Updates in RE Development: Philippines

EGNRET 46: Development of Distributed Energy and/or New Energy Technologies in APEC Economies

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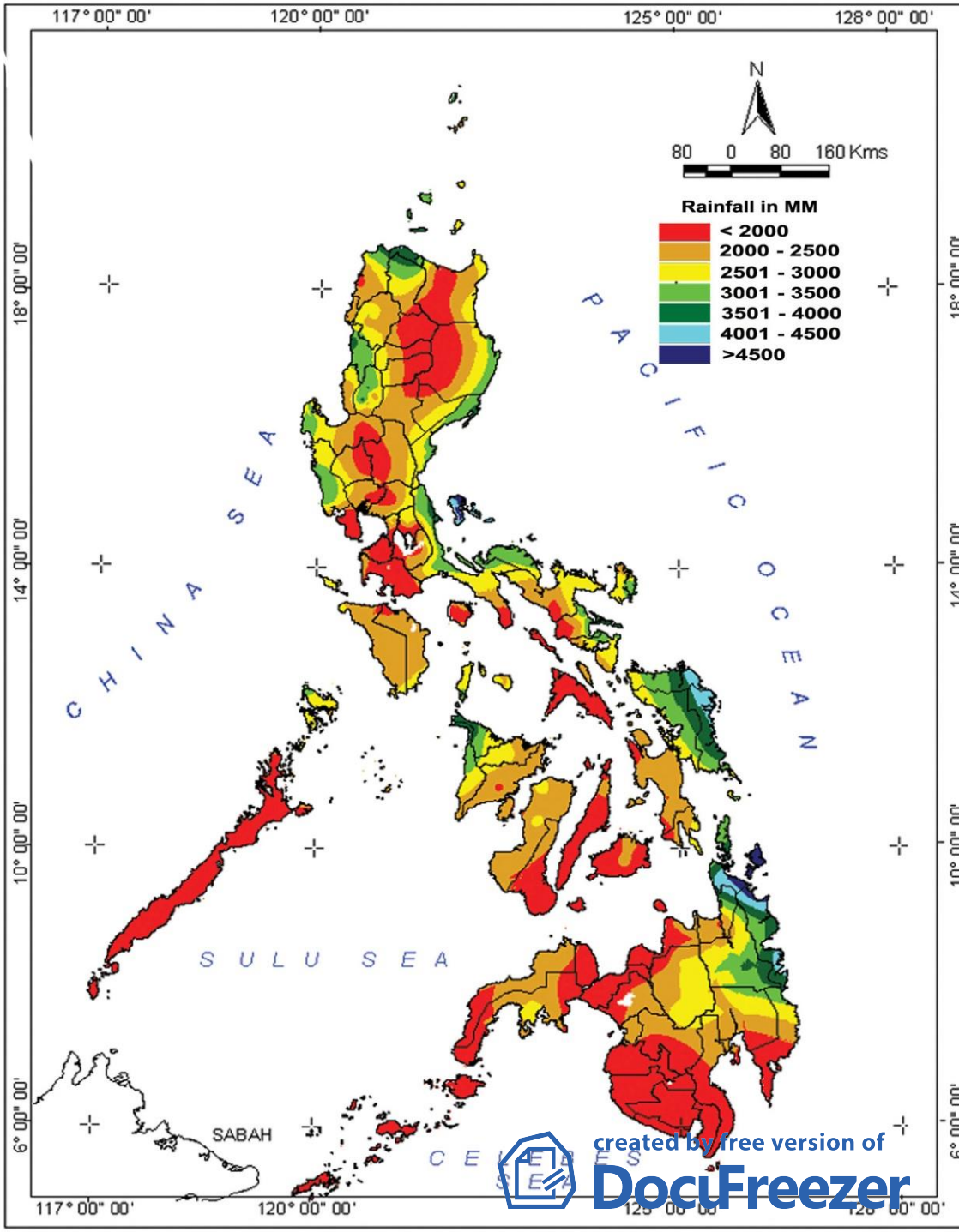
Marissa P. Cerezo
Assistant Director
Renewable Energy Management Bureau
Department of Energy – Philippines
marissa.cerezo@doe.gov.ph

Outline of Presentation

I. Renewable Energy Policy Framework
II. Status of RE Development
III. Renewable Energy Potentials
IV. Challenges
V. Way Forward

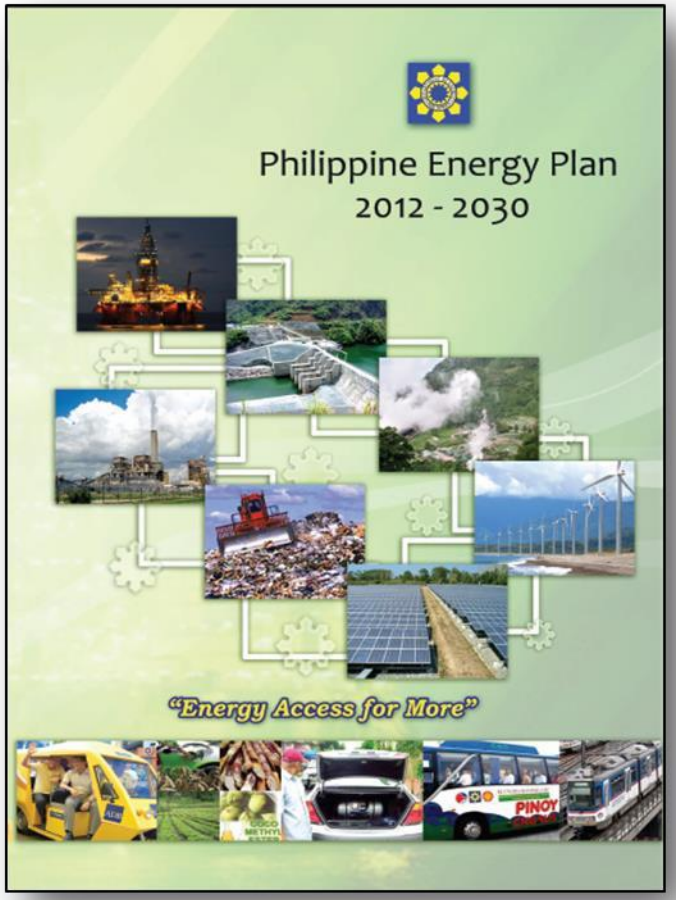
Climate Change Impact

Annual normal rainfall (1971-2000)



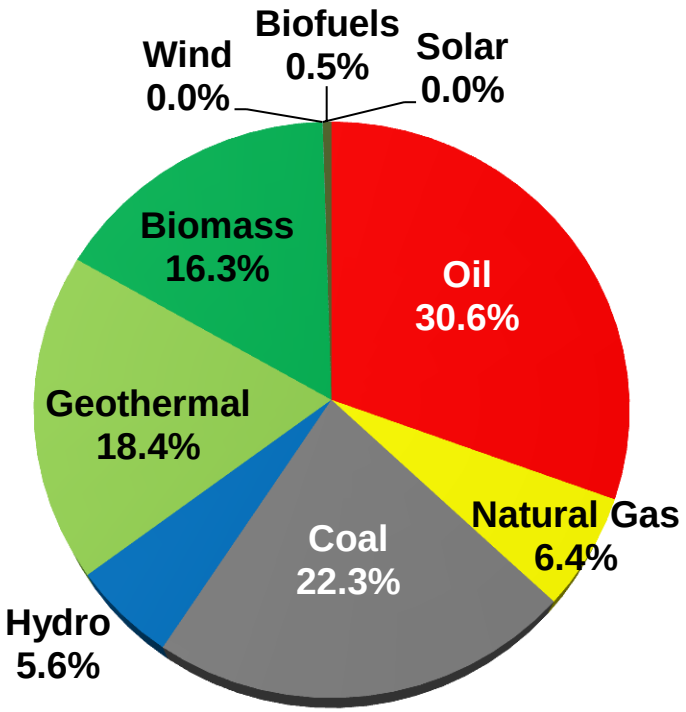
Policy Thrusts (Energy Reform Agenda)

- Ensure Energy Security
- Expand Energy Access
- Promote Low-Carbon Future
- Climate Proof the Energy Sector
- Develop Regional Energy Plans



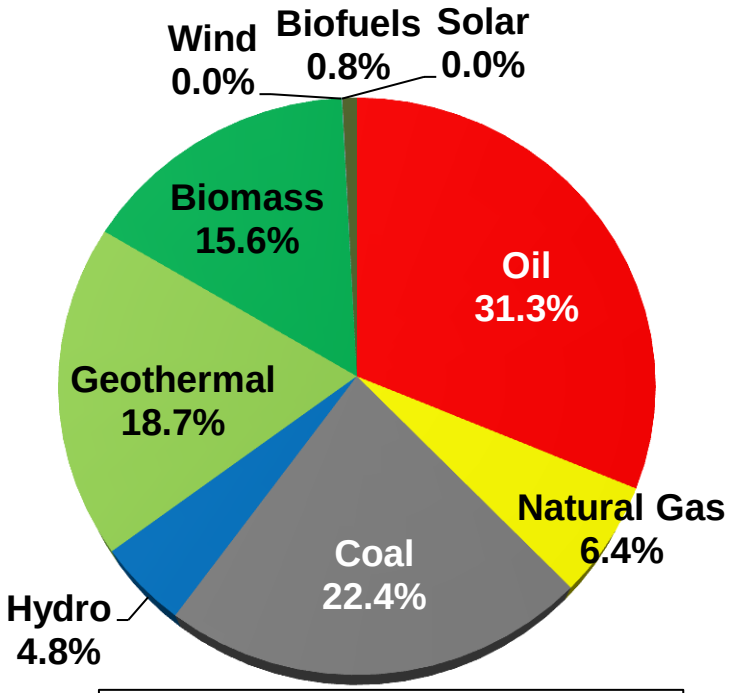
Total Primary Energy Mix

2013



Total Energy: MTOE	44.9
Self-sufficiency:	56.9%
RE:	40.7%
RE + NG:	47.2%

2014

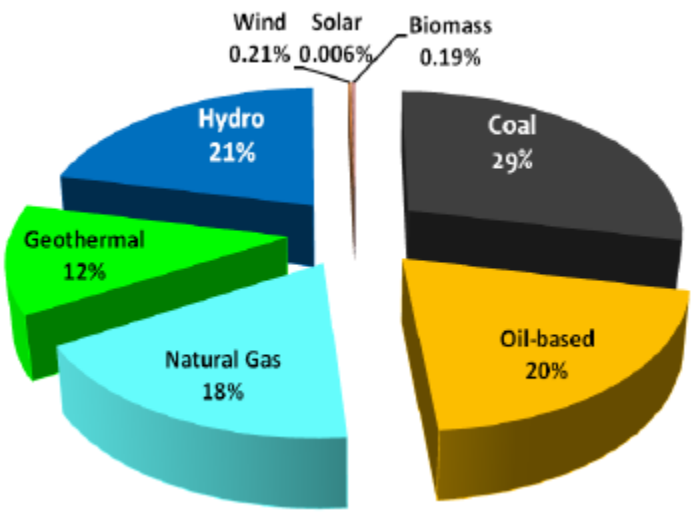


Total Energy: MTOE	47.5
Self-sufficiency:	56.1%
RE:	39.9%
RE + NG:	46.3%

Generation Mix

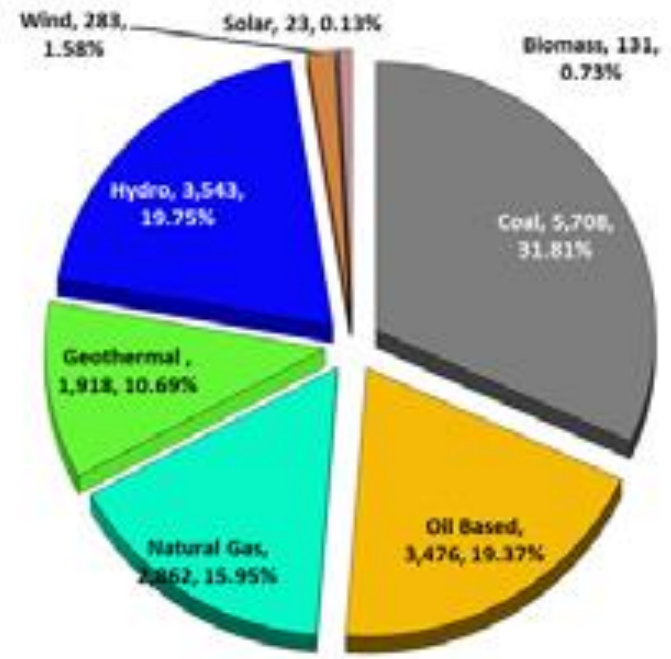
2010 and 2014 Total Installed Capacity Mix (MW)

2010



Total Installed Capacity = 15,881 MW
RE Capacity Share = 5,304.25 MW
% RE Share = 33.4 %

2014

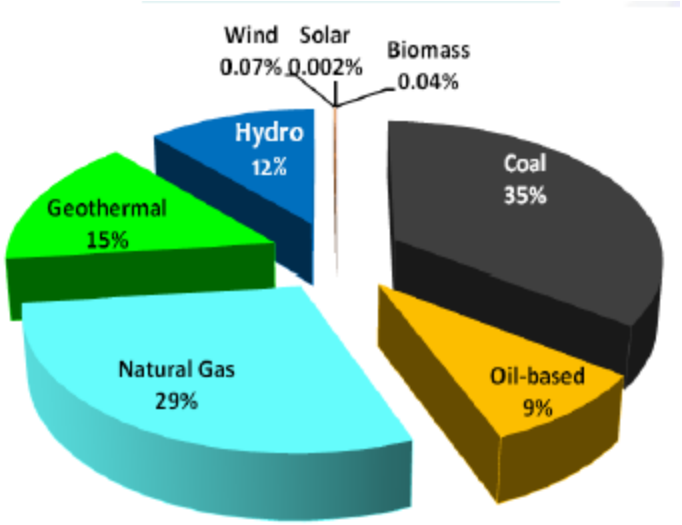


Total Installed Capacity = 17,944 MW
RE Capacity Share = 5,900 MW
% RE Share = 32.88 %

Where are we now?

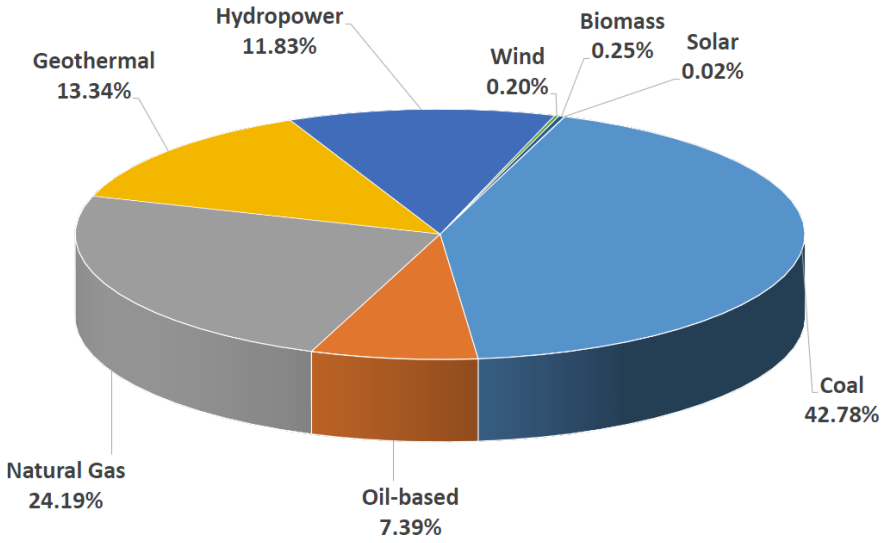
2010 and 2014 Total Generation Mix (GWh)

2010



Total Generation = 65,795 GWh
RE Generation Share = 17,830.4 GWh
% RE Share= 27.1%

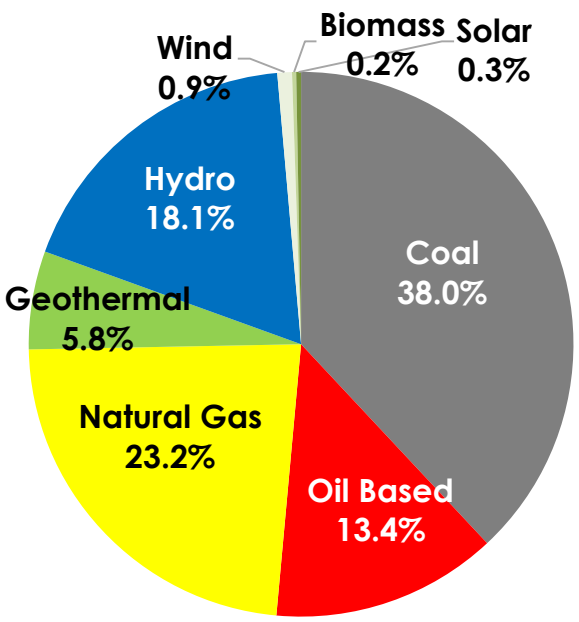
2014



Total Generation = 77,261 GWh
RE Generation Share = 19,809.7 GWh
% RE Share= 25.64 %

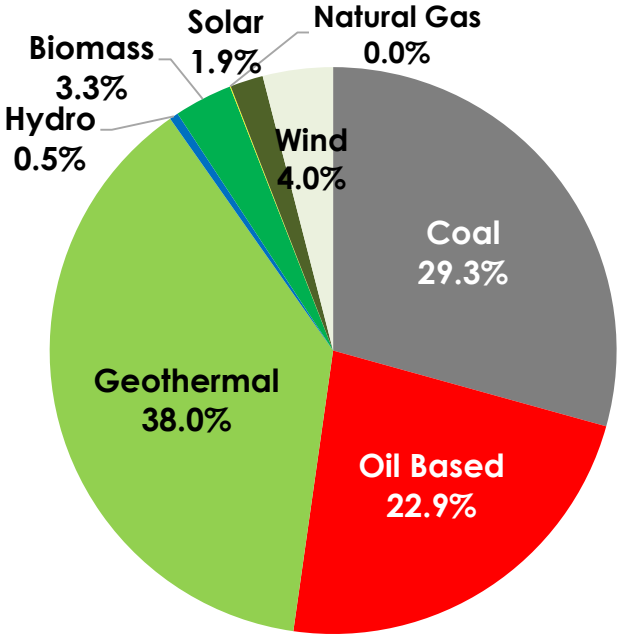
2015 Dependable Capacity Mix

LUZON



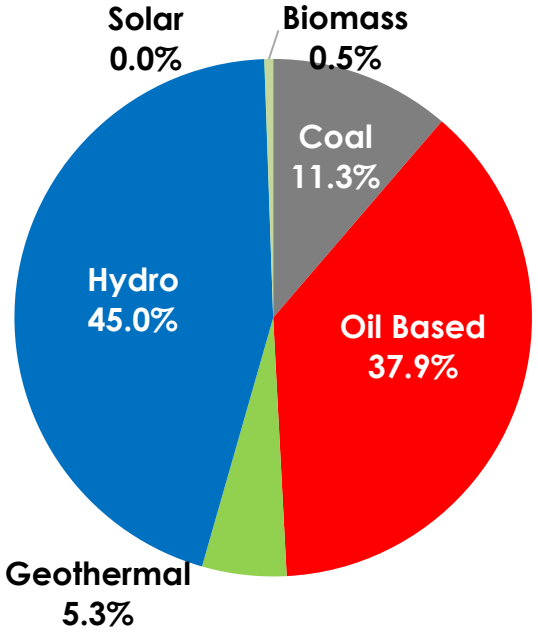
Dependable Capacity
= 11,868 MW
RE Share = 25.3%

VISAYAS



Dependable Capacity
= 2,150 MW
RE Share = 47.7%

MINDANAO



Dependable Capacity
= 1,860 MW
RE Share = 50.8%

Dependable Capacity = 15,878 MW
RE Share = 31.33%

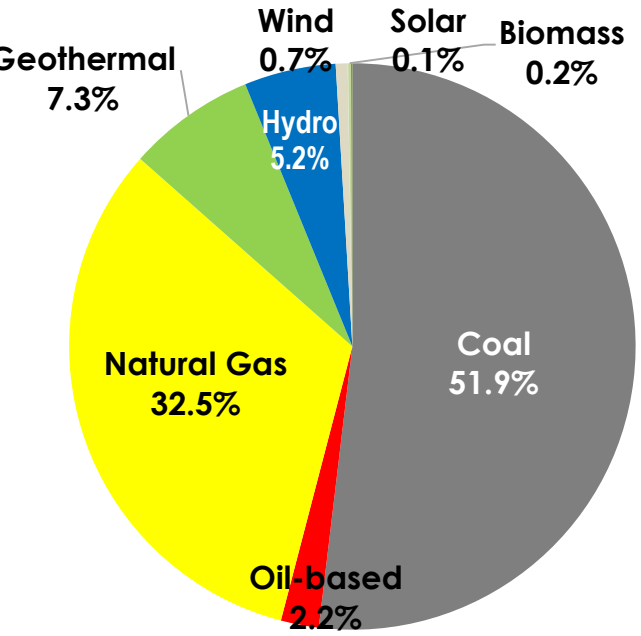
Source: DOE List of Existing Power Plant, June 2015

Department of Energy

Power Generation Mix

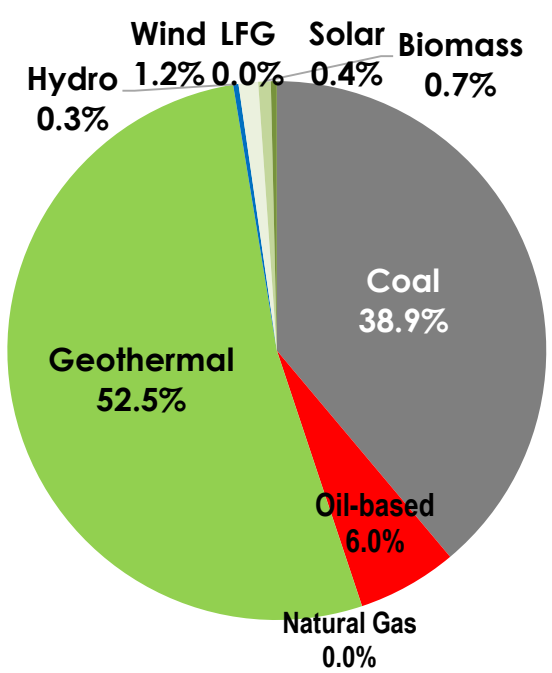
January to June 2015

LUZON



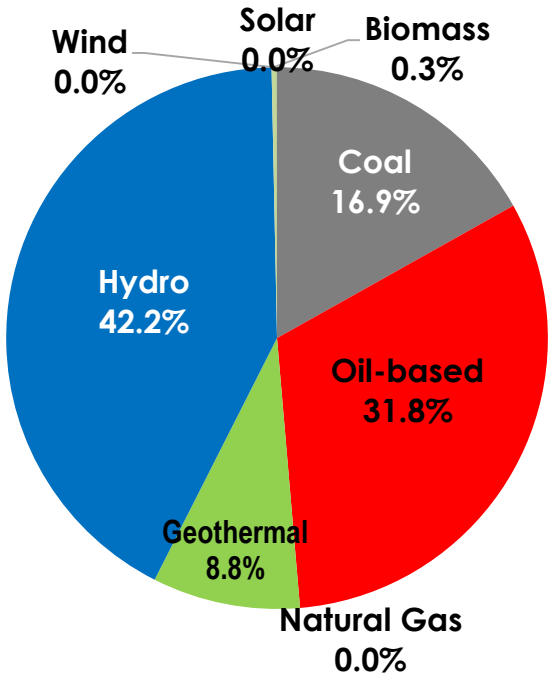
Total Generation = 28,033 GWh
RE Share = 13.5%

VISAYAS



Total Generation = 5,336 GWh
RE Share = 55.1%

MINDANAO



Total Generation = 4,837 GWh
RE Share = 51.4%

Source: submitted Monthly Operations Report
NGCP Daily Operations Report

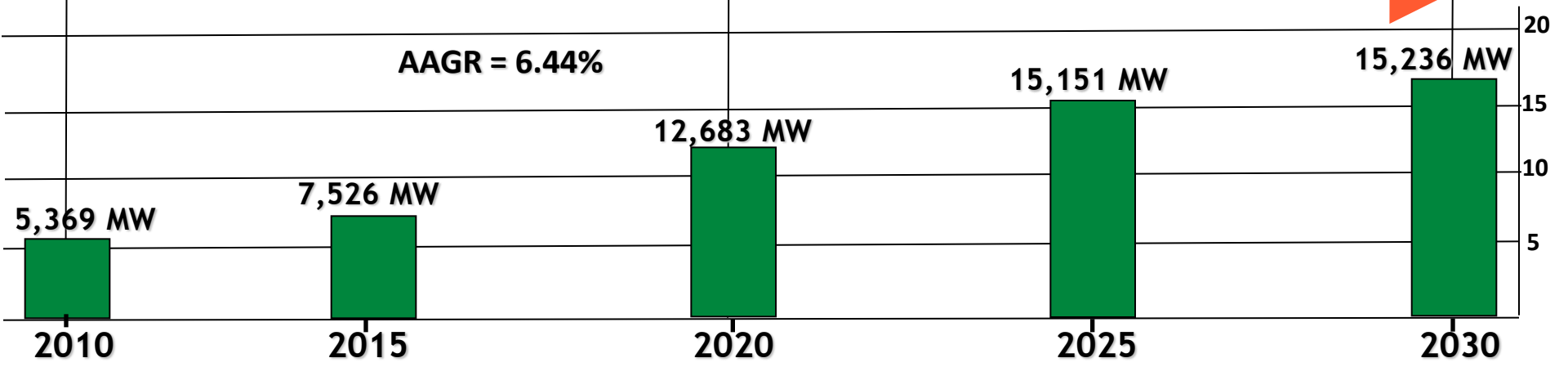
Total Generation = 38,206 GWh
RE Share = 24.1%

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

Policy Mechanisms

- Lowering of investment costs
  - Fiscal Incentives
    - Income Tax Holiday and Low Income Tax Rate
    - Reduced Government Share
    - Duty-free Importation of Equipment and VAT-zero Rating
    - Tax Credit on Domestic Capital Equipment
    - Special Realty Tax Rate on Equipment and Machinery
    - Cash Incentive for Missionary Electrification
    - Exemption from Universal Charge
    - Payment of Transmission Charges
    - Tax Exemption on Carbon Credits

Policy Mechanisms

- Enhanced Competitiveness
  - Mandatory Utilization of RE Resources
    - Biofuels Mandate
    - Renewable Portfolio Standard (RPS)
    - Feed-In Tariff (FIT)
  - Provision of Interconnection / Ancillary Services
  - Other Market Options
    - Net Metering System
    - Green Energy Option

Existing and Updates on RE Policy Mechanisms

Feed-in-Tariff (FIT) Rates

RE Technology	Approved Rates (PHP/kWh)	Installation Target (MW)
Run-of-River Hydro	5.90 (12.8 US$ cents)	250
Biomass	6.63 (14.4 cents)	250
Wind	(8.53) 7.40* (18.5 cents) 16 cents	(with initial target of 200) 400**
Solar	(9.68) 8.69 * (21 cents) 18.9 cents	(with initial target of 50) 500**

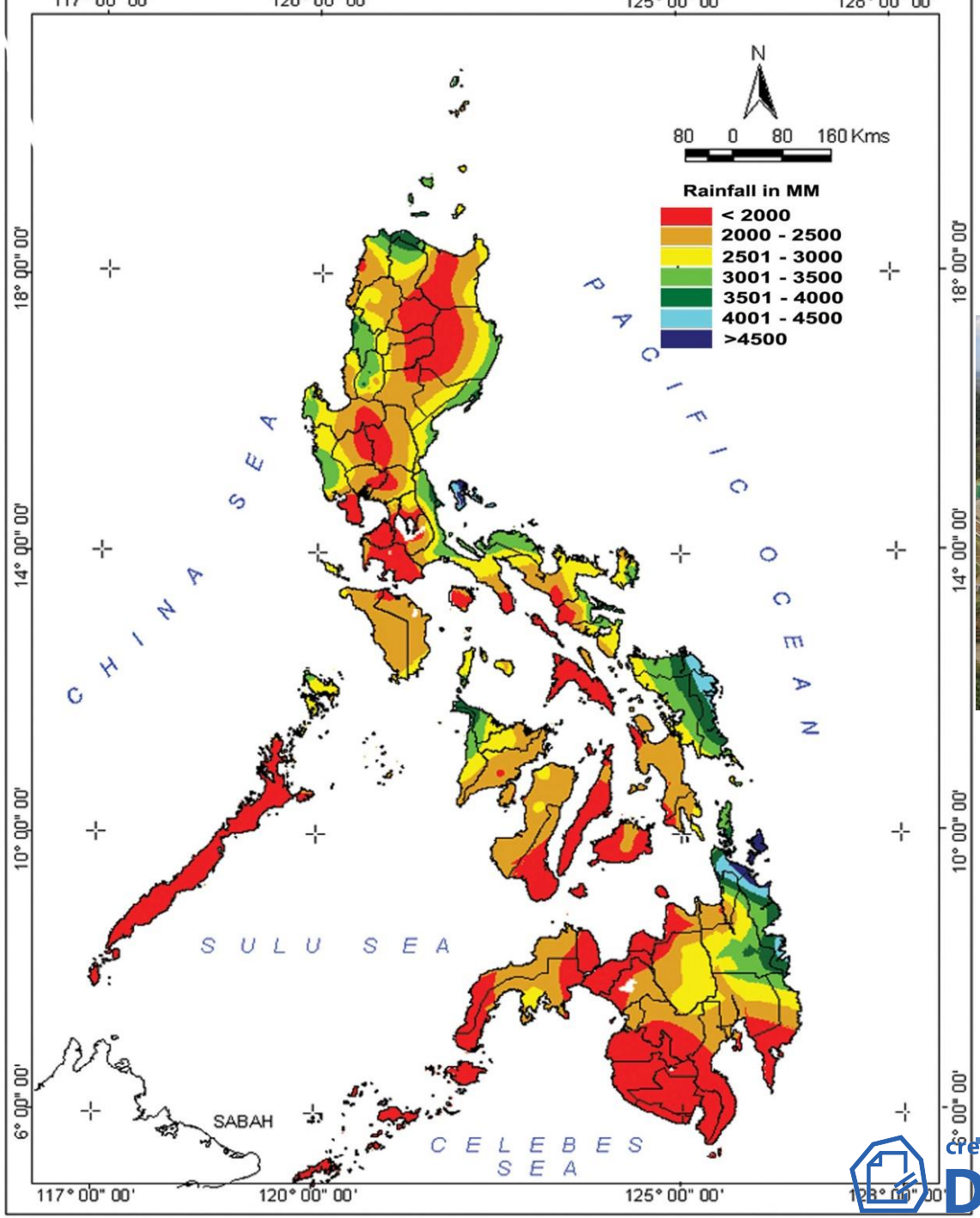
**Feed in Tariff (FIT) rates for solar was revised in April 2015*

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

1US$=PHP46.00

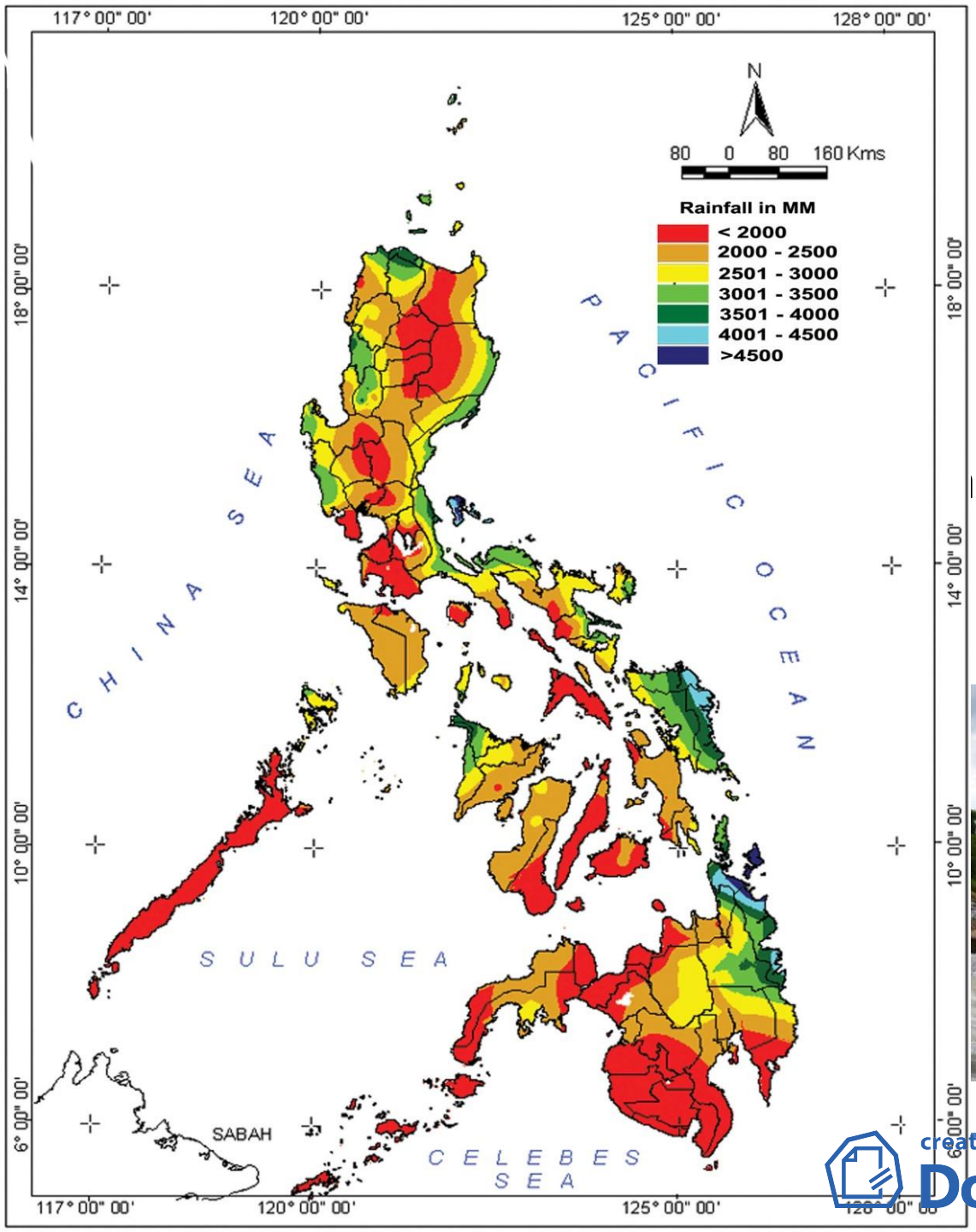
- Rates are secured on actual project commissioning on a first come first served basis
- guaranteed for 20 years

12 MW (Pl
City I Powe



Plant

150 MW Bur



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Power

Department of E

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 1st Sem 2015
	As of 2014				As of 1st Semester 2015				
	Construction*	Operational	Production	Sales	Construction*	Operational	Production	Sales	
Biodiesel	-	584.9	171.6	163.5	-	584.9	102.5	103.0	11
Bioethanol	83.0	222.1	115.1	118.9	83.0	222.1	90.5	86.3	10
TOTAL	**83.0**	**807.0**	**286.7**	**282.4**	**83.0**	**807.0**	**193.0**	**189.3**	**21**

** 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)

BIOFUELS MANDATE IMPLEMENTATION

- **BIODIESEL**

Minimum Blends:
@ 1% (2007) = 62.10 M liters
@ 2% (2009) = 133.68 M liters
@ 2% (2010) = 138.70 M liters
@ 2% (2014) = 160.70 M liters

Biodiesel Supply:
- 9 Accredited Producers with annual total capacity of 392 million liters

Feedstock used:
- Coconut oil (current)
- Jatropha (under study)

- **BIOETHANOL**

Minimum Blends:
@ 5% (2009) = 208.11 M liters
@ 5% (2010) = 218.93 M liters
@ 10% (2011) = 460.63 M liters
@ 10% (2014) = 536.29 M liters

Bioethanol Supply:
- 3 Accredited Producers with annual total capacity of about 79 million liters
- 3 production facilities to be on-stream between 2012-2013 with additional capacity of 134 million liters/year

Feedstock used:
- Sugar Cane, Molasses (current)
- Sweet sorghum, cassava (under study)

NET-METERING SYSTEM

- Not exceeding 100 kw/meter
- Energy saving
- Excess of consumption to be sold to the grid
- Amount exported to be off-set in the next billing
- Distribution Utility has to connect the end-user
- Implemented in 2013, with about 2 MW installations

PV Rooftop Installations in Schools

Manuel L. Quezon University

St. Scholastica's College

Electrification

Household Electrification as of 30 September 2015				
Year	**Total HH**	**Actual HH Energized**	**Households Served**	**% Electrification**
2012	21,027,524	967,075	17,611,023	83.7
2013	21,411,442	864,304	18,475,327	86.2
2014	21,915,309	791,757	19,267,084	87.9
2015	22,310,084	551,760	19,818,844	88.8




RE Capacity Addition Historical Development (2009-15)

RESOURCES	2009		2010		2011		2012		2013		2014		2015		Own-Use		Total	
	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW	No. of Projects	Installed Capacity MW
Biomass	2	29.33	1	21.00	3	27.00	1	19.00	1	0.876	1	12.00	5	108.50	15	140.43	29	358.13
Geothermal	-	-	-	-	-	-	-	-	-	-	2	50.00	1	10.00	-	-	3	60.00
Solar	-	-	-	-	-	-	-	-	-	-	1	22.00	6	122.40			7	144.40
Hydro Power	-	-	2	2.00	1	2.10	2	11.80			4	16.65	2	14.82	-	-	11	47.37
Ocean Energy	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-
Wind	-	-	-	-	-	-	-	-	-	-	4	303.90	2	90.00	-	-	6	393.90
TOTAL	**2**	**29.33**	**3**	**23.00**	**4**	**29.10**	**3**	**30.80**	**1**	**0.88**	**12**	**404.55**	**16**	**345.72**	**15**	**140.43**	**56**	**1,003.80**

Capacity Addition since the enactment of RE Law = 1,003.80 MW
Installed Capacity under Net-Metering (recorded) = 1.605 MWp

TOTAL = 1,005.405 MW

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- CO_2

Reduction (2009-2015)

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

Source: IRENA Rule of Thumb

16,418 Green Jobs

Generated (2009-2015)

NREP ROADMAP (2010-2030)

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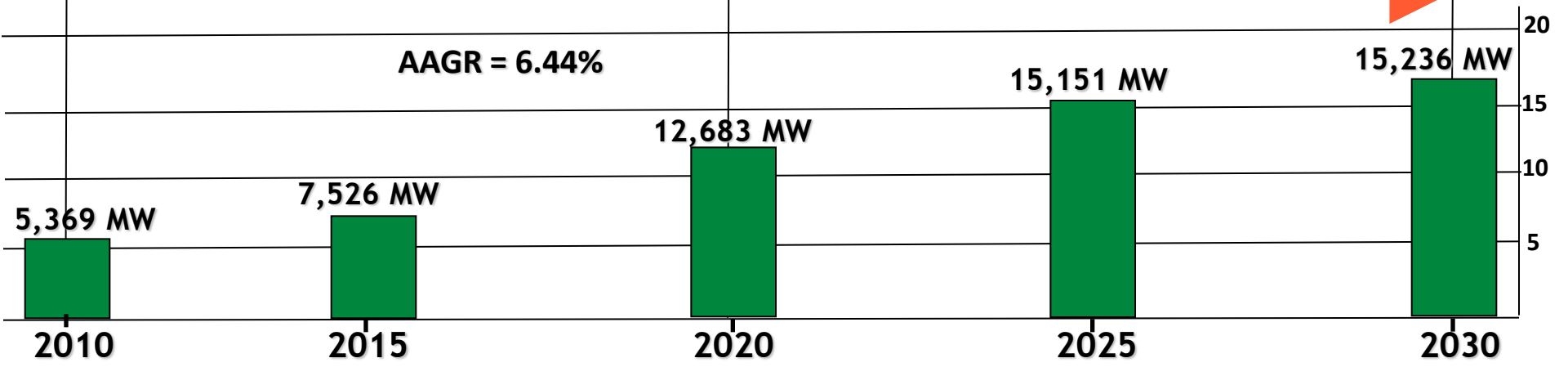

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Source: Philippine Department of Energy/NREP

Additional Capacity and Capacity Expansion Plan

AWARDED PROJECTS UNDER RENEWABLE ENERGY (RE) LAW (March 31, 2016)						
RESOURCES	AWARDED PROJECTS		POTENTIAL CAPACITY ADDITION (MW)		INSTALLED CAPACITY MW	
	Grid-Use	Own-Use	Grid-Use	Own-Use	Grid-Use	Own-Use
Hydro Power	352	1	7,459.52	1.50	139.49	-
Ocean Energy	7	-	26.00	-	-	-
Geothermal	41	-	610.00	-	1,906.19	-
Wind	55	1	1,168.00	-	426.90	-
Solar	124	13	4,016.10	2.395	144.40	1.90
Biomass	38	25	212.08	3.92	241.27	166.18
Sub-Total	**617**	**40**	**13,491.70**	**7.815**	**2,858.25**	**168.08**
TOTAL	**657**		**13,499.52**		**3,026.33**	

RE 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

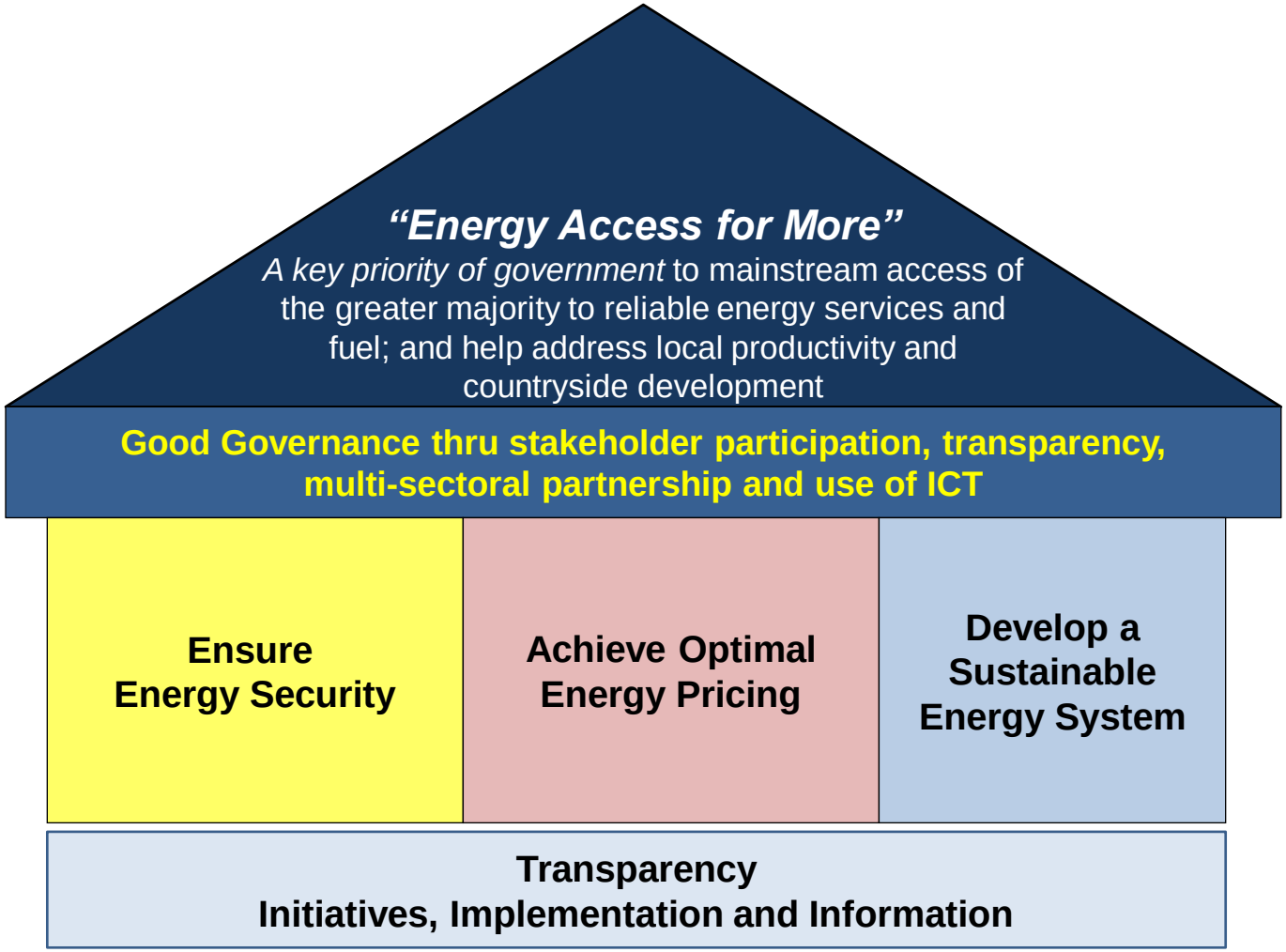
- 4,446.54 MWe Potential Power Generation Capacity net of Competing uses (MW)
- 17.26 MtCO2 Potential GHG emission reduction (tCO2)

On-going detailed resource assessment of selected Low Enthalpy Geothermal Areas

Detailed Wind Resource Assessment Project launched last February 20, 2015

Battery Energy Storage System (BESS) be classified as a new source of Frequency Control Ancillary Services (FCAS), particularly as contingency reserve (primary reserve) and Frequency regulation (secondary reserve).

Energy Reform Agenda



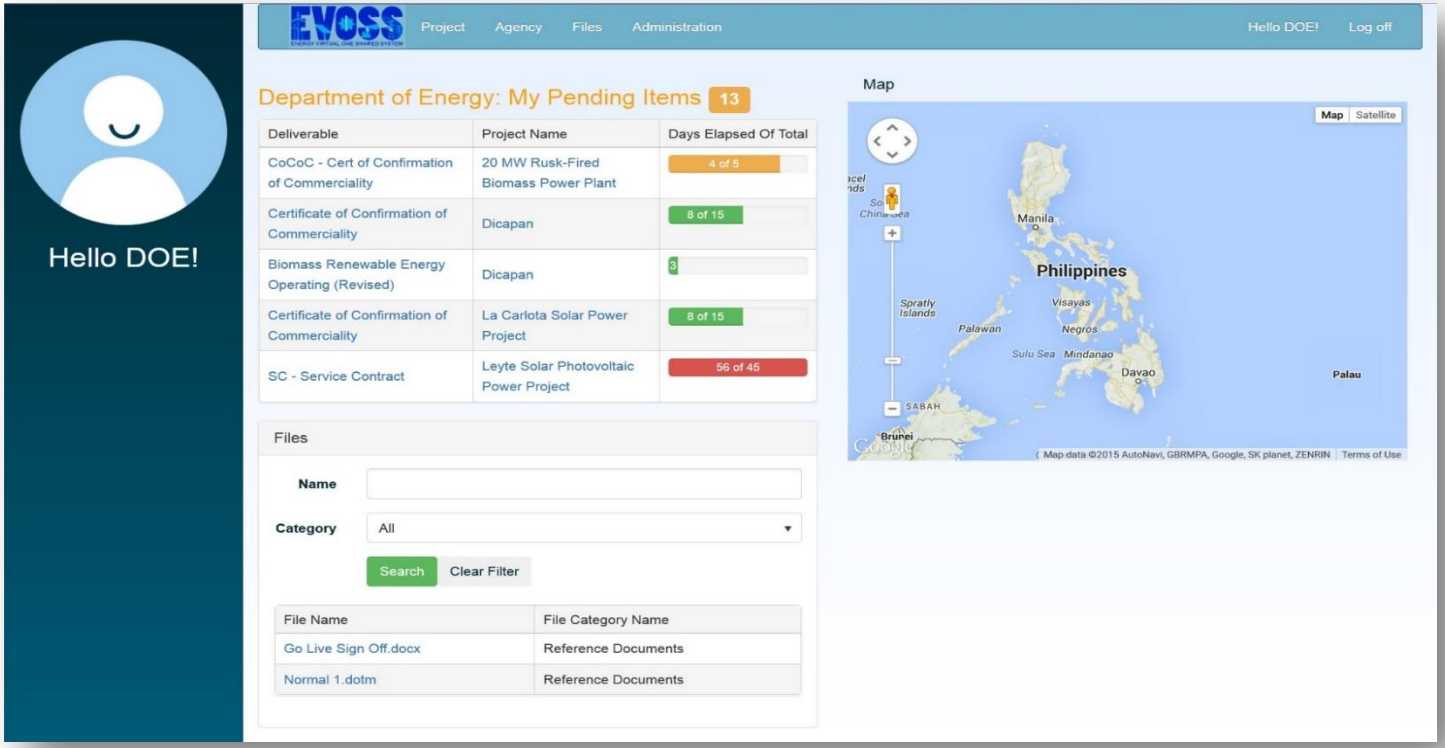
ENERGY MIX POLICY (2015) – RE share must be at least 30% of the total generation mix

Challenges

- Awareness and social acceptance
- Administrative Procedures
- Full implementation of Policy Mechanisms under the RE Law
  - impact of low oil price
  - land use
  - grid integration (geographical)
  - feedstock for biofuel production
  - financing support
  - sustainability of small RE systems

Energy Virtual One Shared System (EVOSS)

- Web-based monitoring system to facilitate approval process of applications in the energy sector and contains a database of processes, existing forms, fees, project related information and permits issued



Thank you !

Marissa P. Cerezo
Assistant Director
Renewable Energy Management Bureau
Department of Energy – Philippines
marissa.cerezo@doe.gov.ph