

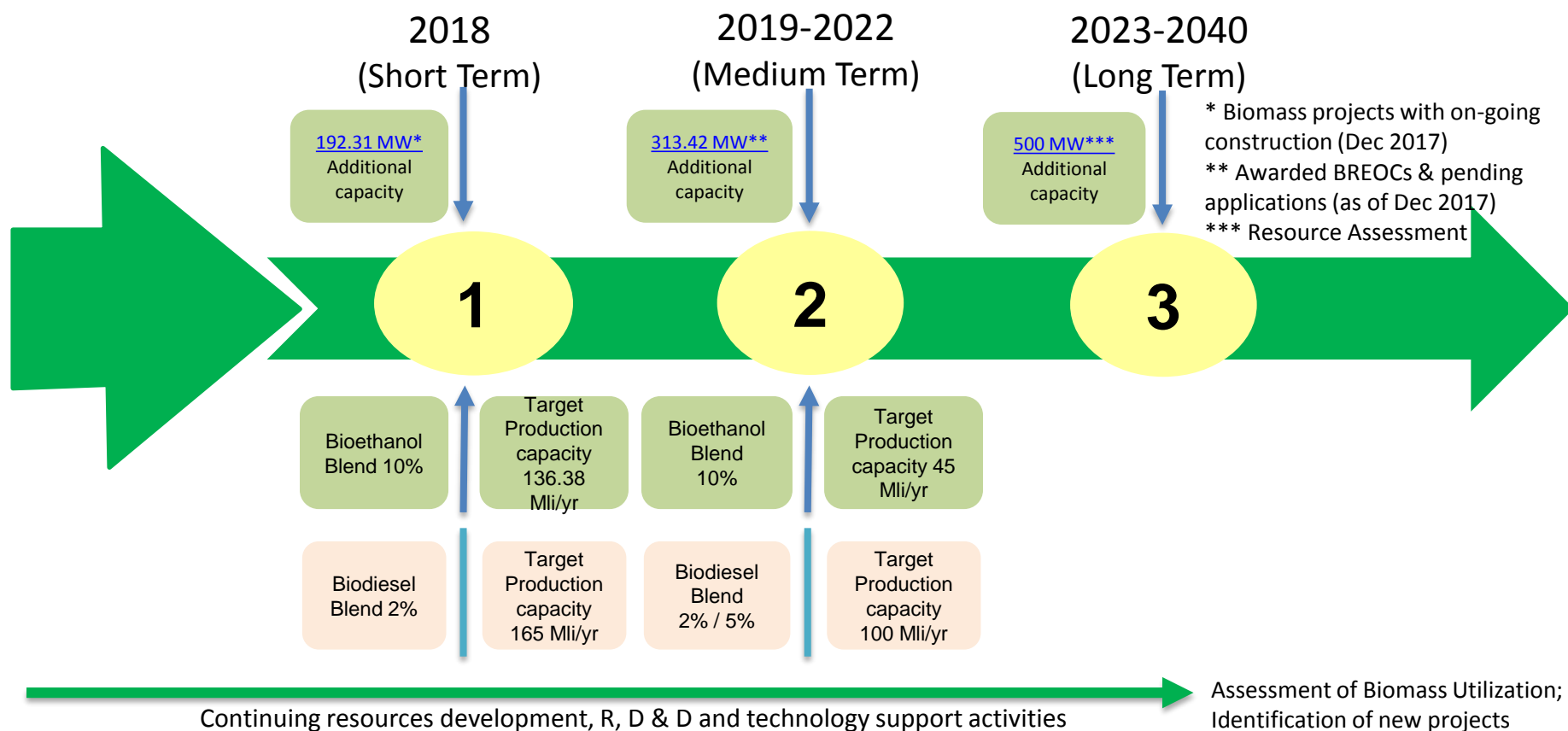
---

# **52<sup>nd</sup> EGNRET MEETING: WASTE TO ENERGY DEVELOPMENT PHILIPPINES**

Hong Kong, China / 18-22 March 2019



# Biomass Sector Roadmap (2018-2040)



# Biomass Resource Assessment

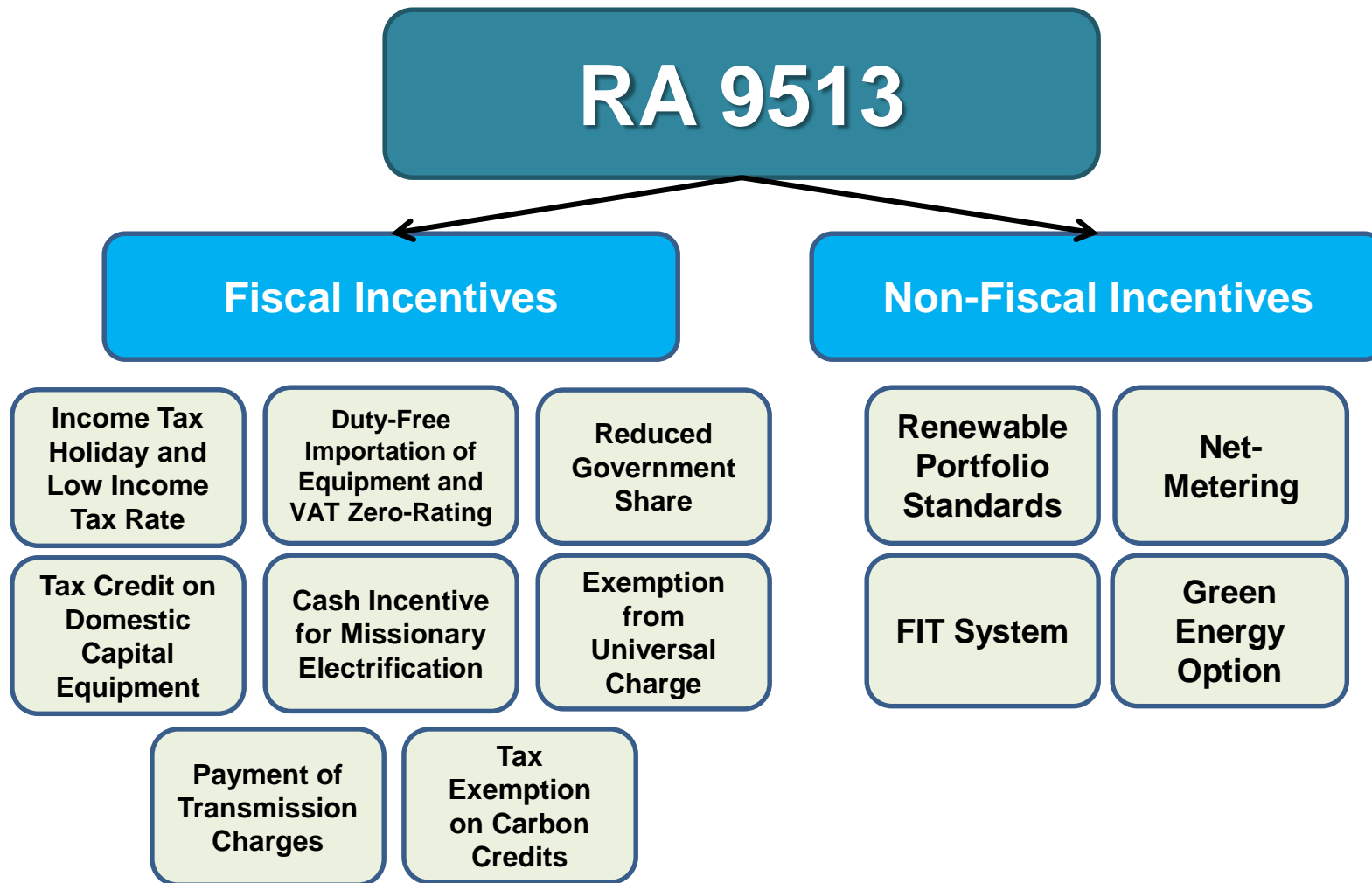
(USAID TECHNICAL ASSISTANCE 2012)

MAJOR ISLAND GROUP	POTENTIAL POWER GENERATION CAPACITY (MW)	Estimated CO <sub>2</sub> Emission Reduced (tCO <sub>2</sub> )
<a href="#"><u>LUZON</u></a>	2,093.78 MW	11.00 M
<a href="#"><u>VISAYAS</u></a>	1,209.04 MW	3.71 M
<a href="#"><u>MINDANAO</u></a>	1,424.50 MW	4.75 M

**TOTAL = 4,727.32 MW**



# Incentives under the RE Act



# CAPACITY MIX (As of 31 December 2017)

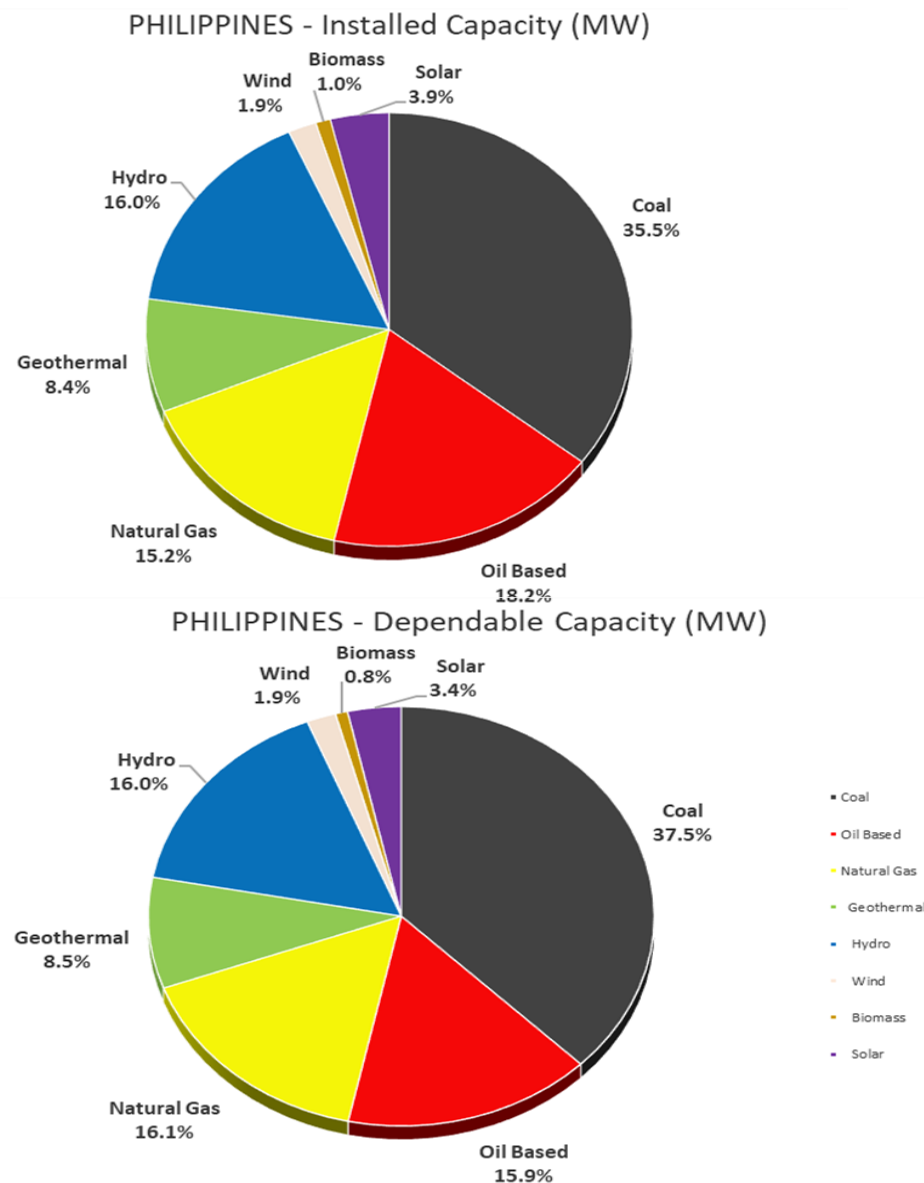
FUEL TYPE	PHILIPPINES			
	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
<b>Coal</b>	<b>8,049</b>	<b>7,674</b>	<b>35.4</b>	<b>37.4</b>
<b>Oil Based</b>	<b>4,153</b>	<b>3,286</b>	<b>18.3</b>	<b>16.0</b>
<i>Diesel</i>	2,682	2,216	11.8	10.8
<i>Oil Thermal</i>	650	530	2.9	2.6
<i>Gas Turbine</i>	822	540	3.6	2.6
<b>Natural Gas</b>	<b>3,447</b>	<b>3,291</b>	<b>15.2</b>	<b>16.0</b>
<b>Renewable Energy</b>	<b>7,079</b>	<b>6,264</b>	<b>31.1</b>	<b>30.5</b>
<i>Geothermal</i>	1,916	1,752	8.4	8.5
<i>Hydro</i>	3,627	3,269	16.0	15.9
<i>Wind</i>	427	383	1.9	1.9
<i>Biomass</i>	224	160	1.0	0.8
<i>Solar</i>	885	700	3.9	3.4
<b>TOTAL</b>	<b>22,728</b>	<b>20,515</b>	<b>100.0</b>	<b>100.0</b>

## Note:

**Installed** - The generator nameplate capacity expressed in megawatts (MW).

**Dependable** - The load-carrying ability of a station or system under adverse conditions for a specified period of time.

Source: DOE List of Existing Power Plants as of 31 December 2017, released 15 February 2018  
US Energy Information Agency (EIA)

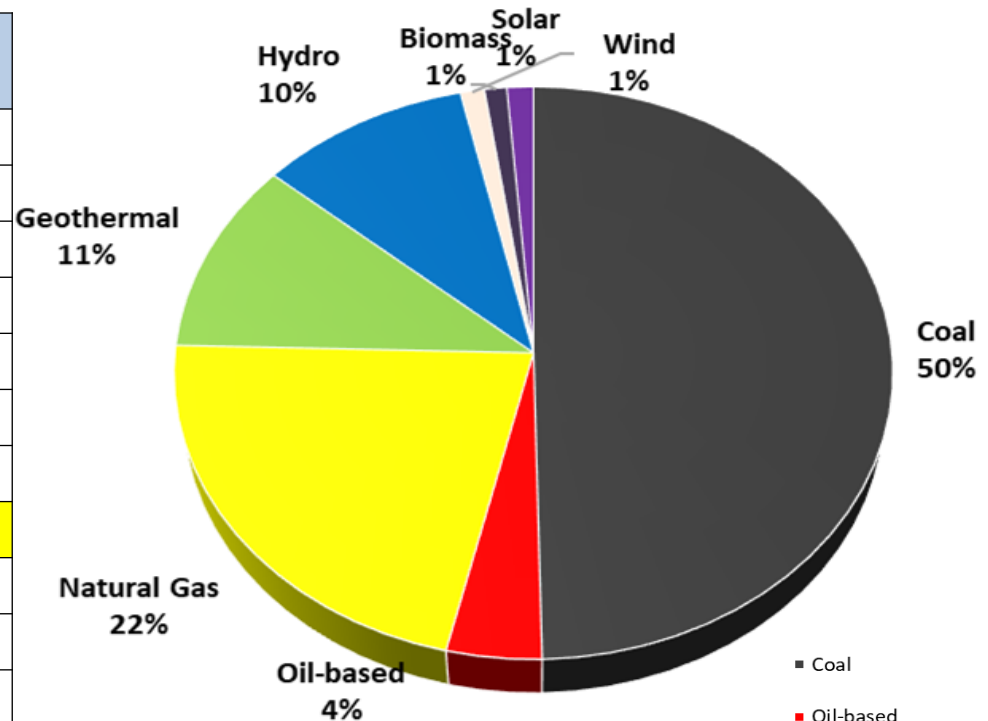


# GENERATION MIX (As of 31 December 2017)

Plant Type	Total Generation (MWh)	% Share
<b>Coal</b>	<b>46,847,274</b>	<b>49.6%</b>
<b>Oil-based</b>	<b>3,787,093</b>	<b>4.0%</b>
<i>Combined Cycle</i>	<i>405,022</i>	0.4%
<i>Diesel</i>	<i>3,100,113</i>	3.3%
<i>Gas Turbine</i>	<i>0</i>	0.0%
<i>Oil Thermal</i>	<i>281,958</i>	0.3%
<b>Natural Gas</b>	<b>20,547,239</b>	<b>21.8%</b>
<b>Renewable Energy</b>	<b>23,188,735</b>	<b>24.6%</b>
Geothermal	10,270,077	10.9%
Hydro	9,610,799	10.2%
Biomass	1,013,148	1.1%
Solar	1,201,152	1.3%
Wind	1,093,558	1.2%
<b>Total Generation</b>	<b>94,370,341</b>	<b>100.0%</b>

## Note:

**Gross Generation** - The total amount of electric energy produced by generating units and measured at the generating terminal in kWh or MWh.



By Grid	Total Generation (TWh)	% Share
Luzon	68.512	72.6
Visayas	14.054	14.9
Mindanao	11.804	12.5
<b>Total Generation</b>	<b>94.370</b>	<b>100.0</b>

Source: DOE Power Statistics 2017 (including off-grid generation), revised as of 30 April 2018  
US Energy Information Agency (EIA)



# Summary of FIT-Eligible Projects as of December 2017

## FIT MONITORING BOARD SUMMARY

as of December 2017

RESOURCE	INSTALLATION TARGET	ERC APPROVED FIT RATES	ERC APPROVED DEGRESSION RATES RATES	WITH CERTIFICATE OF ENDORSEMENT TO ERC		INSTALLATION TARGET BALANCE
	CAPACITY (MW)	(PhP/Kwh)		NO. OF PROJECTS	CAPACITY (MW)	CAPACITY (MW)
HYDROPOWER	250	5.90 (0.11)	.5% after year 2 from effectivity**** of FIT	5	34.60	215.40
		5.8705***			-	-
WIND	200	8.53	.5% after year 2 from effectivity of FIT	3	249.90	6.10
	200 *	7.40**		3	144.00	
SOLAR	50	9.68	6% after year 1 from effectivity of FIT	7	108.90	-
	450 *	8.69**		17	417.05	
BIOMASS	250	6.63 (0.13)	.5% after year 2 from effectivity of FIT	15	125.16	111.39
		6.5969***		4	13.45	
OCEAN	10	Deferred	-	-	-	-
<b>TOTAL</b>	<b>1,400.00</b>			<b>54</b>	<b>1,079.61</b>	<b>332.89</b>

\* - Additional installation targets

US \$1=P 52.73

\*\* - FIT rates for the respective additional installation targets ( W-ERCRes14,s2015; S-ERCRes6,2015 )

\*\*\* - Degressed FIT rates (H&B-ERCRes1,2017)

\*\*\*\* - Reckoning date is January 2015 (Deadline: December 2017)



# RE CAPACITY ADDITIONS

From 2009 – December 2018

Renewable Energy Additional Capacity Installations under RA 9513 (as of 31 December 2018)													
RESOURCES	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Own-Use	Net Metering	Total
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
Biomass	37.33	35.90	19.00	19.00	0.88	12.00	124.50	40.80	18.14	7.70	119.86		435.11
Geothermal	-	-	-	-	-	50	10			12			72.00
Solar	-	-	-	-	-	22	142	729	25	3	7.03	17.57	945.34
Hydro Power	10.40	56.40	4.20	11.80		13.65	17.82	10.00	8.50	78.92			211.69
Ocean Energy	-	-	-	-	-	-							-
Wind	-	-	-	-	-	304	90						393.90
<b>TOTAL</b>	<b>47.73</b>	<b>92.30</b>	<b>23.20</b>	<b>30.80</b>	<b>0.88</b>	<b>401.55</b>	<b>384.09</b>	<b>779.38</b>	<b>51.84</b>	<b>101.82</b>			2,058.04



# Waste-to-Energy (WTE) Development

## Section 30 of RA 9513: Adoption of WTE Technologies

- The DOE shall, where practicable, **encourage the adoption of waste-to-energy facilities** such as, but not limited to, biogas systems. The **DOE shall, in coordination with the DENR**, ensure compliance with this provision.

### WASTE-TO-ENERGY TECHNOLOGIES

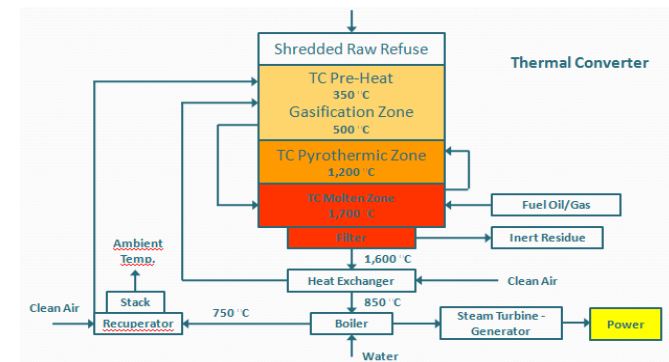
- systems which convert **biodegradable materials** such as, but not limited to, animal manure or agricultural waste, into useful energy through processes such as **anaerobic digestion, fermentation, and gasification, among others**, subject to the provisions and intent of **RA 8749 (Clean Air Act)** and **RA 9003 (Ecological Solid Waste Management Act)**



Anaerobic Digestion



Methane Recovery



Thermal Conversion



# Summary of Registered WTE Power Plants/Projects

## Thermal Conversion

### Commercial

Company/Project Name	Capacity	Location	Feedstock	Status
Green Atom Renewable Energy Corporation's Waste-to-Energy Power Plant Project	6 MW	Laoac, Pangasinan	Municipal Solid Waste	On-going permit and licensing
	6 MW	Mabalacat, Pampanga	Municipal Solid Waste	On-going permit and licensing
	6 MW	San Jose, Batangas	Municipal Solid Waste	On-going permit and licensing
Satrap Power Corporation's Biomass/WTE Power Plant Project	10 MW (3-MW WTE)	Santa, Ilocos Sur	Rice husk & straws, Corn cobs & stalks, tobacco stem, wood chips, MSW	On-going permit and licensing
AustWorks Corporation's Waste-to-Energy Plant Project	5.22 MW	Puerto Princesa, Palawan	Municipal Solid Waste	On-going permit and licensing
CJ Global Green Energy Philippines Corp.'s Waste-to-Energy Power Plant Project	20 MW	Naga, Camarines Sur	Municipal Solid Waste	On-going permit and licensing
<b>TOTAL</b>	<b>46.22 MW</b>			

### Own-use

Company/Project Name	Capacity	Location	Feedstock	Status
Waste and Resources Management, Inc.'s Waste-to-Energy Power Plant Project	100 kW	Trece Martires, Cavite	Tobacco Waste, Food Waste, Waste Paper	On-going construction



# Summary of Registered WTE Power Plants/Projects

## Landfill Gas Extraction

### **Commercial**

Company/Project Name	Capacity	Location	Status
Montalban Methane Power Corporation's Landfill Methane Recovery and Power Generation Facility	14.8 MW	Rodriguez, Rizal	Operational
Pangea Green Energy Philippines, Inc.'s Landfill Methane Recovery and Power Generation Facility	1.5 MW	Payatas, Quezon City	Operational
<b>TOTAL</b>	<b>16.30 MW</b>		

## Refused Derived-Fuel (RDF)

### **Commercial**

Company/Project Name	Capacity	Location	Status
FDR-Integrated Resource Recovery Management, Inc.'s Refused Derive Fuel (RDF) Generation Facility	300 MT/day	Naga City, Cebu	Operational
Green Alternative Technology Specialist, Inc.'s Refuse-Derived Fuel (RDF) Processing Plant	350 MT/day	Rodriguez, Rizal	Operational
<b>TOTAL</b>	<b>550 MT/day</b>		



# Summary of Registered WTE Power Plants/Projects

Anaerobic Digestion (BIOGAS)				
<b>Commercial</b>				
Company/Project Name	Capacity	Location	Feedstock	Status
Green Future Innovations Inc.'s Biomass Cogeneration Power Plant	19 MW (3 MW Biogas)	San Mariano, Isabela	Distillery Waste	Under maintenance
AseaGas Corporation's Biogas Power Plant Project	8.8 MW	Lian, Batangas	Distillery waste	Non-operational
Far East Alcohol Corporation's Biogas Power Plant Project	2.4 MW	Apalit, Pampanga	Waste Molasses	For testing and commissioning
Asian Carbon Neutral Power Corporation's Biogas Power Plant	2 MW	Tarlac City, Tarlac	Animal Waste	Operational
Biotech Farms, Inc.'s Biogas Power Plant	12.39 MW	Banga, South Cotabato	Animal Waste	Phase I (3.96 MW) operational
First Quezon Biogas Corporation's Biogas Power Plant Project	1.2 MW	Candelaria, Quezon	Animal Waste	On-going construction
<b>TOTAL</b>	<b>29.79 MW</b>			



# Summary of Registered WTE Power Plants/Projects

## Anaerobic Digestion (BIOGAS)

### Own-use

Company/Project Name	Capacity	Location	Feedstock	Status
Cavite Pig City Inc.'s Cavite Pig City Biogas Power Plant	1 MW	Gen. Trias, Cavite	Animal Waste	Under Rehabilitation
FDR Integrated Resource Recovery Management, Inc.'s Biogas Power Plant	0.624 MW	Naga City, Cebu	Municipal Solid Waste	Operational
Marcela Farms Incorporated's Biogas Power Generation Project	0.56 MW	Cortes, Bohol	Animal Waste	Operational
Emperador Distillers, Inc.'s Biomass Power Plant Project	9.2 MW (4.2 MW Biogas)	Balayan, Batangas	Waste Water	On-going construction
<b>TOTAL</b>	<b>6.384 MW</b>			



# Landfill Gas-Fired Power Plants



**14.8-MW Montalban Methane Power Corporation  
Landfill Methane Recovery and Power Generation Facility**



**1.5-MW Pangaea Green Energy Philippines, Inc. Landfill Methane  
Recovery and Power Generation Facility**

# RDF Production Facilities



**200 MT/day Refused Derive Fuel Generation Facility**  
FDR-Integrated Resource Recovery Management, Inc



**350 MT/day Refuse-Derived Fuel (RDF) Processing Plant Project**  
Green Alternative Technology Specialist, Inc.



# Biogas Power Plants



**624-kW FDR-IRRMI Dry Anaerobic Digestion Biogas Power Plant (own-use)**



# Biogas Power Plants



**Asian Carbon Neutral Power Corporation  
2-MW Biogas Power Plant**



**Biotech Farms, Inc.  
12.39-MW Biogas Power Plant**



# Biogas Power Plants



**1-MW Cavite Pig City  
Biogas Power Plant (own-use)**



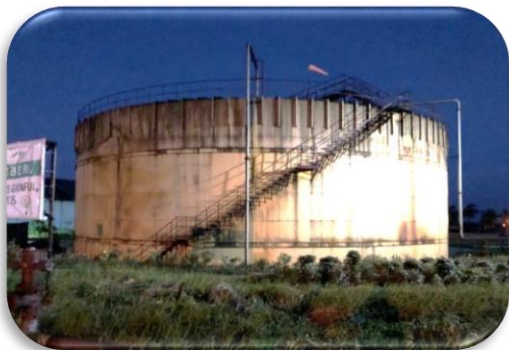
**560-kW Marcela Farms, Inc.  
Biogas Power Plant (own-use)**



# Biodigesters Installed at Bioethanol Production Facilities



**Emperor Distillers, Inc.**  
(4.2 MW Biogas Own-Use)



**San Carlos Bioenergy, Inc.**  
-supplemental fuel to  
boiler equivalent to  
950-kW capacity



**Green Future Innovations,  
Inc. (3-MW Biogas)**



**Far East Alcohol Corporation**  
(2.4-MW Biogas)



---

# THANK YOU!



(+632) 479-2900



[marissa.cerezo@doe.gov.ph](mailto:marissa.cerezo@doe.gov.ph)

maris.cerezo@gmail.com



[www.doe.gov.ph](http://www.doe.gov.ph)



//doe.gov.ph



@doe\_ph

