

Renewable Energy Development

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Department of Energy



e – POWER MO

- e – Secure Mo
- e – Safety Mo
- e – Diskarte Mo



Renewable Energy Development

Presentation Outline

I. Brief History of Renewable Energy Development

II. Governing Laws

I. Biofuels Act of 2006

II. RE Act of 2008

III. Current Situation

IV. Updates

V. Challenges

VI. Way Forward

- Policies***
- Programs***

 **Power of Choice**



Brief History

➤ **Hydropower**

- In 1913 the first Hydropower Plant was developed in Baguio City, Camp John Hay with installed capacity of 560 kW
- Projects under National Power Corporation and the National Electrification Administration
- 1991 - Republic Act No. 7156 on mini-hydropower resources (up to 10 MW) through private sectors
- Mid-90s - Build-Operate-Transfer Scheme of large hydropower projects

➤ **Geothermal**

- 1952 to late 1960's - inventory of geothermal resources
- April 12, 1967 - first electric bulb powered by geothermal
- July 1977 - first commercial geothermal power plant (3-Mwe) in Negros Island
- 1978 – PD No. 1442, 896-Mwe of geothermal installed capacity in 1983
- Mid 90s - allowed private sector development of geothermal facilities through BOT

➤ **Solar, Wind and Ocean**

- 1980's - Solar PV systems for rural electrification program
- Mid-90s - Executive Order No. 462, as amended by Executive Order No. 232 encourage private sector participation
- 2005 - First Wind Farm in Northern Luzon at 25 MW
- 2008 - First grid-connected solar PV Farm at 1-MWe

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Brief History

Presidential Decree (PD) No. 1442: Geothermal Act of 1978

- *Purpose: Established the Service Contract System for geothermal energy development and provides incentives for contractors*

RA 7156: Mini-Hydroelectric Power Incentives Act of 1991

- *Purpose: Provides various tax incentives to qualified private sector developers of small hydropower.*

Renewable Energy Policy Framework (2003)

- *Purpose: Summarizes DOE objectives, policies, and strategies for promoting further development and utilization of renewable energy*

Executive Order (EO) 462

- *Purpose: Private Sector Participation in ocean, solar and wind development. Provides the guidelines for private sector participation in ocean, solar, and wind energy development*

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Brief History

33MW Northwind Power Project (Bangui, Ilocos Norte)



1MWe CEPALCO Solar Power Farm (Cagayan de Oro City)



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Governing Laws

R. A. No. 9367: The Biofuels Act of 2006

Mandates the use of biofuel-blended gasoline and diesel fuels

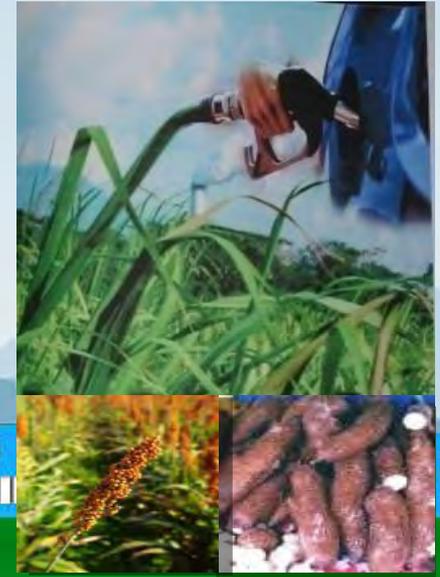


BIODIESEL

- 2008 consumption of 91 million liters (CME)
- 1% biodiesel blend sold in all gasoline stations
- Feb. 6, 2009, effect 2% mandated blend

BIOETHANOL

- Feb. 6, 2009 – mandated 5% by total volume
- Feb. 6, 2012 – increase mandate to 10% blend



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Governing Laws

BIOFUELS MANDATE IMPLEMENTATION

BIODIESEL

Biodiesel Supply:

- 11 Accredited Producers with annual total capacity of 584.9 million liters
- 2 pending applications with proposed total annual capacity of 90 million liters

Feedstock used:

- Coconut oil (current)
- Jatropha, waste cooking oil, microalgae (under study)

BIOETHANOL

Bioethanol Supply:

- 10 Accredited Producers with annual total capacity of about 282.12 million liters
- 3 production facilities to be on-stream between 2016-2018 with additional capacity of 149 million liters/year

Feedstock used:

- Sugar Cane, Molasses (current)
- Sweet sorghum, cassava, nipa sap, macroalgae (under study)

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Governing Laws

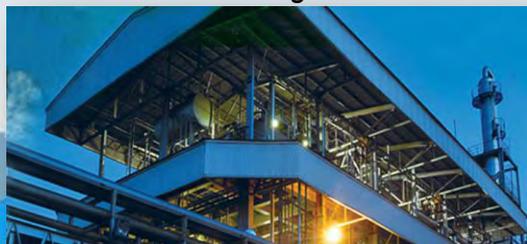
Biofuels Production

Current Mandate: B2, E10

Targets: B10 and E20 by 2020, B20 and E85 by 2025

Renewable Energy	Capacity (in Million Liters)								No. of Projects Monitored as of 4 th Quarter 2016
	As of 2015				As of 2016				
	Construction*	Operational	Production	Sales	Construction*	Operational	Production	Sales	
Biodiesel	-	584.9	204.0	200.6	90.0	614.9	225.9	217.7	13
Bioethanol	83.0	222.1	167.9	168.4	149.0	282.1	230.2	226.9	13
TOTAL	83.0	807.0	371.9	369.0	239.0	897.0	456.1	444.6	26

* With Certificate of Registration of Notice to Proceed Construction



90 ML Chemrez Technologies Inc., Biodiesel Plant (Bagumbayan, Quezon City)



54 ML Green Future Innovation Inc., Bioethanol Plant (San Mariano, Isabela)

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Governing Laws

R. A. No. 9513: The Renewable Energy Act of 2008



Accelerate the development of the country's renewable energy resources : biomass, solar, wind, hydro, geothermal and ocean energy sources, including hybrid systems.

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Governing Laws

Policy Directions

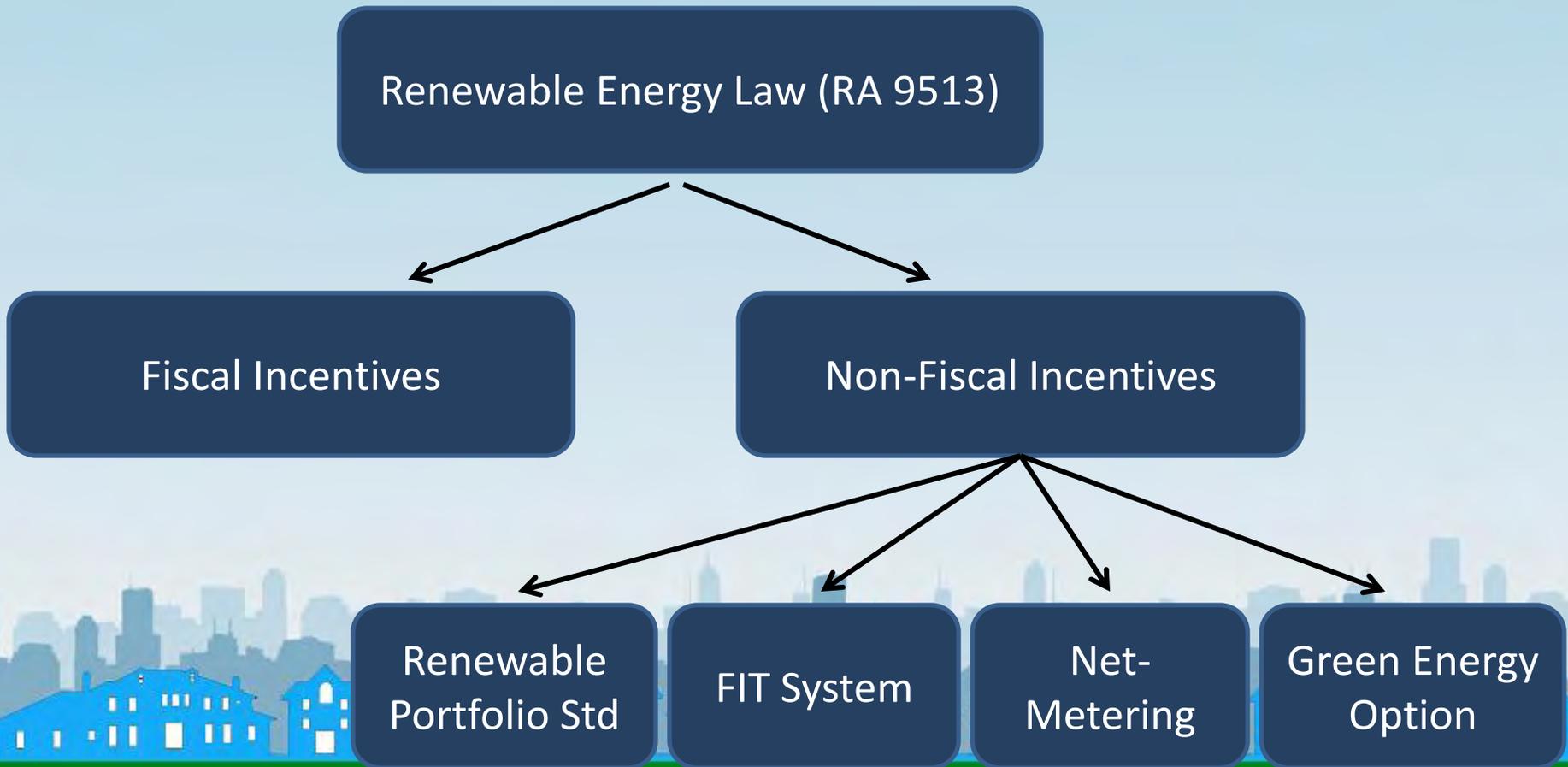
- Accelerate the exploration and development of renewable energy resources
- achieve energy self-reliance
 - to reduce the country's dependence on fossil fuels
 - minimize the country's exposure to price fluctuations
- adoption of clean energy to mitigate climate change
- promote socio-economic development in rural areas
- Increase the utilization of renewable energy by providing fiscal and non fiscal incentives;

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Governing Laws

Incentives Under the RE Act



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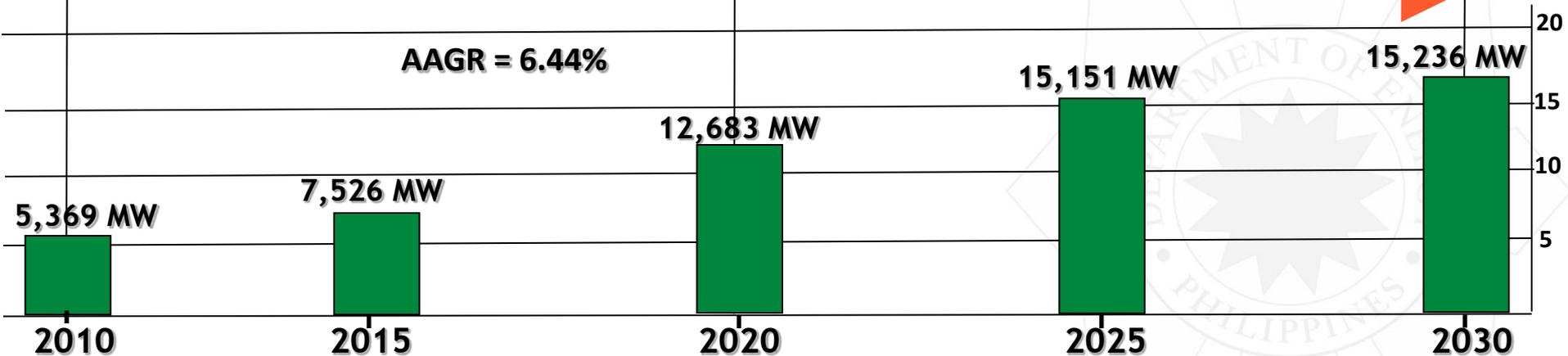


NREP ROADMAP (2010-2030)

- 2012 - Full implementation of RA 9513
- 2015 - Target additional biomass capacity of 277 MW is reached
- 2018 - Commissioning of the 1st OTEC facility
- 2020 - Solar grid parity is attained

- Target additional RE capacities are reached by:
 - 2022 - Wind : 2,345 MW
 - 2023 - Hydro : 5,398 MW
 - 2025 - Ocean : 75 MW
 - 2030 - Solar : 284 MW*
 - Geothermal : 1,495 MW
- 2025 - Wind grid parity is attained

IMPLEMENTATION OF NREP SECTORAL SUB-PROGRAMS



Note: The National Renewable Energy Program (NREP) is currently under review of NREB to reflect developments on RE sector and the DOE's issuances of new Installation targets.

Source: Philippine Department of Energy/NREP



RE Development Background

Enacted the R. A. No. 9513: Renewable Energy Act of 2008

- Published the National Renewable Energy Program (NREP) 2010-2030

- The ERC approved the FIT Rates (July 2012)
- DOE issued Guidelines for the Selection Process of RE Projects under FIT System and Award of Certificate for FIT Eligibility under Department Circular No. 2013-05-0009 (May 2013)
- Implementation of the Net-Metering Program (July 2013)
- ERC issued FIT Allowance (FIT-ALL) Payment and Collection Guidelines (Dec. 2013)

2008

2009-2010

2011

2012-2013

2014-2016

- Issued RE Act Implementing Rules and Regulations
- Administrative Frameworks for awarding RE Service Contracts, Accreditations
- Establishment of Renewable Energy Management Bureau (REMB)
- Creation of DOE's RE-Review and Evaluation Committee
- Initial awards of RE Contracts under the RE Law
- Convening of National Renewable Energy Board (NREB)
- ERC Issued Feed-in-Tariff (FIT) Rules (Aug. 2010)

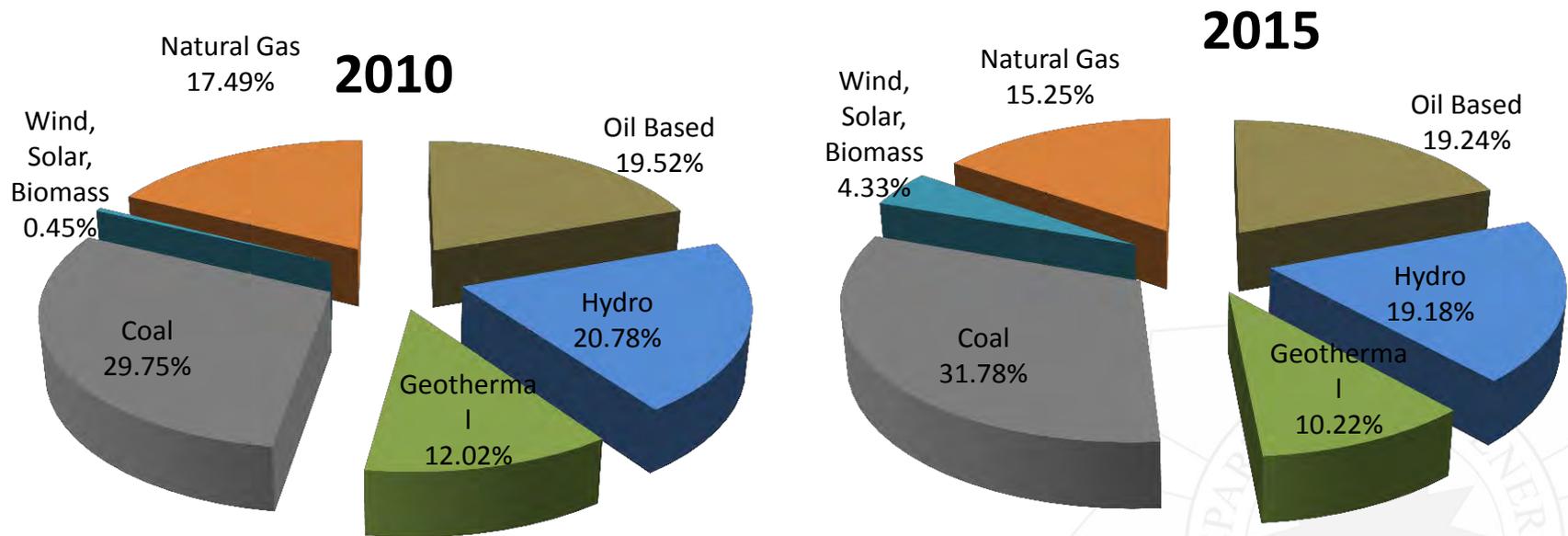
- ERC approved FIT-ALL Rates 0.0406 PHP/kWh (2014-2015), Oct. 2014 and effective January 2015
 - Amendment of DOE's installation target
 - April 2014, 50mw to 500mw for Solar Energy Generation
 - April 2015, 200mw to 400mw for Wind Energy Generation
- ERC issued new FIT Rates for Solar (March 2015) and Wind (October 2015)



Current Situation

RE Contribution

2010 and 2015 Total Installed Capacity Mix (MW)



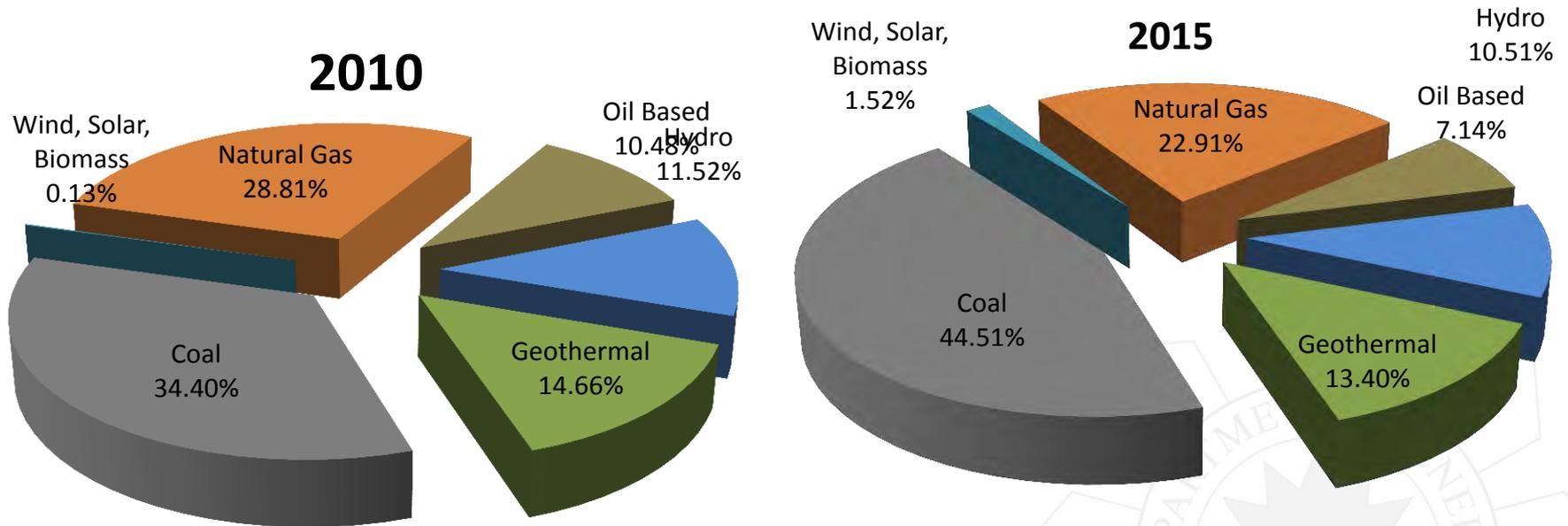
Installed Capacity	2010	2015
Total Installed	16,359MW	18,765MW
Total RE	5,439MW	6,330MW
% RE Share	33.25%	33.73%



Current Situation

RE Contribution

2010 and 2015 Total Generation Mix (GWh)



Installed Capacity	2010	2015
Total Installed	67,743GWh	82,413GWh
Total RE	17,822GWh	20,963GWh
% RE Share	26.31%	25.44%



Current Situation

SUMMARY OF RENEWABLE ENERGY AWARDED PROJECTS (as of July 2017)

AWARDED PROJECTS UNDER RE LAW

RESOURCES	AWARDED PROJECTS		POTENTIAL CAPACITY MW		INSTALLED CAPACITY MW	
	Commercial	Own-Use	Commercial	Own-Use	Commercial	Own-Use
Hydro Power*	451		13,513.63		965.04	
Ocean Energy	6		26.00			
Geothermal**	41		575.00		1,906.19	
Wind	59	1	2,341.50		426.90	0.0006
Solar	196	16	5,567.27	4.286	900.18	3.218
Biomass	51	24	326.68	16.15	389.58	126.78
Sub-Total	804	41	22,350.08	20.436	4,587.89	130.00
TOTAL	845		22,370.52		4,717.89	

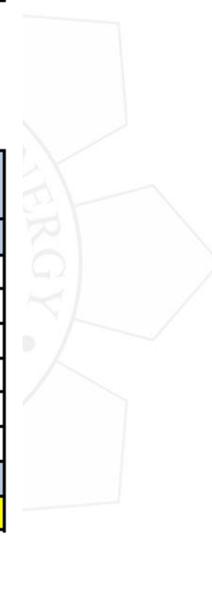
NOTE:

* - excluding 55 installed projects with 3,050.47MW capacity under RA 7156, CA 120, PD 1645, RA 3601 & Own-Use

** - excluding 1 potential project with 20MW capacity under PD 1442.

PENDING APPLICATIONS UNDER RE LAW

RESOURCES	PENDING APPLICATIONS		POTENTIAL CAPACITY MW		INSTALLED CAPACITY MW	
	Commercial	Own-Use	Commercial	Own-Use	Commercial	Own-Use
Hydro Power	86		2,227.17			
Ocean Energy	-		-			
Geothermal	3		60.00			
Wind	22		80.00			
Solar	162		3,377.20			
Biomass	7		91.30			
Sub-Total	280	-	5,835.67	-	-	-
TOTAL	280		5,835.67		0.00	



Current Situation

ACCREDITED RENEWABLE ENERGY (RE) SUPPLIERS, MANUFACTURERS AND FABRICATORS

Solar and Wind – 9

Biomass – 1

Geothermal – 4

Hydropower – 1

Term – 3 years renewable for the same period.

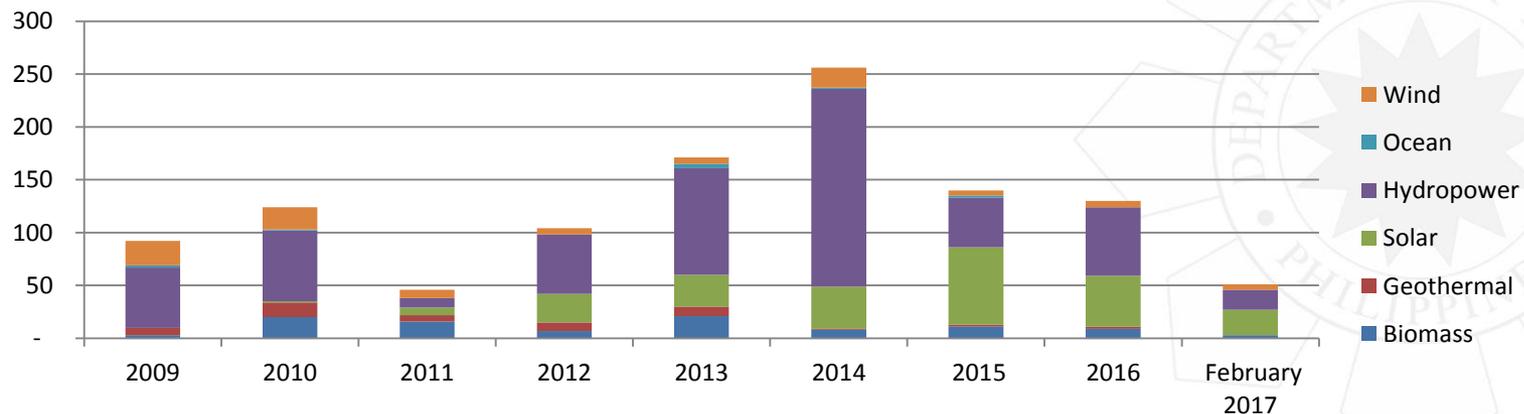


Current Situation

Renewable Energy Service/Operating Contracts Milestone

Awarded Renewable Energy Service/Operating Contracts (RES/OCs) and Certificate of Registrations (CORs) for Own-Use

Resource	2009	2010	2011	2012	2013	2014	2015	2016	February 2017	TOTAL RESOC/COR as of Feb 2017	TERMINATED as of Feb 2017	ACTIVE RESOC/COR as of Feb 2017
Biomass	3	20	16	7	21	8	11	9	3	98	29	69
Geothermal	7	14	6	8	9	1	2	2	-	49	6	43
Solar	-	1	7	27	30	40	73	48	24	250	60	190
Hydropower	57	67	9	56	101	187	47	65	19	608	176	432
Ocean	2	1	-	-	4	1	2			10	3	7
Wind	23	21	8	6	6	19	5	6	5	99	35	64
Grand Total	92	124	46	104	171	256	140	130	51	1,114	309	805



Current Situation

RE Capacity Addition Historical Development

RE Installations from 2009- Feb. 2017 under RA 9513

RESOURCES	2009		2010		2011		2012		2013		2014		2015		2016		Own-Use		Total	
	No. of Projects	Installed Capacity MW																		
Biomass	2	29.33	1	35.90	3	27.00	1	19.00	1	0.876	2	28.00	5	104.50	2	43.80	18	140.66	35	429.06
Geothermal	-	-	-	-	-	-	-	-	-	-	2	50.00	1	10.00			-	-	3	60.00
Solar	-	-	-	-	-	-	-	-	-	-	1	22.00	9	141.77	29	736.41	6	3.22	45	903.39
Hydro Power	-	-	2	2.00	1	2.10	2	11.80			4	16.65	2	14.82	2	2.00	-	-	13	49.37
Ocean Energy	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-
Wind	-	-	-	-	-	-	-	-	-	-	4	303.90	2	90.00			-	-	6	393.90
TOTAL	2	29.33	3	37.90	4	29.10	3	30.80	1	0.88	13	420.55	19	361.09	33	782.21	24	143.88	102	1,835.72

Capacity Addition since the enactment of RE Law = **1,835.89 MW**

Installed Capacity under Net-Metering (recorded) = **5.324 MWp**

TOTAL = 1,841.214 MW



Current Situation

12 MW (Phase 1) San Jose City I Power Corporation



20 MW Maibarara Geothermal Power Plant



22 MW San Carlos Solar Power



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Current Situation

150 MW Burgos Wind Power Project



54 MW San Lorenzo Wind Power Project (Guimaras)



7 MW Tudaya 2 Hydroelectric Power Plant

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Current Situation

Waste to Energy: Biogas Projects



8.8MW AseaGas Corporation



2MW Asian Carbon Neutral Corporation

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Environmental Impact and Social Responsibility

Year	Capacity Addition (MW)	Emission Reduction (t-CO ₂ /year)**	Cumulative Emission Reduction (2009-2015)
2008	3.6	11600.45	81203.15
2009	29.33	94511.48	567068.88
2010	23	71876.27	359381.35
2011	29.1	91420.71	365682.84
2012	30.8	86045.66	258136.98
2013	1.476	4085	8169.72
2014	468.65	1,138,632.50	1138632.5
Total	585.956	1,498,171.93	2,778,275.42



2,778,275.42 t- CO₂
Reduction (2009-2015)

Source: IRENA Rule of Thumb

Total	Capacity Addition (MW)	Construction Jobs	Full Time O&M Jobs
2008	3.6	90	11
2009	29.33	733	88
2010	23	558	64
2011	29.1	710	82
2012	30.8	672	65
2013	1.476	32	4
2014	468.65	7,251.00	410
2015	342.4	5,332.00	316
Total	928.356	15,378	1040



16,418 Green Jobs
Generated (2009-2015)

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Existing and Updates on RE Policy Mechanisms

Feed-in-Tariff (FIT) System

- NREB established a Committee to conduct study on the way forward for FIT System. (Stranded RE Generation, RE Auction, Impact of FIT System)

Feed-in-Tariff (FIT) Rates

RE Technology	Approved Rates (PHP/kWh)	Installation Target (MW)
Run-of-River Hydro	5.8705***	250
Biomass	6.5969***	250
Wind	7.40*	(with initial target of 200) 400**
Solar	8.69*	(with initial target of 50) 500**

* Feed in Tariff (FIT) rates for solar was revised in March 2015 under Resolution No. 6, series of 2015 issued by ERC from Php 9.68 to 8.69/kWh covering additional target of 450 MW.

The second FIT rate for wind energy was issued by the ERC on October 2015 at Php 7.40/kWh from Php 8.53/kWh covering additional target of 200MW under ERC Resolution No. 14, series of 2015.

** Amended targets for wind energy and solar power up to March 15, 2016.

*** Under Resolution No. 1 series of 2017, the ERC on January 2017 issued the degressed FIT rates to cover January to December 2017 for Run-of-River Hydro Plants from Php 5.9 to 5.8705/kWh and Biomass Plant from Php 6.63 to 6.5969/kWh.

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Existing and Updates on RE Policy Mechanisms

Feed-In Tariff Monitoring Board (as of June 2017)

RESOURCE	FOR NOMINATION / CONVERSION		WITH CERTIFICATE OF CONFIRMATION OF COMMERCIALITY		WITH CERTIFICATE OF ENDORSEMENT TO ERC	
	NO. OF PROJECTS	CAPACITY (MW)	NO. OF PROJECTS	CAPACITY (MW)	NO. OF PROJECTS	CAPACITY (MW)
HYDRO		-	103	841.80	5	34.60
WIND	7	1,023.55	12	987.30	6	393.90
SOLAR	15	565.18	51	1,320.60	24	525.95
BIOMASS			18	153.76	15	125.16
TOTAL	22	1,588.73	184	3,303.46	50	1,079.61

Note: For the Northwind 33 MW Wind Power Project in Bangui, Ilocos Norte, the ERC on June 2014 issued a special rate of Php 5.76/kwh

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Existing and Updates on RE Policy Mechanisms

Net-Metering Rules and Interconnection Standards

- Connection / sale of customers' RE generation to the grid
- The ERC approved the Net Metering Rules last May 27, 2013
- Total Number of Net Metering Customers as of July 2017 is 822 with a installed capacity of 6,304.44 kWp



UPDATE ON NET-METERING AS OF 31 July 2017

DUs	NO. OF CUSTOMERS	Capacity (kWp)
MERALCO	880	5610.48
VECO	32	193.21
CEBECO III	1	3.00
CEBECO I	5	84.00
DLPC	14	193.20
AEC	9	48.82
BATELEC I	1	10.00
PELCO II	6	39.00
LEYECO V	2	6.00
PANELCO	1	100.00
OEDC	2	16.73
Total	953	6304.44

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Existing and Updates on RE Policy Mechanisms

Renewable Portfolio Standards (RPS) for On-grid and Off-Grid Areas

On-grid:

- On Aug 2017, the NREB in collaboration with DOE conducted a final public consultation on the revised draft RPS Rules
- Aug 2017, NREB endorsed the revised RPS Rules to DOE for review/finalization and issuance of Department Circular

Off-grid

- For finalization of NREB
- NREB to conduct public consultation on Sept. 2017

Green Energy Option Program (GEOP)

- End-users' option to purchase electricity from RE facilities (open access)
 - The NREB drafted the GEOP Rules on July 2017
 - NREB on-going conduct of public consultation (Luzon, Visayas, Mindanao) before endorsement to DOE

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Challenges

- Awareness and social acceptance
- Streamlining of Administrative Process
- Full implementation of Policy Mechanisms under the RE Law
- Harmonization of laws/policies
- Renewable Energy development hindered by geographical boundaries

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Way Forward

Renewable Energy Resource Assessment

Hydropower Potential Sites- JICA resource inventory result

- 1,413 Sites with potential capacity of 20,599.05 MW
 - Out of the 1,413 Sites, 188 sites is located in Mindanao with a potential capacity of 912.13 MW.

USAID Biomass Resource Inventory Result

- 4,446.54 Mwe Potential Power Generation Capacity net of Competing uses (MW)
- 17.26 MtCO2 Potential GHG emission reduction (tCO2)

LOCALLY-FUNDED:

Low Enthalpy Geothermal Areas - ON GOING

Detailed Wind Resource Assessment Project launched last February 20, 2015

Biofuel Feedstock inventory – on going

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Renewable Energy Programs

- **Household Electrification Program (HEP) – continuing**
- **Support Climate Change Commission Project with GIZ – On-going**
 - RE Policy Implementation & Energy Market Design
 - Integrated Energy Planning
 - Off-Grid RE
 - GHG Emission Reductions from RE
- **Development for Renewable Energy Applications Mainstreaming and Market Sustainability (DREAMS) with UNDP**
 - RE Policy and Planning
 - Institutional Strengthening for RE Mainstreaming
 - Capitalized RE Market Development
 - RE Commercialization

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Renewable Energy Programs

- **Enabling Distributed Solar in the Philippines- NAMA Facility Fund/CCAP**
 - Address Policy and Technical barriers
 - Address Financial challenges
- **Access to Sustainable Energy Programme (ASEP)**
 - PV Mainstreaming programme
 - Rural Network Solar (RNS)
 - Re Zoning in cooperation with USAID
- **IRENA Philippines Renewable Readiness Assessment – Published April 2017**
 - Mini-Grid Assessment – For launching Sept. 2017

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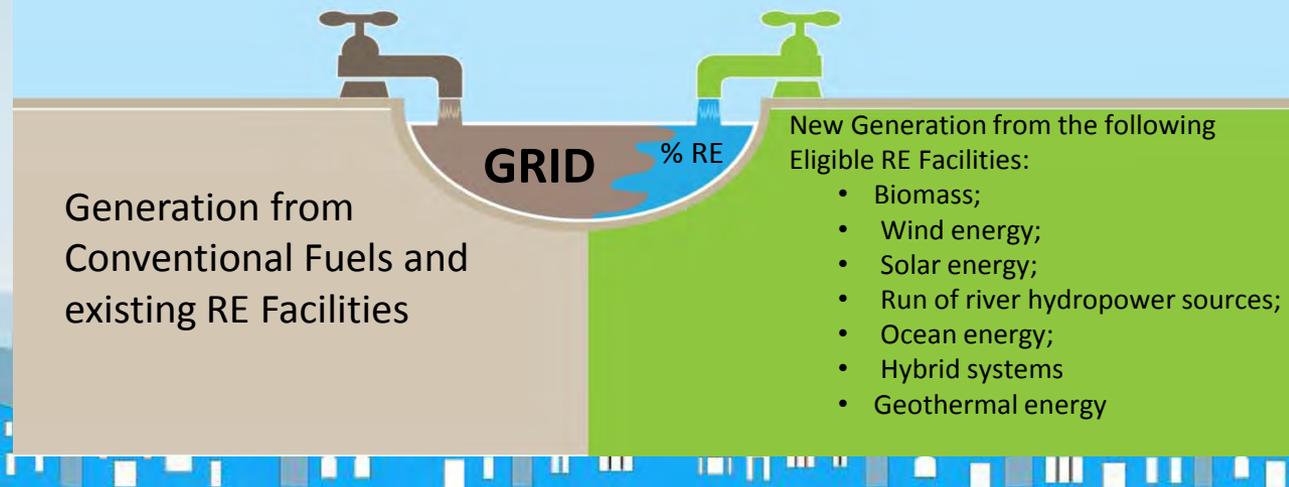


Renewable Energy Programs

Renewable Portfolio Standards (RPS)

- ✓ Mandated Renewable Energy electricity blend to the total supply of electricity for on-grid and off-grid areas.

Will Create Market for Renewable Energy



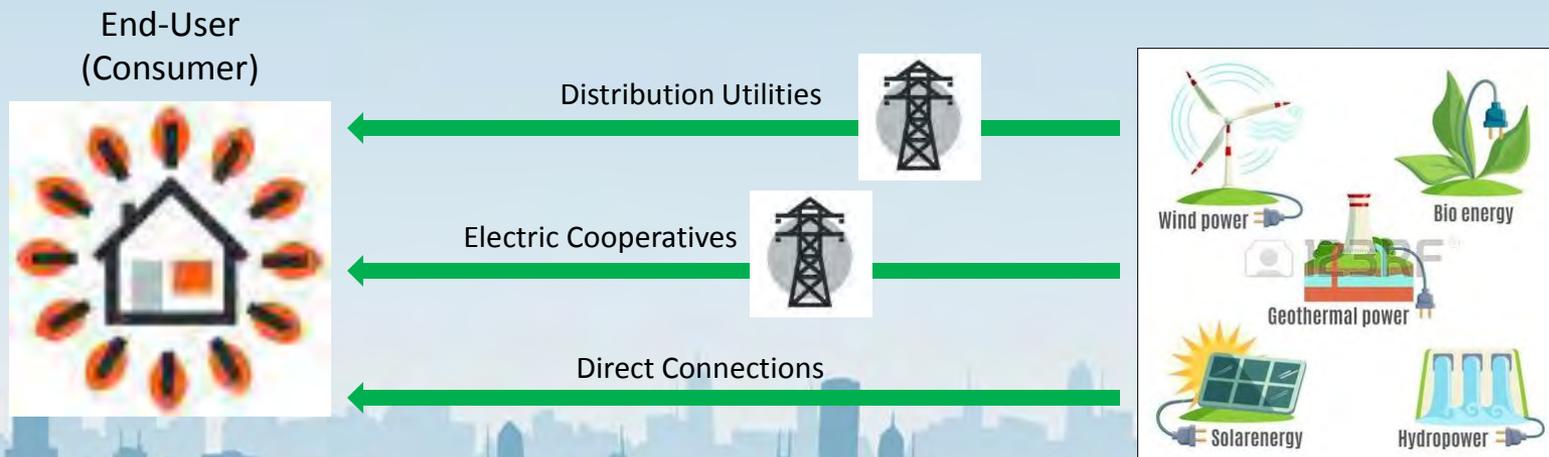
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Renewable Energy Programs

Green Energy Option Program

- ✓ A Renewable Energy Policy Mechanism which shall provide end-user the option to choose RE Resources as their source of Energy.



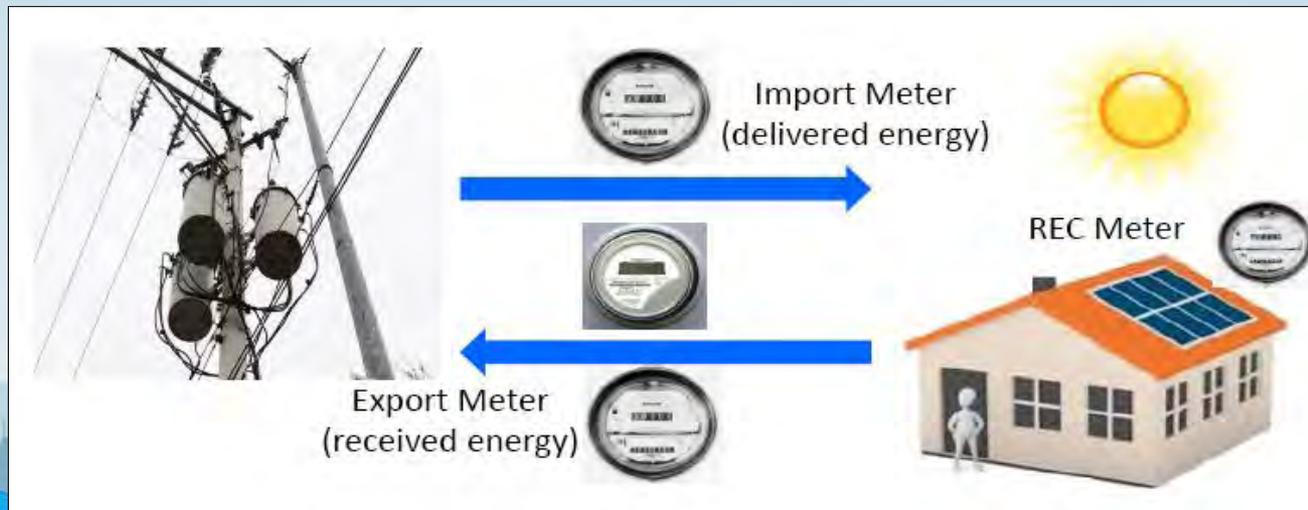
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Renewable Energy Programs

Net Metering Program

- ✓ A Renewable Energy Policy Mechanism which shall provide consumers to produce its own electricity requirement with maximum capacity of 100 kW.

Interconnection Set-up



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RENEWABLE ENERGY ROADMAP

Short-Term (2017-2018)

- Review and update 2011-2030 NREP
- Monitor and assess RESCs awarded for the conversion of indicative projects to committed
- Finalize rules and implement RPS and REM
- Finalize rules and implement Green Energy Option
- Conduct detailed RE technology and resource assessment
- Review other RE policy mechanisms

Medium-Term (2019-2022)

- Intensify development in off-grid areas for wider populace access to energy
- Determine realistic RE potential
- Update the NREP 2017 – 2040

Long-Term (2023-2040)

- Continue and accelerate implementation of RE projects
- Conduct regular updating of RE resource database

ACCELERATION OF RE POSITIONING

CREATION OF CONDUCTIVE BUSINESS ENVIRONMENT

RELIABLE AND EFFICIENT INFRASTRUCTURE

- Streamline administrative processes of RESC applications
- To work on DOE energy projects to be declared as projects of national significance
- Enhance EVOSS for RE projects
- Provide technical assistance to lower investment cost
- Promote and incentivize local technology producers
- Establish RE Information Exchange
- Explore and initiate on the harmonization of LGU and national government related programs and policy

- Strengthen resiliency of RE systems and facilities
- Harmonize transmission Development Plan with RE targets
- Develop geographical installation target
- Enhance local technical capabilities
- Conduct R&D on the efficiency of RE technologies on the Smart Grid System

**INCREASED RE INSTALLED CAPACITY
TO AT LEAST 20,000 MW**

RENEWABLE ENERGY ROADMAP

**Short-Term
(2017-2018)**

**Medium-Term
(2019-2022)**

**Long-Term
(2023-2040)**

PROMOTE AND ENHANCE RD&D AGENDA

- Strengthen the management and operation of ARECS
- Continue conduct of RE technology research and development studies
- Identify viability of new technologies
- Construct Ocean pilot/demo Energy projects
- Implement, monitor and evaluate pilot/demo projects for new RE technologies

OTHER ACTIVITIES

- Identify parameters to determine the viable Ocean Energy tariff rate
- Continue technical capacity building on RE
- Conduct research and promote low-enthalpy geothermal areas for power generation and direct use/non-power application for development
- Harmonize the DOE related programs with agro-forestry policies for an integrated use of biomass
- Continue the conduct of IEC to attain social acceptability

**INCREASED RE INSTALLED CAPACITY
TO AT LEAST 20,000 MW**

BIOFUELS ROADMAP

OVERALL
OBJECTIVE
BY 2030

Short-Term
(2017-2019)

Medium to Long Term
(2020-2040)

BIODIESEL

B2

Maintain 2%
biodiesel blending on
diesel

E10

Review the
bioethanol mandate

- Revisit blending requirement and available feedstock
- Continuous conduct of research and development on feedstock sources

Pursue the development of Biofuels in compliance with the Biofuels Act of 2006 (R.A. 9367)

Thank You!



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