ATENEO DE MANILA UNIVERSITY

STRIKING A BALANCE:

COAL-FIRED POWER PLANTS IN THE PHILIPPINES' ENERGY FUTURE

A POLICY BRIEF

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INTRODUCTION

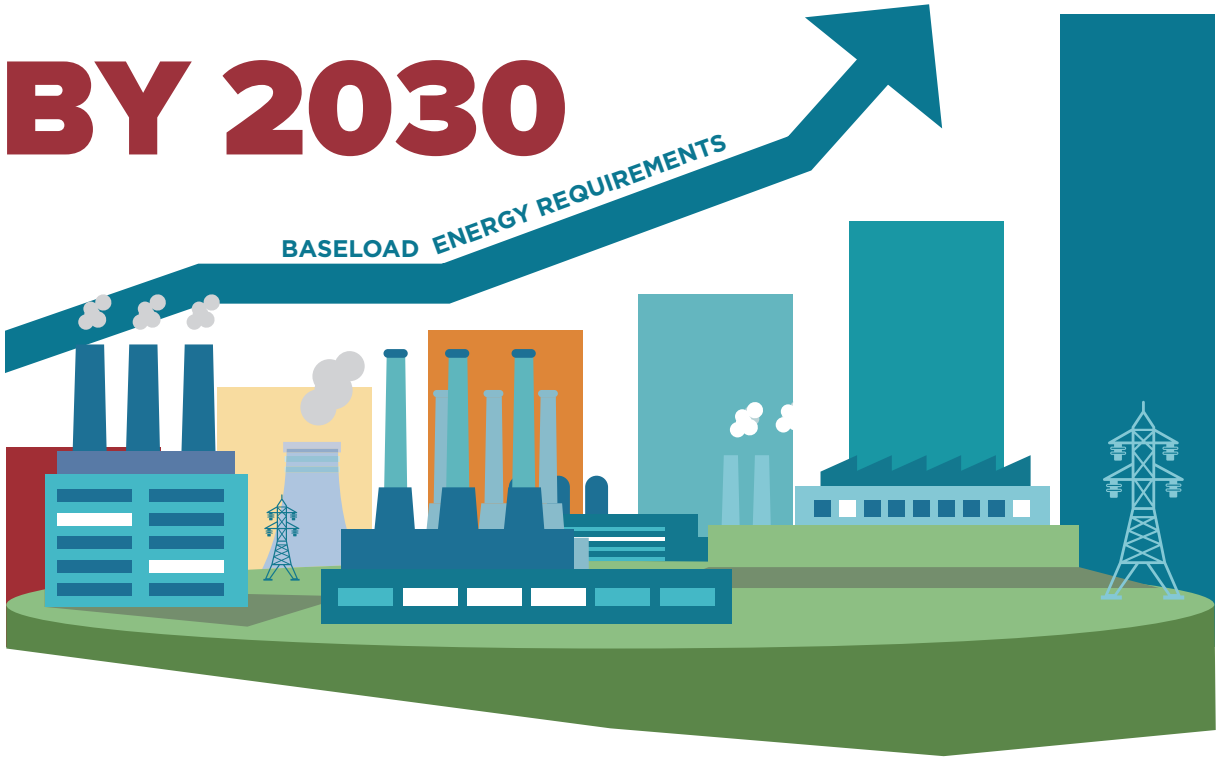
This policy brief is developed as a contribution to ongoing discussions around the role of coal-fired power plants in the Philippines' journey towards sustainable development. This brief complements more detailed supplementary reports outlining the sectoral dynamics of coal-fired power plants as viewed from economic, technological, environmental, health, social and policy perspectives. Through interviews and focus group discussions with stakeholders representing the public, private and non-government sectors, as well as the conduct of primary and secondary research of published and peer-reviewed material on coal-fired power plants in the global and national context, the policy brief attempts to provide an objective assessment as well as a crystallization of both established and emerging thought around properly positioning coal-fired power plants in the midst of Philippine growth and other pressing priorities.

This policy brief limits its examination to coal-fired power plants and does not delve into the upstream side of the coal sector, for instance mining, processing, transport and importation. In the course of its analysis, however, several points are brought up in the policy brief that raise important implications for the Philippine energy sector and its governance as a whole. So while it is not the intention of the study to be comprehensive, it intends to outline a set of important key messages to kick-start a dialogue among stakeholders towards "striking a balance" when it comes to coal in the future of the Philippines.

Striking A Balance: Coal-Fired Power Plants in the Philippines' Energy Future is a product of the Ateneo School of Government, authored by Atty. Antonio La Viña and Lawrence Ang, with co-authors James Esguerra, Atty. Cecilia Guiao, Mike Guioguio, Engr. Jethro Hipe, and Atty. Jennifer Ramos and contributing authors Reginald Rex Barrer, Jemima Marie Mendoza, Purple Chrystyl Romero, and Atty. Railla Puno. It has been reviewed by Mr. Alan Cajes, Atty. Engr. Pedro Maniego, Jr., Mr. Mario Marasigan, Atty. Grizelda Mayo-Anda, Mr. Dennis Ramon Posadas, Engr. Ruben Reinoso, Jr., and Ms. Frances Veronica Victorio. Reviewers have no responsibility for the content of the policy brief and all errors, if any, are the responsibility of the authors.

KEY MESSAGES

1 **Coal-fired power plants have a significant role in meeting the country's baseload energy requirements. However, given the current listing of the Department of Energy on committed and indicative coal-fired power plant projects—assuming they are all completed and built—the Philippines would already exceed the baseload requirement for 2030.**



Philippine economic growth is expected to become even more inextricably linked to the growth of the energy sector.

One of the major stumbling blocks in the Philippines' race towards economic growth is inadequate infrastructure. Power, which is a critical component in the production of goods and services, is one of the major types of infrastructure. Sufficient power could make business operations more efficient and consequently encourage the entry of more investors; additional investors could mean the creation of more job opportunities and an increase in production. An indication of the attainment of this increase is the rapid rise in GDP and GDP per capita.

For the Philippines to address poverty significantly, the country requires a level of economic output similar to Malaysia, which in 2012 reduced its poverty rate to 1.7% of its population by exhibiting a GDP per capita of USD 10,933 with an electric power consumption per capita of 4,345 Kwh. Juxtaposed with the Philippines, the country's poverty rate in 2012 was 25.2% at a GDP per capita of US$2,871 and an electric power consumption per capita of 672 KWh.

If the Philippines is then to virtually minimize poverty by 2030 under the same trajectory followed by Malaysia, all things being equal, the Philippines would need to grow its GDP by an annual average of 10.13% (using current dollar rate as constant price) and increase its electric generation capacity by an annual average of 11.1%. In order to attain the needed 11.1% annual growth in electric capacity between 2014-2030, the equivalent of 417,240 Gwh or 5.4 times the current capacity of 77,261 Gwh is needed.[1] There is an imperative to develop and harness energy sources that can rapidly fill this capacity gap—and among the sources being considered and subject to serious discussions and widespread debates are coal-fired power plants (CFPPs).

There is the argument that once the Philippines attains a certain stage of development or GDP per capita, the option to then explore opportunities to divest from coal and tap more environment-friendly energy alternatives could then be considered.

Coal, hydro and geothermal are the dominant baseload technologies across the country; exogenous factors, however, make coal viable for covering baseload needs for the short-term and midterm period.

By 2030, the Department of Energy (DOE) estimates that the country would need 13,167 MW of additional power capacity,[2] of which 8,548 MW are to be generated from baseload power plants. "Baseload" power plants are the facilities used to meet some or all of a country's continuous energy demand, and produce energy at a constant rate, usually at low cost relative to other facilities available to the system. This is in contrast to "mid-merit" which follows the load and "peaking" power plants which only run when there is high demand, both are designed to supply variable energy needs.

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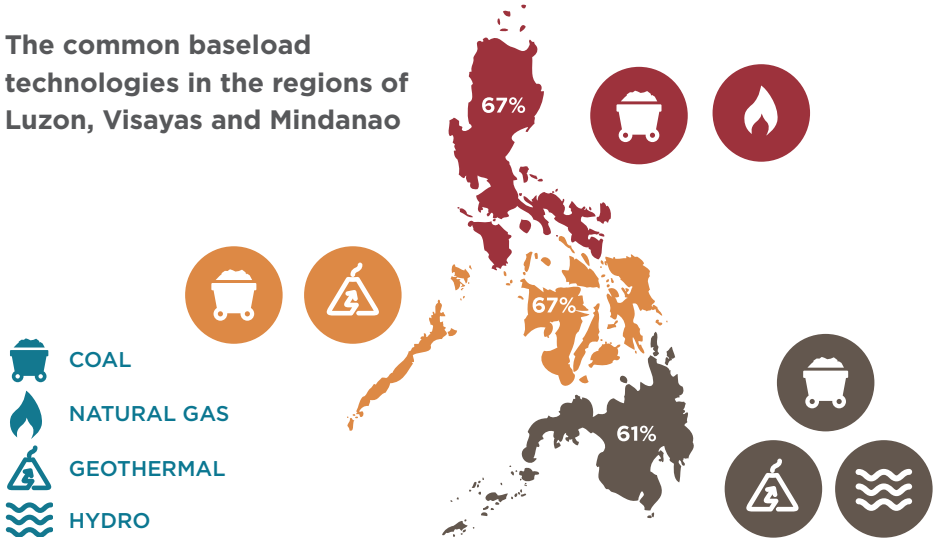
[1] Source: Adapted from World Bank data
[2] The additional capacity of 13,167 MW being developed under the Philippine Energy Plan is intended to augment the country's current capacity of 18,603 MW—placing the total energy capacity of the Philippines at 31,770 MW by 2030.



The common baseload technologies in the regions of Luzon, Visayas and Mindanao are coal and geothermal. DOE data show that the baseload power plants for Luzon are composed of: 1) coal; 2) natural gas; and 3) geothermal, which in 2015 constitutes 67% of the islands' installed capacity.

Table 1. Installed and Dependable Capacity and Percent Share, by Fuel Type, in Luzon.

LUZON Fuel Type	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
COAL	4,806	4,514	36%	38%
OIL BASED	2,139	1,592	16%	13%
DIESEL	769	652	6%	5%
OIL THERMAL	650	320	5%	3%
GAS TURBINE	720	620	5%	5%
NATURAL GAS	2,861	2,759	21%	23%
GEOTHERMAL	844	692	6%	6%
HYDRO	2,484	2,145	18%	18%
WIND	283	103	2%	1%
SOLAR	50	29	0%	0%
BIOMASS	57	34	0%	0%
TOTAL:	13,524	11,868	100%	100%

Source: Department of Energy, 30 June 2015

The baseload plants for Visayas, on the other hand are 1) geothermal and 2) coal, making-up 67% of the islands' installed capacity.

Table 2. Installed and Dependable Capacity and Percent Share, by Fuel Type, in Visayas.

VISAYAS Fuel Type	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
COAL	806	630	30%	29%
OIL BASED	670	493	25%	23%
DIESEL	615	451	23%	21%
GAS TURBINE	55	42	2%	2%
GEOTHERMAL	965	817	36%	38%
HYDRO	11	11	0%	1%
BIOMASS	96	71	4%	3%
NATURAL GAS	1	1	0%	0%
SOLAR	52	41	2%	2%
WIND	90	86	3%	4%
TOTAL:	2,691	2,150	100%	100%

Source: Department of Energy, 30 June 2015

For Mindanao, the baseload plants are: 1) hydro; 2) coal; and 3) geothermal which comprise 61% of the islands' installed capacity.

Table 3. Installed and Dependable Capacity and Percent Share, by Fuel Type, in Mindanao.

MINDANAO Fuel Type	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
COAL	232	210	10%	11%
OIL BASED	799	705	36%	38%
DIESEL	799	705	36%	38%
GEOTHERMAL	108	98	5%	5%
HYDRO	1,061	837	47%	45%
SOLAR	1	0.3	0%	0%
BIOMASS	36	10	2%	1%
TOTAL:	2,237	1,860	100%	100%

Source: Department of Energy, 30 June 2015

Geothermal energy – while present in the Philippines – has limited supply since it is purely indigenous, site specific, and cannot be imported. Coal, on the other hand, has a far more steady supply since it is both indigenous and can be imported readily from countries with abundant reserves (e.g., Australia, Indonesia, Russia, US) which makes its price regime predictable and affordable.

In addition, CFPPs could be practically built anywhere in the country especially in places with available water. Coal could also be easily transported. Natural gas, meanwhile, is so far only available in Luzon with its main source Malampaya expected to run out by 2022. Liquefied natural gas technologies and frameworks are still to be developed.

The other technology for baseload power is nuclear, which the Philippines has long-ago discarded as an energy alternative in 1986 due to safety concerns. The Fukushima incident and Chernobyl catastrophe have raised alarm over the negative effects of nuclear power despite advances in technologies to manage its risks.

Renewable energy sources like solar thermal, photovoltaic, ocean and wind energy, on the other hand, based on current research and development indicate very promising prospects for reliable and continuous power within the next two to four decades.[3] At present, however, these need more development before they can significantly substitute CFPPs as baseload power sources.

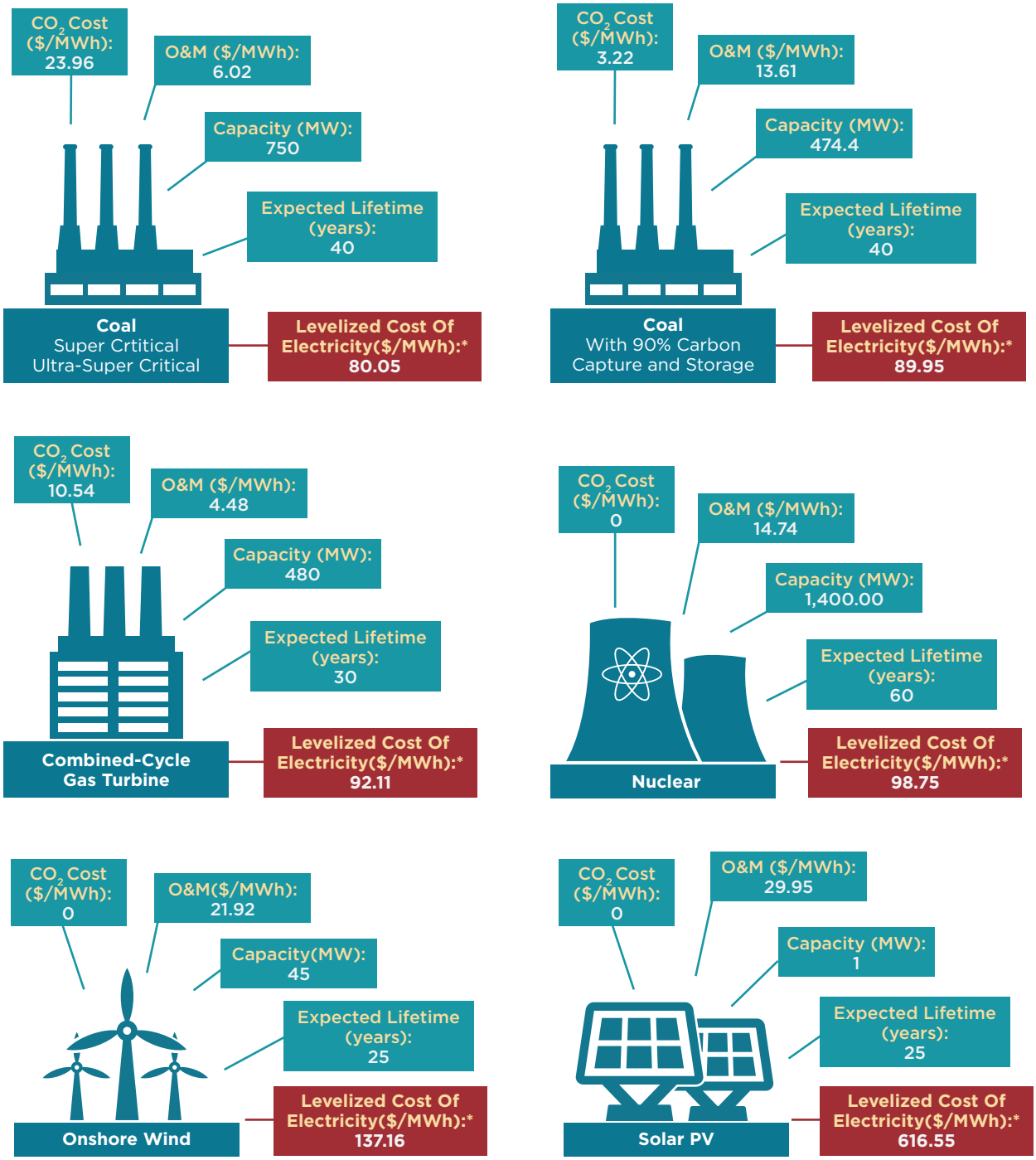
Coal is a least cost technology, particularly for the baseload.

The economic cost-effectivity of coal-fired power plants is compared in the table below (EGC 2010) with other mainstream power technologies using a common global reference called Levelized Cost of Electricity (LCOE). This study has been updated in 2015 and compared with the previous study[4] and it shows that among the established and emerging baseload technologies, coal still remains the cheapest technology option from a purely economic perspective, not accounting for the cost of its impacts.

[3] The potential for renewable energy to provide baseload power in Australia by Stewart Needham (http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp0809/09rp09#_Toc318812465)

[4] EGC, 2015

Median Case Specifications for the Different Fuel Types.

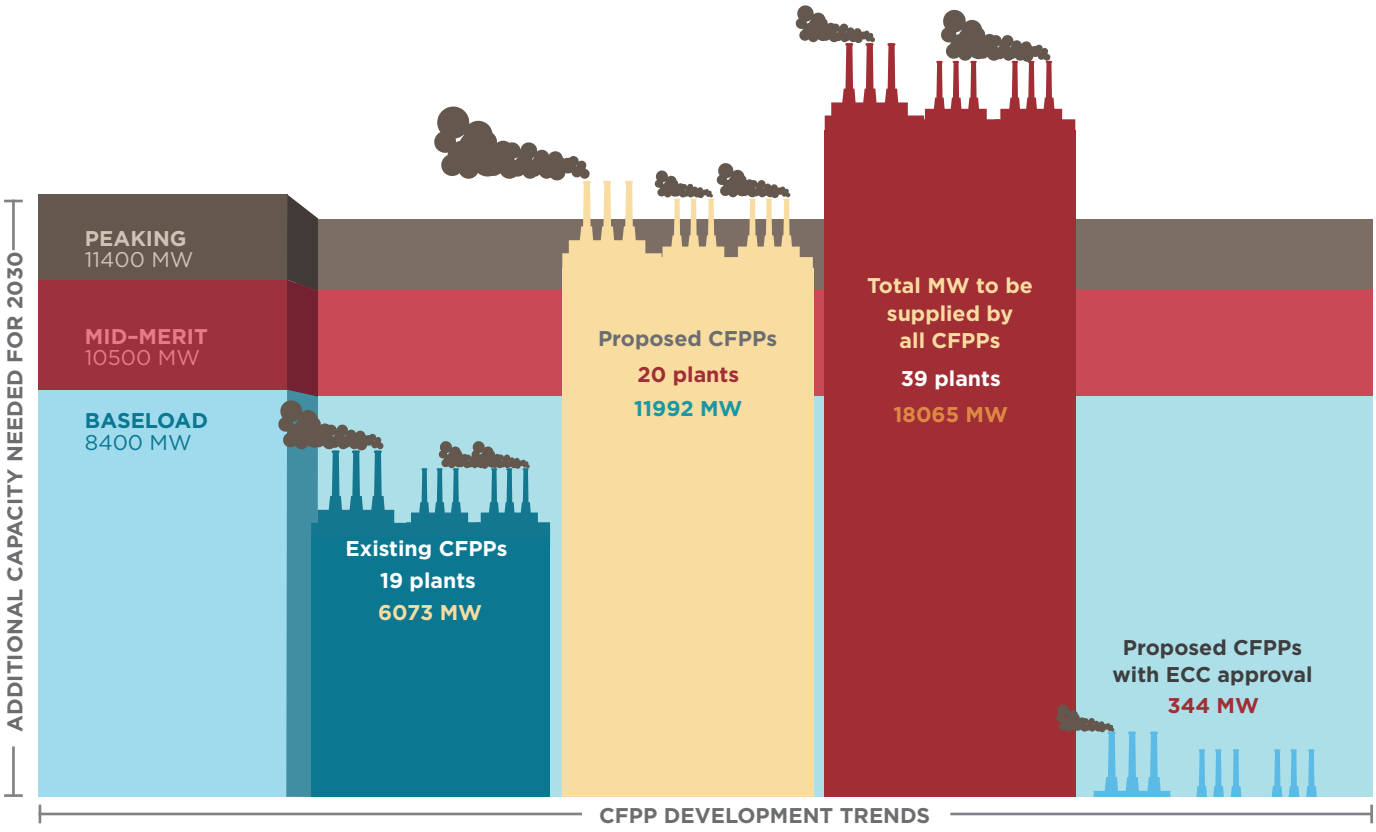


* 10% discount rate
Source: IEA, from a study "Projected Costs of Generating Electricity, 2010"

It argues that CFPPs are the country's dominant power technology because economically, it is widely available and easy to build. However, this particular characteristic only holds true for as long as coal services baseload energy requirements and serves as an uninterrupted energy source. CFPPs become less competitive once oriented to service mid-merit and peaking requirements as this would entail the need to switch the CFPP "on" or "off" to meet variable demands, incurring operators costs and losses.

A 2011 study by World Bank contended that the above LCOEs as explicit cost of these technologies and did not consider the external costs of coal[5] (i.e., health impacts, water pollution, climate pollution). The study posits that if these were included, CFPPs would unequivocally be one of the most expensive forms of electricity generation.

Total Additional Capacity Needed for 2030 vs. CFPP Development Trends



Source: Adapted from DOE data

[5] The Social Cost of Coal: Implications for the World Bank Samuel Grausz October 2011
[6] indicative"- FS only; committed = FS + financing, necessary permits and clearances of various agencies and concerned local government and already have financial closing

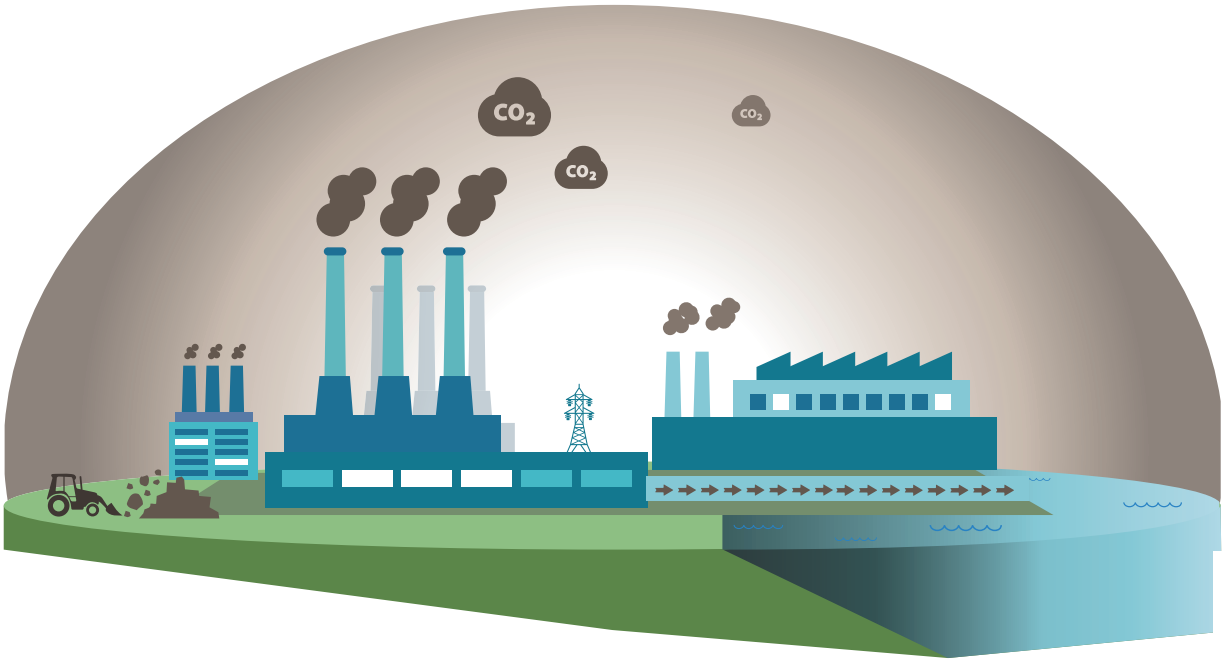
Coal-fired power plants are seemingly poised to secure and exceed the country's baseload energy requirements; hence other considerations have to be factored towards projecting the proper programming of CFPP programs.

Data from DOE would show, however, that the additional power capacity required to supply the country's baseload appear on track to being met. The figures below show that committed and indicative CFPPs[6] between 2012-2030 have the potential to deliver rated capacity of 11,992 MW, assuming that all are completed and built. This is more than enough to supply the whole country's additional energy needs of 13,167 MW, of which 11,400 MW is open for private investments. This will also exceed baseload capacity needs of 8,400 MW as indicated in the 2012-2030 Philippine Energy Plan (PEP) targets.

It is important to highlight that coal, as mentioned earlier, is not economically feasible if used beyond baseload power generation, thus, it would appear that there could be an oversupply of coal power plants relative to the Philippine Energy Plan.

This inevitably raises several questions on the implication of such regime on the future of the Philippine energy sector. One possible scenario is that "too much" investments in coal-fired power plants could lock in the economy to a particular energy source, stifling the development of energy alternatives and burdening future generations with managing the impacts or "externalities" of that particular energy source. Another scenario could be that increased investment towards coal-fired power plants compels government and industry to ensure the uptake of cleaner and more efficient technologies that manage environmental, health and social impacts better, hence ensure competitiveness.

2 **Given its host of by-products (solid wastes, emissions and discharges), and taking into full consideration the availability and effectiveness of pollution control technologies, coal fired power plants are not desirable from a strict environmental perspective.**

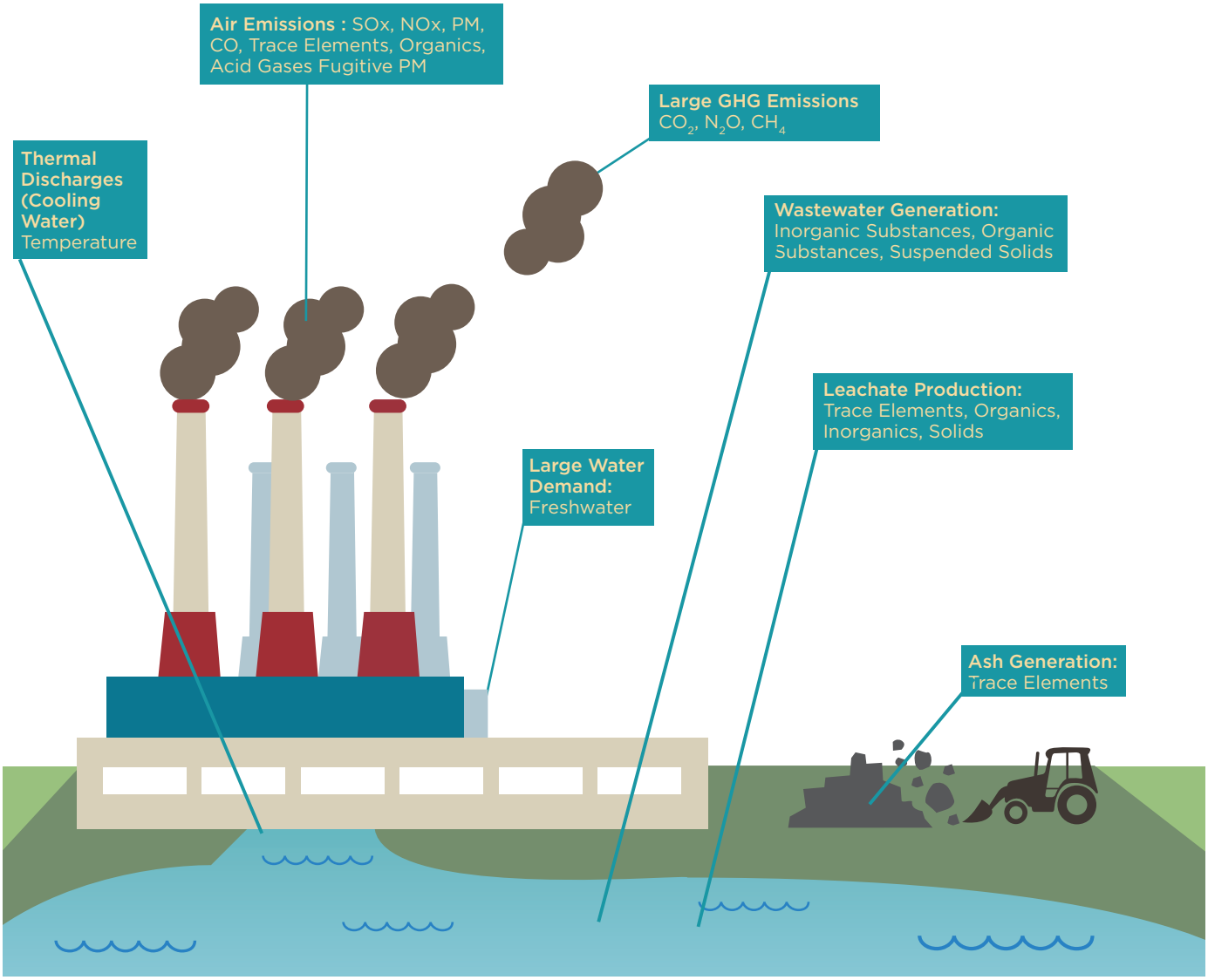


There are significant stressors from CFPPs that may result in adverse environmental impacts.

The smokestacks serving the boiler produce harmful pollutants due to the use of bituminous and subbituminous coal. Aside from the emissions from smokestacks, other CFPP by-products from coal combustion such as wastewater, ash and leachate also discharges into the environment significant stressors such as selenium, mercury and arsenic to name a few.

CFPPs also use an inordinate amount of water to turn turbines and to cool the thermoelectric plants. These unnatural inputs to the environment and considerable usage of natural resources lead to climate change, air, water and soil pollution, and acid rain.

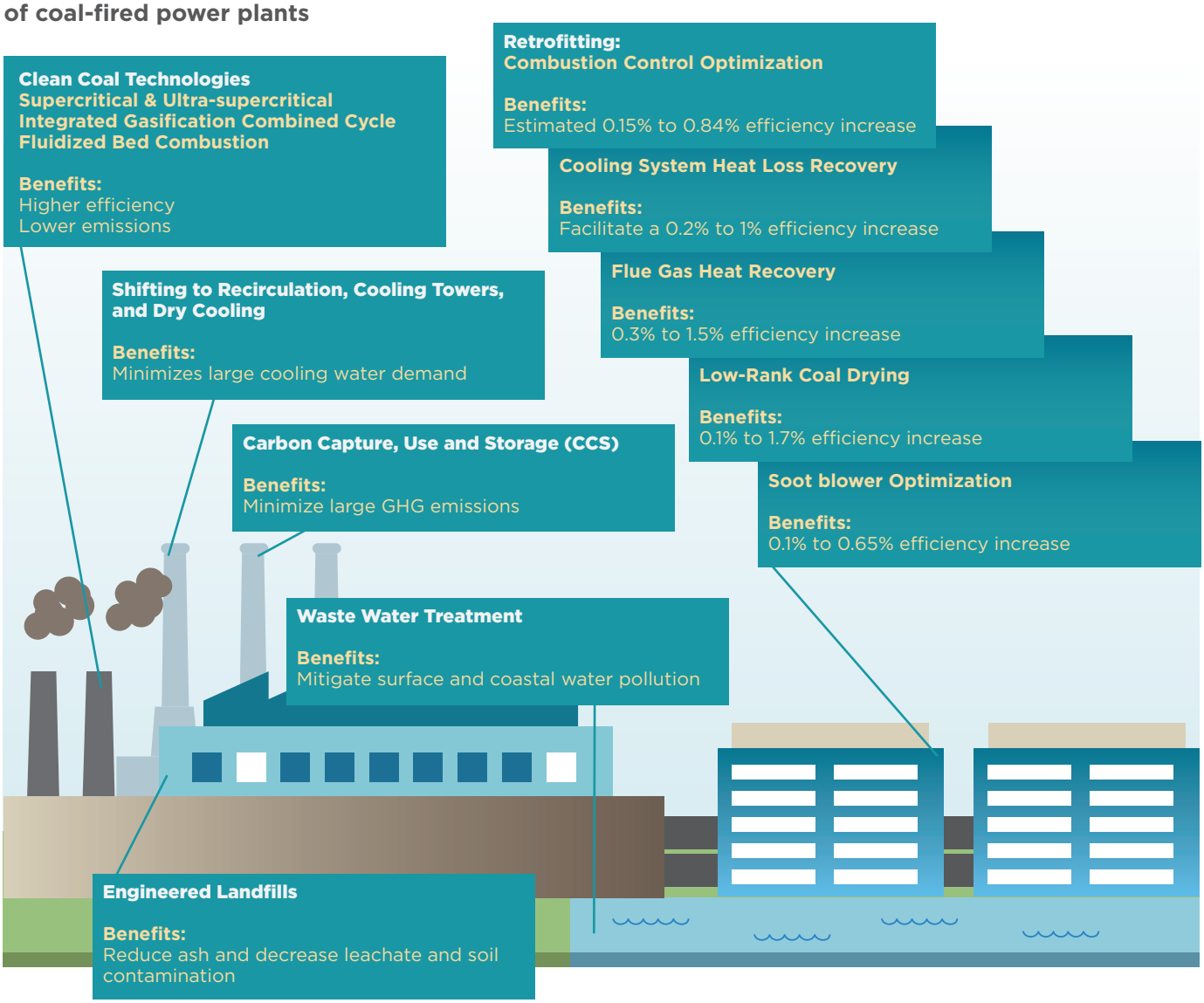
The particular environmental stressors that CFPPs produce are as follows:



There are established measures and technologies, however, to reduce the stressors.

The current trend for CFPPs is to increase efficiencies and use more mature technologies for pollution control. The following are technologies employed by CFPPs to minimize the identified stressors and decrease the impacts:

Established measures and technologies to reduce stressors and address environmental impacts of coal-fired power plants



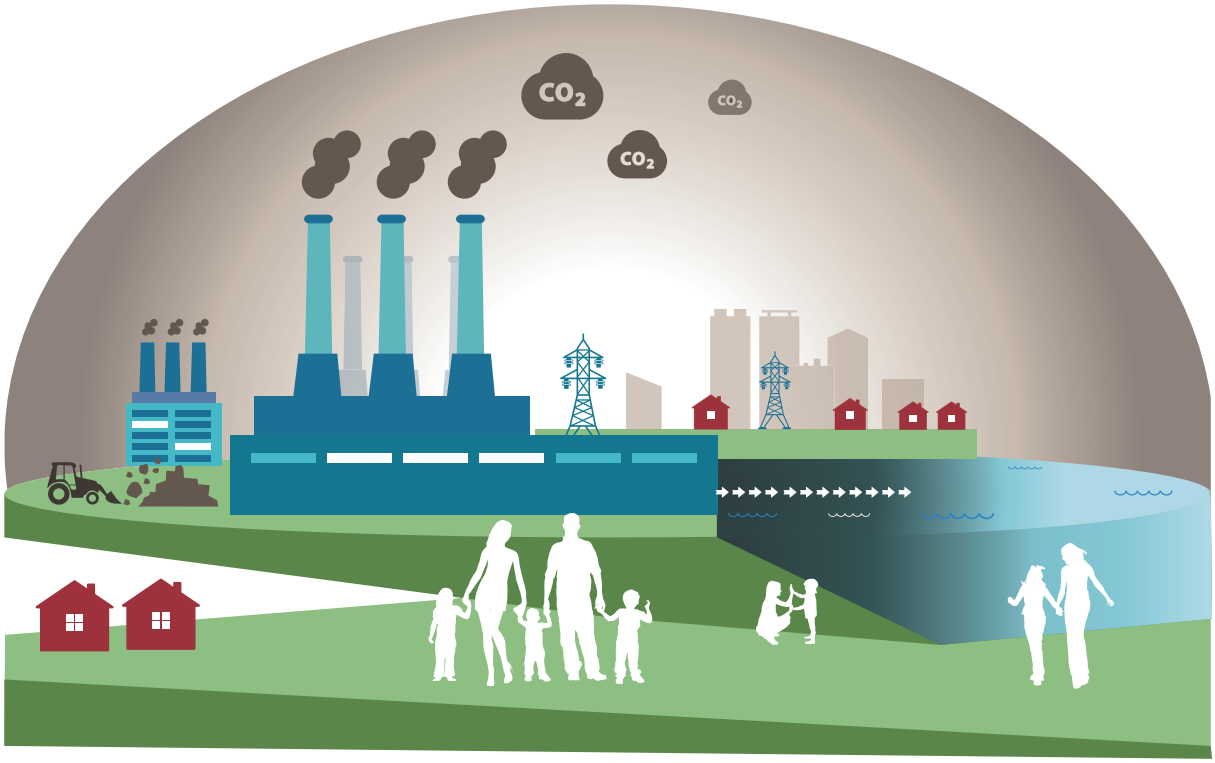
Some local CFPPs have adopted these mature technologies and systems to reduce environmental impacts. In compliance with the DENR and World Bank standards, the Sual Power Station, located near the Lingayen Gulf in Sual, Pangasinan, supposedly operates with some of the above mentioned technologies.

Mitigating technologies to sincerely reduce the stressors and by-products of coal-fired power plants as well as optimize coal use, however, does not deny the clearly polluting nature of coal.

	Air Emissions	Wastewater Generation	Ash Generation	Leachate Production	Thermal Discharges (Cooling Water)	Water Demand (Process and Cooling)	GHG Emissions
COAL	☑	☑	☑	☑	☑	☑	☑
OIL BASED	☑	☑	☒	☒	☑	☑	☑
NATURAL GAS	☒	☑	☒	☒	☑	☑	☑
NUCLEAR	☒	☒	☒	☒	☑	☑	☒
HYDRO	☒	☒	☒	☒	☒	☒	☒
SOLAR	☒	☒	☒	☒	☒	☒	☒
WIND	☒	☒	☒	☒	☒	☒	☒
BIOMASS	☑	☑	☑	☒	☑	☑	☒
GEOTHERMAL	☑	☑	☒	☒	☒	☑	☒

Source: Adapted from NREL, US-EPA, World Nuclear Association data

3 **Based on scientific literature, there is evidence that coal-fired power plants have health and social impacts; however, there is a lack of peer-reviewed local studies to systematically guide industry practice and policy decisions.**

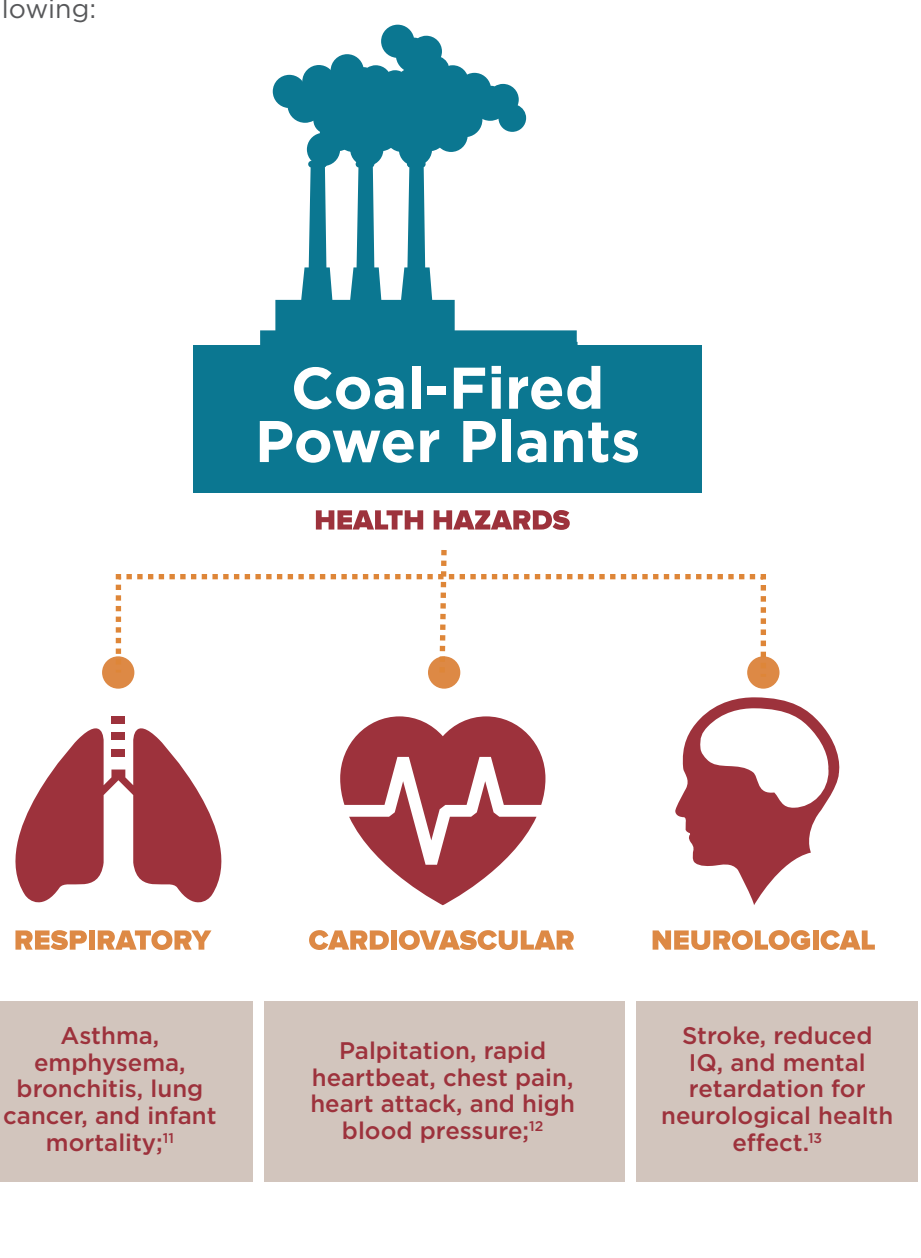


International studies show that the biggest impact of coal on human health comes from the combustion phase of its life cycle.[7]

Burning coal generates by-products such as "carbon dioxide, methane, particulates and oxides of nitrogen, oxides of sulfur, mercury, and a wide range of carcinogenic chemicals and heavy metals."[8] The United States Environmental Protection Agency (US-EPA) also declared that coal-fired power plants emit 84 of the 187 hazardous air pollutants[9] -

[7] Lockwood et al., p. vi
[8] Epstein, et al., p. 85
[9] Environmental Health and Engineering, p. 10

some of these are fuel-based or are contaminants that are released by burning, while some are combustion-based, which are formed during burning.[10] These hazardous air pollutants have short-term effects such as skin and eye irritations. Some of the long-term effects include the following:



[10] Ibid.
[11] Lockwood et al., p. x-xi
[12] Ibid.
[13] Ibid.

The American Lung Association has also enumerated the health effects of the hazardous air pollutants from CFPPs:[14]

Volatile Organic Compounds
May cause irritation of the skin, eyes, nose and throat; difficulty breathing; impaired function of the lungs; delayed response to a visual stimulus; impaired memory; stomach discomfort; and effects to the liver and kidneys. May also cause adverse effects to the nervous system. Benzene is a known carcinogen.

Acid Gases
Irritation to skin, eye, nose, throat, breathing passages.

Dioxins and Furans
Probable carcinogen: soft-tissue sarcomas, lymphomas, and developmental problems, damage to the immune system, and interference with hormones

Mercury
Damage to the brain, nervous system, kidneys and liver. Causes neurological and developmental birth defects.

Lead
Damages the developing nervous system, may adversely affect learning, memory, and behavior. May cause cardiovascular and kidney, and testes.

Non-Mercury Metals and Metalloids (excluding radioisotopes
Carcinogen: lung, bladder, kidney, skin. May adversely affect learning, memory and behavior. May cause cardiovascular and kidney effects, anemia and weakness of the ankles, wrists and fingers.

Polynuclear Aromatic Hydrocarbons (PAH)
Probable carcinogens. May attach to small particulate matter and deposit in the lungs. May have adverse effects to the liver, kidney and testes May damage sperm cells and cause impairment of reproduction.

Radioisotopes: Uranium
Carcinogen: lung and bone. Bronchopneumonia, anemia, brain abscess

Radioisotopes: Radium
Carcinogen: lung and lymphatic system. Kidney disease.

Volatile Organic Compounds: Aldehydes including Formaldehyde
Probable carcinogen: lung and nasopharyngeal cancer.
Eye, nose, and throat irritation, respiratory symptoms.

[14] http://citizensfordixie.org/wp-content/uploads/2011/11/toxic-air-report.pdf [Acessed: 8 November 2015]

The populations most vulnerable to these health effects are fetuses, infants, children, the elderly, hypersensitive, smokers, diabetics and those with heart disease.[15]

The Lancet Respiratory Medicine journal published an article summarizing the health effects for every TWh (Terrawatt-hour) of electricity produced from coal in Europe. The authors estimated the following health effects: 24.5 deaths, 225 serious illnesses including hospital admissions, congestive heart failure and chronic bronchitis, and 13,288 minor illnesses.[16] The authors said that health damage is even greater in countries like China, which has fewer air pollution standards, higher use of coal or poorer quality coal: 77 deaths per TWh from a CFPP that met environmental standards and estimated 250,000 deaths per year, based on estimates of coal combustion in China.[17]

In the Philippines, there is a dearth of studies on health impacts of pollution from coal-fired power plants. Few documented cases nevertheless point to the existence of health concerns in host communities.

Literature on the health impacts of CFPPs in the Philippines is not yet robust, but documented cases show actionable findings. In Naga City, Cebu, affected persons filed a complaint before the Asian Development Bank's Compliance Review Panel (CRP), where they alleged that the 200 MW CFPP it funded will cause adverse health impacts. The new CFPP is located on the previous ash pond disposal area of the existing 203.8 MW Naga Power Plant.[18] Based on its review the CRP finds that:[19]

A. From 1999 to 2004, the leading cause of death (33%) in the project area was pneumonia;
B. Data for 2008–2009 indicate that upper respiratory tract infections were the most common; diseases among people living in barangays of direct impact and adjacent barangay;
C. Both mortality and morbidity levels were much higher than national averages;
D. Air emissions are likely affecting the health of residents of communities directly impacted;
E. Air emissions from the new plant could further deteriorate air quality and could potentially increase negative health impacts in the project area.

[15] Ibid.
[16] Markandya and Wilkinson in Burt, et al., p. 4.
[17] Ibid.
[18] ADB compliance Review Panel, p. iv.
[19] Ibid., p. 7-8.

At that time, air pollution sources included the CFPP, a cement plant, quarrying operations and motor vehicles.

The CRP essentially found that ADB violated its own environmental policies. But since the project was already completed and operational, the CRP claimed that it is limited to practical recommendations that would minimize adverse health and environmental impacts.[20] It specifically recommended that ADB undertake community outreach programs on preventing negative health impacts from air, water, and noise pollution and from exposure to unprotected coal ash deposits.[21]

Another study assessed the health effects associated with particulate matter smaller than 10 micrometers (PM10), sulfur dioxide and nitrogen dioxide emissions from four coal-fired power plants in Luzon. The 2003 study on "Air Quality Impacts of Increased Use of Indigenous Fuels in the Philippines"[22] estimated the health effects on populations in 53 municipalities within 30-km radius of the four coal-fired power plants under the high indigenous scenario, where energy is sourced more from local coal, natural gas, and renewable energy. The study projected that in 2002 to 2011, average incidence of premature mortality is estimated at 982 cases annually while incidence of morbidity effects such as as asthma, acute bronchitis, and chronic bronchitis are 107,392, 28,893 and 1,680 cases respectively.[23]

Environmental laws such as the Clean Air Act are designed to address the impacts of CFPPs on health by regulating pollution, but there appears to be implementation gaps.

Emission standards for stationary sources, ambient air quality guidelines values, and effluents standards have not been reviewed nor revised. There is lack of ambient air quality monitoring stations in the municipalities and cities hosting coal-fired power plants. Data according to the latest National Air Quality Status Report (NAQSR) 2012-2013 show that EMB has nine monitoring stations with complete equipment to monitor pollutants such as particulate matter, sulfur dioxide and ozone,[24] but of the municipalities and cities hosting coal-fired power plants, only Davao City and Naga City, Cebu, have monitoring equipment by EMB. Davao City has a complete monitoring station for ambient air, while Naga City is only monitored for total suspended particulates.

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[20] Ibid. p. 14.
[21] Ibid. p. 15.
[22] Orbeta & Rofu (2003)
[23] Obeta and Rofu, p. 29
[24] NAQSR 2012-2013, p. 26.

Consultations and public participation relating to CFPPs have been problematic.

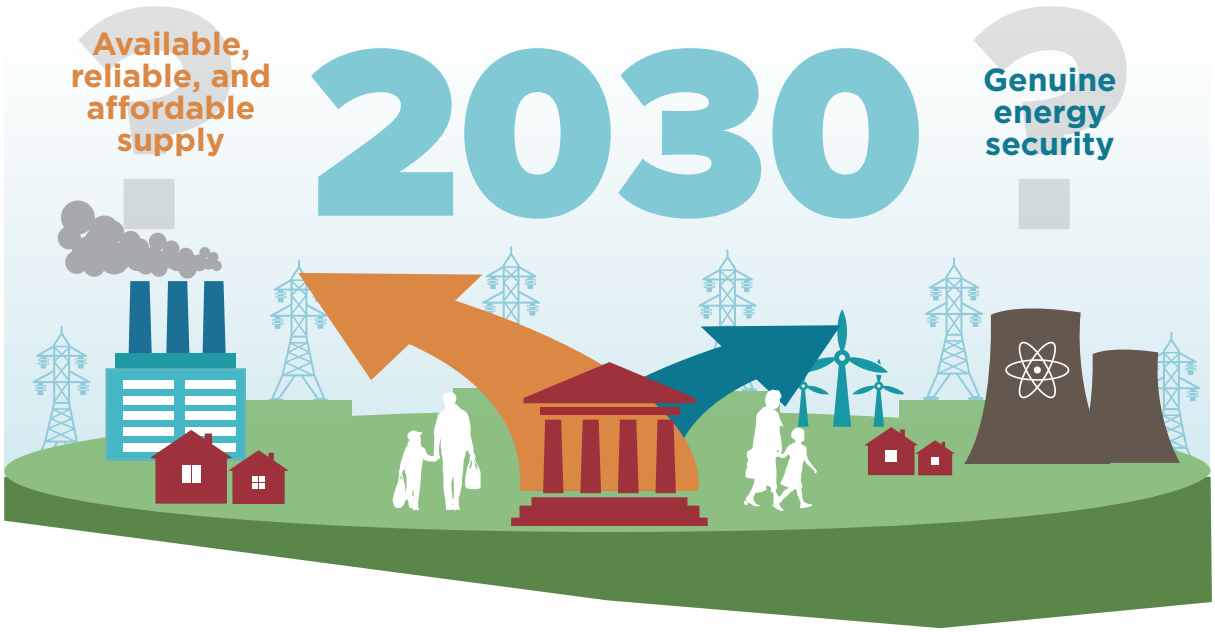
Local government officials must create an environment where the integrity and independence of the consultations are ensured and supported.

There were allegations form Mariveles, Bataan that they communities were made to believe by the local government officials that a planned CFPP will use natural gas as fuel. In a paralegal training for fisher folks and farmers in September 2015, residents from affected barangays in Kauswagan, Lanao del Norte, shared that local government officials also told them during an assembly that a solar power plant will be built, which made them put their guards down.

There is an apparent lack of transparency in the utilization of CFPP related compensation funds.

Compensation funds including the electricity, development and livelihood funds, and the reforestation, watershed management, health or environment enhancement fund or RWMHEE, all mandated under Energy Regulation 1-94 (IRR of the DOE Act of 1992 or RA 7638) involve billions of pesos, and projects funded from these have been implemented in affected communities. But there appears to be lack of information on how much has been paid by the energy-producing companies to the DOE, disclosure on how much is available to the resettled communities and host LGUs, and reporting on disbursement of funds by the LGUs.

4 **The current policy approach for energy in the Philippines is geared solely towards available, reliable, and affordable supply rather than genuine energy security consistent with sustainable development—in spite of the fact that our body of energy laws are among the most progressive in the developing world.**



Philippine law and policy describes "development" as a delicate balance between equitable distribution of wealth, competitiveness, a healthful ecology and optimum opportunities to develop.

The Philippine Constitution identifies development as a more equitable distribution of opportunities, income and wealth, through the promotion of industrialization and full employment.[25] It means being competitive in both domestic and foreign markets, making full and efficient use of human and natural resources, and giving all sectors of the economy optimum opportunity to develop.[26]

Development, however, is qualified insofar as basic ideologies upon which the Constitution is built are respected. Among these are a person's rights to health and to a balanced ecology, where the State

[25] Art. XII, Sec. 1, 1987 Constitution
[26] Art. XII, Sec. 1, 1987 Constitution

must "protect and promote the right to health of the people,"[27] as well as their right to "a balanced and healthful ecology in accord with the rhythm and harmony of nature."[28]

These two aspects put together reflect an idea of development that is holistic, and not limited solely to that of economic development. While These two aspects put together reflect an idea of development that is holistic, and not limited solely to that of economic development. While economic development is indeed a goal as reflected in the Constitution, it must be done within a framework that reflects a more robust understanding of optimum development.

There is a clear gap and inconsistency between the state's aspiration towards "sustainable development" and "energy security" that creates "externalities".

Economic development is inextricably linked to energy; the latter is deemed a necessary ingredient for the accomplishment of the former. Without energy – or electric power in particular – economic development remains limited. Policymaking in terms of energy in the Philippines tends to be focused primarily on energy supply and distribution, and has been more about meeting the demand for electricity than anything else.

Energy security under Philippine policy highlights five components, namely widespread electrification, an adequate and continuous supply of energy, affordability, self-reliance and social and environmental compatibility. However, health and environmental concerns that arise from the sector – which may be considered to fall under the social and environmental compatibility component – are often referred to as externalities, and fall under the mandate of other government agencies, such as the Department of Health and the Department of Environment and Natural Resources, respectively. In practice, therefore, energy security is often perceived to pertain only to continuous and affordable power for all.

There likewise seems to be limited interagency cooperation in terms of decision-making on energy planning, which lies primarily with the Department of Energy. Input from the National Economic and Development Authority only comes in when government funds and

[27] Art. II, Sec. 15, 1987 Constitution
[28] Art. II, Sec. 16, 1987 Constitution

exposure are involved. Private ventures solely fall under the jurisdiction of the DOE with very minimal to no intra-government involvement towards approval, with the exception of DENR.

With regard to non-government actors, communities and other local stakeholders maintain that they have very little – if any – input in energy planning. This could be linked to the general exclusion of "externalities" in the planning process, given that such externalities are more immediately felt by these stakeholders.
Furthermore, there are very few integrated plans, studies or reports produced by government that comprehensively take into consideration such environmental, health, and social externalities of energy, so much more, coal.

Ultimately, there is still no single oversight body that ensures the integrity and coherence of coal-fired power plant development in the Philippines vis-à-vis broader economic and public concerns. There is, therefore, what seems to be a gap in the State's definition of optimum development and development in the context of energy security.

Despite recent innovations, stakeholders feel that Philippine energy policy is still currently skewed in favor of coal-fired power plants.

Likely due to its longstanding status as a primary source of energy in the country, coal as a source of energy is perceived to have more mature and well-entrenched institutional arrangements to suit its needs. A strong lobby for coal is likewise said to further support its continued existence.

In line with the perception of energy security as essentially enough power to meet usage demands, the EPIRA law may have inadvertently lent support to the predilection for coal by indicating a preference for "environment-friendly, indigenous, and low-cost sources of energy."[29] The exclusion of comprehensive social and environmental aspects in the planning process then allows "low-cost" to take precedence as the primary criterion.

Despite references to self-reliance, there are no concrete policies that promote or incentivize the deeper exploration of other sources of energy, save for that of the Renewable Energy Act of 2008. Implementation of the RE Act, however, remains fairly limited.

[29] Sec. 37(b), Republic Act no. 9136

Other considerations must be taken into account in the planning process of energy development, given recent global developments.

The Philippines as a country has become more active in the international energy policy arena, indicating acceptance of and signing on to agreements or declarations that reflect a shift towards sustainable low carbon development. Among these are its submission of Intended Nationally Determined Contributions (INDCs) to the United Nations Framework Convention on Climate Change (UNFCCC), its signing on to the most recent Asia-Pacific Economic Forum Ministerial Declaration on Energy and the United Nations' 2030 Sustainable Development Goals.

5 **Reconciling the abovementioned points, complementary approaches are necessary to start the Philippines on a path that is consistent with sustainable development and the country's strategic priorities.**

Develop clear energy policies consistent with the mandates set out in the Philippines' constitution, energy laws, and international commitments.

There is a serious need to transition energy policy away from technology neutrality and an unrestrained free market approach to a more strategic approach where the Philippines is clear about its priorities as a growing economy. This requires recognizing and addressing competing values like energy supply issues and price issues, possible alternatives to coal that can supply the baseload, address environmental, health and social impacts of coal, as well as meet climate change commitments.

It is also critical that authoritative studies are launched to aid policy development. These include among others 1) a review of the Philippine Energy Planning process; 2) identifying an optimal energy mix for the Philippines to guide baseload determination and assess the viability of energy technologies, including renewable energy, against updated growth scenarios of the country; 3) conducting a full cost accounting of energy technology options; and 4) assessing the competitiveness of energy technology options.

Cap the role of coal-fired power plants in our energy mix to a desired level, taking into account the projected baseload requirement by 2030, while actively seeking and developing alternatives.

It is urgent that energy resource planning in the Philippines levels the playing field and properly accounts for the role coal should play for the country's sustainable development, but in a manner that fully factors its impacts and allows other energy sources to compete and innovate for space in the mid-merit, peaking, and the baseload energy fields. Nonetheless, new and emergent technologies like those mentioned in this study should be utilized for potential projects, and close alternatives to coal as a baseload solution should be actively explored and supported. This is particularly the case for natural gas, which to date, is the closest alternative the country has towards supplying the baseload. Ultimately, a serious dialogue now needs to take place to understand, anticipate, and leverage the implications of capping coal-fired power plants to the baseload and positioning other energy sources for mid-merit and peaking demand.

A gold standard should be used for approving and disapproving proposed coal-fired power plants.

There is no more doubt that coal-fired power plants result in several negative environmental, health and social issues. Moving forward, a gold standard of harnessing more efficient, new and emergent coal technologies should be adopted by industry and shepherded by government as a means to approve or disapprove coal projects. Government should conduct a comprehensive review of relevant environmental rules and regulations, and address policy and implementation gaps hand-in-hand with stakeholders and the private sector. At all times, indigenous communities should always be given free, prior and informed consent (FPIC) and communities must be meaningfully consulted on all issues that affect them and those issues must be effectively and adequately addressed. This being said, a life cycle assessment of the whole coal value chain, including a social-cost benefit analysis and scientific research to validate claims of the health and social impacts of coal-fired power plants, should be led by government and its partners to inform policy making and the execution of this gold standard.

Finally, the offer of the Philippines to reduce by 2030 70% of its greenhouse gas emissions relative to its business-as-usual scenario of 2000-2030 under the United Nations Framework Convention on Climate Change (UNFCCC), provides an opportunity for the country to completely transform its energy system.

As an ambitious policy declaration that we made contingent on the availability of support under the UNFCCC, the Philippines government is compelled to identify opportunities reduce its greenhouse gas emissions from various sources. We can use this to leverage the availability of climate financing, technology transfer, and capacity building to support alternatives to coal-fired power plants, as well as implement the recommendations stated in this brief.

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