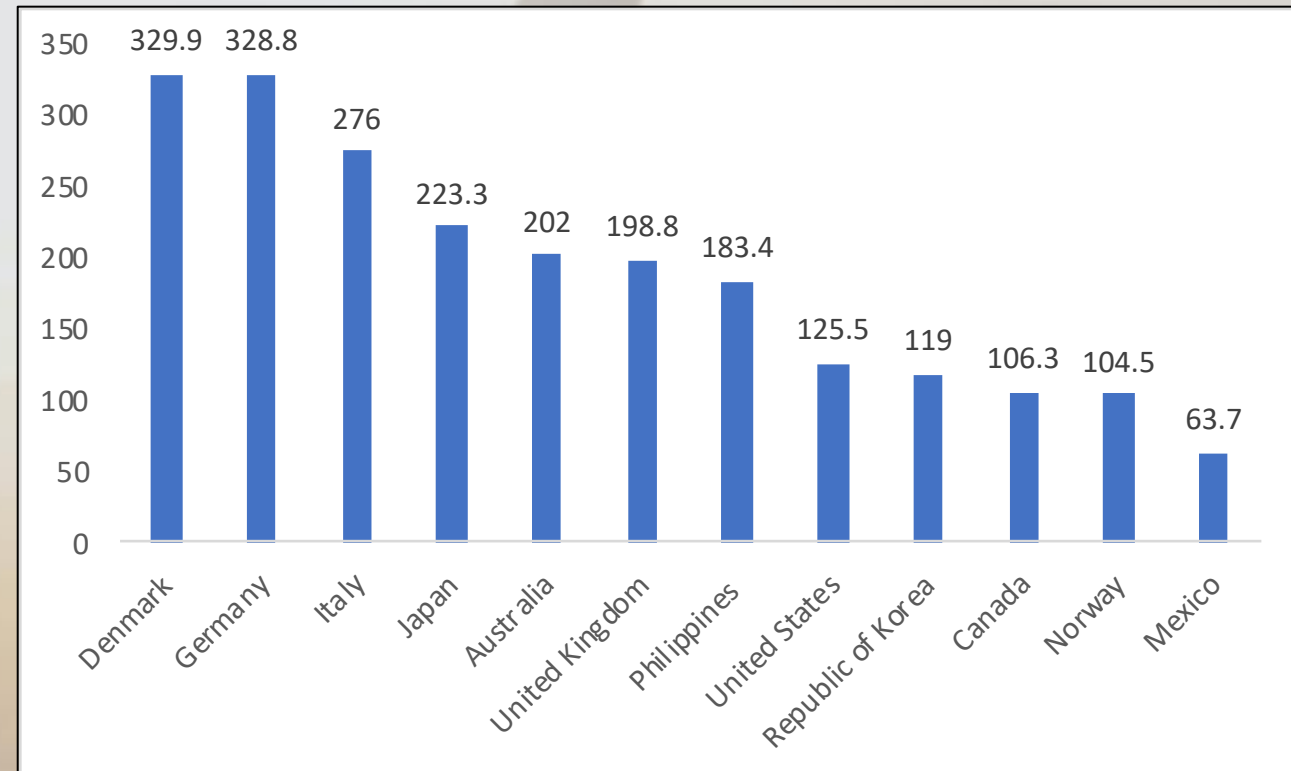




# Evolution of the Philippine Power Sector

- The Electricity Power Industry Reform Act (EPIRA) Act of 2001, otherwise known as Republic Act No. 9136, was enacted.
- It unbundled the electric power industry into four sectors: generation, transmission, distribution, and supply.
- The law create Power Sector Assets and Liabilities Management Corporation (PSALM)
- The Energy Regulatory Board was replaced by the Energy Regulatory Commission (ERC) to enforce rate making policies and regulation over suppliers and distributors.
- The control and ownership of the transmission lines and assets were designated to the National Transmission Corporation (Transco), which eventually awarded the concession to the private-owned National Grid Corporation of the Philippines (NGCP)
- Distribution utilities still operated in their respective jurisdictions but there is now open retail access and competition. This allowed a spot and contestable market via the Wholesale Electricity Spot Market (WESM)

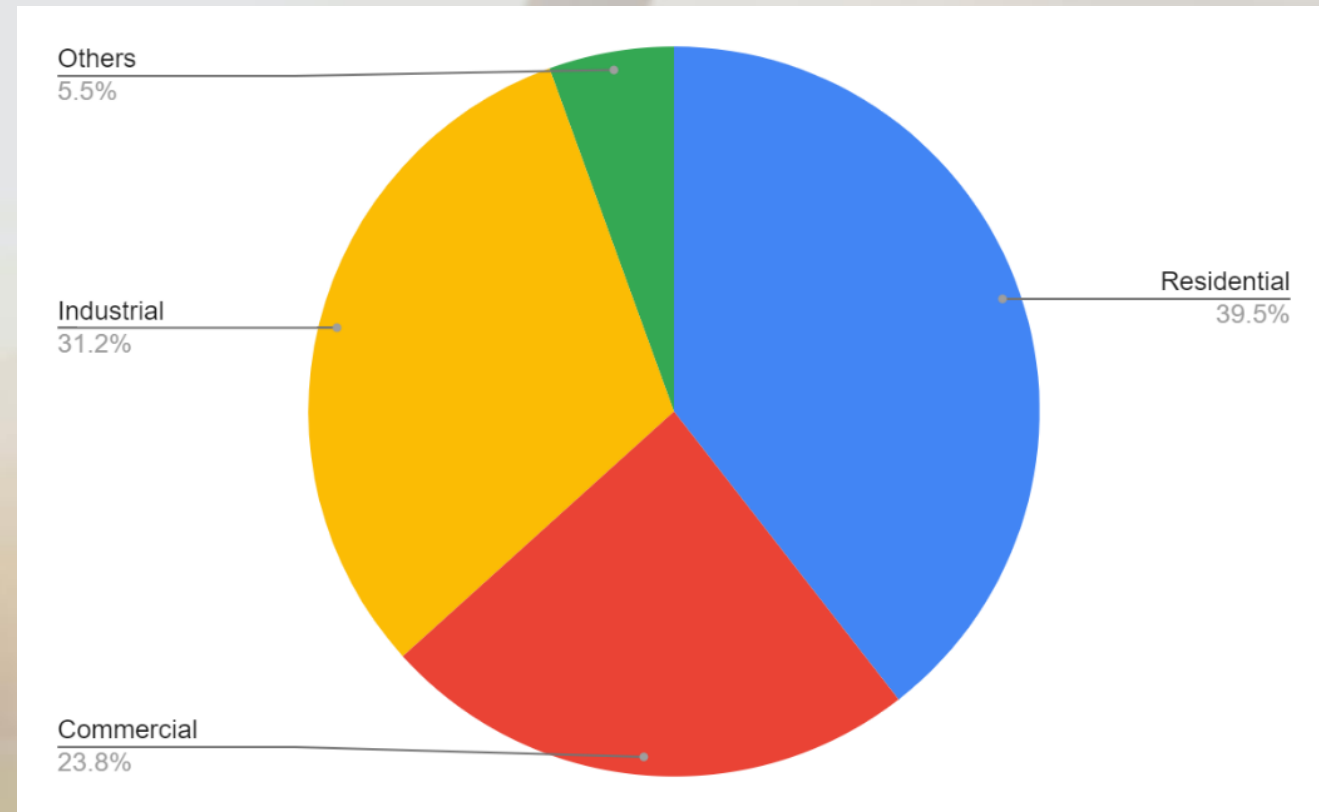
- The EPIRA was able to deregulate a highly vertically integrated electric power industry.
- It unbundled the electric power industry into four sectors: generation, transmission, distribution, and supply.
- But electricity prices in PH power industry remained high compared to other countries.
- 1.2 million households are still off-grid.



*Electricity prices for households (USD/MWh)*

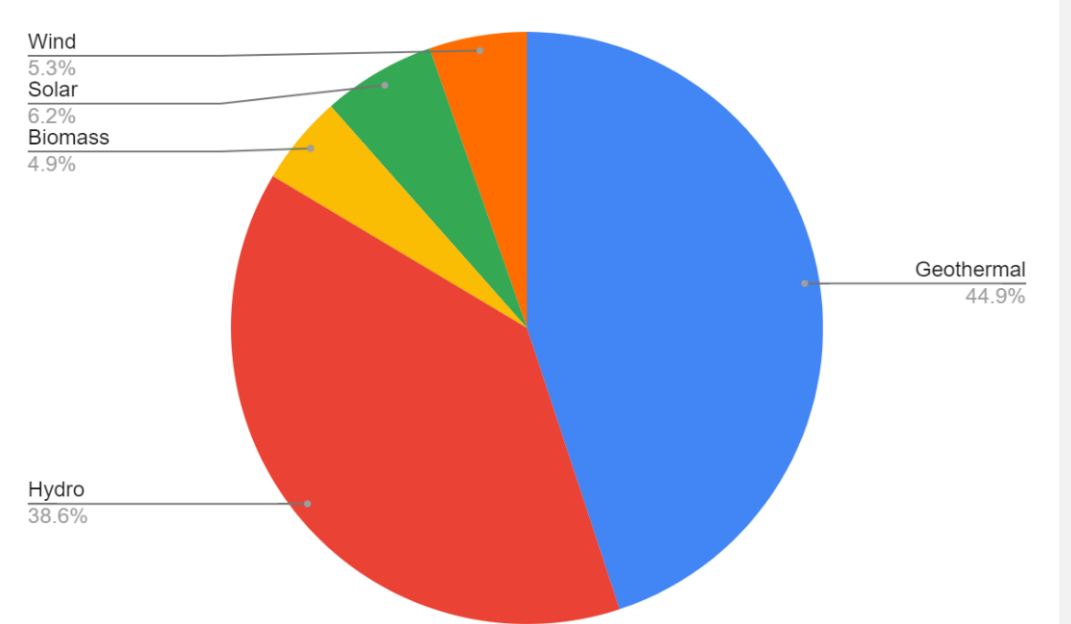
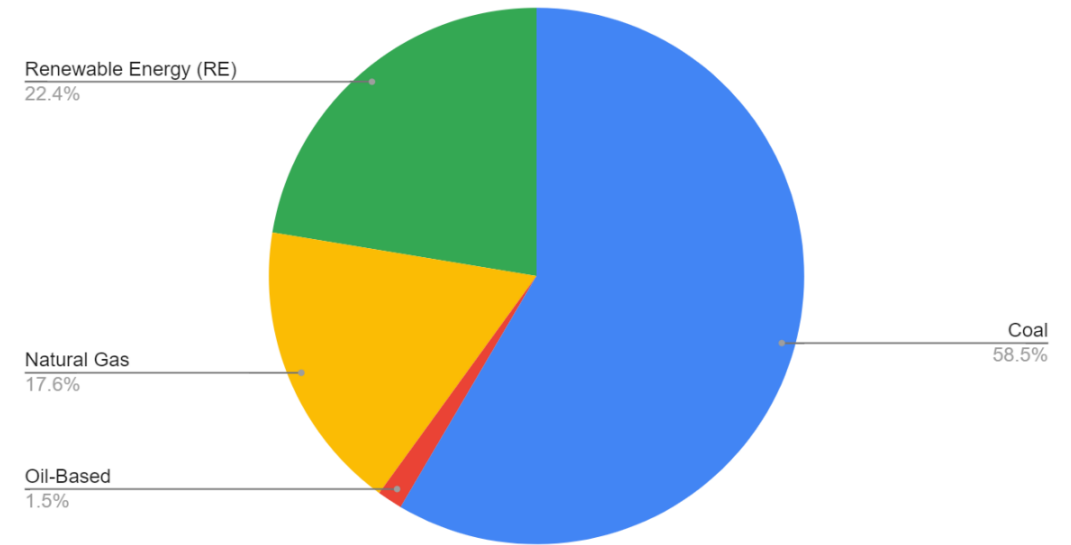
# Structure and Characteristics of PH Power Sector

- The Philippines is the third largest economy in Southeast Asia. Ambisyon 2040 and SDG 7
- Despite the economic growth, the Philippines has one of the lowest total primary energy supplies (TPES) and total final energy consumption (TFEC) in the Region (PH – 6,695 MW, Vietnam – 24,519 MW, Thailand – 11,860 MW, and Indonesia – 9,861 MW).
- As of 2021, the country's recorded peak demand particularly in the main grid is 16,036 megawatt (MW) which indicated a rise of 4.9 percent from the previous year's level of 15,282 MW.
- The residential and industrial sectors were the largest users comprising of 39.5 percent and 31.2 percent of the 88,626 GWh of total electricity sales in 2021. Commercial sector consumption accounted for 23.8 percent while others was only 5.5 percent of the total



# Philippine Power Sector Characteristics

- Dominated by coal contributing 58.5 percent (62,052 GWh) of the total generation. Renewable energy contributed 22.4 percent (23,771 GWh) and natural gas 17.6 percent (18,675 GWh), while oil-based roughly supplied 1.5 percent (1,617 GWh).
- Geothermal energy which contributes a total of 44.9 percent of the total 23,771 GWh power generated by renewable energy, has the biggest contribution among other renewable sources.





# RE plans and potential for decarbonisation

- The National Renewable Energy Plan (NREP) 2011-2030 aims to triple RE capacity from 5,438MW in 2010 to 15,304MW in 2030.
- The NDC commitment of GHG emission reduction is at 75%, with 2.71% as unconditional and 72.29% as conditional.
- NREP 2020-2040 aims at least 35% share of RE in the total power generation mix by 2030 and 50% by 2040.
- However, the Philippines also plans to enhance the generation capacity by three times the 2017 level by 2040 through mixed energy.
- PH has abundant natural resources as an energy source with NG of 98.5 billion cum and coal of 315 million tons, and oil reserves of 100 million barrels.
- To reach the CES of 50% share by 2040, RE must have an average annual growth rate of 11.1% for the next 20 years
- Business-as-usual cumulative economy-wide emission of 3,340.3 MtCO<sub>2e</sub>.





# RE plans and potential for decarbonisation

- RE Act (RA 9513): Feed-in-tariff policy, Net metering (100 KW), Preferential dispatch of Re-based plants in WESM, MPs for RPS, Off-grid rules, GEOP, and Energy Trust Fund.
- One of the innovations is to accurately identify and locate RE sources via the Philippine Renewable Energy Resource Mapping from LiDAR Surveys (REMap) Project (2014 to 2017)
- But the government has yet to bring such information into a single authoritative GIS that could help multiple stakeholders to access to the relevant data, information and insights to accelerate the development of RE projects that are strategic to the Philippines and pushed for the energy transition.
- Microgrids are a significant part of the solution space needed to actualize many RE Projects because they are organized collections of DRE and controls that can operate autonomously (independent of a bulk power grid) when necessary (or always) to provide electrical power.

Table 6. Philippines' Power Generation in GWh and Percent Share, 2021-2040

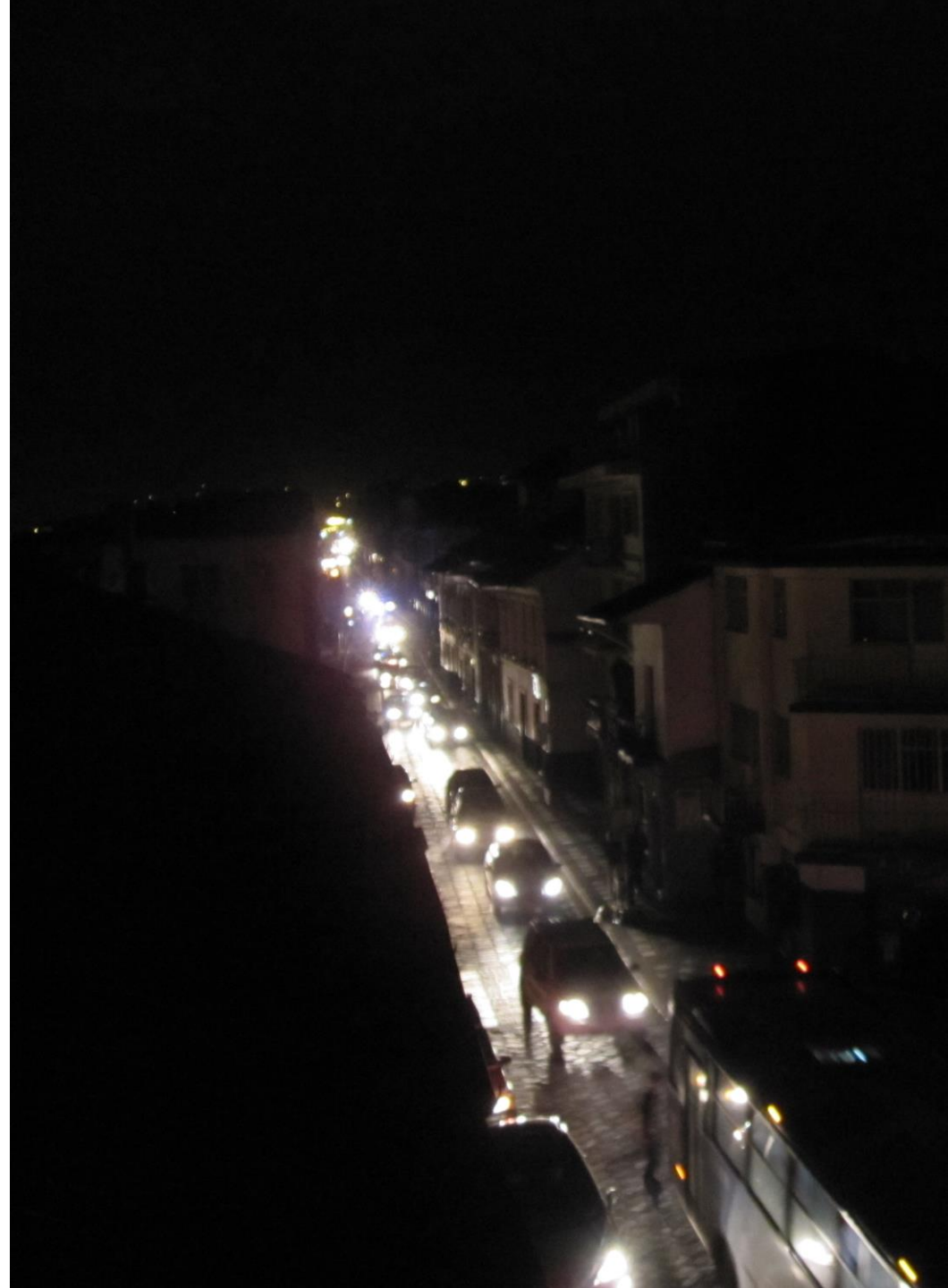
Plant Type	2021	2025	2030	2035	2040
Power Generation in GWh					
Coal	64,704	83,696	84,306	89,303	84,491
Oil-based	84	140	308	509	365
Natural Gas	18,776	13,810	36,618	58,105	89,866
Renewable Energy	22,917	37,071	65,316	109,384	174,783
Biomass	847	1,455	1,455	2,331	2,353
Geothermal	9,573	16,883	23,293	31,144	35,321
Solar	1,263	5,945	10,436	15,540	43,686
Hydro	10,424	11,677	12,884	26,041	49,697
Wind	810	1,112	17,250	34,328	43,726
<b>Total</b>	<b>106,481</b>	<b>134,717</b>	<b>186,547</b>	<b>257,301</b>	<b>349,505</b>
Power Generation in Percent Share					
Coal	61	62	45	35	24
Oil-based	0	0	0	0	0
Natural Gas	18	10	20	23	26
Renewable Energy	22	28	35	43	50
Biomass	1	1	1	1	1
Geothermal	9	13	12	12	10
Solar	1	4	6	6	12
Hydro	10	9	7	10	14
Wind	1	1	9	13	13
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**The Total Primary Energy Supply (TPES) must also grow at an average of 4.5% with RE share accounting for 46.5% by 2040 in the overall energy supply mix**

Fuel Type (TWh)	2020 Current	2040		AAGR (2020-2040)	
		REF (BaU)	CES	REF (BaU)	CES
Actual Mtoe	56.4	156.6	146.8	5.2%	4.9%
Coal	30.8%	21.1%	30.6%	3.3%	2.9%
Natural Gas	5.8%	16.9%	16.2%	11.0%	8.6%
Oil-Based	29.2%	36.6%	52.5%	6.4%	6.0%
Renewable \a	34.2%	25.3%	46.5%	3.7%	4.5%
Self-Sufficiency	52.6%	51.1%	59.9%		

# Barriers, opportunities and Risk in PH energy transition

- These include permitting issues due to layers of approvals needed from the LGUs and the national government, which are exacerbated by: (1) politicking, (2) stakeholder conflict, (3) risk appetite of investors, and (4) information asymmetry
- Lack of political will among regulatory agencies to accelerate the energy transition has insulated legacy carbon-based power plants to shift away from carbon fuels and imported coal
- Innovation in RE technologies has been slow.
- Grid interconnection
- Many ECs supplying electricity in different islands and remote areas are dependent on diesel generators as the main source of energy.
- The energy system is still very much carbon-based – coal, oil and natural gas – which account for around three-fourths of the country's energy supply







# Barriers, opportunities and Risk in PH energy transition - 2

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- The private energy market is vulnerable to natural monopoly and 'gaming' by interest groups.
- As to power generation, more than three-fourths of the country's 126 power plants in Luzon are 15 years old and over, which often break down due to lack of maintenance, repair and rehabilitation.
- The capacity of the grid to accommodate the bidirectional flow of power is still uncertain with the presence of distributed generation.
- Extreme weather changes wrought by climate change might also affect the supply of variable RE (i.e., wind, solar, hydro, and tidal energy).
- Energy security arises due to dependence on imported fossil fuels.
- Changes in administration also results to changes in the priorities of each administration creating investor uncertainty.
- For solar and wind energy, land availability and convertibility issues are still challenges.



## Conclusion

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- RE development is predominantly top-down structure.
- Long-term plans are crafted by national agencies, primarily the DOE, and cascaded down to investors and project implementors.
- NREP 2020-2040 adopts a whole-of-nation approach to RE development to achieve its RE goals and reap the resulting positive socio-economic benefits.
- Unlike large, centralized power plants that are most often connected to the transmission facilities of the grid, distributed generation is mostly connected to the distribution system.
- Observed implementation policy & information asymmetry gaps that currently hinder the realization of the whole-of-nation approach adopted by NREP 2020-2040.
- The drive towards energy transition cannot be accomplished without linking it with environment protection, health care, inclusive growth, transportation, and national security.
- Former UN Secretary-General Ban Ki-moon said, “Energy is the golden thread that connects economic growth increase social equity, and an environment that allows the world to thrive.”