

Bringing Calamities to Communities: Coal-fired power plants and Mirant

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Finally, the toxic circle is complete. Ash samples taken from the 735-MW dirty coal-fired power plant in September in Pagbilao, Quezon - owned and operated by the notorious polluting company Mirant - were tested and found positive for hazardous substances such as mercury, arsenic and lead. The Pagbilao coal plant of Mirant is the last major coal-fired power station in the country to have its ash sampled and tested for toxic material. The rest results show a glimpse of the huge burden that communities are forced to bear due to the operation of coal plants in the country.

Mirant is the biggest peddler of dirty coal-fired power in the Philippines. Even its coal plants in the US have long been identified to be major sources of severe pollution. When Mirant brags about how clean its power plants are, should the company be believed?

In April 2003, months before its main office filed for bankruptcy in the US, the US Federal Energy Regulatory Commission announced that Mirant had agreed to settle claims valued at nearly \$500 million. Mirant was charged with price gouging during California's 2000-2001 energy crisis and "profited by breaking the laws and plundering the people of California," according to California Attorney General Bill Lockyer. According to the US official, Mirant was "without question, one of the worst offenders during the [California] energy crisis."¹

Mirant is a company that cannot and should not be trusted.

Killer costs of coal

Coal is the dirtiest, most carbon intensive of all fossil fuels, emitting 29 percent more carbon per unit of energy than oil and 80 percent more than gas. It is one of the leading contributors to climate change. Burning coal also releases massive amounts of substances such as mercury and arsenic that are toxic to human health and create acutely detrimental effects on developing economies. Despite all the negative impacts of coal-based power generation, however, nothing has been done by the Philippine government to account for the external costs of coal fired power plants much less stop the expansion of coal in the country.²

According to the External Cost study conducted by the European Commission (EC) in 2003 on different types of power generation, coal-fired power plants registered the highest external cost. In comparison, renewable energy sources such as wind power exhibited the lowest external cost.

Also known as externalities, external costs arise when the social or economic activities of, say, a power station, have an impact on a set of people and when that impact is not fully accounted, or compensated for, by the power plant. Thus, a power station that generates sulfur dioxide or mercury emissions, causing damage to human health, imposes an external cost. Environmental costs are thus "externalized" because, although they are real costs to members of society, the owner of the power station is not taking them into account when making decisions related to his economic activities.

The EC study considered climate change impacts, human mortality (i.e. reduction in life expectancy, cancers), human morbidity (i.e. respiratory hospital admissions, restricted activity days, congestive heart failure), its impacts on building materials (i.e. aging of galvanized steel, paint), crops (i.e. changes in yields caused by nitrogen oxide, sulfur dioxide, trioxide and acid deposition), amenity³ losses due to noise or spoliation of aesthetics, and the impacts of acid and nitrogen deposition on ecosystems.

Applying the study's externality cost to the Philippines demonstrates that in 2003 alone, with coal plants in general generating way less than their projected full capacity, the external costs incurred by coal-fired power stations ranged from Php19.3 billion to a staggering Php67.9 billion (based on power generation at 14,517-GWh (gigawatt hours)).⁴ In 2003, coal power represented 28 percent of total power generation.

Based on full capacity, the estimated external cost of Mirant's Pagbilao coal plant alone ranges from a low of Php7.7 billion to a high of Php27 billion. In addition, at full capacity, the intention of Mirant to expand the Pagbilao coal plant by 300-MW will be equivalent to imposing on Filipinos a low of Php3.6 billion to a high of Php12.9 billion in external costs.

When the Philippine Department of Energy and companies such as Mirant refer to coal as a 'cheap' source of energy, they do not tell us that coal is cheap only because Filipino taxpayers - and communities hosting coal plants - end up shouldering the massive costs and impacts created by burning coal for energy.

Catastrophe on top of calamity

Because of the massive amounts of carbon dioxide it emits, coal is one of the biggest climate change culprits. Climate change is considered the single biggest environmental threat facing the planet today. Scientific evidence anticipates the likelihood of more severe hurricanes in the future along with other climatic impacts attributable to rising global temperatures. Hurricanes tend to become more destructive as ocean temperatures rise. An unchecked rise in greenhouse gas concentrations will also very likely increase ocean temperatures further, "ultimately overwhelming any natural oscillations."⁵

Since the industrial revolution, massive carbon dioxide (CO₂) emissions produced by burning fossil fuels such as coal have seriously altered the composition of the planet's atmosphere and trapped the sun's energy, creating increasingly devastating, chaotic weather patterns.

There is no lack of evidence that human-induced climate change is underway. For communities hosting coal-fired power plants, the consequences of climate change means doubling the grave local impacts that coal has on their lives.

It was determined by an institute that from the 1970s to the present, the global area affected by drought has doubled due to climate change. Based on research conducted by the National Center for Atmospheric Research in Colorado, the study found widespread drying occurred over much of the world including Asia, and identified rising global temperatures as the major factor for increased drought.⁶

In the Philippines, recent research projects that crop yields may drop by 10 percent for every 1 degree °C temperature rise. It is a fact that nights in the Philippines are now 2.5 °C warmer than they were 50 years ago.⁷ Thailand was recently caught in the grip of a deadly drought which affected 63 of the country's 76 provinces and cost the government \$193.2 million in damages.⁸ "One of the main causes of the current prolonged drought [in Thailand] is global warming," said Dr. Kansri Boonpragob, a vice-chairperson of the UN-formed Intergovernmental Panel on Climate Change (IPCC), the foremost global authority on the issue.

Coral bleaching events in Southeast Asia and the Pacific are set to increase in frequency and intensity if greenhouse gas emissions increase unabated. Corals tend to die in great numbers immediately following coral bleaching events.

Considered as one of the most diverse habitats in the marine tropics, the Philippines is home to 488 coral species out of the 500 known coral species worldwide. Over a third of the 2,300 known fish species in the Philippines are reef-associated. Unrestrained global warming can spell "catastrophe for tropical marine ecosystems everywhere", with bleaching events "very likely" occurring annually within three decades and

events as severe as the 1998 episode possibly becoming commonplace inside twenty years.⁹ The 1990s was the warmest decade in recorded history and 1998 was the hottest year of all.

Duke of hazards

The test results based on the ash samples taken from Pagbilao is but the latest evidence concerning toxic coal plant pollution.¹⁰ Ash samples taken from the coal plants of Mirant in Toledo, Cebu and Sual, Pangasinan; the coal plants of Napocor in Masinloc, Zambales and Calaca Batangas and the QPL coal plant in Mauban, Quezon all revealed the insidious presence of the same heavy metals detected in the waste stream of Mirant's Pagbilao coal plant: mercury - a deadly neurotoxin, arsenic - a known carcinogen, as well as the hazardous substances lead and chromium.

From the time toxic coal plant emissions were first exposed, the government has taken no substantive step to address the issue - whether to put a stop to the continued release of toxic substances by Philippine coal-fired power plants, to audit the amount of hazardous releases spewed by the dirty power stations or even to seriously begin assessing the extent of risks that host populations are forced to bear.

The deadly operations of coal plants operated by companies such as Mirant have thus continued unabated.

Results of Ash Samples taken from Philippine Coal Fired Power Plants

Coal Plant	Location	Size (MW)	Mercury	Arsenic	Chromium	Lead
Mirant Sual Coal Power Plant	Sual, Pangasinan	1,200	1.20	8.40	6.00	8.00
Mirant Pagbilao Power Station	Pagbilao, Quezon	735	0.02	13.00	14.00	5.60
Mirant Toledo Power Plant	Toledo, Cebu	144	0.14	1.70	26.00	7.60
Salcon Power Plant	Naga, Cebu	105	0.07	1.70	12.00	2.40
QPL Mauban Coal Plant	Mauban, Quezon	440	1.90	41.80	49.00	15.00
NAPOCOR Masinloc Coal Plant	Masinloc, Zambales	600	1.20	10.40	18.00	22.00

Mercury falling

Coal plants have been identified as one of the largest sources of mercury emissions. Mercury is a substance so toxic that all it takes is .002 pounds of mercury accumulated over a year to contaminate a 10 hectare lake to the point where fish caught are deemed unfit for human consumption. A typical 100-MW coal plant has been estimated to emit at least 25 pounds of mercury a year.

Going by the 100-MW average mercury emission rate, the 300-MW of dirty coal power that Mirant intends to add to its 735-MW Pagbilao power plant will potentially emit an additional 75 pounds of mercury each year - an appalling amount with wide-ranging and deadly consequences to the municipality of Pagbilao's and to Quezon province's environmental and human health.

Although mercury detected in the ash samples from Pagbilao registered the lowest amount, there is no reason to be less concerned. In fact, there is more cause to be alarmed: the greater portion of the neurotoxin escapes pollution control devices employed by the power plants. The much-touted pollution-capture efficiency of devices such as electrostatic precipitators (ESPs) means little when mentioned in reference to mercury emissions. Coal plants the size of Mirant's Pagbilao power station requires the continued burning of hundreds of tons of coal per hour and coal plants equipped with ESPs have been known to emit up to and above 95 percent of mercury liberated upon coal burning in either gaseous or particulate form.¹¹

Mercury is capable of causing severe brain damage in developing fetuses and mild tremors, mental disorders, motor and emotional disturbances, even death, in exposed adults. Once mercury enters water

- either directly or through deposition from the air - biological processes transform it into methyl mercury, a more toxic form of mercury that bioaccumulates in fish - along with humans that eat fish. When a substance biomagnifies, its concentration increases as it moves up the food chain.

Studies have shown that newly deposited mercury is more readily converted into methyl mercury than mercury already in the ecosystem. Methylmercury biomagnifies in the marine food chain to reach very high concentrations in predatory fish such as swordfish, tuna, king mackerel, and shark.

Methylmercury and Extreme Risks to Children

The deposition rate of mercury is over 900 kilometers. According to studies published by the US National Academy of Sciences (US-NAS) in May 2005, "there is strong evidence for the fetal neurotoxicity of methyl mercury, even at low concentrations of exposure." Exposure to methyl mercury emitted by coal-fired facilities "causes lifelong loss of intelligence in hundreds of thousands of babies born each year."

Based on the study, the resulting loss of intelligence "causes diminished economic productivity that persists over the entire lifetime of these children. This lost productivity is the major cost of methyl mercury toxicity, and amounts to \$8.7 billion annually, \$1.3 billion of which is attributable to US coal-fired power plants, threatening "the economic health and security of the United States."

If the dirty Pagbilao coal plant is allowed to expand, how much will it cost the province in terms of lost productivity due to similar risks of lifelong loss of intelligence among countless infants exposed to methyl mercury emitted by the power station?

Fallacy of cheap coal

There is no such thing as clean coal. Neither is there anything such as cheap coal.

While coal fired power plants are often referred to as one of the cheapest sources of electricity, the external cost of coal is indisputably one of the highest among the different types of power generation in the world.

Estimated annual external costs of existing coal fired power plants in the Philippines¹²

Coal Plant	Location	Annual Electricity Production (Gwh)	Size (MW)	External Cost Low End ¹³	External Cost High End (Peso) ¹⁴
Pagbilao Coal Fired Power Plant	Pagbilao, Quezon Province	5795	735	7,707,004,200	27,119,383,200
Sual Coal Fired Power Plant	Sual, Pangasinan	9461	1200	12,582,864,000	44,276,544,000
Toledo Thermal Power Plant	Toledo, Cebu	1135	144	1,509,943,680	5,313,185,280
Mauban Coal Fired Power Plant	Mauban, Quezon Province	3469	440	4,613,716,800	16,234,732,800
Calaca Coal Fired Power Plant	Calaca, Batangas	4730	600	6,291,432,000	22,138,272,000
Masinloc Coal Fired Power plant	Masinloc, Zambales	4730	600	6,291,432,000	22,138,272,000
Salcon Coal Fired Power Plant	Naga, Cebu	828	105	1,101,000,600	3,874,197,600
Total		30148	3824	40,097,393,280	141,094,586,880

Estimated annual external cost of proposed new coal plants and coal plant expansion¹⁵

Owner	Location	Annual Electricity production (Gwh)	Expansion Size (MW)	External Cost Low End	External Cost High End
Mirant Expansion	Pagbilao, Quezon	2759.4	350	3,670,002,000	12,913,992,000
Mirant Expansion	Toledo, Cebu	1576.8	200	2,097,144,000	7,379,424,000
Mirant	Barotak Viejo, Iloilo	788.4	100	1,048,572,000	3,689,712,000
DMCI	Concepcion, Iloilo	788.4	100	1,048,572,000	3,689,712,000
Naga Thermal Plan Expansion	Naga, Cebu	1576.8	200	2,097,144,000	7,379,424,000
Isabela Mine Mouth	Isabela	394.2	50	524,286,000	1,844,856,000
TIPCO	Mabalacat, Pampanga	394.2	50	524,286,000	1,844,856,000
Total		8278.2	1050	11,010,006,000	38,741,976,000

Before any further development of coal fired power plants in the country is undertaken, the external cost of existing coal-fired power plants should be quantified. Incorporating external costs is an indispensable way of achieving genuine sustainable development because it corrects the severe imbalance in the power sector that is right now stacked against allegedly more expensive renewable energy technologies.

The 'cheapness' of coal is a myth. So is the supposed 'expensiveness' of new, renewable energy. It is time to make the switch to clean power.

Viable renewable alternatives

To say that the Philippines has enormous new renewable energy (NRE) potential resources is an understatement.

For instance, based on a study by the National Renewable Energy Laboratory of the U.S, the Philippine wind energy resource potential - 76,000-MW - can supply over seven times the current power demand of the country.¹⁶ Experts estimate that, with the right policy support from the government, within a 10-year plan period, commercial viability of wind power in the country can reach anywhere from 10 to 20 percent utilization of the said potential.

Solar power is abundant in the country and is capable of producing 1500 hours of power annually at 5 kilowatt hours per square meter per day. Solar energy in the Philippines possesses one of the highest efficiency ratings in the world. In fact, energy from sunlight that falls on a land area half the size of Quezon City can provide the power needs of the entire country.¹⁷

The combined commercially viable biomass potential within a ten-year planning period from bagasse¹⁸, rice and coconut residue is over 2,300 MW while mini-hydropower has a total resource potential of 1,132 MW.¹⁹

Strategic approach required

The volatile situation on world fossil fuel prices, the rampaging and worsening impacts of climate change and the increasing toxic risks faced by communities hosting coal plants warrants a serious, strategic reconsideration of the energy pathway so far chosen by the country. New renewable energy (NRE)

alternatives can be harnessed by the country to protect the environment, to provide jobs and to strengthen the country's energy independence.

Such urgency has yet to be transmitted policy-wise. Communicating to foreign and domestic investors that time-bound targets are in place regarding new renewable energy would constitute a clear, concrete and compelling start.

Unfortunately, NRE technologies such as wind, solar and modern biomass today represent less than 0.2% of the overall Philippine power mix. What is required, therefore, is real ambition and targets. Sadly, both requirements seem absent from the DOE's plan. In 2004, for instance, the DOE announced that it aims to install 417 MW of wind power by 2013.²⁰ This represents less than 0.5% of the total wind energy potential of the country in 10 years and as such would clearly not convey the potential investment opportunities considering the scale of the country's wind power potential. Wind energy is the fastest growing industry in the world and could unlock a new era of big investments in the country.²¹

Greenpeace believes that for the Philippines, it is feasible and desirable for 10% of the installed power capacity in the country to come from wind, solar and modern biomass by 2010. With the inclusion of mini-hydro and demand-side management and energy efficiency measures, the 10% by 2010 target would be even more viable and easier to reach.²²

Projected 10 percent NRE share in the power mix by 2010.

	Percentage in Power Generation ²³	Installed Capacity by 2010 (MW)
New Renewable Energy		
Wind	7.0%	1171
Modern Biomass	2.7%	453
Solar	0.3%	50
Total	10.0%	1674

Projected 10 percent share of NRE in the power mix by 2010 including mini hydro.

	Percentage in Power Generation	Installed capacity by 2010 (MW)
New Renewable Energy		
Total for Wind	6.0%	1007
Biomass	2.5%	419
Solar	0.2%	30
Mini Hydro	1.3%	218
Total	10.0%	1674

Opportunity to displace dirty energy?

According to experts, the country is experiencing a power supply glut due to faulty power demand forecasting.²⁴ The current reported installed capacity is 15,124-MW with an 88.8% dependable capacity of 13,404 MW. The peak demand however is 8,378 MW, representing only 55.4% of the installed capacity and 62.5%²⁵ of the dependable capacity. Under this scenario, overcapacity presents an opportunity for the entry and development of new and renewable energy technologies which can strategically displace carbon-intensive polluting coal-fired power generation. Being modular and decentralized by nature, new renewable energy can be expanded and built much more rapidly (and operated more efficiently given the country's archipelagic character) than conventional polluting sources.

The Philippine government faces many challenges in formulating future energy policy over the coming years. The need to address issues concerning the security of energy supply, economic growth, climate

change and sustainable development, employment and technological development demands a strategic approach to developing the country's new renewable energy resources.

Greenpeace is calling for 10% of our power to come from the sun, wind and modern biomass power by 2010.

Other demands

With huge virtually untapped new renewable resources, there is clearly no need to build - or expand new coal-fired power capacity.

Greenpeace calls on the Philippine government to:

- Reject the plague of proposals to build more coal plants in the country. Specifically, to throw out of the window the Mirant proposal to build a polluting coal plant in Iloilo, along with the proposals by other dirty energy proponents for coal plants to be built in Isabela Province, Cagayan de Oro and Pampanga.
- Stop proposals to expand the capacities of existing coal plants, in particular the plan of Mirant to expand its dirty Pagbilao power plant by 300-MW.
- Conduct a full-scale environmental audit of existing coal plants and determine once and for all the extent of risks faced by host communities, municipalities, cities and population centers.
- Ensure that the external costs of coal are fully internalized by proponents even as preferential strategic policy treatment is put in place favoring and leveraging the massive development of new renewable energy technologies, energy efficiency measures and sustained demand-side management.

¹ With a debt of \$11.4 billion, Mirant's bankruptcy case is the 11th largest in US history. See: "Mirant Chapter 11 Plan Draws Objections," in Washington Post, 4 April 2005. The Lockyer quote is from the Greenpeace Southeast Asia brief "Coal-fired Power Plants and Mirant: Climate Killers, Toxic Polluters, 2005.

² External Costs, Research Results on Socio-Environmental Damages Due to Electricity and Transport, European Commission. See: <http://www.externe.info/externpr.pdf>

³ Amenity is defined as an enhancement to a piece of property that is not essential to the property's use, but may increase the property's value. Examples include a swimming pool, tennis courts, scenic view, access to a body of water, etc.

www.secured--loan.co.uk/glossary-loans.html

⁴ See DOE Power Development Plan. Values derived using total power generated from coal in 2003, European externality value (2-7 Eurocents) and an exchange rate of 66.83 PHP to 1 Euro.

⁵ "Hurricanes and global warming: is there a connection," Stefan Rahmstorf, Michael Mann, Rasmus Benestad, Gavin Schmidt, and William Connolley, RealClimate.org, September 2, 2005. See: <http://www.realclimate.org/index.php?p=181>

⁶ National Centre for Atmospheric Research, University of Colorado AR, Boulder, Colorado, 2005 - Jan 10th. See press notice at - http://www.ucar.edu/news/releases/2005/drought_research.shtml

⁷ "Is the UN wrong about climate change leaving billions to starve?" *New Scientist*, Nicola Jones, November 17, 2001.

⁸ Reports from AP, AFP and Reuters based on figures released by the Thai Agriculture ministry, March 15, 2005.

⁹ Ove Hoegh-Guldberg, Climate change, coral bleaching and the future of the world's coral reefs, Greenpeace.

¹⁰ Greenpeace first exposed the risks faced by the country and local communities due to toxic releases from coal-fired power plants in May 2001 based on ash samples taken from the waste stream of the 600-MW coal plant operated by the National Power Corporation (NPC) in Calaca, Batangas. In 2002, Greenpeace released another report demonstrating the unabated emission of hazardous substances coming from other coal-fired power plants operating in Sual, Pangasinan (1200-MW); Mirant, Mauban, Quezon (40-MW; QPL) and Masinloc, Zambales (600-MW; Napocor). Each of the tests registered the insidious presence of mercury, arsenic, chromium and lead. Most recently, in May 2004, Greenpeace published a report revealing the same set of toxic materials present in Mirant's 100-MW coal plant in Toledo City, Cebu and Salcon's 100-MW coal plant operating in Naga City, Cebu. For more information, go to the reports section of www.greenpeace.org.ph.

¹¹ Hazardous emissions from Philippine coal-fired power plants, Greenpeace Laboratories, University of Exeter, Exeter, UK, 2002.

¹² Maximum potential annual energy production computed using 90% capacity factor.

¹³ Using low end of European external cost of coal fired power plants at 2 eurocents per kilowatt hour

¹⁴ Using high end of European countries external cost of coal fired power plants at 7 eurocents per kilowatt hour

¹⁵ Maximum potential annual energy production computed using 90% capacity factor.

¹⁶ The Philippines offers a land area of more than 10,000 km² with a “good-to-excellent” wind resource. This represents less than 4% of the country’s total land mass. Using conservative assumptions of 7 MW per km², these areas could support over 70,000 MW of installed capacity, delivering more than 195 billion kWh per year.

¹⁷ Germany, the largest market for solar power in the world right now only has 800-1000 hours of capacity factor.

¹⁸ Waste plant fibre left after the juices have been removed from sugar cane.

www.ergon.com.au/energyed/glossary.asp

¹⁹ Department of Energy website, www.doe.gov.ph

²⁰ Wind energy investment kit distributed by the Department of Energy during the Bonn Renewable Energy Conference last June 2004.

²¹ See “Wind force 12, a blueprint to achieve 12% of the world’s electricity from wind power by 2020,” Global Wind Energy Council, download at www.greenpeace.org.

²² Geothermal power is renewable energy. The more rapidly that the country can double its geothermal capacity, the better for the country’s energy security and sustainable development goals. Geothermal power is not included in Greenpeace’s 10% by 2010 call for the reason that it is a mature technology and that it is the nascent renewable energy technologies such as solar, wind and modern biomass power that greatly require strategic government policy support.

²³ Total installed capacity was based on DOE’s peak demand projection (PDP 2005-2014) of 13,418. If an additional 25% reserve is provided for system reliability, the total would be 16,772 MW by 2010. The assumption here is that DOE’s demand forecasting is correct.

²⁴ Philippine Electricity Demand Projections, Maitet Diokno-Pascual, 2005.

²⁵ Department of Energy Power Development Plan 2005-2014.