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Briefing Paper 4

Philippines climate change agenda: High vulnerability! High ambition?

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This paper is part of a series of briefing papers that examine the climate change policies of the countries key to a global agreement at the United Nations Framework Convention on Climate Change (UNFCCC) negotiations in Paris in December last year, and its effective and ongoing implementation.

Executive Summary

The Philippine climate change agenda comprises two key features. First, it recognises that the country is highly vulnerable to climate change and disaster risks. Second, in light of this and consistent with sustainable development, it pursues highly ambitious national climate polices and climate diplomacy.

This briefing paper examines food security and electricity generation in the Philippines. Our aim is to investigate the extent to which 'vulnerability' and 'ambition' aptly describe each area, respectively. We will explore how consistent the country is to its avowed commitment to an integrated adaptation-mitigation approach to climate change.

Key findings:

- The Philippines' food security and production system, as well as its villages and rural areas, are highly vulnerable to the impacts of climate change and natural hazards.
- The Philippines needs to develop clear energy, and in particular electricity generation, policies consistent with its highly ambitious national climate change laws and international climate change commitments.
- The international community can help the Philippines implement its national mitigation initiatives and development targets, as well as its greenhouse gas (GHG) reduction target, established through the Nationally Determined Contribution in the Paris Agreement, * of 70% below business as usual (BAU) levels by 2030, by providing public and private sector support in the form of adequate, predictable and sustainable financial resources, and technology development and transfer.

*Originally, the commitments of the parties to the Paris Agreement were called Intended Nationally Determined Contributions (INDC) but the Paris Agreement has settled on the phrase Nationally Determined Contribution (NDC). We use both acronyms in this paper.

Introduction: vulnerability and ambition – an overview

The Philippines is an archipelago composed of 7100 islands, divided into three major island groups: Luzon, Visayas and Mindanao. Its population exceeds 100 million, the majority residing in rural areas even as its major cities Manila, Davao, and Cebu City are rapidly growing with the usual attendant environmental and social challenges and pressures.

The country, and the region in which it is located, is highly vulnerable to the impacts of climate change and national hazards. In 2009 the Asian Development Bank (ADB) released a report that examined the economic impacts of climate change in Southeast Asia. It pointed out that 'heat waves, droughts, floods, and tropical cyclones have been more intense and frequent, causing extensive damage to property, assets, and human life'.[1]

The Philippines itself is particularly vulnerable. In 2012, the Philippine Department of Environment and Natural Resources produced a map identifying the potential exposure to climate change of each island group. The map divides the country's offshore areas into 11 zones and identifies specific risks for each of them from the effects of climate change (see Diagram 1). It identifies five risk factors: sea level rise, extreme rainfall events, extreme heating events, increased ocean temperatures and fresh water disturbance.[2] It shows that the Philippines' is surrounded by potential climate-related disasters.

The ADB Report finds similarly, providing evidence that shows a dramatic increase in floods and severe storms; strong increases in sea levels, particularly around Manila; increasing dry spells that have caused wildfires, severe water shortages, and several outbreaks of cholera, dengue, malaria, and typhoid.[3] However, typhoons were considered the biggest risk, it explained:

> The frequency of typhoons entering the Philippines' area of responsibility increased more than four-fold during 1990–2003. On average, 20 tropical cyclones, most of them originating in the Pacific, frequented the area each year, with nine (on average) making landfall. Most of these tropical cyclones pass over the central Visayas region of the country. Observations have increasingly supported the scientific claim that rising sea surface temperatures are already enhancing the destructiveness of tropical cyclones worldwide.[4]

Four years later, in November 2013, Typhoon Haiyan – named 'Yolanda' by Philippine authorities – struck the coastal provinces of Leyte and Samar in the Visayas region. It caused 6340 deaths and $US13 billion in economic losses – 1061 people are still missing. It was the world's deadliest tropical cyclone recorded and the strongest to reach landfall, with wind speeds at 230km/h punctuated by 315km/h blasts.[5] That year, the UN World Risk Index report, which examines 'global hotspots of disaster risk', identified the Philippines as the world's third most-at-risk country to climate-related hazards such as typhoons, floods and sea level rise.[6] This acute vulnerability was similarly expressed in Germanwatch's 'Global Climate Risk Index of 2015', which ranked the Philippines first in its top 10 countries most affected by climate-related disasters in 2013, and fifth overall between 1994 and 2013.[7]

The Philippine agricultural sector is particularly vulnerable to climate change and disaster risks. The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), released in 2014, emphasises this point, as does the UN Food and Agriculture Organisation (FAO). Both explain that climate change not only directly threatens food production, raising food security concerns, but also has a negative impact on rural livelihoods – mostly poor and unable to adapt – and the national economy. The ADB similarly finds that rising sea levels have contributed to the loss of arable lands in low-lying coastal areas of the Philippines. The rise, it explains, has intensified saltwater intrusion in groundwater resources in the northern part of Luzon, which is predominantly an agricultural region, as well as in many other food-producing coastal areas.[8]

According to climate models, the Philippines and Southeast Asia will remain highly vulnerable to climate and disaster risks. According to the IPCC, since 1971, the Philippines mean, maximum, and minimum temperatures have increased 0.14C per decade. By 2080, a temperature increase of 1.2–3.9C is projected. The United States Environmental Protection Agency Modelling Project predicts that an increase in temperature of +2C

(at 330 ppm CO2 concentration) would reduce the rice yield by 22% in the Philippines.[9] By 2100, however, under the A1FI scenario – the most pessimistic IPCC scenario – the rice yield would potentially decline by 75% in the Philippines, without adaptation or technical improvements.[10] Across the region, the ADB explains that climate change impacts are predicted to intensify, with 'dire consequences'. Indeed, 'modelling suggests that the region is likely to suffer more from climate change than the world average, if no action is taken'.[11]

The Philippines' high vulnerability to climate and disaster risks has provided a backdrop to its ambitious domestic climate change policymaking, and climate diplomacy, since the early 1990s. In 1991, based on the 'mounting scientific evidence of an impending global warning' that will 'adversely affect' the Philippines' coastal areas and land ecosystems, the government established the Inter-Agency Committee on Climate Change (IACCC). The IACCC,

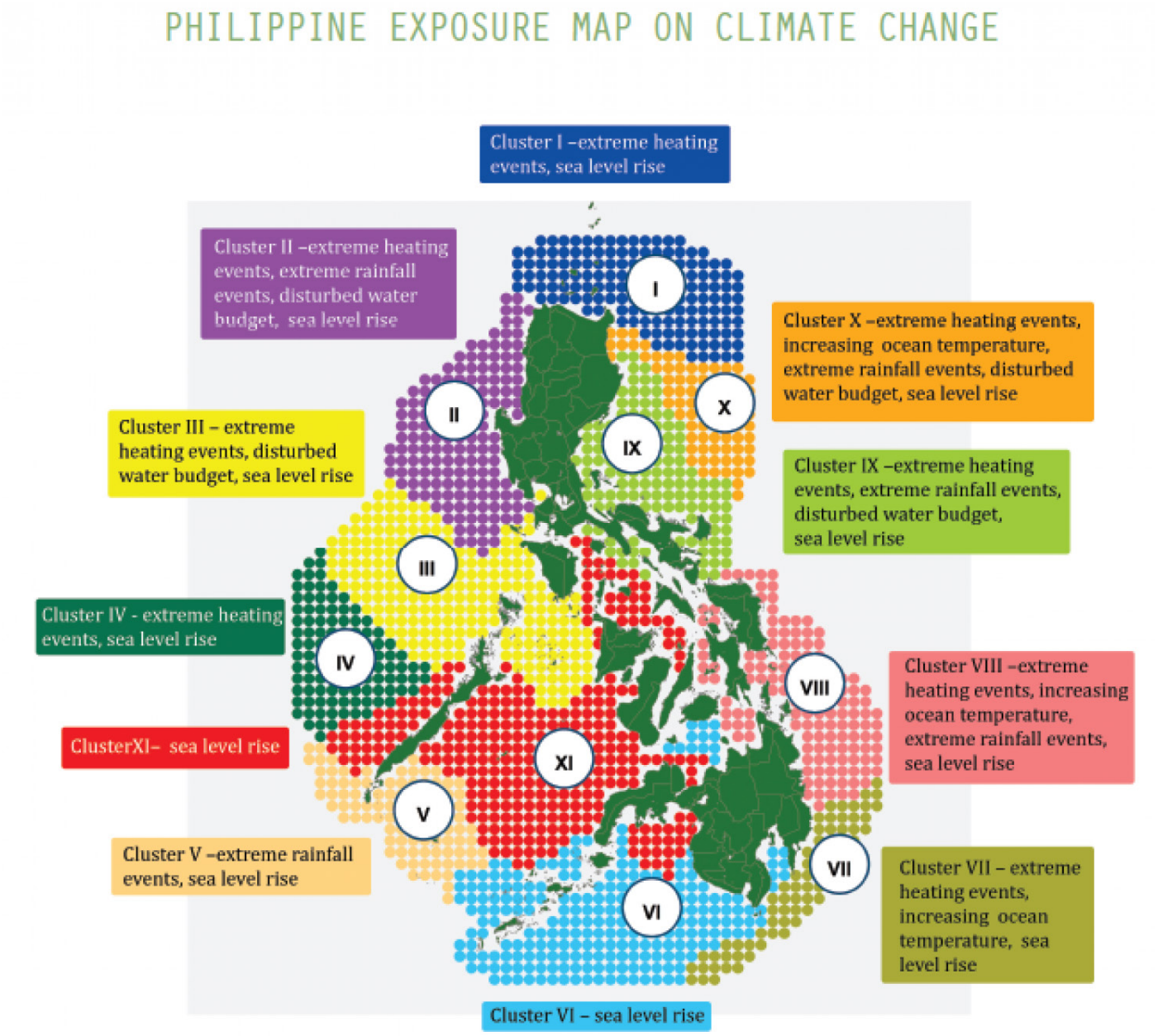

DIAGRAM 1

Graphic Source: Department of Environment and Natural Resources, Republic of the Philippines, 2012.

created by executive order of President Corazon C. Aquino, was tasked with assessing the environmental and socio-economic impacts of climate change, formulate domestic policy responses and strategies, and co-ordinate national requirements to the 1992 UNFCCC negotiations.[12] It was led first by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the country's weather agency, but in 1996 leadership was transferred to the DENR to emphasise the necessity of domestic action.

In 1994 the Philippines ratified the UNFCCC treaty and served as Chair of the Group of 77 and China in the first conference of the parties in Berlin, Germany. The first national communication to the UNFCCC, submitted in 2000, included a national inventory of anthropogenic emissions by sources and removal by sinks of GHGs.[13] In November 2003, the Philippines ratified the Kyoto Protocol (as a non-Annex I country), an international agreement in which it played a leadership role in the negotiations.

In 1999, the Philippine Congress enacted a Clean Air Act. A comprehensive law, the Act outlined the government's approach to reduce air pollution, which included a plan to ensue national GHG emissions reductions were consistent with its UNFCCC commitments.[14]

From the late 2000s, Philippine climate policymaking and climate diplomacy intensified. In early 2007, the Philippines created the Presidential Task Force on Climate Change (PTFCC) to be the focal point for all climate-related activities.[15] The order asserted that climate change was an 'urgent' problem that requires a strong policy response.[16]

In 2009, after Typhoon Ketsana (named 'Ondoy' locally) devastated Metro Manila, the Climate Change Act was passed. The Act created the Climate Change Commission as the principal climate policymaking body within government. The Commission was established under the President's office (abolishing the PTFCC) and provided for an advisory board composed of government ministries and agencies.[17] The latter, however, has not been functional and needs to be given attention if the law is to be complied with. The four-person Commission, headed by the President as the Chair and a Vice-Chair who has rank of cabinet secretary, recommends climate legislation, policies, strategies, and investments to government, as well as representing the Philippines at international climate change negotiations (working with the Department of Foreign Affairs), among other things, such as involvement in disaster management.[18]

The Disaster Reduction and Management Act, passed in 2010, served as a guide to mitigate the impacts of disasters and increase resilience in the face of natural disasters.

In 2011, a Cabinet Cluster on Climate Change Adaptation and Mitigation was created, which aims to evaluate climate change action milestones as well as the degree of co-ordination between agencies and tiers of government. Basically, it seeks to fast-track climate action. As required by the Climate Change Act, in 2010 the Commission released the National Framework Strategy on Climate Change (NFSCC) for 2010-2022.[19] The document begins:

> The Philippines now faces threats from more intense tropical cyclones, drastic changes in rainfall patterns, sea level rise, and increasing temperatures. All these factors contribute to serious impacts on our natural ecosystems — on our river basins, coastal and marine systems, and their biodiversity — then cascading to impacts on our food security, water resources, human health, public infrastructure, energy, and human settlements.

The aim of the NFSCC was to build a roadmap for a national program on climate change. In 2011, the Commission translated the NFSCC into the National Climate Change Action Plan, 2011-2028.[20] The Plan set the tone for the Government to implement short, medium and long-term actions in seven thematic areas of food security, water security, ecological and environmental stability, human security, climate-smart industries and services, sustainable energy, and knowledge and capacity development.[21]

In 2012, the Climate Change Act was amended to include the Peoples Survival Act, which would permit the allocation of national budget for adaptation needs of

local communities and local governments. In November 2014, the Philippines Greenhouse Gas Inventory Management and Reporting system was established. Led by the Climate Commission, the system would report on the management of GHG emissions under the jurisdiction of each relevant government agency.

In October 2015, the Philippines lodged its INDC to the UNFCCC. It emphasises that the Philippines is 'highly vulnerable to climate and disaster risks', and on this basis 'The Philippines intends to undertake GHG (CO2e) emissions reduction of about 70% by 2030 relative to its BAU scenario of 2000-2030'.[22] The reductions would come from energy, transport, waste, forestry and industry sectors. But would be conditioned on the extent of the financial resources, including technology development and transfer, and capacity building, made available to the Philippines. At COP21 in Paris, the Philippines led a new negotiating bloc of 44 'vulnerable countries' who argued for the inclusion of a warming limit of 1.5C rather than 2C in the final negotiating text. This limit, even if language is aspirational, was eventually adopted in the Paris Agreement.

This 'victory' on the target of the Paris Agreement is just one example of the vigorous work and the successes of the Philippine delegation in Paris. It was also the leader in successfully pushing for human rights and ecosystems integrity language in the Agreement. It was active in the finance and other support discussions. It also played a critical role in the adoption of a loss and damage article in the Paris Agreement. Recognising its efforts, the Philippine delegation was awarded the 'Ray of the Day' distinction by civil society on three occasions during the Paris conference.

In summation, we can see that the Philippines' is highly vulnerable to climate change and disaster risks and it would appear, correspondingly highly ambitious in terms of implementing policy measures that minimise those risks. Certainly, it is a global leader in pushing countries to act with high ambition to address effectively the challenge of climate change.

In the remainder of this briefing paper we present an up-close look at two sectors that reflect the Philippine vulnerability-ambition nexus – food production and electricity generation, respectively. Our aim is to investigate the extent to which 'vulnerability' and 'ambition' aptly describe each sector.

We begin with food security and production.

Food security and production – high vulnerability!

Agriculture in the Philippines, which comprises four sub-sectors (crops, livestock, poultry and fisheries), contributes about 10% to gross national product (GNP) and provides a livelihood for 31% of the labour force.[23] Farming and fishing households, however, who are mostly poor, face high levels of food insecurity as a result of climate change and natural disasters such as typhoons, floods, sea-level rise, intense rainfall events, droughts and El Niño events, as well as volcanoes, earthquakes, landslides, and tsunamis.[24]

The IPCC and FAO find that rice production, and Philippine food security therefore, is particularly vulnerable to climate change.

An average Filipino diet is based on rice. It provides half of the country's calorie requirements and one-third of the protein intake. It is both a major expenditure item and a source of income for many households.[25] Indeed, it accounts for about 20% of total food expenditure for the average household, which increases to 30% for poor households. It is grown on about 3.2 million hectares. Two million households are engaged in rice-farming, along with millions of farm labourers, and tens of thousands of merchants and traders. Furthermore, rice is an economic commodity. Rice tops the list of national annual production value at $US4 796 414 – almost double that of its closest rival, indigenous meat.[26]

This section largely focuses on rice production. First, we outline the policy measures that the government is taking to help protect this vital crop against the impacts of climate change and natural disasters. Next, we highlight the advantages of this pre-emptive policy approach. Third, we offer suggestions about how greater crop protection could be achieved.

a) Climate-resilient food production policies, and the importance of rice

A top priority for the Philippine government is to prepare its agricultural sector, particular rice crops, for future climatic instability and natural hazards. Although it started late, the Department of Agriculture (DOA) is now on top of the situation and has begun mainstreaming climate change into the policies and programs of the sector. Moreover, colleagues from the DOA led the adaptation negotiating team of the Philippine delegation to the UNFCCC.

This focus on climate change and its impact on agriculture are also mandated by the Philippine Development Plan 2011-2016, which identifies food security and rural poverty reduction as key overarching goals.[27] Towards achieving these goals, in June 2012, the DOA launched the Food Staples Sufficiency Program (FSSP) as the central focus of the country's food security policy from 2011 to 2016 and beyond.[28] The accompanying landmark report, Food Staples Sufficiency Program 2011-2016, asserts that food security and rural poverty reduction requires 'massive investments in financial resources and policy attention' as well as a 'dynamic link between agriculture, industry and service sectors'.[29] The FSSP covers food staples including white corn, bananas and root crops; however 'the main focus of the FSSP is self-sufficiency in rice, the country's main staple', it asserts.[30] Climate change features prominently in the report. In fact the solitary aim of the FSSP beyond 2013 is 'to strengthen national resilience in staples production to impacts of climate change'.[31] This aim, and its connection to rice production, is expressed by Philippine President Benigno Aquino III:

> Through investments in climate change readiness, we are supporting research on drought and submergence-tolerant rice varieties and appropriate farm systems technologies and on climate change-adaptive infrastructure designs to secure our food for the future.[32]

The Philippine National Rice Program (NRP), operating under the DOA, plays a key role in helping the FSSP achieve its food security and poverty alleviation goals. To this end, the Program integrates national and local government interventions to support rice production. For example, the Program supports the production of climate-resilient rice seed varieties, such as those that show some tolerance to drought and saline. Support is also provided to help improve rice irrigation, infrastructure facilities such as post-harvest, market development services, education and training services, as well as research and development.[33]

The other major government entity supporting Philippine rice production is the Philippine Rice Research Institute (PhilRice). Established in 1985, and also operating under the DOA, PhilRice aims to help develop high-yielding and cost-reducing technologies so farmers can produce enough rice for all Filipinos.[34] In 2011, PhilRice created its own Climate Change Centre (CCC) to spearhead the planning and implementation of climate change management in relation to rice farming. Specifically, the Centre was tasked to 'develop and extend a comprehensive and judicious understanding of the current and future impacts of climate change, including variability and extremes on the Philippine rice farming system, and to cushion its possible negative effects on the realisation of rice self-sufficiency'.[35] Similarly to NRP, the CCC provides a number of climate change mitigation and adaptation rice farming solutions. For example, new rice varieties that offer some resistance to climate-related stresses such as drought or low rainfall as well as moderate salinity levels after being submerged in water during floods/typhoon; water conservation technologies for periods of drought such as the Alternative Wetting and Drying system, which floods the rice field for a certain number of days after the disappearance of standing water; fossil-free technologies such as the 'rice hull gasifier-pump system', which uses rice hulls in place of gasoline or diesel as a fuel for pumping water for irrigation and other purposes; among other initiatives.[36]

Inter-agency co-ordination is producing good results. For example, in April 2015, PhilRice, in partnership with the International Rice Research Institute, said they had developed a new rice variety, 'the Green Super Rice'. This rice combines the superior traits of 250 rice varieties adapted to difficult growing conditions such as drought and low inputs, including no pesticide and less fertiliser.[37] The High Yielding Technology Adoption program,

which is managed by the NRP, approved the rice variety, and the DOA plan to distribute the variety to farmers through regional offices. This variety is expected to increase Philippine rice production from 18.97 million tonnes in 2014 to about 20 million in 2015 and by a further 500 000 tonnes in 2016.[38]

These policies will help insulate Philippine food production, and rural livelihoods, from coming climate change impacts.

b) The advantages of climate-resilient food production policies

Food Security: The IPCC AR5 released in 2014 asserts that current rising temperatures are damaging rice development in the Philippines, which raises concerns for the country's future food security:

> With rising temperatures, the process of rice development accelerates and reduces the duration for growth… in terms of risks of increasing heat stress, there are parts of Asia where current temperatures are already approaching critical levels during the susceptible stages of the rice plant, including the Philippines (April/June).[39]

Similarly, the PAGASA finds that periods of extreme warming, such as during El Niño events, which are caused by the warming of sea surface temperature in the Pacific and can affect air and sea currents, are expected to result in reduced rainfall that may lead to droughts, stronger typhoons and higher risk of forest or grass fires. Severe damage in farms, fisheries and forests may affect 30% of the country's population relying on agriculture as a primary source of livelihood.[40] The FAO estimates that the current El Niño event in the Philippines has caused total damage and production losses in crops worth $US49.4 million; 57 111 tonnes of crops lost, including rice, corn and high-value crops such as bananas and rubber. It also finds that 58% of the country will likely experience drought, including 25 provinces in Luzon, 13 provinces in the Visayas and 9 in Mindanao; and 47 111 affected farmers may need support to recommence their farming activities in the next cropping season.[41]

Livelihoods: The IPPC AR5 finds that rural livelihoods and poverty in the Philippines are highly vulnerable to climate change impacts, particularly typhoons.

> Factors that have made agriculture less sustainable in the past include input non-responsive yields, soil erosion, natural calamities, and water and land-quality-related problems. These have predisposed rural livelihoods to climate change vulnerability. Livelihoods are impacted by droughts, floods, and typhoons. Typhoon impacts are mainly through damage to the livelihood assets of coastal populations in the Philippines and the level of ownership of livelihood assets has been a major determinant of vulnerability.[42]

The FAO finds similarly. Typhoon Haiyan/Yolanda which struck in November 2013 – between two planting seasons (rice and corn) – destroyed more than 600 000 hectares of farmland in nine of the poorest provinces in central Philippines. The FAO estimates that one million farming households were affected and 1.1 million tonnes of crops lost. The affected provinces are significant contributors to the total rice harvested in the Philippines and were among the highest-producing areas for agricultural commodities.[43]

Future: IPCC models predict that under an A2 warming scenario – which estimates a 3.4C warming, and 0.23-0.51 metre sea-level rise, by 2100 – the economic costs for the Philippines, if only the market impact (mainly related to agriculture and coastal zones) is considered would constitute a mean loss of 2.2% of GDP by 2100 on an annual basis, which is 'well above' the global average at 0.6% GDP due to market impact alone. In addition, it finds that the mean cost for the Philippines, Indonesia, Thailand, and Vietnam could reach 5.7% of GDP if non-market impacts related to health and ecosystems are included and 6.7% of GDP if catastrophic risks are also taken into account. The cost of adaptation for agriculture and coastal zones is expected to be about $US5 billion per year by 2020 on average. Adaptation that is complemented with global mitigation measures is expected to be more effective in reducing the impacts of climate change.[44] Indeed, the Philippine NDC recognises that a key challenge for the Philippines is to pursue economic development while simultaneously having to deal with the impacts of climate change and natural hazards. This challenge is particularly acute in the agriculture sector, as the Philippine NDC attests: 'Climate change

and natural hazards will progressively impact sectors that are strategically important for the growth of the economy, e.g., agriculture, fisheries, and water resource management'.[45]

c) How to strengthen food security and reduce rural poverty

Despite the significant advancements in agricultural R&D, the Philippines still needs help from the international community to further protect its citizens against food insecurity in the face of climate change impacts and natural hazards. In particular, as expressed in the Philippine NDC of 2015, 'financial resources, technology transfer and capacity building support for adaptation will ensure that the country's committed mitigation NDC will be attained'. It identifies 'enhancement of climate and disaster-resilience of key sectors – agriculture, water and health' as priorities that need implementation support.[46]

Specifically, PhilRice says more R&D is required to produce rice varieties tolerant to saline. Recently, there has been a growing concern that saline intrusion, and the projected sea level rise that affects coastal integrity, will increasingly threaten agricultural production in coastline areas.[47] PhilRice and other research institutions are continuously developing saline-tolerant crop varieties to address this challenge, but international assistance is required to fast-track new varieties.

Irrigation is also cause for concern. In particular, PhilRice explains that irrigation infrastructure would fail under environmental impacts, which would disable food production. International assistance to upgrade irrigation infrastructure to better resist natural disasters would be welcome.

We conclude that Philippine food production is highly vulnerable to climate and disaster risks. But there are identified solutions to adapt agriculture and make the sector more resilient. International supports – in terms of finance, technology transfer and development, and capacity building – are essential for the implementation of those solutions.

Electricity generation – high ambition?

Poverty reduction and electricity generation are intimately linked in the Philippines. In 2012 the poverty rate in the Philippines was 25.2% and electric power consumption per capita was 672 kilowatt hours. To minimise poverty by 2030 at a rate consistent with comparative countries such as Malaysia, which is a societal goal, the Philippines would need to increase its electric generation capacity by an annual average of 11.1%. In order to attain this annual rate between 2016 and 2030, the equivalent of 417 240 gigawatt hours (GWh), or 5.4 times the current rate of 77 261GWh, is needed. The question is: how to fill this capacity gap? Among the sources being considered and subject to serious discussions and widespread debates are coal-fired power plants (CFPPs).[48] The alternative is low-pollution electricity sources.

This section of the briefing paper first outlines past and future plans for clean and dirty electricity generation. Second, it highlights the benefits of clean electricity generation. Third, it lists several ways in which the international community could assist develop and expand Philippine clean electricity generation capacity, as well as a few domestic reforms worth considering.

a) Electricity generation policies – clean and dirty

The Philippines has a rich history of implementing clean electricity generation policies. In September 1991, the Mini-hydroelectric Power Incentive Act was implemented. Operating under the auspices of the Department of Energy (DOE), the Act aims to strengthen Philippine electricity resources to attain energy self-sufficiency. To do this, the DOE can grant hydro-electric developers a range of tax breaks and incentives to encourage them to establish and expand their operations.[49]

In December 2008, the President approved the Renewable Energy Act. Also overseen by the DOE, the Act offers a similar suit of tax reductions, caps, exemptions, and credits to incentivise clean energy development and expansion.[50] The Act also created the Renewable Portfolio Standard, which sets a minimum percentage of renewables supply for every electricity supplier, as well

as the National Renewable Energy Board to facilitate implementation of the National Renewable Energy Programme, which provides strategy advice to help achieve the country's renewable energy goals.[51]

DOE documents show that as of October 2015, 616 renewable energy projects have been approved and awarded by the agency. Hydropower topped the list with 344 projects, followed by solar with 105, biomass 65, wind 52, geothermal 43, and ocean energy 7.[52]

And there are more to come. Indeed DOE data shows that the Philippines' has more than 600 renewable energy projects in the pipeline, with potential generation capacity of more than 12 000 megawatt (MW). According to DOE, the potential generation capacity of hydropower projects stand at 7390MW, solar projects at 2551MW, wind 3355MW, biomass 254MW, geothermal 750MW, and ocean energy 26MW.

Aside from these, DOE says that there are still 272 renewable energy projects yet to be approved by DOE that have a potential electricity-generation capacity of more than 5031MW. The pending projects include hydropower at 191 projects, solar at 61, wind 11, biomass 5, ocean energy 2, and geothermal 2.[53] To put this in context, about 1MW of solar power could light up about 100 homes.

But it's not all good news.

Philippine President Benigno Aquino III recently attended the inauguration of a 300MW CFPP in Davao City, Mindanao. He said that the plant, once operational, 'can be tapped into anytime, rain or shine, with very minor fluctuations'.[54] The rationale for this CFPP, the President explained, was to supply reliable and affordable energy as well as plug the electricity capacity gap created by the reported failure of hydro-electric plants during the dry season. Critics argue however that renewables (including geothermal) can also be used as baseload plants and that the price of coal-based electricity is artificially low because it does not incorporate externalities such as carbon, environmental and health impacts.

And there are more to come. As of July 2015, 23 new CFPPs are set to be built by 2020 and even more are in the pipeline for 2030. Some of these proposed plants already have environmental permits but most have not yet been approved. The Philippines should now consider a moratorium on approvals while it revisits its energy and electricity generation plans and policies.

CFPP opponents contend that renewables such as geothermal, solar and wind are just as reliable as coal in supplying electricity during dry spells, and decisions about the country's electricity supply mix should seek to balance the country's long-term aspirations for sustainable development, as enshrined in the Philippine Constitution, with more immediate energy security concerns.[55] Furthermore, opponents contend, CFPP expansion is inconsistent with the overall trajectory of the Philippines' electricity generation sector, as well as its ambitious national GHG emissions reduction target of 70% below BAU by 2030, and impressive climate diplomacy at COP21 in Paris that led to a 1.5C target being included in the Paris Agreement. Despite this, CFPP opponents fear that coal is poised to dominate the country's future electricity supply mix.[56]

What are the advantages of expanding the supply of clean electricity instead of dirty coal?

b) The advantage of adopting clean electricity policies

The principal advantage of clean electricity generation is that it minimises the negative impacts to the environment and human health associated with CFPPs. CFPPs produce a host of environmentally harmful by-product's (emissions, solid wastes and discharges). For example, the smokestacks serving the boiler produce harmful atmospheric pollutants due to the use of bituminous and subbituminous coal; coal combustion creates discharges of wastewater, ash and leachate which comprise environmentally harmful doses of selenium, mercury and arsenic to name a few. These damaging environmental inputs, among others, have led to climate change, air, water and soil pollution, as well as acid rain. In addition, CFPPs use an inordinate amount of water to spin their turbines and to cool thermoelectric plants. While there are technologies available to reduce pollution from CFPPs, and optimise coal use, they cannot fully expunge the clearly polluting nature of coal.[57] Diagram 2 shows the particular environmental stressors that CFPPs produce.[58]

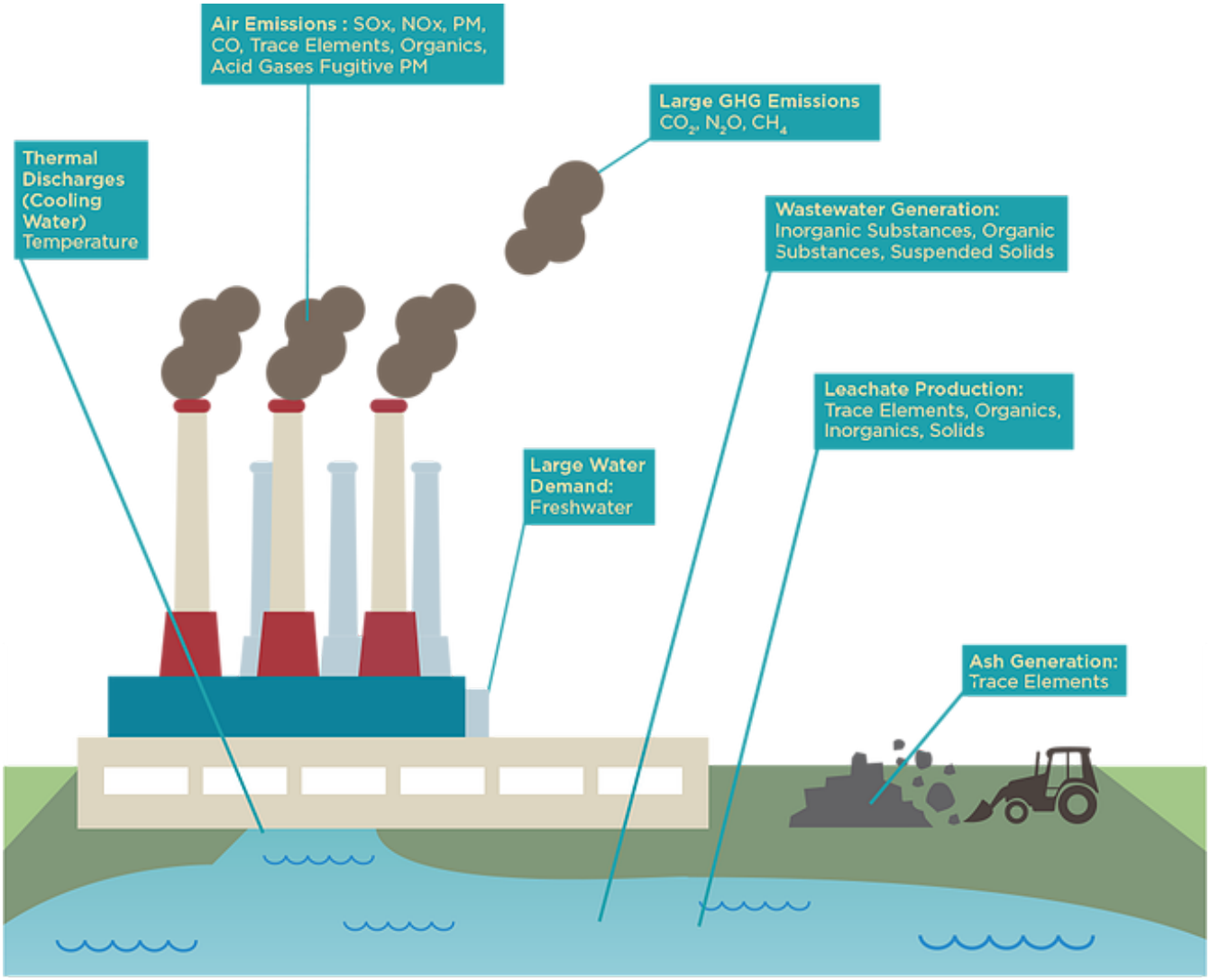

DIAGRAM 2

Graphic Source: Antonio La Viña and Lawrence Ang et al., 'Striking a Balance: Coal-fired Power Plants in the Philippines Energy Future', Policy Brief, Ateneo de Manila University, 2016.

The combustion of coal in CFPPs can cause significant problems for human health. As suggested above, burning coal generates by-products such as carbon dioxide, methane, particulates and oxides of nitrogen, oxides of sulphur, mercury, and a wide range of carcinogenic chemicals and heavy metals. In fact the United States Environmental Protection Agency finds that CFPP emit 84 of the 187 hazardous air pollutants – some fuel-based or contaminants released by burning, while others combustion-based formed during burning. Those most vulnerable to CFPP-related health problems are infants, children, the elderly, smokers, diabetics and those with heart disease. Diagram 2 shows some of the long-term health impacts of CFPP by-products.[59]

The economics of CFPP expansion becomes questionable when cost-benefit analyses include the environmental and human health costs associated with coal and its combustion. A World Bank study released in 2011 found that most studies into the economics of CFPP electricity generation did not consider external costs such as health impacts, water pollution and climate pollution.[60] The study posits that if these costs were included, CFPPs would unequivocally be one of the most expensive forms of electricity generation.[61]

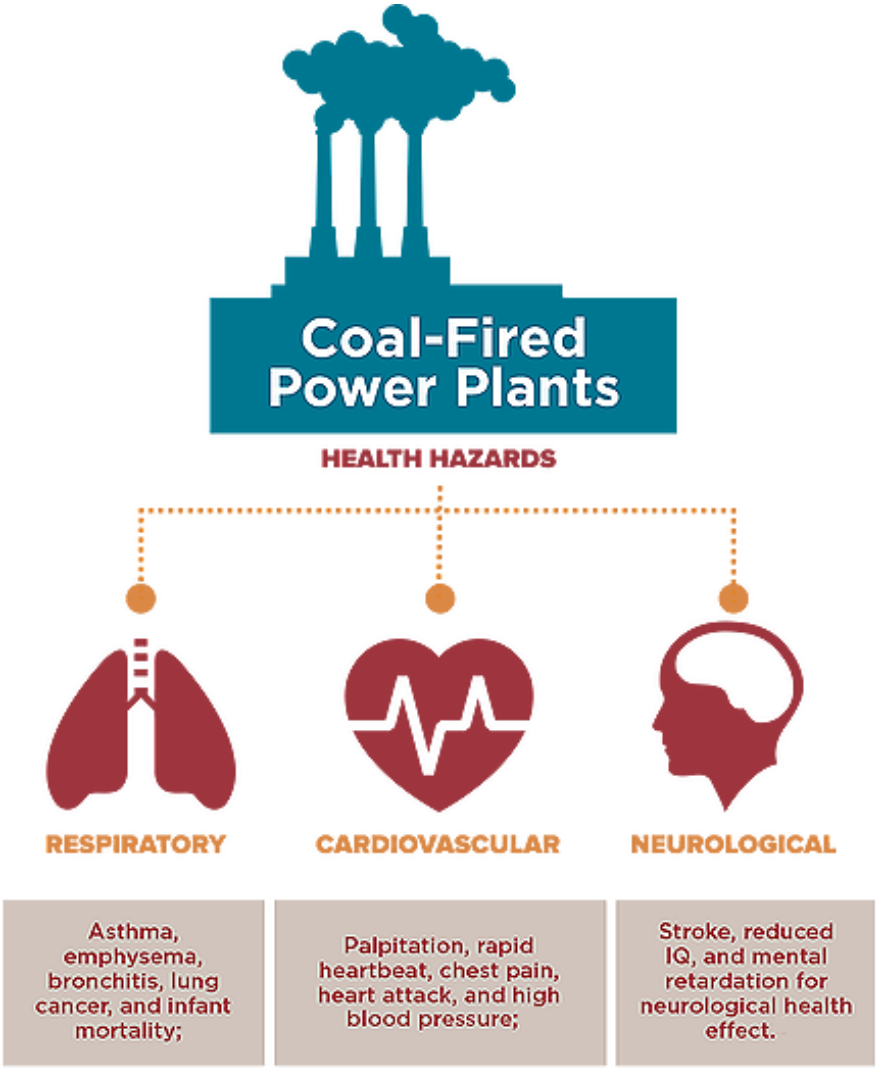

DIAGRAM 3

Graphic Source: Antonio La Viña and Lawrence Ang et al., 'Striking a Balance: Coal-fired Power Plants in the Philippines Energy Future', Policy Brief, Ateneo de Manila University, 2016.

Direct advantages also stem from choosing to expand clean electricity sources rather than dirty CFPP. For example, in recent years in the Philippines, a large number of foreign electricity generation companies have taken advantage of the tax incentives on offer under the Mini-Hydro Act, setting up new enterprises or expanded existing ones.[62] The expansion of mini-hydro operations has reportedly boosted employment opportunities during the construction phase as well as providing clean electricity to thousands of households.[63] The Renewable Energy Act has helped increase the use of renewable energy sources and reinforced and institutionalised Philippine climate change mitigation action.[64]

c) How to expand clean electricity and reduce poverty

How can the international community help the Philippines grow its clean electricity capacity, and reduce the poverty rate, to 2030?

First, technology transfers and innovations are needed to enhance capacity for mitigation, as the Philippine NDC explains: 'Technical inputs and assistance are critical for certain sectors such as grid efficiency improvement, standard development for energy and water efficiency,

cost-effective renewable energy, alternative or high-efficiency technology for conventional power generation, among others'.[65] R&D into renewable energy technology – such as solar thermal, photovoltaic, ocean and wind energy – indicates that reliable and continuous power is highly likely within the next two to four decades. While more development is required before they can significantly substitute CFPPs as baseload power sources,[66] the right policies and incentives can help enable this. Also, liquefied natural gas – which is very capable of providing baseload power – technologies and frameworks are still to be developed. Natural gas is only available in Luzon with its main source Malampaya expected to run out by 2022.[67] Geothermal sources are also not exhausted in the Philippines.

Second, coal's ongoing cost competitiveness with low pollution alternatives is premised on: first, the Philippines' small indigenous source of coal; and second, and most prominently, the ongoing availability of a cheap, steady and predictable supply of coal from countries with abundant reserves such as Australia and Indonesia.[68] These countries should play their part in helping wean Asian countries off coal. Given Asia's high vulnerability to the impacts of climate change, there is a strong national interest case for minimising the flow of coal in the region.

Third, there is lack of ambient air quality-monitoring stations in municipalities and cities hosting CFPPs. According to the National Air Quality Status Report only Davao City and Naga City have the complete range of equipment to monitor CFPP pollutants such as particulate matter, sulphur dioxide and ozone.[69] Increasing the number of complete measuring devices operating in cities hosting CFPPs is critical to gain an accurate picture of the urban environmental and health impacts of these electricity sources.

Growing Philippine clean electricity capacity to 2030 will also require domestic policy reforms. The Philippine government could consider the following:

First, cap the role of CFPP electricity in the national electricity mix to a desired level, taking account of the projected baseload requirement by 2030, the NDC offered by the Philippines in Paris, while actively seeking and developing alternatives. Second, use a 'gold standard' for approving and disapproving proposed CFPPs, taking account of the negative environmental and health costs. Third, there is still no single oversight body that ensures the integrity and coherence of CFPP development in the Philippines vis-à-vis broader economic and public concerns. Fourth, there are very few integrated plans, studies or reports produced by government that comprehensively take into consideration the environmental and health externalities of CFPP electricity generation. Fifth, amend existing environment laws such as the Clean Air Act to account for health issues arising from CFPPs. Sixth, include health and environmental issues arising from CFPPs under DOE responsibilities, rather than the current arrangement that they remain Department of Health and Department of Environment responsibilities, respectively. Seventh, encourage increased input from community groups and local stakeholders into central energy planning, current general exclusion may be the result of the environmental and health impacts being more immediately felt by these stakeholders. Eighth and ninth, greater government transparency in awarding electricity sector contracts is needed as is greater political will to make this clean electricity future happen.[70]

Reforming these areas would increase the compatibility between the Philippines' national approach to climate change and its activist climate diplomacy – most recently exercised through its INDC submission to the UNFCCC, signing of the Asia-Pacific Economic Forum Ministerial Declaration on Energy, and signing of the United Nations' 2030 Sustainable Development Goals – all suggesting the Philippines is strongly committed to low-carbon development.[71] However, at present, we conclude that the Philippines' CFPP electricity generation plans are inconsistent with its highly ambitious national and international climate change agenda.

Conclusion

The Philippines is highly vulnerable to the impacts of climate change and natural hazards. It also pursues a highly ambitious national and international climate change agenda – or so it claims. In this briefing paper we have sought to test both of these claims.

We began by exploring the extent to which the Philippine food security and production system is vulnerable to climate change and natural disasters. We found that this area is highly vulnerable, rice production, in particular, which is a staple food for Filipinos as well as contributing significantly to the national economy. Poor people rely most on rice for their food and livelihoods. We saw that a collapsing food production system as a result of climate change poses a considerable threat to mid-term food security and rural livelihoods. Policy measures such as producing climate-resilient rice varieties have been taken to minimise this threat. But more needs to be done. The international community can help by providing financing and technology transfer.

In the second section we examined the extent to which the Philippine electricity generation sector reflects the Philippines' highly ambitious national climate change laws and international climate diplomacy, most recently in its NDC in the Paris Agreement (e.g. a 70% GHG reduction below BAU by 2030). We found that the electricity generation mix to 2030 seems to favour building more CFPPs over expanding clean electricity alternatives such as renewables. We saw that to reduce poverty more electricity is needed, but building more CFPPs to achieve this reduction will contribute to a more unstable climate as well as damage food production, human health, and the environment, which significantly calls into question the economic rationality of this option. The international community can help expand clean electricity generation sources by providing technology transfers and public and private finances. Domestic reforms are also required.

In short, the Philippines' food security and production system is 'highly vulnerable' to climate change and the country has begun responding to this with the right priorities and policies. However, the energy sector, in particular electricity generation, fails to reflect the country's 'highly ambitious' national climate change laws and climate diplomacy. To be consistent with its integrated climate change adaptation and mitigation approach and to be faithful to its Paris Agreement obligations, the Philippines must radically transform this sector to rely more on renewables and veer away from coal as a source of energy and electricity.

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