



Coal-Fired Power Plants and the Menace of Mercury Emissions

A Greenpeace Southeast Asia Report

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In May 2001, Greenpeace Southeast Asia (GPSEA) collected ash samples from the vast coal waste field of the National Power Corporation's (NPC) Coal-Fired Thermal Power Plant in Calaca, Batangas. The samples were sent to the Philippine Institute for Pure and Applied Chemistry (PIPAC) in the Ateneo de Manila campus to determine whether or not byproducts from the power station carried heavy metals. The laboratory results revealed a fact that Greenpeace had long suspected: mixed with the carbon waste of the coal plant was the manifest presence of the deadly neurotoxin mercury.¹ Mercury is the only metal that remains liquid at room temperature and is so dangerous that it only takes 1/70th of a teaspoon to contaminate a 10.11-hectare lake to the point where fish in that lake are no longer safe for human consumption.²

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. The exposure to mercury depends on its form, with mercury vapor and methyl mercury being the most likely forms since they are nearly completely absorbed into the body. Once mercury enters water – either directly or through deposition from the air – biological processes transform it into methyl mercury, a highly toxic form of mercury that *bioaccumulates* in fish and other animals that eat fish. When a substance bioaccumulates, its concentration increases as it moves through the food chain.³ Seafood is the largest source of present-day exposure because mercury accumulates in aquatic animals and reaches significant levels at the top of both salt and freshwater food chains.⁴

It is ominous to note that the Calaca coal plant, like all the other coal-fired power plants in Luzon, is situated along a coastal area.

Calaca: environmental disaster

The detection of mercury, also known as quick silver, in the Calaca coal plant's waste stream is the most recent evidence of the toxic releases of NPC's power station, described by Sen. Sergio Osmeña as "an environmental disaster which I would not wish on anyone."⁵ The 600-megawatt coal plant, which operates on a 24-hour basis, produces 62.62 tons of ash per hour.⁶

In a study conducted by NPC in 1987, just three years after the first phase of the coal plant started operating, deadly levels of mercury, cadmium and lead were detected in the deep wells (used for drinking water) in the area chosen by NPC as the resettlement site for communities displaced by the construction of the power station. The NPC study revealed "the recorded

¹ Philippine Institute of Pure and Applied Chemistry analysis report, A-2001-0549-00, page 1, June 6, 2001.

² "Clean the Rain, Clean the Lakes: Mercury Rain is Polluting the Great Lakes," *National Wildlife Federation and Great Lakes Natural Resources Center Report*, page 6, September 1999

³ "EPA to regulate mercury and other air toxics emissions from coal-and oil-fired power plants," US Environmental Protection Agency (US EPA) Fact Sheet, December 14, 2000.

⁴ *Toxics A to Z: A Guide to Everyday Pollution Hazards* by John Harte, Richard Schneider, Christine Shirley and Cheryl Holdren, University of California Press, Berkeley and Los Angeles, 1991.

⁵ *The Visayan Daily Star*, Carla Gomez, August 18-19, 2001.

⁶ *Batangas Coal-Fired Thermal Power Plant Unit II (BCFTPP-II) Environmental Impact Study*, p. VI-37, June 1987.

exceedences of the cadmium, lead and mercury limits ... 19 wells exceeded the cadmium standard ... 31 wells exceeded the lead standard ... and 9 wells exceeded the ... mercury standard.” Samples taken from the coal and coal ash of the power plant also registered disturbing levels of the three trace metals. In fact, the study disclosed that the “progressive worsening quality of groundwater at the Resettlement Area has been cited as one of the reasons for the ... recommendation to Management to relocate the San Rafael residents anew or to encourage them to relocate on their own but at NAPOCOR expense.”⁷

Instead of addressing the trace metal contamination problem of the deep wells in the original resettlement area, NPC converted the said relocation site into an extension of its ash disposal pond, effectively converting the said area and its immediate environs into a toxic sacrifice zone. Liquid matter in this ash pond, according to NPC technicians interviewed by Greenpeace in August this year, regularly drains out to the sea.⁸

Duke of hazards

Coal plants have long been notorious because of the havoc they wreak on hapless communities and environments. The list of health and environmental hazards associated with coal burning is astounding. Coal, for instance, is the most carbon intensive among fossil fuels, emitting 29 percent more carbon per unit of energy than oil and 80 percent more than gas.⁹ Coal plants have long been identified by scientists the world over as major contributors to the atmospheric accumulation of greenhouse gases responsible for global warming and climate change. Toxic gases like nitrogen oxide and sulfur dioxide are infamous byproducts of coal plants which are responsible for acid rain and a host of serious lung diseases. Dioxins, a known human carcinogen and probably the most toxic compound known to science, can also be formed when coal is burned, because most coal contains chlorine. Utility and industrial burning of coal is in fact the sixth largest source of the US Environmental Protection Agency’s (US EPA) list of dioxin emissions to air in 1995.¹⁰

The confirmation of the presence of mercury in the disposal pond of the Calaca power plant, however, is of particular significance. It comes at a time when foreign and local corporations, encouraged enthusiastically by the Philippine government, are busily preparing for strategic investments in energy generation projects throughout the country because of the passage of the Omnibus Power Reform Act. The exposure of mercury contamination also arrives during the period when the U.S. is confronting the difficult challenge of regulating and eventually eliminating mercury emissions from its coal-fired electric utilities and other US industries.

⁷ Batangas Coal-Fired Thermal Power ... p. VI-28, 29. The coal plant and the said original resettlement area are both within the barangay of San Rafael, Calaca, Batangas. In 1992, a four-day investigative study conducted by a team of 25 Japanese and Filipino scientists and environmentalists led by Tai Harada, a chemist of the National Chemical Laboratory for Industry of Japan’s Ministry of Trade and Industry, issued a warning that the “smallest amount of pollution could accumulate in 10 years to levels dangerous to human beings, plants and animals.” According to Harada’s team, the pollution caused by the Calaca power plant was so bad that the effects could be seen as far as 10 kilometers away. Harada’s team concluded that “The only way to curb pollution from the coal-fired thermal power plant is to stop its operation.” (see - <http://www.bulatlat.com>)

⁸ Interview on August 19, 2001. NPC personnel requested to remain anonymous for obvious job security reasons.

⁹ Fast Facts on Air: A Sourcebook for the Clean Air Advocate, Clean Air Network, Washington, DC, 2000.

¹⁰ America’s Choice: Children’s Health or Corporate Profit, Center for Health, Environment and Justice, Falls Church VA, 1999.

American mercury crisis

In a landmark decision in December 2000, the US EPA announced its plans to reduce human exposure to mercury in the environment. According to the US EPA, coal plants in the US produce 43 tons of mercury annually constituting “the largest source of human-caused mercury emissions in the U.S.” The decision by the US EPA to regulate the mercury emissions of coal plants was taken because of the risks posed by a trace metal so deadly that only .002 pounds of mercury accumulated over a year is needed to pollute a large lake “to the point that the fish in that lake are unsafe to eat.” This condition appears even worse once we learn that a typical 100-megawatt coal-burning power plant emits approximately 25 pounds of mercury a year.¹¹

Despite the gravity of the problem and because of its stated lack of effective technological and financial means to address it, the US EPA can only “propose regulations by December 15, 2003 and issue final regulations by December 15, 2004.”¹² The question that is posed to the country’s policy makers is this: if the richest and most powerful country in the world can only envision recommending two years from now measures to control its electric utility industry’s mercury emissions, why must the Philippine government rush blindly to embrace such dirty technologies whose toxic releases it cannot even hope to monitor nor control in the first place.

The government has practically no capacity at present to monitor coal plant facilities for emissions of concern on a regular basis. It is the height of arrogance, therefore, for our government to start dispensing its power-to-permit when such power remains unmatched by the power to protect the people from the hazards associated with these dirty energy projects.¹³

The Pulupandan Experience

The detection of concentrations of heavy metals in the waste discharge of coal plants is not a new Philippine experience. The toxic threat to communities posed by these carbon-intensive electric utilities is, in fact, among the major reasons why the municipality of Pulupandan in Negros Occidental is currently the epicenter of resistance to coal plants.

The strong opposition to the proposed coal plant in Pulupandan stems mainly from its earlier experience with a small 3.5-megawatt coal-fired power station that ran for a decade during the 1980s using coal as its primary fuel. The plant services the energy needs of Asian Alcohol Distillery and is widely suspected to be responsible for the high toxicity of the waters of Pulupandan.

In January 2000, an environmental impact assessment was conducted to determine the feasibility of building a controversial proposed 50-megawatt coal plant in the municipality.¹⁴ Woodward-Clyde Philippines, Inc., the multinational environmental engineering firm commissioned to accomplish the study, revealed, “The concentrations [sic] of heavy metals in the marine waters of Pulupandan were ... found to exceed DENR standards” and were of “an

¹¹ “Clean the Rain, Clean the Lakes: Mercury Rain is Polluting the Great Lakes,” *National Wildlife Federation and Great Lakes Natural Resources Center Report*, page 6, September 1999

¹² www.epa.gov/mercury. See U.S. EPA Fact Sheet, issued with the U.S. EPA mercury regulation press release, December 14, 2000, on the said website.

¹³ “The Coal Plant Menace,” Red Constantino, *Manila Times*, April 3, 2001.

¹⁴ Major permits and other government papers granted to the said coal plant have been withdrawn recently owing to the fraudulent transactions committed by the proponent, the Central Negros Power Corporation. The proposed 50-megawatt coal-fired power plant is considered a “fossil fuel flashpoint” by Greenpeace Southeast Asia’s climate and energy campaign.

order of magnitude greater than” internationally tolerable levels.¹⁵ The presence of heavy metals like cadmium, hexavalent chromium and lead in Pulupandan’s waters was discovered in the marine sampling stations established by Woodward-Clyde.

Toxic factories?

Like the proposed Pulupandan coal plant, however, the Woodward-Clyde study is marred by serious discrepancies, chief of which is its failure to make even the slightest connection between Asian Alcohol Distillery’s coal plant and the heavy metal contamination of Pulupandan’s waters. In the 1 ½-inch thick study, a vague one-sentence explanation is made: “The elevated [heavy metal] concentrations ... could be attributed to unidentified natural or anthropogenic sources.” Nothing more follows.

In the scientific world, it is a common fact that the burning of coal produces cadmium, a toxin classified by the US Environmental Protection Agency (US EPA) as a probable human carcinogen, lead, a deadly heavy metal, and hexavalent chromium or chromium VI. Cadmium, for example, is a soft silvery metal that sticks to fly ash and is associated with heart, kidney, lung and liver disease. Chromium VI on the other hand is a major air pollutant whose toxicity is second only to benzene. Chromium VI is among the strongest known causes of lung cancer and can produce internal hemorrhaging and liver, kidney and respiratory damage. Exposure to chromium VI comes from coal plant cooling towers¹⁶

Mercury falling

Mercury emissions from coal plants are carried by winds and are eventually deposited to bodies of water and land. Mercury can be deposited locally, but it can also travel great distances. The distance with which mercury travels depend on the form in which it is emitted, the height at which it is released and prevailing atmospheric conditions. Typically, 50 percent of the mercury emitted from coal-fired power plants can travel up to 600 miles from the power plant.¹⁷

Bioaccumulation is a process whereby the concentration of a substance increases as it moves through the food chain. Bioaccumulation means that the concentration of mercury in predators at the top of the food web (for instance, predatory fish and fish-eating birds and mammals) can be thousands or even millions of times greater than the concentration of mercury found in the water. Most of the coal plants in the Philippines are built along the coast in order to ensure a more efficient way of unloading coal from transport ships as well as to expedite the easier disposal of wastewater. Because of lack of adequate studies on the heavy metal impact of coal plants on the environment and neighboring communities, little attention is paid to the potentially disastrous accumulation of poisons ingested by humans and animals.

US mercury advisories

US experience documenting the dangers of mercury emissions is particularly instructive for those concerned with toxic power plant emissions. According to the US EPA, freshwater fish in the US caught by recreational or subsistence fishermen from contaminated waters have been shown to have particularly high levels of methyl mercury.

¹⁵ *Ibid.* p. 3-19 to 3-21. DENR stands for Department of Environment and Natural Resources.

¹⁶ *Toxics A to Z: A Guide to Everyday Pollution Hazards* by John Harte, Richard Schneider, Christine Shirley and Cheryl Holdren, University of California Press, Berkeley and Los Angeles, 1991

¹⁷ Center for Clean Air Policy, “Power Plant Emissions and Water Quality,” October 1997, Part 1, p.13.

High mercury levels have also been found in certain saltwater fish. In March 2000, for example, Florida, Georgia, North Carolina and South Carolina issued a joint fish consumption advisory because of high mercury levels in large king mackerel. Certain species of commercially available saltwater fish, such as swordfish, have also been found to carry high amounts of mercury.

Researches show that fish and mercury make a lethal combination. Indeed there is evidence which shows that whatever the nature of the mercurial pollutant, a methylation of mercury compounds or the conversion of non-toxic mercury into lethal mercury, takes place within the fish itself or by microorganisms in coastal sediments which is subsequently absorbed by fish.

The experience of the residents of Minamata in the early 1950s is quite instructive in this regard. After enjoying the fruits of bountiful fish harvests for years from the waters of Minamata Bay, this small Japanese community one day awoke to the nightmare of more than a hundred people getting killed or seriously disabled after eating fish contaminated with mercury from a nearby chemical plant. That incident introduced a new phrase into the medical dictionary called the Minamata Disease, a condition caused by the ingestion of large amounts of fish and shellfish contaminated by alkyl mercury compounds from industrial waste.

Threats to health

Mercury exposure in high doses can cause ailments such as tremors, inability to walk, convulsions – and even death. Women of childbearing age and people who regularly eat highly contaminated fish (or large amounts of moderately contaminated fish) are the most likely to be at risk from mercury exposure.¹⁸ The developing fetus is the most sensitive to the effects of mercury, because its brain is developing rapidly. Children of women exposed to relatively high levels of methylmercury during pregnancy have exhibited a variety of abnormalities, including delayed onset of walking and talking, cerebral palsy and reduced neurological test scores. Children exposed to far lower levels of methylmercury in the womb have exhibited delays and deficits in learning ability. In addition, children exposed after birth are potentially more sensitive to the toxic effects of methylmercury than adults, because their nervous systems are still developing.¹⁹

According to a report released by a panel of experts from the US National Academy of Sciences, methylmercury exposure is a “widespread and persistent problem in the environment and may cause neurological problems in 60,000 children born in the US each year.”²⁰

Confirmed allegations

According to a recent media report, residents of villages surrounding the Calaca coal plant are still subjected to regular blasts of ash carried by winds. Blowing air to clear tubes and smokestacks occurs “once every quarter, the effects of which are painful to the nostrils and to the throat.” Gusts of ash are strong during the period of northeasterly winds. (called *amihan* in Filipino, the period generally covers the months from October to February)²¹ Serious

¹⁸ U.S. EPA Mercury Fact Sheet, December 14, 2000. See www.epa.gov/mercury

¹⁹ U.S. EPA Mercury Fact Sheet....

²⁰ <http://abcnews.go.com/sections/us/DailyNews/mercury0/11.html>

²¹ Unpublished letter dated August 1, 2001 to the *Manila Times* editor by Amelia de Castro, chairperson of Barangay Baclaran in the Batangas municipality of Balayan. De Castro’s letter was intended as a corrective to the

respiratory afflictions have reportedly become "part of the daily lives" of many residents in the Calaca coal plant communities since the power station started operating in 1984.²²

Yet, no medical evaluation has been undertaken among neighboring Calaca barangays based on neurological illnesses and developmental abnormalities traceable to exposure to the heavy metal byproducts of the coal plant. For that matter, no Filipino communities living close to any existing Philippine coal plant have been tested for possible mercury poisoning.

Analysis of the Greenpeace samples of the Calaca coal plant's ash residues dumped in an open field beside the coast, showed mercury levels of 0.21 ppm, a serious concentration if one takes into account the continuous dispersal of the ash residues by wind or by water when rains flush the same residues out into the sea. The fact that mercury does not degrade and the fact that it accumulates in the environment and in the food chain should be a strong enough argument for the authorities to take action.

While the Calaca case does not bring home the headline-grabbing reality of mercury poisoning in the same way that Minamata did in the 1950s, the confirmed presence of mercury in the waste stream of the coal plant is but an alarming indication of the imperceptible, but insidious build-up of heavy metal contamination in the coastal environment surrounding the plant. Considering that the Calaca plant has been operating for about 17 years now, indeed it is probable that fish-eating communities along the coast are already suffering varying degrees of mercury poisoning.

The arrogance of the Philippine government in foisting coal plants on unwary communities so that other more distant populations can enjoy the boon of debatable development, combined with its apparent ignorance of the hazards that coal plants bring is possibly claiming, the future, not to mention the very lives, of Filipino women, infants, and children in the present.

Don't burn it

When the U.S. EPA stated its decision last year to regulate mercury emissions from American coal-power electric utilities, the agency announced that, despite the magnitude of the crisis, it needed at least three years just to propose, not implement, regulations. This was recognition of the difficulty that the coal-based American energy industry was facing in terms of coming up with effective technological remedies. Thus far, even with the enormous resources at the command of this industry and despite years of financial assistance from the American government (a hefty and altogether immoral subsidy for an industry awash with cash), the solutions that the U.S. coal industry has come up with have remained fruitless.

A telling assessment of the efficacy of anti-pollution schemes developed by the coal industry was provided last year by U.S. Congressperson Paul Ryan (Republican-Wisconsin) who said bluntly, "There is nothing new being developed in the [U.S.] clean coal technology program except for new ways to squander taxpayers money."²³ The Philippine government would do

news item "Under (coal) fire from Napocor" by Yna Soriano that came out in the *Manila Times* on July 29, 2001. De Castro felt strongly that Soriano misquoted her in the "grossly exaggerated" news story.

²² "Under (coal) fire from Napocor," Yna Soriano....

²³ U.S. Congressional Record, June 15, 2000.

well to recall this appraisal each time it feels itself swooning over corporate pledges that “their facilities are safe and operating within environmental and legal standards.”²⁴

The way out

The remedy to the heavy metal byproduct of America’s coal plants requires a solution that is as severe as the consequences of unfettered mercury emission are cruel. The National Wildlife Federation (NWF), the largest conservation organization in the U.S., which has worked extensively on the American mercury concern, provides the premises for addressing the problem and, more importantly, the way out:

“The only way to reduce power plant emissions is to burn less coal ... Although there are pollution control technologies to capture mercury from coal plants, they have never been used in North America because they are not required and they are very expensive. They also are not really effective; the mercury they capture has to be treated as waste and can re-enter the environment. The better alternative is for [electric] utilities to burn less coal, which will reduce not only emissions of mercury but also of pollutants that cause smog, acid rain, and global climate change ... [M]ajor sources of mercury must cut their mercury emissions by the maximum amount possible, as soon as possible ... Coal-fired power plants must cut and eventually eliminate their combustion of coal.”²⁵

Imperatives of US situation

The findings of the U.S. EPA on mercury emissions along with the announcement of its intent to propose and impose regulations on coal-fired power stations were released only after several years of gathering and analyzing data on the toxic emissions of coal plants. The effort was methodical and painstaking according to the Agency, which said that it had to cover a wide swath of studies and perspectives and review “extensive comments from outside scientific experts – including the National Academy of Sciences – and from industry; other federal agencies; state, local and tribal agencies; and citizens groups.”²⁶

The lack of any similar effort in the Philippines to document, much less analyze, coal plant mercury emissions in the Philippines means not just that the Philippine government must initiate the undertaking of this process now; the effort must also be nothing less than comprehensive and sustained, and done with as much public participation as possible. The country at present operates a number of coal plants, namely: in Sual, Pangasinan, a 1200-megawatt plant; in Mauban, Quezon, a 440-megawatt station; in Pagbilao, Quezon, 700-megawatts; in Masinloc, Zambales, a 700-megawatt coal plant; and in Calaca, Batangas, 600-megawatts. None of these plants, including the neighboring communities who are the most likely recipients of the mercury toxin, are being monitored for mercury contamination. Going by the 100-megawatt average mercury emission rate mentioned earlier, it is possible that all these plants combined are emitting approximately 750 pounds of mercury a year – a staggering quantity with potentially far-reaching and destructive implications to the nation’s environmental and human health.

²⁴ “The Coal Plant Menace,” Red Constantino, *Malaya*, April 5, 2001.

²⁵ “Clean the Rain, Clean the Lakes: Mercury Rain is Polluting the Great Lakes,” National Wildlife Federation (NWF) and Great Lakes Natural Resources Center Report, September 1999. The NWF was founded in 1936.

²⁶ U.S. EPA Fact Sheet, December 14, 2000. See www.epa.gov/mercury

Increasing social burden

The health and environmental risks posed by mercury emissions are just another addition to the litany of social burdens imposed by coal plants on host communities. Lives change in communities living with coal plants, often for the worse. Accounts of diminishing family incomes due to declines in fish catches and farming productivity are common among such communities. Instead of the oft promised abundance of jobs and new sources of income that coal plant proponents regularly pledge in order to gain social acceptance, what the communities get are diminishing sources of livelihood and increasing hardships. Along with the clear drop in the self-sufficiency capacities of formerly self-reliant agricultural and fishing communities, jobs associated with the tourism industry have also drastically dwindled among host communities. Few families would desire, after all, to travel hours and bathe in formerly pristine areas where massive smokestacks loom and where ash mixes intermittently with previously unsoiled elements like rainwater, beaches, greenery and the cool sea breeze.

From the communities of Mauban and Pagbilao, Quezon to those of Masinloc, Zambales and Sual, Pangasinan, the sentiments are the same – “*Nawala na ang pagka-in, nawala pa ang magandang tanawin.*”²⁷

Conclusion

The toxic threat posed by coal plants and the social burdens they impose constitutes more than enough reason for relevant agencies of the Philippine government to initiate the necessary steps towards eliminating human-caused mercury pollution from the environment and the lives of Filipino coal plant communities.

Because of the urgency the situation demands, Greenpeace believes the following actions from the government is warranted:

- **Immediately launch a full-scale environmental audit of all existing coal plants in the country including all areas located in primary and regional impact zones of operating coal plants. Alongside this, immediately implement a full-scale health audit of all coal plant communities.**

The national and local government often only see the artificially cheap cost of building coal plants. When presenting to public officials who often simply take the word of vendors selling their polluting wares, proponents of dirty coal plants always subtract the externalities and the full extent of operating and maintenance costs - the power station’s myriad pollutants, the need for regular and comprehensive clean-ups, loss of income, loss of jobs, loss of tourism, increasing family health expenses, uprooted and fragmented communities, etc. - from the price they present and lure officials with promises of cheap rates. Often, when a value is placed on all these factors, coal plants come out undeniably more expensive and infinitely less enticing.

- **Require the national government, the National Power Corporation and local government units who allowed places like Calaca to become toxic sacrifice zones to clean-up the environments located within the impact zone of existing coal plants. Specifically, ensure that the clean-up effort includes international financing**

²⁷ “What the people and officials say about the coal power plant in their locality,” Romana de los Reyes and Ella Jacildo, report based on the coal communities exchange composed of Filipinos and Thais sponsored by Greenpeace International in September 1999.

institutions, like the Japan Export-Import Bank, that helped facilitate the construction and operation of the power station, to significantly contribute to the remediation process.

- **Immediately impose a complete ban on the construction of new and additional coal plants, and push for the mainstreaming of renewable energy options and more aggressive promotion of energy efficiency programs.** The current excess supply of electricity from existing fossil fuel power plants (including oil and natural gas) allows the Philippine government to make the decisive step towards an energy regime that increasingly utilizes renewable energy and energy efficiency programs. The government must begin to send the signal to multilateral development banks, international funding institutions and builders of energy projects that it is set on pursuing this course – by providing preferential policy treatment towards renewable energy projects. Some concrete options can be in the form of:
 - The provision of capital investment incentives, which reduce the capital costs of renewable energy developers and thus induce them to invest in renewable energy;
 - Production incentives, the provision of which is based on per kWh of electricity generated – this eliminates the temptation to inflate initial project costs and encourages developers to build facilities that maximize energy production.
 - Percentage obligation, a simple way to achieve national targets by passing on the target to energy retailers with legislation requiring them to meet defined (and increasing) percentages of energy from renewable projects – a system where the volume required is explicitly defined and the price of energy is left to the market.
 - Environmental taxation, which adds to the cost of fossil fuel based energy and thus provides a competitive advantage to renewable energy technologies with low emissions.
 - Government can also indirectly stimulate the implementation of renewable energy by providing business development assistance that encourages the formation of, say, risk-sharing consortia, technology export promotion, etc,
- **A more aggressive promotion of energy efficiency programs and integration of demand-side management (DSM) in developing energy plans.** Studies and experience in Asia have shown the potential in this area to be quite large. Studies in Thailand, for instance, have estimated potential savings from DSM within a ten year period to be as high as 2,000 to 3,000-megawatts. The logic in this point is simple - if the government is serious about achieving its energy efficiency targets and energy saved for a given plan period actually reaches, for example, a total of 500-megawatts, when combined with the entry of new renewable energy projects, the Philippine government is placed in a concrete position to forego the installation of new coal plants equivalent to 600-megawatts. More efficient use of energy thus concretely means more opportunities to lessen the country's dependence on dirty coal plants and other fossil fuel power projects.
- **Disallow the re-use of coal plant waste and by-products as aggregate material for construction purposes, as filling material or as an ingredient in fertilizer formulations.** Such wide distribution of contaminated ash throughout the environment is a dangerous policy. As with most combustion processes, the ash from burning coal is highly

contaminated with dioxin, mercury and other toxic metals. Just like incinerator ash, coal ash must be classified and treated as hazardous waste, and not recycled or reused.

- **Addressing the environmental impacts of coal burning requires measures which will have an enormous impact on workers and local economies. A policy on coal must acknowledge these impacts and include provisions to minimize worker dislocation and community disruption through a program for just transition.**

The Climate Imperative

Yet, even beyond the justifiably serious concerns of communities affected by coal plant pollution, lies the imperative for the Philippines to begin adopting carbon-reducing energy policies. This is a necessity imposed on the country by the fluctuating climatic conditions prevailing over our planet today. The climate is rapidly changing, in ways potentially more dangerous and irreversible than the nuclear threat, because of human society's continued burning of fossil fuels.

The country is a signatory to the historic United Nations Framework Convention on Climate Change (UNFCCC), a global accord that recognized as its "ultimate objective" the need to significantly reduce global greenhouse gas emissions in order to prevent "dangerous anthropogenic interference with the climate system."²⁸ Yet even without our commitments to the UNFCCC, developing countries like the Philippines are morally required to walk away from the dark future offered by fossil fuels. The consequences of unfettered combustion of fossil fuels like coal and oil will be most severe on the developing world. More importantly, climate consequences are not concerns that are projected to take place a thousand years from now, nor even a hundred years from today. If humankind does not begin to reduce its use of fossil fuels now, scientists have time and again projected the deadly impacts of climate change, like increased flooding, rapidly rising sea levels, more frequent and intense storms and more severe drought, to take place within the span of just forty years. By not beginning to embrace the alternative today, therefore, the Philippine government will in effect be a party to the suffering of its own people inflicted by a climate run wild.

The alternative is to begin decisively embarking down the path of renewable energy using sources of sustainable and clean power like wind and solar energy with the concrete end in view of systematically reducing the country's dependence on polluting, unsustainable and ultimately non-renewable fossil fuels.

²⁸ <http://www.unfccc.de>