Philippines Coal Industry

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Implementation of CCT and CCS in the Philippines

Clean Coal Technology - Power Generation

- The existing Coal Fired Power Plants (CFPP) in the Philippines utilize either Pulverized Subcritical technology or Circulating Fluidized Bed (CFB) Technology

- ***Circulating Fluidized Bed (CFB) Combustion Technology*** - Crushed coal is fed with crushed limestone or dolomite to a fluidized bed furnace with a bed material (silica sand). At a controlled furnace temperature of 800-950° C, the limestone or dolomite due to its reactive CaO or MgO absorbs and reacts with SOx gas, thereby reducing the formation of this gas. At the said temperature, NOx emission is also controlled.

Clean Coal Technology - Power Generation

- ***Pulverized Coal (PC) Combustion Technology*** - Pulverized coal of about less than 1mm is fed to the furnace whose temperature is maintained at 1200-1400° C. SOx and NOx are controlled using Flue Gas Desulfurizer (FGD) and Selected Catalytic Reactor (SCR) which are not necessary in CFB boiler.

  The high efficiency of the coal combustion process of CFB & PC boilers controls CO_2 emissions.

- ***Flue Gas Desulfurizer (FGD)*** - This equipment is installed to control the SOx emissions by spraying or scrubbing the flue gas with limestone slurry whose MgO content absorbs and reacts with SOx to form a stable substance (gypsum).

Clean Coal Technology - Power Generation

- ***Selected Catalytic Reactor (SCR)*** – This equipment is installed after the PC boiler to control NOx emissions which are high in the PC furnace (at 1200-1400° C).
- ***Covered/enclosed coal stockyard and conveying system*** - This set-up prevents or minimizes coal dust accumulation.
- ***Water sprinkler*** - This equipment is used to prevent coal dust and coal spontaneous combustion.
- ***Continuous Emissions Monitoring System (SEMS)*** - This device is installed at the smokestack to monitor if the levels of gas emissions and suspended particles conform to international and DENR standards.
- ***Mercury analyzer*** - instrument used to analyze the mercury content of coal and ash.

Enclosed Coal Conveying System and Stockyard at APEC Power Plant in Pampanga


Ash pond of
Quezon Power

FGD and EP of Quezon Power

Clean Coal Technology - Power Generation (Future)

- ***Coal Liquefaction*** - a process of converting solid coal into liquid fuel
- ***Coal Gasification*** - a process of converting solid coal into fuel gas
- ***Coal Bed Methane Technology*** - a process of extracting the methane gas from coal bed using drillholes
- There are two Coal Fired Power Plants currently under construction that will be utilizing ***Supercritical Technology***.

Clean Coal Technology – Power Generation

Upcoming Coal-fired Power Projects (Location)	Type of Coal Power Plants	Rated Capacity (MW)	No. of Units	Status
		1,660		
San Buenaventura Power Ltd (Quezon)	Supercritical Coal	460	1	Committed; Target Commercial Operation: December 2019
Atimonan One Energy (Quezon)	Supercritical Coal	1,200	2	Indicative; Target Commercial Operation: 2020/2021

Source: DOE List of Private Sector Initiated Power Projects

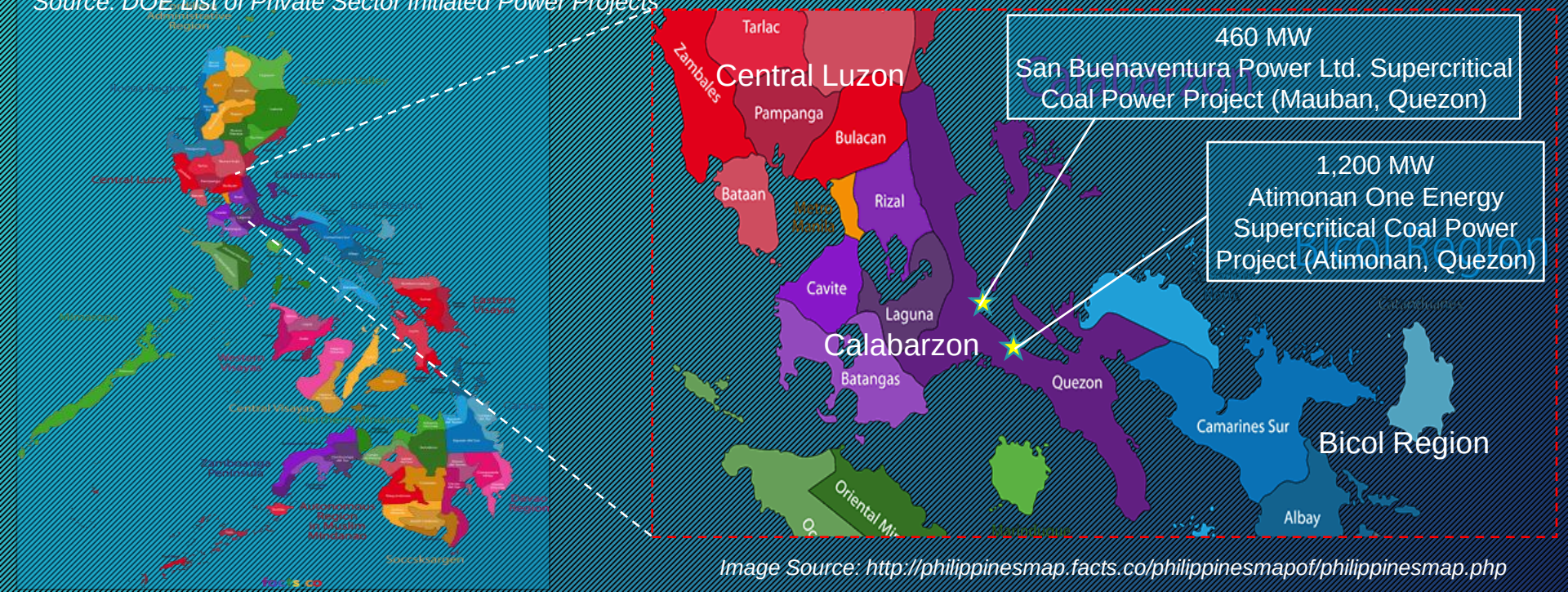


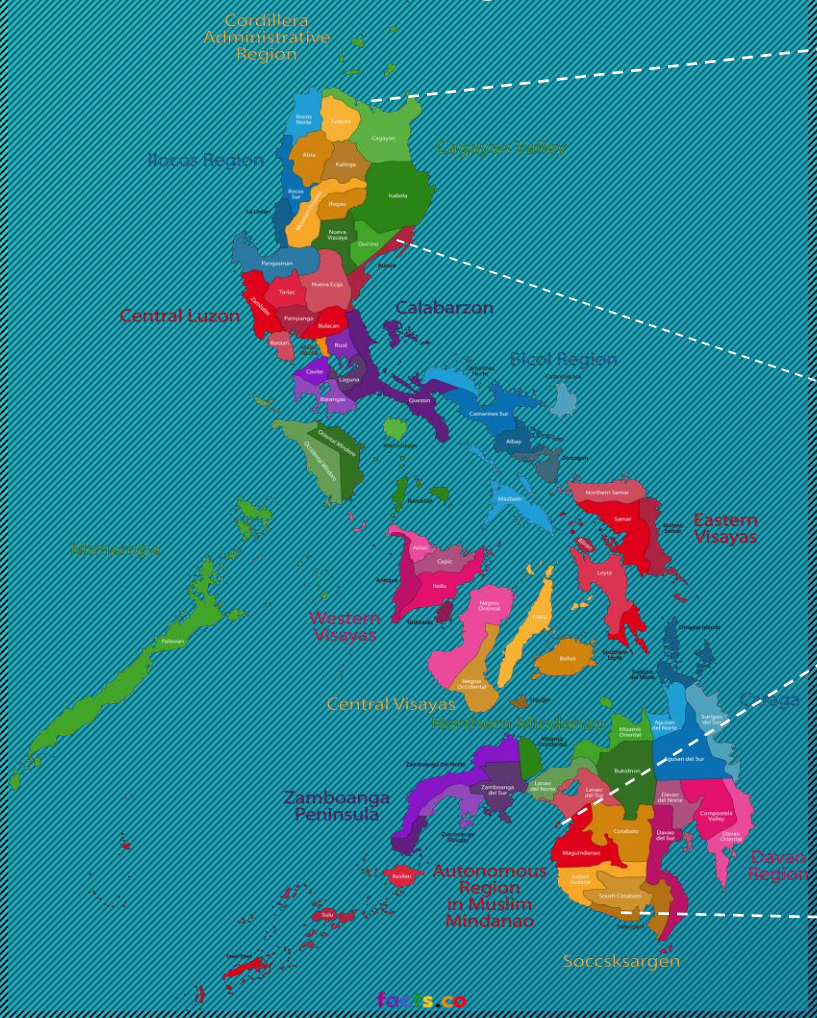
Image Source: http://philippinesmap.facts.co/philippinesmapof/philippinesmap.php

Other Clean Coal Technology Opportunities

The Philippines has large resources of low-rank coal which can only be developed and utilized through Integrated Mine-Mouth Coal Fired Power Plants. This provides investors opportunities to set-up power plants utilizing Clean Coal Technology alongside the Coal Operating Contracts in the areas, particularly in Isabela, Cagayan Valley and South Cotabato.

Opportunities for CCT in the Philippines

Potential Integrated Mine-Mouth Coal-fired Power Plant Projects



CAGAYAN VALLEY

Coal Operating Contract Nos. 116 & 123
D. M. Wenceslao & Associates, Inc.

Coal Operating Contract No. 122
Philippine National Oil Company - Exploration Corporation

DAVAO REGION

Coal Operating Contract No. 126
Daguma Agro-Minerals, Inc.

SOCCSKSARGEN

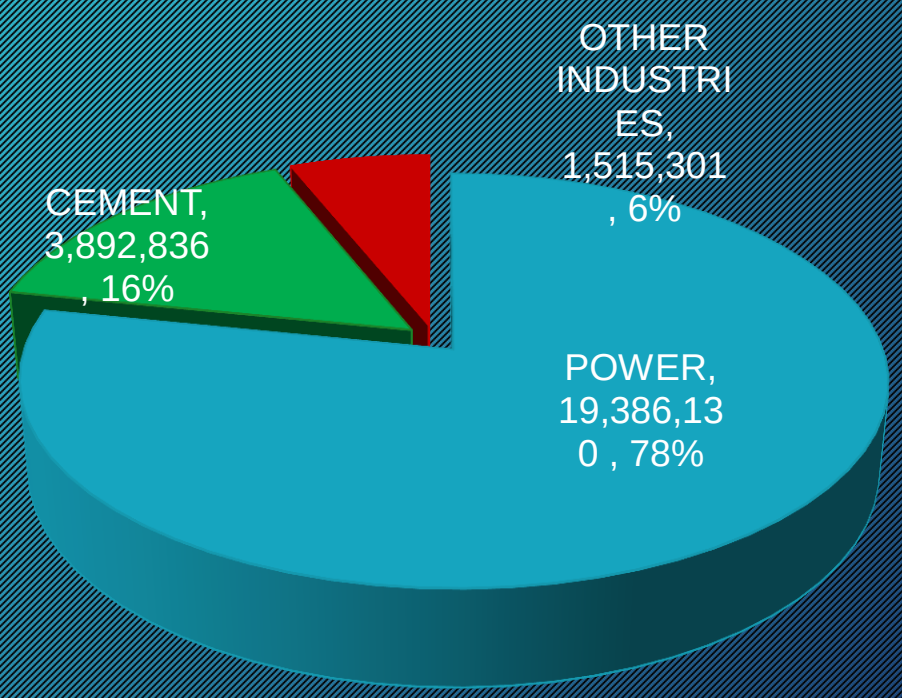
Carbon Capture and Storage

- At the present, there is no CCS being implemented/utilized in the Philippines
- Knowledge and Capacity Building in CCS are essential
- Studies on the feasibility of CCS application in the Philippines need to be conducted

Coal Demand and Utilization in the Philippines

Coal Utilization Situation in the Philippines

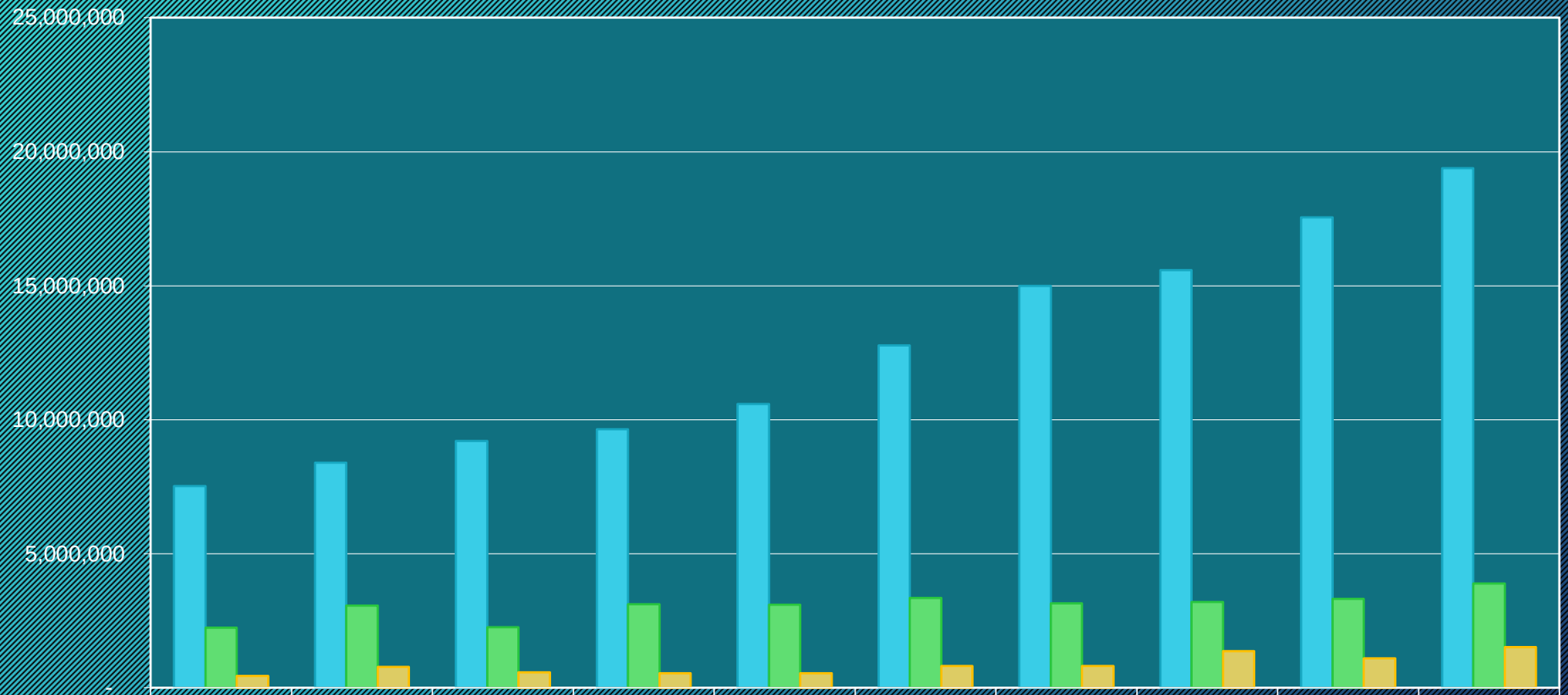
2016 Coal Consumption (in Metric Tons)



Total Coal Consumption – 24,794,267

Historical Coal Consumption in the Philippines

(in Million Metric Tons)



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Power	7,525,52	8,396,72	9,204,25	9,643,06	10,580,4	12,777,1	14,991,8	15,587,4	17,553,8	19,386,1
Cement	2,239,63	3,063,24	2,266,90	3,118,23	3,103,00	3,356,32	3,155,91	3,203,43	3,315,82	3,892,83
Industrial /Direct	449,701	775,258	571,679	550,839	550,838	815,173	803,724	1,372,30	1,104,18	1,515,30

Challenges for the Philippine Coal Industry

Social Acceptability

- Main challenge for the Philippine Coal Industry is social acceptability
- Most of the Filipino citizens have a negative view/perspective on coal mining and utilization
- This is due to the lack of information/knowledge on coal, most base their opinions on mainstream media which portrays coal in negative light
- There is a need to conduct Information, Education and Communication (IEC) Campaigns to spread correct information about coal and increase social acceptability

Climate Change

- Paris Agreement on Climate Change will also be a major challenge for the Philippine Coal Industry
- As a developing country, coal remains to be one of the key factors in producing power that is needed to pursue the country's industrialization
- As the Paris Agreement has been ratified in the Philippines, it may hamper this aggressive pursuit for the country's growth

Way Forward

Way Forward

- Coal remains to be an important factor for sustained growth
- The implementation and utilization of CCT and CCS is essential to deliver sustainable and cleaner energy supply
- These technologies are critical in the drive to address climate change

Thank You