Responsible Energy Initiative Philippines

Renewable Energy to Responsible Energy: A Call to Action

ICSC Institute for Climate and Sustainable Cities

OXFAM Pilipinas

THE CENTRE Center for Empowerment, Innovation, and Training on Renewable Energy

Business & Human Rights Resource Centre

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Foreword

Current climate scenarios strongly indicate that we are at increasing risk of crossing the 1.5°C threshold on planetary warming by 2030,[1] which will cause a significant rise in climate-related disasters.

The Philippines—already one of the countries in the world that is highly vulnerable to climate-induced disasters—is taking decisive steps to counter this reality by setting targets to accelerate the shift towards an energy system where renewable energy is a major part of the mix.

The benefits of renewable energy are well recognized: the sector plays a vital role in mitigating carbon dioxide emissions, enhancing energy security, expanding energy access, creating jobs and livelihoods, and reducing pollution stemming from electricity generation. Nevertheless, as the sector continues to scale rapidly, there is a need for it to uphold the highest standards of social and environmental responsibility throughout its value chain.

The *Responsible Energy Initiative Philippines: Case for Action* report provides a situational analysis of where there are risks of adverse ecological and social impacts in utility-scale renewable energy value chains, how such risks are currently being managed, and where there is potential for renewable energy system actors to take collaborative action to create the requisite norms for responsible practices.

We invite you to participate in the Responsible Energy Initiative Philippines and play an important part in ensuring a just transition towards a responsible renewable energy system: one that is ecologically safe, socially just and resilient to serve future generations to come.

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Abbreviations

ADB: Asian Development Bank
CADT: Certificate of Ancestral Domain Titles
CARP: Comprehensive Agrarian Reform Program
CREZ: Competitive Renewable Energy Zones
DENR: Department of Environment and Natural Resources
DOE: Department of Energy
ECC: Environmental Compliance Certificates
EIA: Environmental Impact Assessment
ERC: Energy Regulatory Commission
ESG: Environmental, Social and Governance
ESIA: Environmental and Social Impact Assessment
ETC: Energy Transition Councils
ETM: Energy Transition Mechanisms
EVOSS: Energy Virtual One Stop Shop
FPIC: Free, Prior and Informed Consent
GEAP: Green Energy Auction Program
GEOP: Green Energy Option Program
GHG: Greenhouse Gas Emissions
GW: Gigawatt
IFC: International Finance Corporation
IPRA: Indigenous Peoples Rights Act
IUCN: International Union for Conservation of Nature
KWh: Kilowatt hour
LGU: Local Government Unit
MDB: Multilateral, bilateral and development financing
MW: Megawatt
MWh: Megawatt hour
NREB: National Renewable Energy Board
NREP: National Renewable Energy Program
OHS: Occupational Health and Safety
PHP: Philippine Peso
RE: Renewable Energy
REC: Renewable Energy Certificate
REMB: Renewable Energy Management Bureau
RETF: Renewable Energy Trust Fund
RSP: Renewable Portfolio Standards
SEC: Securities and Exchange Commission
SHP: Small Hydro Power
SIA: Social Impact Assessment

About the Responsible Energy Initiative

The Responsible Energy Initiative Philippines ('REI PH') is a multi-year program committed to advancing a just and regenerative adoption of renewable energy in the Philippines. It strives to unlock the full potential of the energy transition in the nation to create a truly ecologically and socially responsible energy system for the betterment of both humanity and the planet. Achieving this outcome requires RE actors to recognize and act on the environmental and social risks in the production and deployment of utility-scale RE.

In 2023, the Institute for Climate and Sustainable Cities, Oxfam Pilipinas, Friedrich-Ebert-Stiftung Philippines, Forum for the Future, the Center for Empowerment, Innovation and Training on Renewable Energy (CentRE) and the Business & Human Rights Resource Centre joined hands as Consortium Partners to launch REI PH.

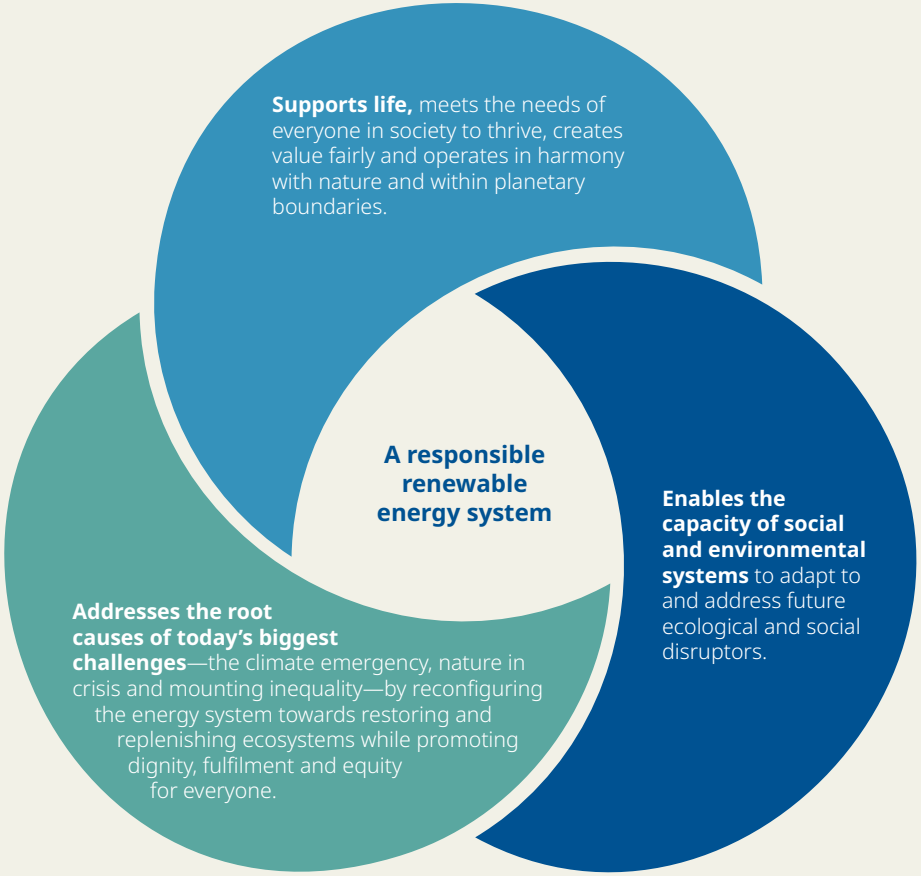
The choice to initiate REI in the Philippines as the second country program following the launch in India in 2021 recognized the clear potential the country offered to shape—and role model—what an ecologically safe and socially just energy transition can look like. The nation is sending strong policy signals of an accelerated transition trajectory—its Paris Agreement commitments of a 75% reduction in greenhouse gas (GHG) emissions against a projected business-as-usual pathway by 2030 and its aim to peak emissions within the same timeline,[2] as well as its recent pledge at COP28 to triple the world's renewable energy capacity and double energy efficiency[3] speaks to this. Its RE market is maturing and is likely to be confronting ecological and social imperatives as production and deployment scales.

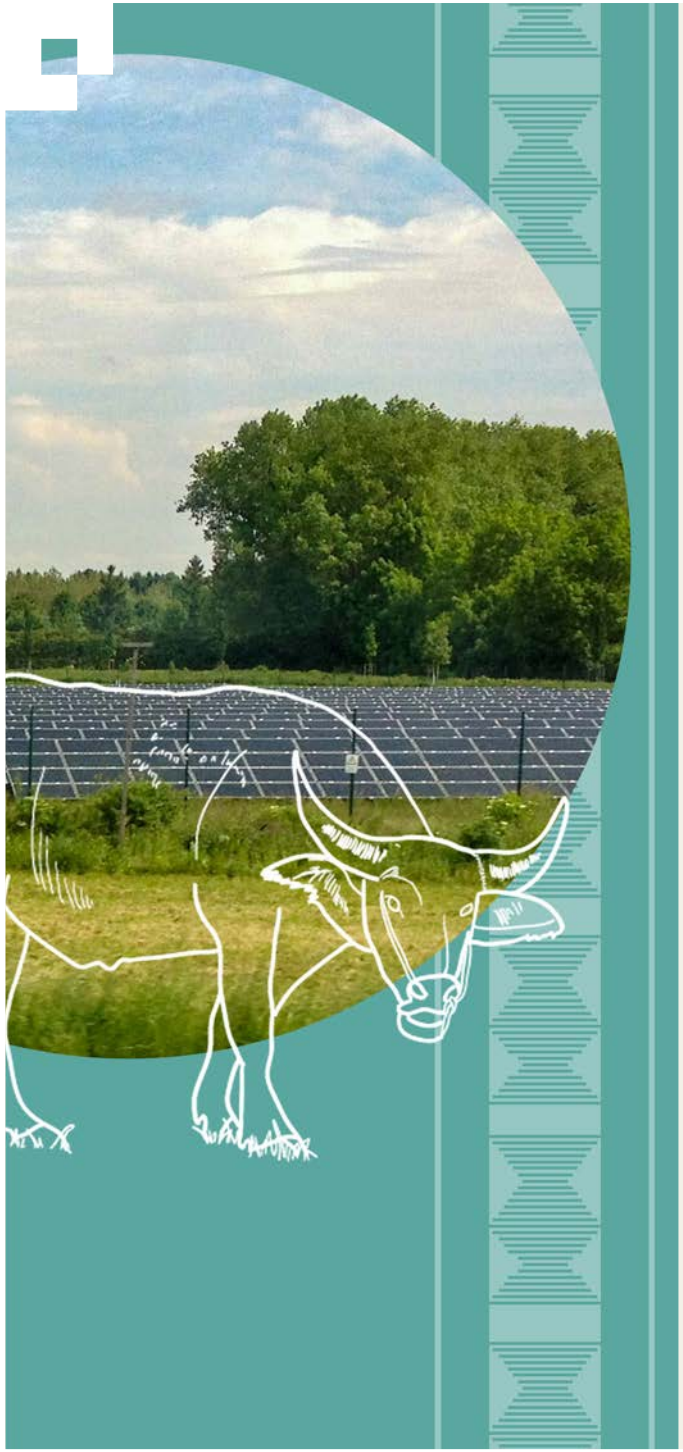
These factors, together with the deep ground-up expertise and commitment of civil society to just energy transition principles, provide the foundations for REI to contribute optimally to achieving impact within the Philippines, and to building an understanding of what actions are needed to shape the clean energy transitions in other Southeast Asian countries.

REI PH serves as a collaborative platform, uniting industry, finance, civil society and policymakers in the Philippines' renewable energy system to collectively shape a responsible future energy system. Its program of activities is designed to support participants in innovating and adopting business models, financing frameworks and value chain relationships that create the conditions to achieve this goal.

Employing a range of systems design and futures-thinking frameworks, participants engage in a unique systems thinking, futures-led inquiry process that builds their capacity to:

- **Understand and identify** where and how to intervene in order to achieve an ecologically safe and socially just energy transition;
- **Design a future-fit and resilient renewable energy** system through long-term thinking and anticipatory governance approaches;
- **Frame a shared vision and set of responsible renewable energy principles** that inspire and motivate other actors to adopt and implement; and
- **Prototype interventions** that have the potential to systemically translate the principles into action.





About the Report

This report aims to provide a broad understanding of the ecological and social impacts being generated by—and anticipated through the future growth of—utility-scale RE in the Philippines, sharing insights into how they are currently being governed, managed and mitigated by public and private sector actors within the RE system.

It presents a case for action to RE developers, investors, financiers, procurers, policy-makers and civil society to collaboratively set a new direction for creating a fast and fair energy transition in the Philippines. It intends to set the foundation for a deeper collective inquiry into the systemic barriers and opportunities for unlocking the RE sector's full and unique potential to bring about change.

This report's insights are the result of a literature review, semi-structured interviews with stakeholders from the industry, the financial sector, civil society and government, and on-site visits. It has also benefited from an expert panel's review.

The technologies we focus on

There is a specific focus on utility-scale RE technologies, given their prevalence in the Philippines' energy landscape and recognizing that ecological and social impacts emanating from the production and deployment of energy by these means will require management at scale. In particular, this report looks at:

- **Established technologies**—rapidly expanding and being mainstreamed with an established ecosystem (onshore wind, large-scale ground-mounted solar PV, and mini and micro hydro);
- **Technologies that are established elsewhere globally, but only developing** and likely to scale significantly in the next 5-10 years in the Philippines (offshore wind);
- **New technologies**—possible future sources or carriers that are still at the conceptual and trial stages (floating solar PV); and
- **Storage technologies**—required to address the intermittency of some RE (Battery Energy Storage Systems).

SECTION 1

The energy transition in the Philippines

Scaling renewable energy (RE) is critical to achieving a rapid decarbonization of the energy production system. RE also has the potential to dramatically expand access to affordable, clean energy, reduce air pollution, create jobs and build future resilience. For these reasons, UN Secretary-General António Guterres refers to the RE transformation as having the potential to be *"the peace project of the 21st century."*[4]

As the RE sector expands however, we are learning to give acute attention to managing the environmental and social impacts generated throughout the sector's value chain. Key challenges include the livelihood threats to marginalized communities, escalating volume of hard-to-manage waste from decommissioned solar panels and wind turbines, a shortage of transparency and accountability in the wider supply chain, and growing concerns about land availability and its impact on biodiversity. A heightened focus on environmental and social impact within the industry is pivotal for advancing renewables. Failure to do so risks RE deployment slowing down, jeopardizing our shared climate ambitions and our collective response to a warming planet.

As utility-scale RE begins to scale in the Philippines, there is a clear case for action to proactively integrate policies, practices, norms, and behaviors that enable the RE system to anticipate and respond responsibly to its ecological and social impacts. History provides numerous instances where unchecked growth has led to extractive and exclusionary practices in various sectors. The RE sector can learn from these and act in ways that ensure the energy transition unlocks its full potential, leveraging this opportunity to drive sustainable economic development, and transform the energy system towards one that is regenerative, inclusive, ecologically safe and socially just.

The energy transition in the Philippines

Over the last 15 years, the Philippines has made steady efforts to increase the uptake of RE. At the heart of this momentum is the nation's vulnerabilities to the climate crises.[5] Multiple hydrometeorological hazards facing the Philippines such as extreme rainfall, storm surges, floods, drought and extreme heat are projected to intensify under business-as-usual climate scenarios.[6] These impacts already contribute to annual losses in gross domestic product (GDP), with projections from the World Bank estimating that the economic damage of climate change to the Philippines could reach up to 7.6% of its GDP by 2030, and 13.6% by 2040 due to climate change risks.[7]

Recognizing these risks, the Philippines has committed to a 75% reduction in GHG emissions against a projected business-as-usual pathway by 2030, as well as its aim to peak emissions within the same timeline.[8] At the recent COP28, the Philippines signed the Global Renewables and Energy Efficiency Pledge to triple the world's RE capacity and double energy efficiency.[9] It is against this policy backdrop that the Philippines has, over the last 15 years, focused on building a RE system by introducing tax incentives and feed-in tariffs of development and use, and stimulating investments via various instruments.[10]

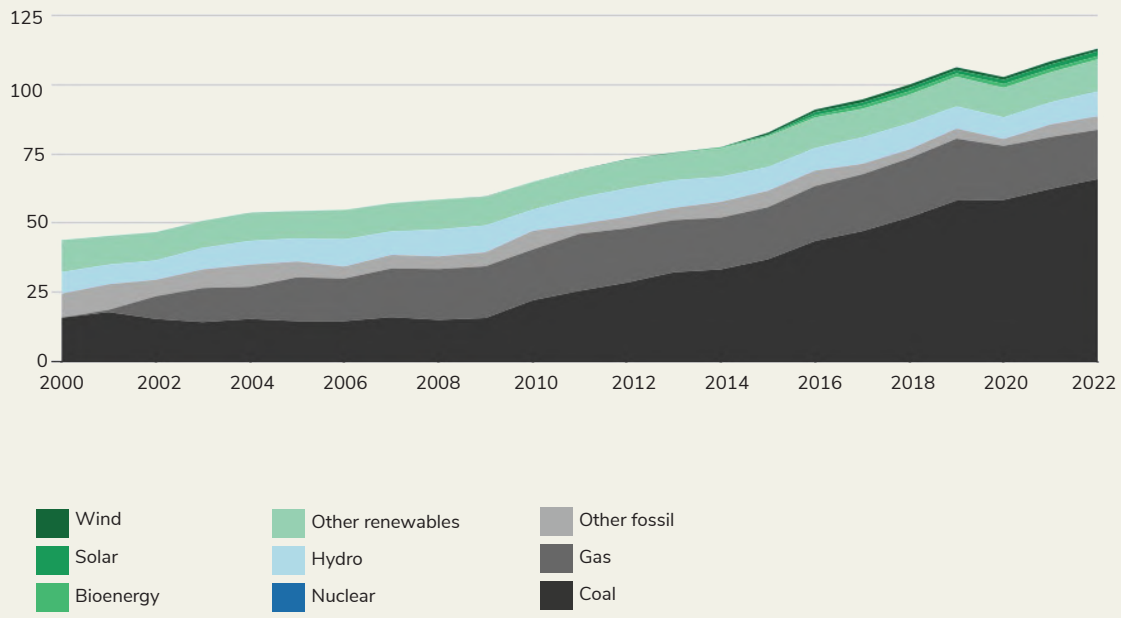
Alongside the climate agenda, these key factors are driving the energy transition in the Philippines

Current dependence on fossil fuels

The current reliance on fossil fuels is a major contributor to the Philippines' GHG emissions, with more than half of GHG emissions coming from the energy sector.[11] Within the Philippines, coal-based generation dominates the power mix, contributing over 50% of generation (See Figure 1). While its share is expected to decline to 24% by 2040, gas is currently projected to play an increasing role as a 'transition fuel' and contribute 26% of the power mix. More than half of the country's power generation is, however, based on imported fuels.[12] As a net importer of energy, there is comparatively more impetus for the Philippines to sunset fossil fuels than its neighboring countries that are producers and net exporters of carbon-intensive energy sources. The imperative for the Philippines to accelerate the transition to RE became especially apparent over the course of the COVID-19 pandemic and the Russia-Ukraine war. Both events highlighted the value of RE as an indigenous resource that is less susceptible to logistical disruptions. The Philippines' emphasis on RE is thus significantly driven by its desire to enhance energy security—particularly given the rising cost of oil.[13]

FIGURE 1

Philippines electricity generation by source (TWh)



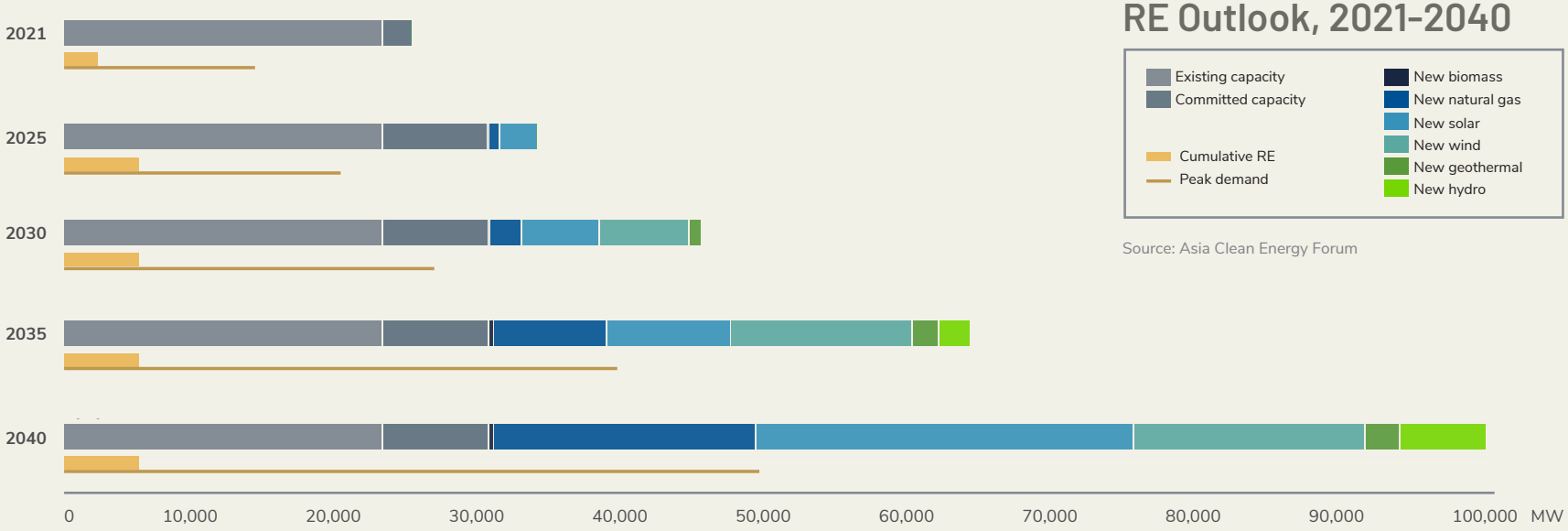
Source: Ember Electricity Data Explorer

Tackling energy affordability

Households in the Philippines pay among the highest rate per kilowatt-hour (KWh) in the ASEAN region.[15] A weakening peso continues to worsen the situation, with power rates reaching as high as PHP 21 per KWh (~USD 0.4) for consumers, many of them poor households in rural provinces.[16] Given the global decline in costs associated with the deployment and integration of solar and wind power, it is anticipated that a cleaner energy future will be more cost-effective. A study by the Institute for Energy Economics and Financial Analysis (IEEFA) has shown that greater adoption of RE sources in the Philippines could translate to a 30% discount in electricity prices.[17]

FIGURE 2

RE Outlook, 2021-2040



Source: Asia Clean Energy Forum

Future proofing the energy mix

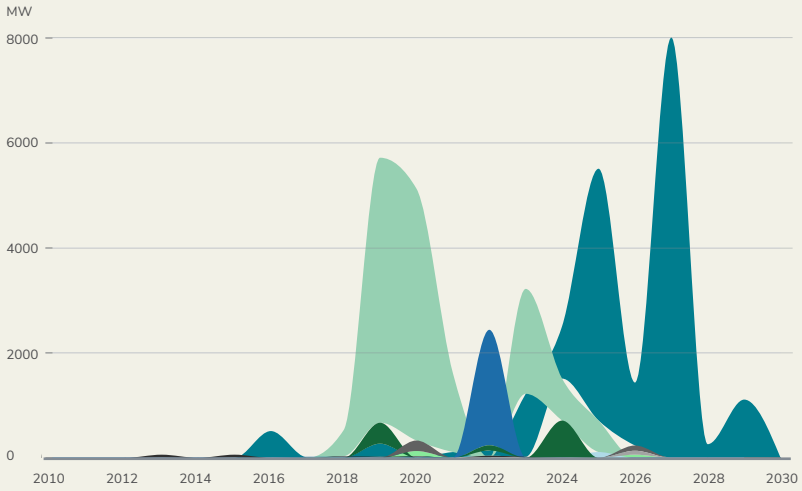
In its concerted effort to boost energy security while reducing its dependence on fossil fuels, the Philippines proposed its National Renewable Energy Program (NREP) for years 2020 to 2040. The NREP has set a target to increase the share of renewables from approximately 23% at present to 35% of the power mix by 2030 and 50% by 2040. Its ambitious project development pipeline, which foresees a 15-fold boost in combined solar and wind power by 2030, places the Philippines in pole position to potentially leapfrog Vietnam as the main RE producer in Southeast Asia (see Figure 3).[18] Hydro is also expected to contribute a fair share to the power mix, while geothermal is expected to see little new capacity addition due to high exploration costs and other risks. Beyond this, the Philippines has indicated interest to explore the potential of ocean and tidal stream energy and examine the viability of hydrogen, but is at an extremely early stage of technical studies.[19]

FIGURE 3

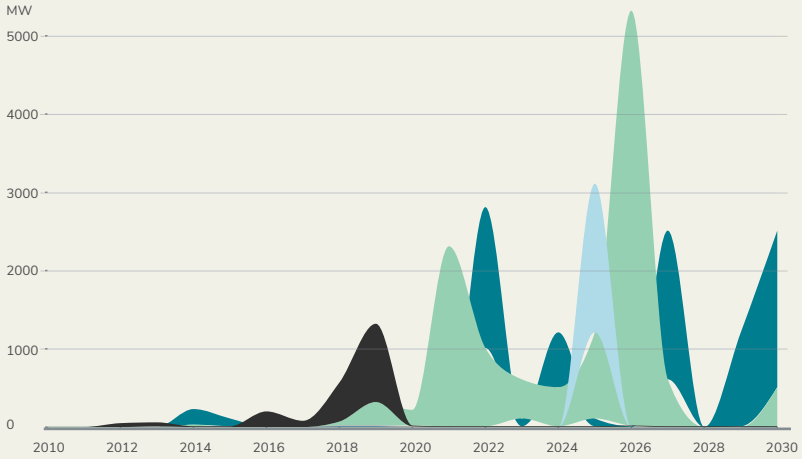
Renewable Energy Pipelines

The Philippines has the largest renewable energy development pipeline in Southeast Asia. The country plans to add 17,809 MW of solar and 7,847 MW of wind power by 2030.

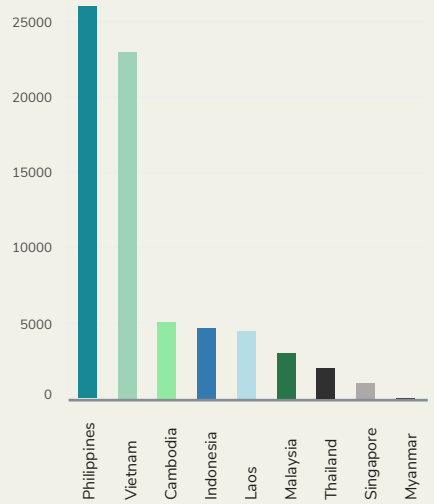
Planned solar capacity additions in Southeast Asia



Planned wind capacity additions in Southeast Asia



Total solar and wind capacity by 2030 (in MW)



Source: Global Energy Monitor

The current policy landscape

The NREP defines the renewable transition pathways, identifying policies and programs required to build the RE market, the necessary enabling regulatory environment and strategies to support access to energy and livelihoods in the transition and outlines specific programs in offshore wind, waste-to-energy, expanded rooftop solar and geothermal generation, as well as plans to develop new renewable technologies in hydrogen and ocean and tidal stream energy.[20]

To support the achievement of these targets, a range of policies and incentives have been introduced to enable RE sector growth. As early as 2008, the Philippine government introduced the Renewable Energy Act (RA 9513), which is considered to be the first comprehensive legislation on RE in Southeast Asia.[21] The Act was introduced to promote the development, utilization and commercialization of RE resources, including but not limited to biomass, solar, wind, hydro, geothermal and ocean energy resources.[22] A number of institutions support policy-making and implementation on the energy transition. The DOE is the primary government agency responsible for formulating and implementing policies, plans, programs, and regulations relating to energy resources, including RE. It receives support from a range of other institutions including the Renewable Energy Management Bureau (REMB), which manages the country's RE program and the National Renewable Energy Board (NREB), which provides advice on policies and programs, as well as coordinates with other government agencies and stakeholders to promote the development of RE in the country.

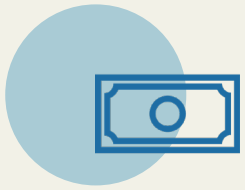
- The Energy Regulatory Commission (ERC) regulates and supervises the power industry's activities, including the generation and distribution sectors. The ERC is responsible for ensuring that all players in the industry comply with the relevant regulations and standards, and it approves rates and charges for electricity.
- As part of its mandate to manage and conserve the country's natural resources, the Department of Environment and Natural Resources (DENR) is responsible for issuing Environmental Compliance Certificates (ECC), which are required prior to any development on project sites.
- Provincial and municipal governments may set additional regulations and policies for developing RE projects within their jurisdictions, such as zoning regulations for RE facilities, environmental standards for RE projects, and incentives for RE investments. These need to be compliant with national laws and regulations and the national government has the ultimate authority to approve or disapprove RE projects.
- Parliamentary oversight comes through the House of Representatives and Senate Committees on Energy, both of whom have jurisdiction over matters directly and principally relating to the exploration, development, utilization, or conservation of energy resources and entities involved in energy or power generation, transmission, distribution, and supply.

A variety of policy instruments and bodies have also been introduced to create the infrastructure for market actors to enter the RE market in the Philippines. These are summarized in Table 1.

Table 1. Regulatory instruments and bodies that support renewable energy advancement in the Philippines

Competitive Renewable Energy Zones (CREZ)	CREZ have been identified to facilitate proactive transmission planning by identifying areas with the most economically viable RE resources.
Energy Transition Councils (ETC)	ETC have been established in specific cities that work to identify opportunities for RE projects, engage with stakeholders, and develop policies to support the transition to clean energy.
A web-based Energy Virtual One Stop Shop (EVOSS)	EVOSS platform additionally facilitates the submission, processing, monitoring, and approval of energy project permits. Currently, most DOE permits and endorsements for RE projects are lodged in the EVOSS, while the National Electrification Administration (NEA), National Power Corporation (NPC), and TRANSCO have also included some of their processes in the EVOSS.
The Green Energy Auction Program (GEAP)	GEAP is a government-led mechanism that aims to promote the development of RE projects in the Philippines by encouraging private sector participation through a competitive bidding process. It plays an important role in promoting the development of the RE sector in the Philippines by providing a market-based mechanism for project financing and incentivizing the adoption of sustainable practices throughout the life cycle of the project.
The Green Energy Option Program (GEOP)	GEOP is a voluntary program under the Renewable Energy Act of 2008 that aims to increase demand for RE. It allows electricity consumers with an average peak demand of 100kW for the past 12 months to source directly from RE power suppliers. Suppliers are also required to offer a green energy option to customers, with incentives for those that offer a higher percentage of RE.
Green lanes initiative	The "green lanes" initiative accelerates approval of licenses and permits for strategic investments. This includes mining for transition minerals, as well as clean energy projects. This initiative is expected to help the country seize USD 64 billion in investment leads from Singapore, Indonesia, the United States, Japan, China, Thailand and Europe. As of November 2023, 11 RE projects have been approved under this initiative.
Renewable Energy Trust Fund (RETF)	The RETF, established as part of the RE Act of 2008, supports research, development, demonstration, and promotion of the widespread and productive use of RE for power. The fund is sustained by various sources including emission fees, contributions from government institutions, percentages, proceeds from penalties imposed under the RE Law, and is overseen by a committee chaired by a DOE undersecretary.
Renewable Portfolio Standards (RPS)	RPS mandate electricity suppliers to source a specific percentage of their electricity from renewable sources. Initially set at 1% of net electricity sales, it has been raised to 2.52% from 2023 onwards. The aspirational RPS target is 35% by 2030. A Renewable Energy Market has also been established where Renewable Energy Certificates (RECs) can be traded, to help mandated electricity suppliers achieve their RPS requirements.

As the structures are being put in place to enable accelerated growth of the RE market, there is a need to ensure that environmental and social impact imperatives are paid attention to. For instance, the issuance of Executive Order 18 in February 2023, Constituting Green Lanes for Strategic Investments—designed to speed up the process of approving licenses and permits for strategic investments in clean energy and other sectors—has raised concerns that fast-tracking may hinder the ability for communities to highlight environmental or social risks.[23] An approach that balances fairness, accessibility, and resilience along with the need for swift renewables expansion ensures that the energy transition not only progresses swiftly, but also fosters an equitable landscape for all stakeholders involved.



Financing the energy transition in the Philippines

The Philippines, like most Southeast Asian countries, currently faces a significant infrastructure financing gap that needs to be closed if the region is to simultaneously ensure its own sustainable economic expansion and a much-needed deep transformation of its energy systems. The current national fiscal budget deficit at 21.2% in the first half of 2023[24] and the country's outstanding debt rose to PHP 13.2 trillion (~USD 237 billion) as of June 2022[25] will impact the country's ability to adequately invest in its energy transition.

Notwithstanding these limitations, the International Renewable Energy Agency (IRENA) observes that the Philippines has been taking positive steps in using public finance to promote the use of RE, encourage energy efficiency and mitigate climate change. In 2023, the central bank, BSP, proposed a new set of incentives as part of its 11-point Sustainable Central Banking (SCB) strategy, which seeks to scale up sustainable finance—including transition activities to decarbonization—through integration of sustainability principles throughout the central bank's key operations.[26] This development is important since government and central bank backing of sustainability assets, through direct investment, policy, or regulatory incentives will help increase penetration of sustainability assets across the investment landscape, thus providing alternative instruments with which investors can diversify their portfolios.

The government has also formed public-private partnerships to finance green infrastructure through mechanisms such as the Clean Energy Finance Investment Mobilization Program, together with the use of instruments such as green debt, equity, and credit enhancement mechanisms (e.g. credit guarantees).[27] This can help increase investor appetite by removing regulatory barriers, providing risk mitigation and incentives, to unlock the immense potential of private financing. Innovations such as the Energy Transition Mechanisms (ETM) leverage the power of blended finance to accelerate much needed retirement or repurpose of coal-fired power plants in the transition to a greener economy.[28] The power of such mechanisms lies in their scalability and replicability.

As it currently stands, multilateral, bilateral and development financing (MDB) is the main source of financial intermediation and credit in the RE sector in the Philippines, providing the much-needed capital where it is unavailable locally, as well as signalling the viability and creditworthiness of RE projects to attract private investment into the sector. The Asian Development Bank (ADB) has made over USD 31 billion in cumulative commitments to the country as of 2022, of which USD 3.7 billion has been directed to the energy sector in project and technical assistance (12% of total).[29]

Further, programs such as the UN's Framework Convention on Climate Change Sustainable Energy Finance (SEF), implemented by the IFC in the Philippines,[30] are designed to increase private sector investment in sustainable energy projects including energy efficiency and RE projects.[31] Two of the largest universal banks in the Philippines—BDO Unibank and BPI—have leveraged the SEF program. By the end of the SEF II program that ran from 2009–2015, 193 project loans were financed, with disbursement of USD 880 million, USD 3.02 billion of finance facilitated and 446 projects in the pipeline with 3.83 million megawatt hours (MWh) of energy produced through RE projects. In addition to MDB support, public financing in developing nations such as the Philippines has come through various multilateral and bilateral agreements including from China, its largest trade partner.[32]

Private sector financing is essential in closing this gap, given the public sector's constraints in relation to available funding as well as in effective and efficient capital allocation. As the Philippines' financial system is primarily bank-based rather than capital-market based, debt rather than equity financing is likely to play a bigger role for the time being.[33] With the current administration signaling the energy transition as a policy priority, there has been an observable lift in loans for RE project.[34] For example, LANDBANK recently greenlit a PHP 20 billion (~USD 360 million) loan to ACEN to partially finance the firm's general corporate requirements and investments in RE projects.[35] Earlier in 2023, ACEN also secured a PHP 5 billion (~USD 121 million) loan from Metrobank to expand its RE projects. There has also been increasing commercial bank participation in the bond market, with the Bank of Philippines Islands issuing three green bonds since 2018, with continued support from IFC's Sustainable Energy Finance (SEF) program. As of August 2020, over USD 2.5 billion worth of green bonds had been issued, with most of the proceeds allocated to RE.[36]

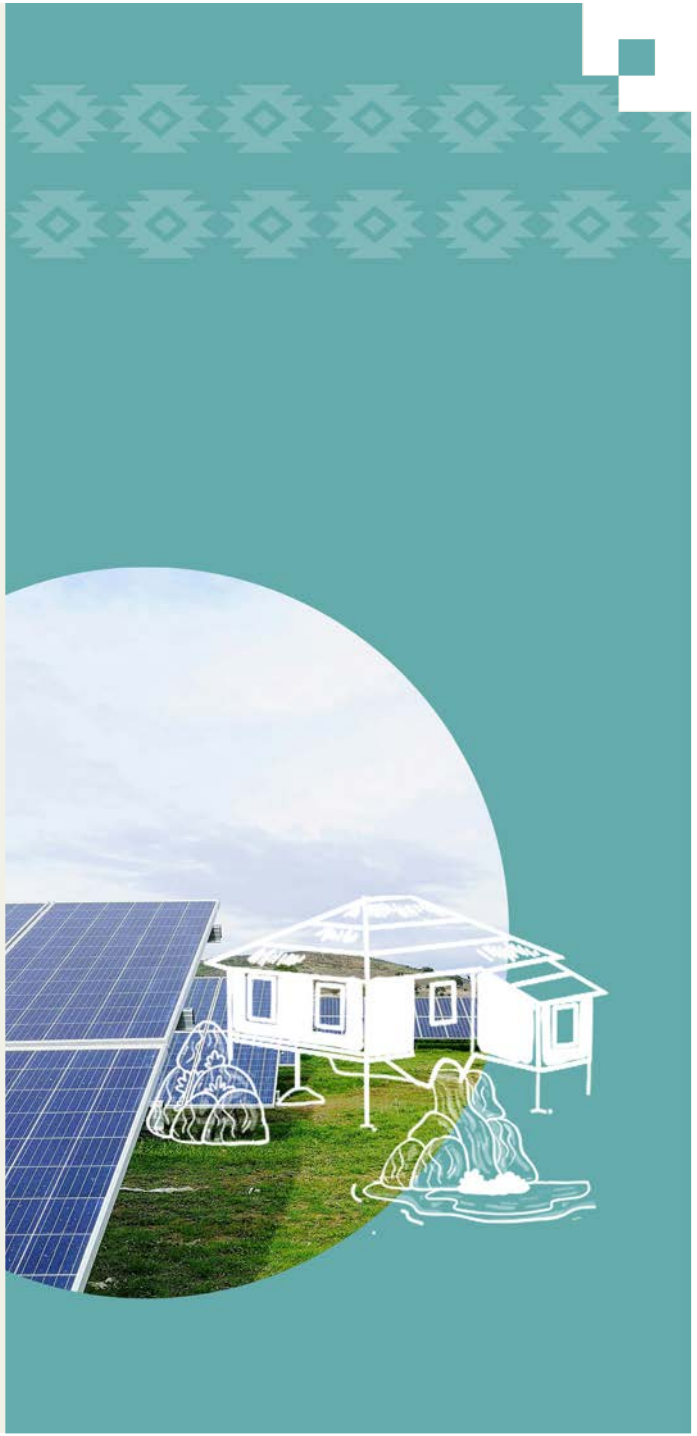
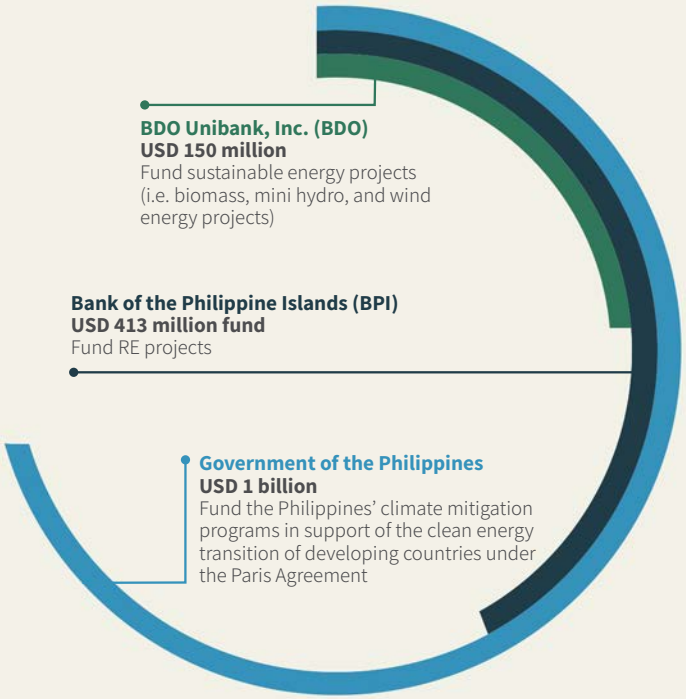


FIGURE 4

Revenues raised by the Philippines from select green bonds



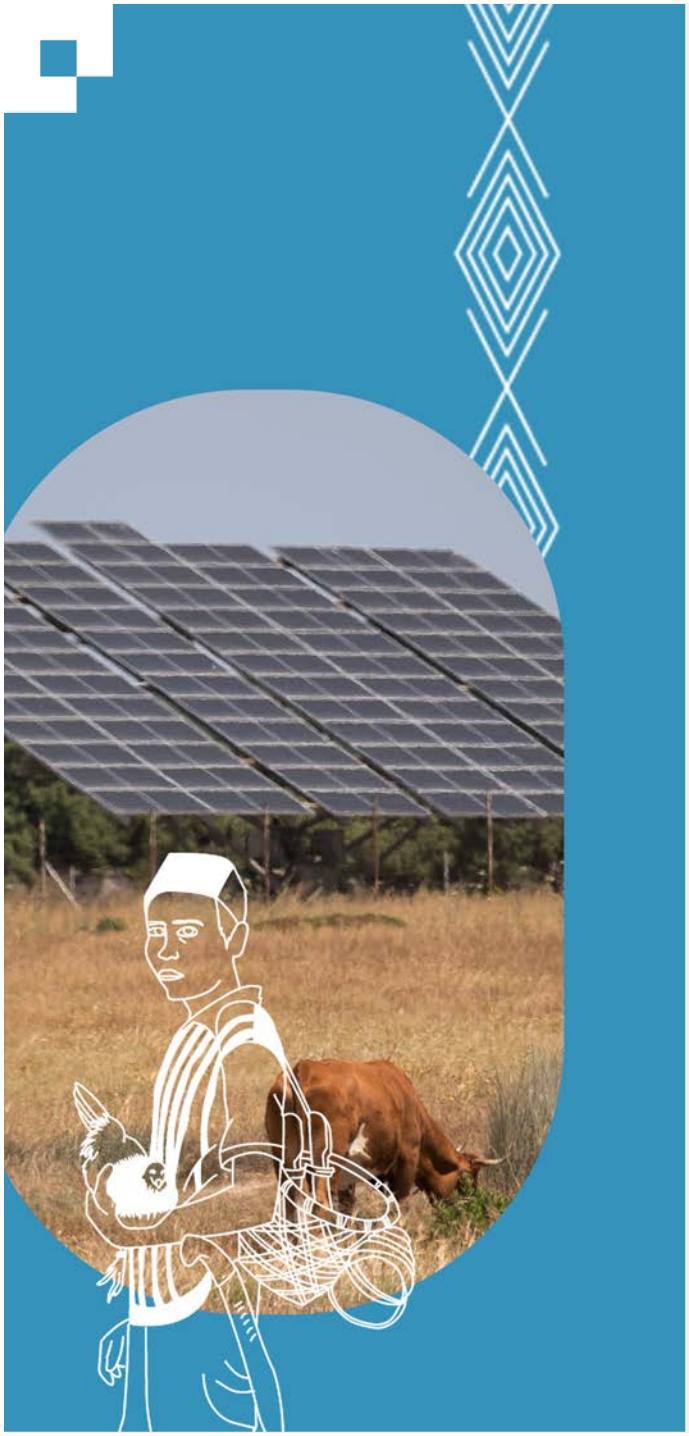
Source: Ember Electricity Data Explorer, ember-climate.org

A major challenge standing in the way of increasing private funding support for RE development is the financial sector's reluctance to invest, due to perceptions of the RE sector being high-risk with low returns because of the unpredictability of the project pipeline (given requirements on regulatory approval and the heterogeneous nature of the sector); the relative newness of technologies and challenges in accurately valuing projects; and the reliance on foreign contractors for knowledge transfer of RE development, which then increases costs.

However, investors are now starting to enter the RE market in the Philippines.[37] In BloombergNEF's 2023 annual assessment of individual markets' progress in the energy transition, the Philippines came in fourth among the ten most attractive development economies for clean energy investment. The assessment cited how the market has run two RE auctions, has a supportive environment in place, and includes an ambitious offshore wind roadmap, as factors in its placement.[38]

Spurred on by the change towards 100% foreign ownership, foreign direct investment (FDI) will also play a significant role in driving growth. The Board of Investments (BOI) has already approved a record amount of investment from foreign sources in the first five months of 2023, with PHP 532 billion (~USD 9.6 billion) in investment pledges approved—more than double that of 2022.[39] Nine Chinese energy companies, including state-owned China Energy Group and wind turbine manufacturer Mingyang Wind Power, are set to move into the Philippines with a total investment pledge of USD 13.7 billion.[40] Danish firm Copenhagen Infrastructure Partners (CIP) is investing USD 5 billion to develop three offshore wind energy projects in the Philippines with a potential capacity of 2,000 MW.[41]

Other financial instruments that are bringing greater liquidity and access to capital for the RE sector include Citicore's Energy Real Estate Investment Trust (C-REIT),[42] which allows retail investors, with traditionally lower risk appetites, to access and invest in the RE sector.



An evolving RE market in the Philippines

Several notable drivers and barriers are shaping the trajectory of the RE market in the Philippines. The maturity of the RE market in the Philippines relative to other ASEAN markets—coupled with recent government initiatives to incentivize utility-scale solar and wind projects—has contributed to a favorable environment for market formation and stabilization, particularly for these technologies.

While traditional fossil fuel companies (such as AboitizPower and Shell), as well as mining companies (such as Nickel Asia Corp. and Atok-Big Wedge) are building RE portfolios, the emergence of publicly listed 'pure-play' RE developers in the Philippines is becoming an important driver of growth in the sector. Most notably, Solar Philippines founded in 2013 has grown to be one of Philippines largest solar power companies. It aims to develop 10 gigawatts (GW) of solar by 2025.[43] Other companies such as CleanTech Global Renewables, Alternergy, Citicore Power are also developing pure RE offerings in solar, onshore and offshore wind, and run-of-river hydro. According to IEEFA, one factor driving growth is investor willingness to place a higher value on RE 'pure plays' rather than on traditional utilities in the Philippines based on the tremendous growth firms such as Solar Philippines and ACEN Corporation have shown in the past five years in comparison to firms with that still have non-renewables in their portfolio.[44]

There are however continuing barriers to the acceleration of utility-scale RE in the Philippines. Developers continue to cite the protracted permitting processes as a hurdle. Additionally, unattractive tariffs are also seen as a challenge. At the latest GEAP (See Table 1) in July 2023, more than 8,000 MW of renewable energy went unsubscribed.[45] Recognizing this challenge, policy-makers are considering revising and reevaluating tariff structures to be more reflective of the market conditions and the long-term benefits of RE. What remains crucial however is that safeguarding processes be respected and upheld alongside greater efficiency.[46]

Corporate procurement of RE is a growing trend in the Philippines. Several companies with local operations in the Philippines are members of RE100 and REPH100, committing to become 100% renewable. Furthermore, the Green Energy Option Program (GEOP) facilitates voluntary participation of industries with an average peak demand of at least 100kW in directly sourcing RE from licensed providers (See Table 1). The Clean Energy Demand Initiative (CEDI) also has the potential to unlock more than USD 2 billion in private sector investment in power infrastructure in the Philippines by leveraging corporate clean energy commitments from a range of multinationals.[47] Additional momentum is expected with the formation of the Asia Clean Energy Coalition (ACEC), a body established in 2022 to convene

world-leading RE buyers in Asia—in collaboration with sellers and financiers—to strategically shift policy in key Asian national and regional markets.[48] The Net Zero Carbon Alliance, a consortium of Philippine enterprises, also seeks to engage the private sector in the Philippines to achieve net zero by 2050.[49]

RE manufacturing is still nascent in the Philippines, with only a handful of companies currently operating in the country. Solar Philippines officially opened the country's first PV module plant in 2017, with the aim of exporting to the US and European markets in cooperation with several undisclosed Chinese companies.[50] SunPower, in turn, manufactures cells and has operated in the Philippines since 2004.[51] While the dependence on imports creates supply chain challenges, the ADB has noted more generally that solar panel PV demand in the Philippines is mainly hindered by its grid infrastructure.[52] Similarly, while there is currently no domestic wind manufacturing in the Philippines, initiatives have been put into place by the Philippine Council for Industry, Energy and Emerging Technology Research and Development to provide local support for training, resource assessment, repair, maintenance, design and fabrication of small-scale wind turbine prototypes.[53]

Scaling RE in an ecologically safe and socially just way

There is a compelling case to support a fast transition away from fossil fuel use in the Philippines towards renewables, and action is clearly being taken to achieve this. As production and deployment of utility-scale RE scales in the Philippines, risks of ecological and social impacts are likely to amplify. The need to pay attention to this phenomenon is important but to date, the well-recognized positive impacts of RE deployment in relation to decarbonization has meant that RE is usually seen as "ESG-friendly" and not requiring further scrutiny. Yet, in many ways, the RE sector's value chain shares the same range of environmental and social risks as other infrastructure sectors.[54] From the mining of critical minerals, to decommissioning, a range of complex ecological and social impacts resulting or relating to land use changes, production and manufacturing, equitable access to energy and waste are showing up across the world.

With this context in mind, the next section provides insights into the ecological and social impacts associated with the production and deployment of utility-scale RE in the Philippines, and the current governance mechanisms at play to anticipate and respond to such risks.

SECTION 2

Shaping an ecologically safe and socially just renewable energy system in the Philippines

Impacts and governance

At current levels of RE penetration into the Philippines energy market, we are only beginning to observe the material ecological and social impacts in relation to utility-scale production and deployment. There is a growing recognition of the risks and the need to take responsible steps to manage prospective risks, or else risk slowing down the transition if the social license to operate at both project and sector level comes under threat.

There is however another way to look at it: the RE sector is uniquely poised to pioneer the shift to just and regenerative business models, supported by an enabling governance framework. To achieve this potential, the RE sector will need to couple the production of RE with environmentally safe and socially just practices throughout the value chain and life-cycle of the technologies.

This section provides a summary overview of key ecological and social impacts that are already—or anticipated to be—associated with utility-scale RE production and deployment in the Philippines, as well as what is currently in place to govern, manage and mitigate these impacts. More detailed insights on these impacts that are specific to each of the technologies can be found in Section 3.

Key ecological and social risks across mainstream RE technologies

Transition minerals extraction

The RE sector heavily relies on a variety of mineral resources for energy production, distribution, and storage. According to World Bank projections, an increase in demand of over 3 billion tonnes of metals and minerals is expected by 2050.[55] As the world's fifth most mineral-rich country with substantial nickel and copper deposits, the Philippines plays a significant role in supplying these minerals to meet the growing demand across the world.[56]

The environmental and social risks associated with the mining of minerals include heavy metal pollution, health risks, threats to life, and forced displacement. Biodiversity loss is a critical risk since mines are often located in areas rich in flora and fauna.

Concerns have also surfaced about the nickel industry's reliance on labor hire companies where there are risks of workers being employed without contracts, delayed payment of wages and the absence of compulsory employee benefits (including social security and health insurance). In mining areas, the 'company town' syndrome can mean that mining activities do not contribute to alleviating poverty for local communities when skilled workers are brought in from other localities.[58] The safety of human rights defenders advocating against mining-related impacts continues to raise concerns.[59] Indigenous peoples as well as agricultural communities are often affected most by displacement resulting from the siting of mining projects [See Boxes B to D].

As the country explores the potential of deep-sea mineral exploration for cobalt, manganese, copper, nickel and other rare minerals across the South China Sea and beyond, there are clear risks of widespread ecological impacts to be considered. As an archipelagic nation with a heavy dependence upon fisheries, there will also be implications for both livelihoods and food security.[60]

Box A: Bio+Mine Project
A case study in participatory decision-making

Mines deliver essential metals for the energy transition to arrest climate change, yet they impact the resilience of both ecosystems and stakeholder communities. The rehabilitation of legacy mines can also prove challenging given the difficulties in returning them to safe and stable conditions and ensuring that the mined-out areas become productive to support the economic activity of the host community. Efforts commonly focus on purely technical and environmental aspects, leading to resistance from the local community due to their exclusion from the rehabilitation process.

In the case of the Sto. Niño copper mine (Philippines), Bio+Mine has sought to dramatically shift this approach by supporting the local community to play a central role in addressing legacy issues. With the local community, Bio+Mine is co-devising a site-specific program of intervention that mitigates the problems, recovers valuable metals for renewables, while neutralizing problematic components. The community's in-depth involvement is a significant step forward in increasing the prospect of mutually-beneficial outcomes. To this end, this site-specific system underpinned by the local community's knowledge and practices is set to become a model for wider implementation to other legacy and active mines worldwide.[61]

Box B: Copper-gold mining project impacts 40,000 hectares of prime agricultural land

The Tampakan mining project in Mindanao is set to be the largest copper-gold mining project in Southeast Asia. According to the International Union for Conservation of Nature (IUCN), it is anticipated to impact about 40,000 hectares of prime agricultural land, affecting around 20,000 farming households and displacing over 1,000 indigenous families. Located in a critical watershed area, once operational, it could pose serious risks to water provisioning and agriculture in Central-South Mindanao.[66]

Box C: New Clark City highlights key vulnerabilities of indigenous communities

The development of New Clark City—the Philippines' first smart and green metropolis—highlights key vulnerabilities of indigenous communities. While authorities provided assurances that no ancestral domain would be impacted, local communities claim that this obscures the root of their struggle, which has been the difficulty in securing certificates of ancestral domain titles (CADT) to prove their ownership of the land; a struggle that began in 1999. The Aeta people displaced as a result of this development now face food insecurity.[67]

Land use changes

As RE scales in the Philippines, competition for land will intensify. In a country where only 16% of its total land surface is deemed arable,[62] the clean energy transition will impact agricultural land use, access to water, as well as indirect land use change emissions in instances where agriculture moves to land with high carbon stocks. This is particularly so as increasingly large land banks are being acquired for the purpose of RE.[63] Conscious of these risks, a recent study commissioned by the DOE signalled the need for new policy responses to address food security implications associated with the growing number of solar and wind farms competing for agricultural land.[64]

Related concerns over the reclassification of land in the Philippines have been attributed to mechanisms and conditions of land acquisition—purchase or lease, formal or informal—often existing in an uneasy balance between customary forms of land titles and post-colonial efforts to formalize land tenure and regulate land uses.[65] Against this backdrop, land acquisition processes have been associated with land-based conflicts, as well as the further marginalization of rural land users. Since conversion of agricultural land can be easier than obtaining the Free Prior and Informed Consent (FPIC) required for use of ancestral domains, developers may opt to buy and rezone agricultural land for RE projects.

Since conversion of agricultural land can be easier than obtaining the Free Prior and Informed Consent (FPIC) required for use of ancestral domains, developers may opt to buy and rezone agricultural land for RE projects. That said, while processes such as Free, Prior and Informed Consent (FPIC) are available to attend to the impacts on indigenous communities, there is a possible blind spot in relation to farming communities who are not covered by FPIC.

Preserving cultural heritage and livelihoods of indigenous communities

According to the Legal Rights and Natural Resources Center, as much as 60% of mineral deposits in the Philippines are found in ancestral domains—areas where the rights of indigenous peoples' communities are protected by law.[68] While the constitution and other provisions such as the Indigenous Peoples Rights Act of 1997(IPRA - see table 2)[69] protect the rights of indigenous communities to their ancestral lands to ensure their economic, social and cultural well-being, this protection is subject to national development priorities.

The need for enhanced due diligence is further accentuated by the fact that protected areas and Indigenous Community Conservation Areas (ICCAs) overlap significantly with where resource extraction also occurs. In this connection, mining and other extractive industries account for 51% of all documented Environmental Critical Projects within areas registered under Certificate of Ancestral Domain Titles (CADTs), the formal tenurial instrument for ancestral lands under the Indigenous Peoples Rights Act.[70]

While not all of these involve companies involved in the extraction of transition minerals, an ecologically safe and just energy transition depends on ensuring that the sharp rise in demand for these resources upholds principles of FPIC. It further requires that women within indigenous communities be afforded the right to equal participation in FPIC and other related processes.

Box D: Indigenous resistance and conflict over nickel mining in Brooke's Point, Palawan

In Brooke's Point in Palawan, nickel mining, led by Ipilan Nickel Corporation (INC), has triggered robust opposition and protests from indigenous Palaw'ans, local residents and the local government. The conflict centers around the mine's location within Mt. Mantalingahan, a protected area considered sacred by the Palaw'an community. In response to concerns about irreparable environmental damage, the Supreme Court issued a writ of kalikasan against several entities involved in the mining operations, highlighting the potential peril faced by Brooke's Point residents.

Local residents and the government have linked deeper, muddier floods affecting homes and livelihoods to the mining activities and deforestation caused by the firm's actions. Reports of irregularities in the FPIC process have also surfaced, particularly regarding the construction of a pier that has disrupted local fishing and lobster harvesting practices. In August 2022, the National Commission on Indigenous Peoples (NCIP) responded by issuing a cease-and-desist order (CDO) against INC, citing the company's failure to obtain the required FPIC. However, INC has continued its mining operations, defying the standing cease-and-desist order (CDO) issued against them.[71]

Gender-related impacts

In many rural contexts, women are responsible for growing food for their family and income. Consequently, land grabs—whether for RE or transition mineral extraction—risk endangering women's livelihoods and food security.[72] Worldwide, estimates also indicate that men outnumber women in RE-related jobs, especially in technical, managerial and policy-making positions, and are often paid more for the same type of work.[73] The just energy transition is a critical opportunity for overcoming gendered power structures.

As the energy transition accelerates in the Philippines, it will be important for all actors involved to increase efforts to gather gender-disaggregated data that will identify where gender-related impacts are turning up within RE value chains and where there are risks of inequities.[74] A starting point is recognizing that energy services have gendered patterns of use, which are linked to the gendered division of labor and roles in society, leading to different requirements on energy supply and appliances.[75] This further highlights the imperative to address gender-related energy barriers and differences in opportunity to act upon the provision of supply.[76] Such assessments must look into the different types of energy use made by women within the informal sector, which may hamper their agency or the capacity to take action in securing access to energy services.[77]

As for gender-related risks in the production of RE, it has been noted that in siting decisions, women may not be adequately consulted, or compensation may be solely allocated to heads of families due to 'gender-blind' policies.[78]

Some developers, such as the EDC, have already been taking important steps in collecting disaggregated data, with one particular example relating to gender ratios for community engagement in monitoring compliance requirements of tree-cutting permits.[79] Deliberate steps have also been taken to select women as heads of livelihood associations across RE projects.[80] In an effort to further support such leadership, the Fair Finance Association will be launching a feminist development framework for the Just Energy Transition in February 2024.

The just energy transition is a critical opportunity for overcoming gendered power structures.

ASIA FEMINIST COALITION

Box E: Bridging the gender gap in the RE value chain

The imperative to integrate women's perspectives into energy decision-making arises from the need for equitable sharing of benefits and risks in the energy transition. Currently, the majority of decisions in the energy sector, spanning production, deployment, and electricity use, are predominantly made by men. Bridging this gender gap calls for the creation of inclusive spaces that represent women's interests in energy, while also acknowledging their dual role as primary caretakers. Implementing accountability systems, including gender audits, is crucial in both public and private processes.

Notably, the Philippines' Department of Energy is the frontrunner among ASEAN nations, having introduced a gender toolkit and Gender and Development Focal Point System in 2019, in collaboration with the Philippine Commission on Women.[81] It aims to prioritize gender equality and women's empowerment within energy policies and programs, and is responsible for setting up systems for collecting and processing sex-disaggregated data.[82]

Despite strides towards gender mainstreaming in RE policies, stakeholders have reported that related activities often lack adequate and sustained budget support.[83] Women's underrepresentation in decision-making and problem-solving processes persists, and RE policies have been described as being primarily business-oriented, with limited scope for gender and social inclusion.[84]

Labor rights

While WalkFree assessed the Philippines to have the second strongest response to modern slavery in the Asia Pacific, it also noted that it was among the most vulnerable countries to modern slavery, with risks largely driven by conflict—and climate-related displacement, inequality and discrimination.[85] This provides the context for noting that the complexity and opacity of the renewables supply chain leaves the sector open to risks of modern slavery - especially in relation to the extraction of raw minerals and the manufacture of various key components.[86] In mining, there is evidence that indicates risks of workers in the Philippines being hired without contracts and irregularities with wage payments in ways that breach labor laws.[87]

With regards to manufacturing of RE components for utility-scale production, given its limited scope in the Philippines at present, most of the risks are transboundary across the supply-chain. For example, 40-45% of the world's solar-grade polysilicon—a key component in 95% of solar modules—are sourced from the Xinjiang Uyghur Autonomous Region of China, where instances of forced labor have been widely reported.[88] Meanwhile, growing demand for balsa wood used in wind turbines has been associated with exploitation of workers in the balsa industry in Ecuador, as well as forced labor linked to increased illegal logging across the Amazon rainforest.[89]

It remains unclear to what extent the Green Jobs Act of 2016 has been effective in curbing reliance on labor hire agencies at the construction, operations and maintenance stages. Beyond favoring casual contracts, such agencies are often associated with the use of unqualified workers, as well as little training or apprenticeships.[90] The precarity of employment is also likely to discourage workers from voicing safety concerns.

Cumulative impacts on biodiversity and wildlife

The RE sector's potential threats to biodiversity and wildlife are multi-faceted, both in terms of direct and indirect impacts. The impacts of mining transition minerals have been documented [see Box F]. In relation to production, one of the better-known examples related to wildlife is fauna collision with wind turbines. The likelihood of this depends on factors like bird species, season, time of day, noise, and even wind speed or temperature.[91] Habitat fragmentation—associated with the conversion of vast tracts of land for the installation of solar and wind power—has also affected the migration patterns of local birds in the Philippines and wider Southeast Asia.[92] Similarly, in other RE technologies such as small hydro, impacts of individual small reservoirs and weirs will usually be limited, yet may have substantial impacts on river ecosystems when considered collectively.[93]

Related changes in ecosystem functions and biodiversity loss also occurs when deforestation during project siting displaces local wildlife.[94] Studies suggest that, while there is an understanding that biodiversity underpins ecosystem functions and services, many stakeholders may not appreciate the

difficulties of restoring biodiversity akin to reference ecosystems.[95] Unless biodiversity goals are explicit, levels of restoration risk being inadequate to support the level of functional ecosystems and desired ecosystem services upon which traditional livelihoods depend.

While reforestation does not automatically mitigate the ripple effect of biodiversity loss, plantings do have the potential to provide conservation co-benefits when diverse mixtures of native species are selected. To achieve the desired outcomes, however, biodiversity objectives must be integrated into reforestation projects and specific restoration goals with transparent reporting outcomes must be set.[96] These objectives should also be informed by robust stakeholder engagement mechanisms, with particular emphasis on creating the conditions for marginalized communities to participate equitably.

As the expansion of RE projects continues, cumulative impacts are at risk of contributing to the passing of critical ecosystem thresholds—which in many instances may not be immediately obvious due to system lags. While best practice indicates that solar PV can not only co-exist with agriculture, but also enhance biodiversity, ensuring that such practices become mainstream will be essential to safeguarding the natural world as the energy transition accelerates.

Box F: Threatened species of flora and fauna at Mt. Bulanjao, Palawan

In the province of Palawan, home to 105 threatened species of flora and fauna, Mt. Bulanjao was previously designated by the authorities as "areas of maximum protection" to protect species that were endemic to the province, and extraction of metals was not allowed. The Rio Tuba Mining Corporation, however, has recently announced the expansion of its operations into these areas. [97]

End-of-life disposal

In the Philippines, end-of-life disposal processes for the RE sector are currently overlooked, with a lack of policy frameworks to govern waste management and disposal of RE components. Failing to address risks associated with the end-of-life stage of RE technologies can result in significant vulnerabilities such as ecological harm, health hazards, and inefficient resource utilization. For instance, the presence of hazardous materials in solar panels like cadmium and lead can contaminate ecosystems and endanger the health of those involved in disassembly or disposal.[100] Furthermore, the lack of reusability or recycling designs for RE will lead to large volumes of waste reaching the disposal stage in the near future, compounding the challenge. This risks especially being so if rapid improvements in generation efficiency result in significant volumes of modules being replaced before the end of their lifespan. Managing these end-of-life disposal risks and exploring circular economy innovations are essential to reduce dependence on finite resources and ensure an ecologically safe and socially just transition to RE in the Philippines. Measures to reduce energy demand and improve energy efficiency are equally important in this regard.

Current governance landscape for ecological and social impacts relating to RE production and deployment

This section provides a situational analysis of the governance structures in place in the Philippines to anticipate and manage existing and emerging ecological and social risks associated with RE production and deployment. The multidimensional and intersectional nature of these impacts requires a matrix of public, corporate and civil society governance mechanisms that work in complement to create the conditions for safeguards and accountability in the RE system. This matrix is still evolving however and there is an opportunity to design it systemically to support a just transition.

Public governance mechanisms for addressing ecological and social impacts in the RE sector

The Renewable Energy Act, which anchors the clean energy transition in the Philippines, requires RE projects to comply with environmental and social standards set by relevant government agencies. It also provides for civil liability for environmental damage caused by RE projects. Project developers are required to provide financial assurance in case of environmental damage, and they may be held liable for any damages that occur. The Act is complemented by a range of other legislative and regulatory measures that together provide the regulatory framework for attending to environmental and social impacts of RE production and deployment. A high-level summary of these is articulated in Table 2.

The DOE and the Environmental Management Bureau (EMB) are required to conduct regular monitoring and inspections to ensure compliance with these environmental and social standards. These inspections can lead to fines or penalties for non-compliance.[101] However, limited resources are said to impede monitoring and enforcement capacity.

While policy direction is set at the national level, local governments have discretion on RE development in their jurisdictions. For instance, while national government agencies set and steer RE interests, local government units can exercise spatial jurisdiction over the RE project sites in their locality, such as through the issuance of permits and construction endorsements. The devolution of such key functions to Local Government Units (LGUs), which have more limited capacity to implement permitting and monitoring, could affect the extent to which LGUs are able to adequately assess social and environmental impacts of RE developments. As the energy transition accelerates in the Philippines, it is becoming increasingly evident that further regulatory measures will be needed to manage impacts. This could include legislation to address some current gaps. For example, under consideration is a House Bill for a National Land Use Act aimed at creating a comprehensive land use system and physical planning mechanism that integrates all mandates and policies on the use and protection of lands to ensure a "just, holistic and ethical planning consistent with the principle of sustainable development."[102] Once signed, a National Land Use Commission will be established to oversee integration activities from national to local government unit level. The hope is that this new integrated approach will course-correct a previously fragmented system where various land laws were sector-specific, resulting in conflicts on land.[103] It will also constitute a vital safeguard against strengthening climate change impacts and disasters that disrupt people's lives and economic activities.

Apart from new legislation, there may also be a need to undertake a systemic assessment of how the various laws and regulations work in complement rather than in conflict with each other, so as to avoid scenarios where the intended outcomes of protecting against ecological and social impact are not achieved because of disconnectedness.

As part of the suite of public governance mechanisms, the judiciary has played an important role in providing legal remedy to civilians where environmental or human rights have been breached. It has often referred to Article II of the Philippine Constitution of 1987,[106] which enshrines the right of the people to a balanced and healthful ecology along with the State's duty to protect it for this purpose. One example is the *writ of kalikasan*, which allows individuals or groups to seek remedy when the environmental damage is of such magnitude that it prejudices the life, health, or property of inhabitants in two or more cities or provinces.[107] The mining sector has been hardest hit by the writ, as evidenced by a 2016 High Court issuance of a writ against five mining companies. Large-scale hydroelectric dams have also been the focus of others.[109]

Across other technologies, in 2015 the Court of Appeals ordered the suspension of the operations of a wind farm in the province of Ilocos Norte on the basis that the wind farm had caused significant environmental damage and health risks to communities. More recently, in 2019, it ordered the DENR to revoke the ECC of a 60 MW solar power plant in the province of Cebu, ruling in favor of local residents and environmental groups who alleged that the power plant had caused significant environmental damage, posing risks to nearby communities. Together, these examples point to the judiciary playing an active role in upholding environmental protections. However, a fast and fair transition is dependent on the root causes of these cases being addressed from the outset. To that end, the REI PH Call to Action seeks to collaborate with actors across the value chain.

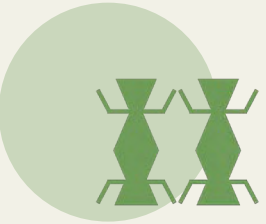


TABLE 2

Legislative and regulatory mechanisms complementing the Renewable Energy Act

National Integrated Protected Areas System (NIPAS) Act – RA 7586

The NIPAS Act establishes and manages protected areas in the Philippines, which may impact the location and design of RE projects. In addition, the Forest Management Bureau (FMB) policies and guidelines aim to promote sustainable forest management practices, including the protection of biodiversity and carbon sequestration, which are relevant to RE projects that involve land use changes.

Comprehensive Agrarian Reform Program (CARP) – RA 6657

CARP affords ownership rights to landless farmers on government acquired lands. With Department of Agrarian Reform approval, CARP allows agricultural land to be converted to other uses, particularly if agriculture is not deemed the most economically beneficial land use. While CARP affords farmers a range of protections, these are limited by a 1993 Supreme Court ruling which authorizes the Philippine government to override CARP through eminent domain for projects in the public interest, including energy infrastructure.[104]

Philippine Environmental Impact Statement System Law (PEISS) – PD 1586

The existing policy framework on environmental protection and natural resource management is institutionalized through the Philippine Environmental Impact Statement System (PEISS). The Environmental Impact Assessment (EIA) is a planning and management tool designed to help government, decision-makers, developers and affected communities decide whether the benefits of the project will outweigh potential environmental risks. A key purpose is to provide democratic input into the decision-making process.[105]

Indigenous Peoples Rights Act (IPRA) – RA 8371

This law recognizes and promotes the rights of indigenous cultural communities and indigenous peoples in the Philippines. It protects their rights to their ancestral domains to ensure their economic, social and cultural well-being. It also recognizes the applicability of customary laws governing property rights or relations in determining the ownership and extent of ancestral domains. The IPRA additionally upholds the right to free, prior and informed consent (FPIC).

Ecological Solid Waste Management Act – RA 9003

This Act provides for the proper management and disposal of solid waste, including hazardous waste generated by the RE sector.

Renewable Energy Safety, Health, and Environment Rules and Regulations (RESHERR) – DC 2012-11-0009

The RESHERR, issued by DOE in November 2012, mandates safety and protection against hazards to health, life, and property and addresses environmental concerns such as air, land and water pollution during the operation of RE facilities. In June 2021, the DOE took additional steps to issue RESHERR related specifications for each RE technology, including geothermal, hydropower, solar, wind and biomass. These require RE companies to designate an eligible safety officer and be subject to random safety inspections by the DOE and the Renewable Energy Management Bureau (REMB).

Clean Water Act – RA 9725

This law promotes the protection of different water resources from pollutants brought by industries, commercial establishments and agriculture. The sectoral focus of this policy is industry, manufacturing, public and agriculture.

Administrative Code of 1987

This code provides the guidelines for public consultation with concerned sectors prior to the implementation of any project. Additional guidelines for public consultations also feature in the Local Government Code of 1991.

Box G: Environmental Impact Assessments for RE development

According to the Philippine Environment Impact Statement System (PEISS), prior to any development activities on a project site, the RE developer must secure an Environmental Compliance Certificate from the DENR-EMB, where the RE project is for 100 MW or more.[110] Undertaking an Environmental Impact Assessment (EIA) is required and this process includes the formulation and development of corresponding measures designed to mitigate identified adverse effects, as well as plans and mechanisms for performance monitoring and environmental management, including proposed compliance with other environmental policies.

The assessment investigation usually looks into the following impacts for the duration of the life-cycle of a project: ecological vulnerabilities resulting from land use changes, direct and indirect impacts on the local and regional biodiversity during site development, construction, and operation of the project; competition and conflicts arising from the use of water resources and water quality; meteorology and climatology, climate change projections, GHG mitigation potential, noise, and air quality; intrusion into protected and environmentally critical areas; potential generation of chemical wastes, solid-waste (including equipment end-of-life stage disposal); and potential effects on the heritage and cultural resources, socio-economic well-being, or public health conditions within the local and regional population.

The table shows the documentary requirements for RE projects depending on their scope and coverage in line with PEISS.[111]

Despite strong disclosure features underpinning the PEISS, concerns arise regarding the implementing agencies' resources and capacity to review EIAs, as well as to implement, enforce, and monitor measures that are set out in the approved assessments.[112] Ambiguities in the procedural guidelines could be compounding these challenges, though there are positive signals of these being addressed. A case in point includes the government's issuance of temporary freeze orders vis-à-vis floating solar and offshore wind in May 2023, until relevant permitting processes are aligned across relevant agencies. A particular focus included alignment on the breadth and scope of marine special planning requirements.[113]

TABLE 3

Documentary requirements for RE projects depending on their scope and coverage

	COVERED (Required to secure ECC)			NOT COVERED (May secure CNC)	
Projects/Description	**Category A: ECP**	**Category B: Non-ECP**		**Category D**	**Project Size Parameters and Remarks**
	ECC	**EIS**	**IEE Checklist**	**PO (Part I only)**	
Hydropower Facilities	**≥ 50 MW**	**≥ 10 MW but < 50 MW OR With Tunneling (Regardless of Capacity)**	**> 1 MW but < 10 MW and Without Tunneling**	**≤ 1 MW Without Tunneling**	**Total power generating capacity** **For projects with weir/dam/other impounding facility, refer to dam as additional criteria for multi-component project screening**
Renewable Energy Projects (Ocean, Solar, Wind, and Tidal Power)	**None**	**≥ 100 MW**	**> 5 MW but < 100 MW**	**≤ 5 MW**	**Total power generating capacity**

Corporate governance mechanisms for addressing ecological and social impacts in the RE sector

Corporate governance mechanisms provide a necessary complement to public governance ones to prevent, manage and mitigate environmental and social impacts emanating from business operations along the value chain. These can take various forms from disclosure and reporting requirements mandated by company law and stock exchange filings, to investor ESF disclosure requirements, as well as internal corporate ESG policies. Industry associations can also wield considerable influence by establishing industry principles and leveraging their advocacy efforts to shape the norms of the operating environment.

Finance Sector ESG Policies and Implementation: The Philippines launched its Sustainable Finance Roadmap and Guiding Principles in 2021 to align public and private investment in green projects, address policy gaps in promoting sustainable finance, and facilitate investment in public infrastructure to catalyze sustainable financing in the Philippines.[114] Sustainable finance has been defined as incorporating *"climate, green and social finance while also adding wider considerations concerning the longer-term economic sustainability of the organizations that are being funded, as well as the role and stability of the overall financial system in which they operate."*[115] The Philippines finance industry has, however, yet to fully incorporate ESG and sustainability considerations into its businesses. Interviews with various RE market actors indicated a limited awareness of the full environmental and social risks associated with development of the RE industry, or the need to consider them. As RE projects are considered high risk and heterogeneous infrastructure projects requiring large amounts of funding over long periods of time, considerations of long-tail risks associated with RE are less of a priority.

Multilateral Development Bank safeguards: Through DFIs, sustainability frameworks such as the ADB's Safeguard Policies, World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines), and IFC's Environmental and Social Performance Standards have been imported into the Philippines' investment landscape, proving an effective complement to evolving national standards and regulations in relation to RE environmental and social impacts. These guidelines and standards incorporate appropriate due diligence, review, and supervision processes to ensure clients/borrowers comply with requirements.

The ADB has had a Safeguard Policy Statement (SPS) issued since 2009, which builds on three previous safeguard policies addressing the environment, involuntary resettlement, and indigenous peoples, bringing them into a consolidated framework that applies to all ADB loan-supported projects. The IFC also provides its own Sustainability Framework which outlines its commitment and approach to sustainable development and comprises the organization's Sustainability Policy, its Performance Standards, and its Access to Information Policy. The IFC Environmental and Social Performance Standards[116] are significant as their eight standards - which establish IFC clients' requirements to identify, assess and manage environmental and social risks - serve as the basis for the Equator Principles (discussed in the next section). Some local developers have explicitly aligned themselves with the IFC performance standards in their environmental and social policy statements.[117]

However, beyond projects directly financed by DFIs, the application of the IFC performance standards by financial intermediaries such as banks lacks a standardized approach. Nonetheless, there are ongoing amendments to the IFC performance frameworks, aiming for increased uniformity in applying standards across financial intermediaries. Explicit agreements to commit to the IFC standards are being incorporated into loan agreements for high-risk projects, reinforcing the adherence to these standards.

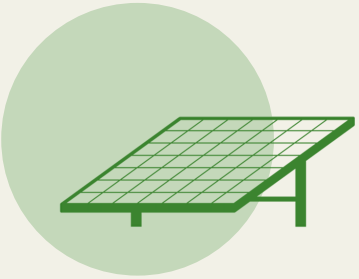
Philippines-based banks and ESG: Local banks can play a key ESG monitoring role, with bank lending having the required flexibility to disburse funds gradually over the lifespan of a project; and when there are unforeseen events, banks can quickly restructure debt to meet additional capital needs of projects.[118] These advantages are also opportunities for banks to the steward behavior of borrowers throughout the banking relationship including making the disbursement of funds conditional on disclosure and risk assessments of specific social and environmental impacts. None of the domestic banks are currently signatories of the Equator Principles (EP), an environmental and social risk management framework adopted by financial institutions that has been derived from IFC standards.[119]

However, the application of ESG conditionalities upon RE projects by Philippines-based banks is beginning to take root slowly and with the notable increase in large loans to the sector, there is an opportunity to support this trajectory.[120] Furthermore, there is potential for international banks to introduce other global standards, setting new benchmarks for Environmental, Social, and Governance (ESG) practices. For instance, HSBC has established policies in this regard, including a forestry, mining and metals, and heritage site policy; however, its current influence in this specific domain within the RE financing market in the Philippines remains relatively limited.[121]

ESG reporting and corporate responsibility regulation: ESG reporting can play a vital role in stakeholder governance of environmental and social impacts in the RE sector by promoting transparency, accountability, informed decision-making, and the continuous improvement of industry standards. It empowers stakeholders to engage with companies, influence their practices, and encourage responsible management of environmental and social concerns, ultimately contributing to a responsible energy transition.

The development of ESG reporting in the Philippines is a new practice, only recently catalyzed by the issuance of the Securities and Exchange Commission (SEC) Memorandum Circular No. 19, “Code of Corporate Governance for Publicly-Listed Companies” in 2016, and reinforced in 2019 with SEC Memorandum Circular No. 4, “Sustainability Reporting Guidelines for Publicly-Listed Companies”. The guidelines have an expansive view of corporate purpose, reinforced the relevance of stakeholder governance, and introduced sustainability reporting in the governance framework of publicly-listed companies.[122] Notably, the SEC has made sustainability reporting mandatory for publicly-listed companies as of 2023. To date, there have been some challenges with the guidelines: for example, the ability to apply a variety of reporting frameworks has led to fragmentation in how publicly-listed companies submit their disclosures and the lack of independent assurance. They are currently being updated with the aim of elevating the quality of sustainability reporting and expanding its coverage to non-listed corporations as well.[123]

Global developments in sustainability regulations also the impact environmental and social governance structures of companies in the Philippines, and RE actors will need to take note of this. For instance, the



European Union's Corporate Sustainability Reporting Directive (EU CSRD) has implications for Philippine companies looking to export to European markets. The Philippines has also expressed its intent to adopt the International Sustainability Standards Board inaugural standards to be launched in 2024.

While there has been an upward trend in the adoption of sustainability disclosures by publicly listed companies in the Philippines,[124] most large local energy incumbents diversifying their portfolios through RE subsidiaries currently do not highlight any RE-specific environmental or social impacts in their publicly available reports.[125, 126] Encouragingly, interviews surfaced that while reporting requirements do not extend to non-listed companies or projects, certain listed companies did ensure that their subsidiaries followed suit. For instance, the EDC is not publicly listed and has no compliance requirements from the SEC, but as units of First Philippine Holdings, it regards reporting on ESG as an intrinsic part of the purpose and mission of the EDC.

Corporate policies and internal sustainability governance: RE developers in the Philippines exhibit a diverse range of strategies and approaches in addressing their environmental and social impacts. For some in the sector, running an RE business in itself ticks the ESG box by supporting the transition towards clean energy, boosting energy security and contributing towards sustainable, economic growth, thus warranting a lesser degree of scrutiny in terms of value chain impacts.

A significant number of RE developers operating in the Philippines manage their Corporate Social Responsibility (CSR) initiatives through separate foundations or entities that operate independently from their core business operations, which focus on philanthropic and community engagement efforts that are separate from core business operations.

Some go further in managing environmental and social impacts arising from their business practices and have stronger sustainability governance structures in place. Impacts are managed through robust environmental and social management systems, with ISO14001:2015 certified environmental management systems being most commonly used.[127] There are policies around human rights, indigenous peoples and a dedicated sustainability committee at the board level. For these firms, their CSR efforts are aimed at creating positive social impact directly in the communities where the developers operate, through social investments in building infrastructure for host communities in RE project sites (e.g. building access roads, bridges, power transmission lines, solar street lights) and supporting livelihoods opportunities (partnering with local tourism, farmers etc. to create jobs and provide materials/capital).

A third—and much smaller set—of RE developers in the Philippines are driven by forward-looking views towards ESG, with integrated governance systems equipped to allow for real-time monitoring and feedback from external stakeholders. These developers demonstrate their commitment to not merely meeting regulatory requirements, but to setting industry benchmarks for responsible environmental and social governance in the RE sector, with many framing their sustainability strategies in line with ecologically safe and socially just outcomes. This could also include unlisted or smaller companies that are not currently obligated to disclose their ESG performance.

Notably, these firms tend to prioritize employment opportunities for local residents and indigenous peoples throughout the project life-cycle. Some actively support the formation and accreditation of Indigenous Peoples' Organizations (IPOs) within their host communities[128] and adopt policies to explicitly respect land rights within their own operations. They look beyond their immediate value chains to consider trade-offs, e.g. addressing food security concerns due to loss of agricultural land through co-siting solar panels.[129]

Across the spectrum of approaches, one area requiring further attention is the creation of robust grievance mechanisms that are consistent with the UN Guiding Principles on Business and Human Rights and that are designed to enable trust for rights-holders, as well as providing adequate assistance for those who may face particular barriers to access. Such grievance mechanisms should be based on engagement and dialogue and constitute a source of continuous learning, with a view to preventing future grievances and harms.[130]

Risk mitigation mindset: RE is perceived as inherently clean and the focus of risk mitigation is on more "traditionally unsustainable" parts of the business and on increasing RE investments. Examples of practices include Corporate Social Responsibility being separate from RE operations and focused on unrelated environmental and social impacts.

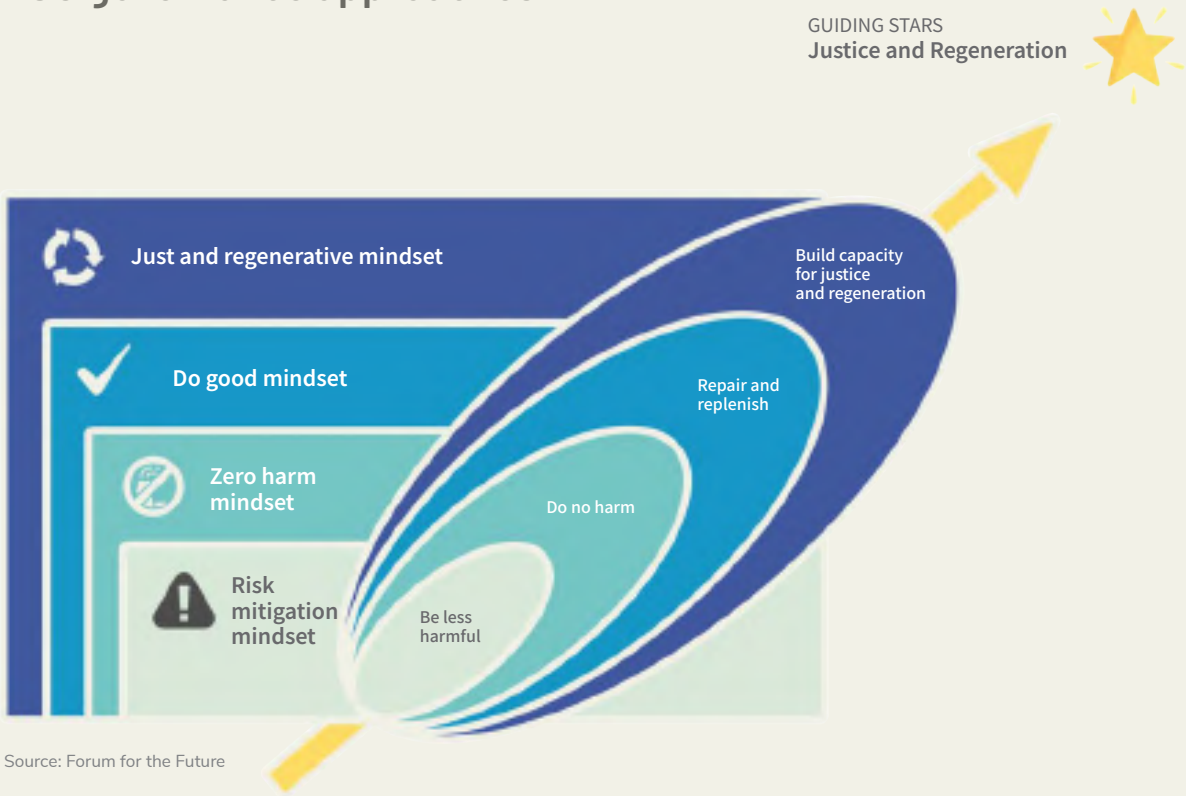
Do no harm mindset: Recognizes the environmental and social impacts arising from RE operations and takes steps to minimize them. Examples of practices include creating company-wide policies around human rights; complying with voluntary standards; establishing high-impact and targeted CSR programs.

Do good mindset: Actively creating positive impact by taking action to repair and replenish communities and ecosystems and embedding sustainability into core operations. Examples of practices include creating opportunities to strengthen the participation of historically disadvantaged groups; launching initiatives to manage trade-offs associated with RE land use.

Just and regenerative mindset: Beyond traditional ESG frameworks, it recognizes the interconnectedness of all natural systems, as well as the interdependence of planetary health with human health and well-being. It is underpinned by principles of intergenerational justice and distributional justice, it ensures that the clean energy system remains resilient for future generations. It transcends the mere inclusion of women and marginalized groups towards the restructuring of energy systems to prioritize social equity, environmental integrity, and adopts economic justice. Examples of practices include actively building capacity to ensure that ecological and human systems are able to adapt, evolve and thrive in the context of social and ecological disruption.

FIGURE 5

Underlying mindsets arising in different ESG governance approaches



Source: Forum for the Future

TABLE 4

ESG responses of the top five solar and onshore wind RE developers in the Philippines

(by cumulative installed capacity as of November 2023)[133]

	About the company	ESG policies and narratives	ESG initiatives
ACEN  solar  wind	ACEN has over 600 MW of solar and wind capacity operational in the Philippines, and has the largest international portfolio among listed Philippine energy companies. The company targets 100% RE in its portfolio by 2025. At present, it is 98% RE and 2% diesel. Under the Energy Transition Mechanism by ADB, ACEN has already divested its final diesel plant. It has set targets for a fivefold increase to 20 GW of attributable renewables capacity by 2030.	In March 2020, ACEN adopted an Environmental and Social policy aligned with the UN Framework Convention on Climate Change and focused on creating value for the communities it serves.[134] In November 2021, ACEN established a board-level Sustainability Committee and an executive-level ESG Committee to regularly review its sustainability strategy, culture and values, while maintaining oversight of performance.[135] In 2023, it adopted a Human Rights Policy Statement that emphasizes the importance of due diligence to identify, prevent, mitigate and account for adverse impacts.[136] ACEN seeks to "meet the needs of the present without compromising the ability of future generations to meet their own needs."[137] "ACEN affirms [its] commitment to protect biodiversity, forest areas, endangered and migratory species, water sources and aquatic habitats."[138]	ACEN pioneered a circular initiative to upcycle plastic waste collected from solar panel packaging materials into eco-bricks. These eco-bricks are subsequently utilized in the construction of new solar plants, effectively closing the loop. ACEN launched "Solar Gulayan", an agrivoltaics-based program, at five of its solar farms across the country and has already harvested more than 1,700 kilos of crops. ACEN created a conservation estate in Ilocos Norte inside a wind farm through analogue forestry to mitigate impacts on biodiversity.
Citicore Renewable Energy Corporation (CREC)  solar	CREC, a leading pure-play RE developer, currently operates a total of ten solar power plants across the country. CREC has a 5 GW project pipeline in the next five years.	"Through ESG, the company is not only a leader in harnessing renewable energy, but a responsible steward of growth and development towards a green future." "Citicore recognizes the need to 'provide sustainable sources of energy while upholding the essential balance of our ecosystems." They explicitly recognize the need to ensure responsible practices in renewable energy generation. "It is the Company's practice for the new projects to undergo screening for potential harmful impacts by incorporating its environmental management programs with quality management and occupational health and safety standards."	CREC is the first AgroSolar-Social RE generating company in the Philippines pioneering agrivoltaic technology, with a view to boosting both food security and local livelihoods as it generates solar energy. CREC runs initiatives to enhance the employability of host communities by offering training in electrical installation and maintenance. CREC hosts the Pailaw project to provide night-time solar powered light units for host communities.

TABLE 5

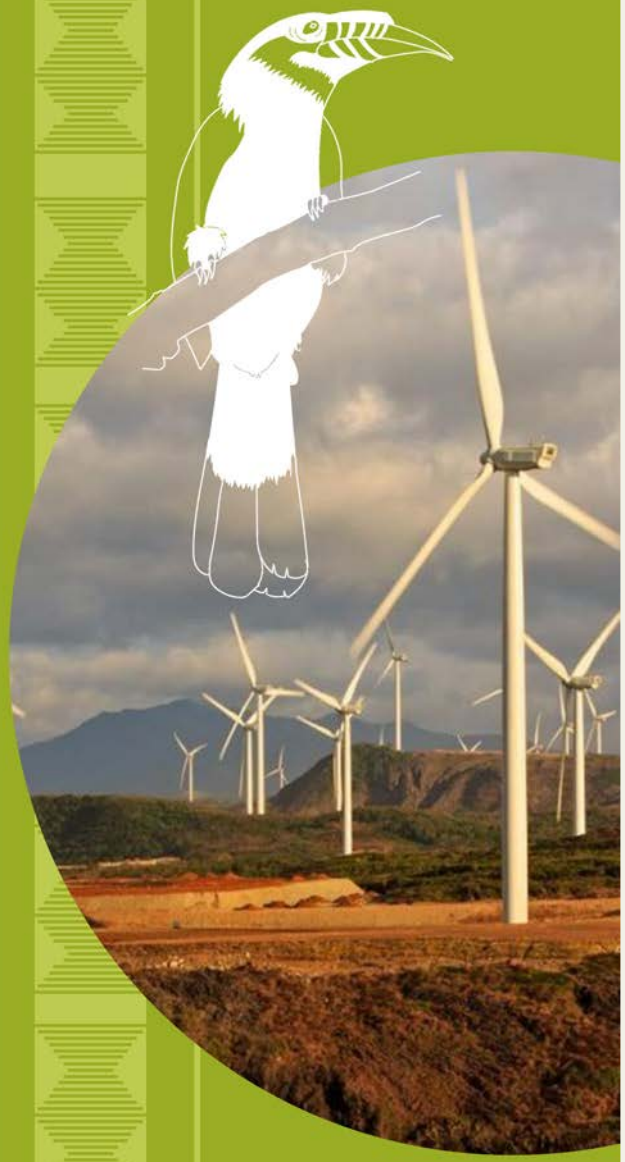
ESG responses of the top five solar and onshore wind RE developers in the Philippines

(by cumulative installed capacity as of November 2023)[133]

	About the company	ESG policies and narratives	ESG initiatives
Energy Development Corporation (EDC) onshore wind	EDC, a leading geothermal developer, is also the owner and operator of the 150 MW Burgos Wind Project in Burgos, Ilocos Norte, which is the country's only combined wind and solar farm. Six other wind power projects of the EDC have been given clearance by the DOE to conduct a system impact study (SIS), the largest of which is the 996 MW Iloilo-Guimaras offshore wind project.	EDC explicitly acknowledges that "pursuing sustainability that seeks only to do less harm is no longer good enough'' and has adopted the following mission— ''to forge collaborative pathways for a decarbonized and regenerative future." "We are mindful that we exist within highly diverse and nested systems and must all play unique, reciprocal, and synchronized roles in a world that needs healing." "EDC's human rights policy affirms the company's commitment to recognize, respect, and safeguard the human rights of all individuals working for the organization. It promptly monitors human rights situations in project areas, and minimizes response time to address potential human rights breaches." EDC'S CSR policy states that "EDC is committed to promoting social prosperity and environmental stewardship through the implementation of a comprehensive, responsive, and sustained program on social responsibility, in partnership with its stakeholders and in keeping with its energy objectives."	EDC runs the BINHI program, which is the largest private sector led reforestation initiative. Initiatives to regreen, rescue and propagate endangered local tree species are situated primarily in areas around the company's geothermal operations.
Solar Philippines solar	Founded in 2013, Solar Philippines is one of the earliest solar developers in the country. Solar Philippines has secured 10,000 hectares of land for conversion into solar energy zones, which will be opened to partners and third party locators who want to build solar farms	"Creating opportunities and empowering communities with solar energy."[139] "The Corporation shall be socially responsible with respect to its dealings and transactions with the community where it operates. It shall ensure that its operations comply with environmental laws, rules, and regulations. The Corporation shall promote a mutually beneficial relationship with stakeholders. This relationship shall foster the growth of the Corporation while it contributes to the advancement of the community and protection of the environment where it operates."[140]	No publicly available sustainability report.[141]
Alternergy run-of-river hydro solar offshore & onshore wind	Alternergy is a small pure-play renewables developer that has listed its shares on the stock market recently, raising a total of PHP 1.61 billion (~USD 29 million). It is aiming to develop 1,370 MW of RE projects including wind, offshore wind, solar and run-of-river hydro projects in the next five years.	Alternergy a "quadruple bottom line philosophy of financial profitability, climate change mitigation, host community benefits and employee satisfaction" and views its "impact on the next generation as the ultimate measure of our success."	Alternergy's 54 MW Pililla Wind Farm received the IFC Sustainable Finance award for being the first non-recourse wind project financing by an entirely local bank syndicate, and the country's first non-recourse wind financing for a Feed-in-Tariff project. Alternergy set up a visitor info center in partnership with WWF at the Pililla wind farm, where visitors and the local community learn about the benefits of clean energy.

Industry associations: Industry associations can play a substantive role proactively identifying current and future challenges for their parts of the sector and establishing task forces to shape a response. In the US for instance, associations are paying attention to social issues in the value chain. For example, the Solar Energy Industry Association (SEIA) has pledged to eliminate forced labor in solar value chains, amassing signatures from over 340 companies, including some of the largest manufacturers in the world.[142] In Europe, the Solar Stewardship Initiative, supported by over 60 solar companies, has introduced a comprehensive supply chain assurance scheme to ensure credible data transparency and bolstering ESG standards across the solar supply chain.[143]

In the Philippines, key industry associations include the Confederation of Solar Developers of the Philippines (CDSP), the Philhydro Association Inc., the Philippine Solar and Storage Energy Alliance (PSSEA), the Renewable Energy Association of the Philippines (REAP) and the Wind Energy Developers Association of the Philippines (WEDAP). Developers of Renewable Energy for AdvanceMent, Inc. (DREAM) is the national organization that unifies RE industry associations to advocate for RE policies and promote knowledge sharing. Currently, most associations focus on policy advocacy, consultations, awareness and capacity building activities to attract investments into and create a conducive policy environment for the RE sector.



Civic governance of the RE sector

Alongside public governance and corporate governance mechanisms, civic governance mechanisms have an important place in ensuring the accountability of the RE sector in the Philippines for its ecological and social impacts. Long active in advocating for the clean energy transition—for example, the moratorium on coal-fired power plants was a direct outcome of civil society advocacy—civil society is now emphasizing the need for the transition to be safe and just for the planet and its people to thrive. The risks of ecological and social impacts associated with the RE sector are being brought to light in the Philippines is a result of civil society working with affected communities to identify areas of concern, raise awareness with both state and private sector actors and advocate for mechanisms to prevent and remedy adverse impacts.

As an example, knowing that the energy transition will catalyze a considerable increase in demand for transition minerals, civil society organizations are calling for the adoption of the Alternative Minerals Management Bill (AMMB).[144] The Bill proposes a transformation of the present minerals regime by balancing the need for minerals with environmental, social, and economic considerations. It features an exhaustive list of "no-go" mining zones and recommends a framework that gives agency to affected communities and local government units to approve projects that are sited in their localities.[145]

Civic governance in relation to RE development has also come in the form of civil society groups supporting affecting workers and communities to access remedial avenues, ensuring accountability within the system, and contributing to norm-setting. The Alternative Law Groups, a coalition of over 20 legal-empowerment organizations in the Philippines, has been active in this respect. In pursuing an approach called "developmental law", coalition members seek to empower poor and marginalized populations, while supporting efforts to bring about systemic justice reforms.[146]

Participatory forms of decision-making—especially in relation to land use changes—are a critical means of building a responsive and resilient RE system. To this end, civil society has played a key role in foregrounding this as a core component of siting decisions, ensuring that FPIC procedures are abided by—where the development plans affect occupancy, control and utilization of ancestral domains—and communities are able to effectively engage in the process. Indigenous communities have nonetheless raised concerns over this ability being undermined by the time limitations outlined in the Revised FPIC Guidelines (NCIP Administrative Order No. 3 Series of 2012), which allow communities a maximum of only 60 days for their deliberations.[147]

Where civic governance plays a further important role as RE scales is in upholding principles of distributional justice, by ensuring a fair distribution of the responsibilities, costs and benefits of the energy transition are shared equitably across different economic and social groups. As the RE system evolves in the Philippines, creating the conditions for benefits-sharing will be foundational to the health and resilience of the energy transition. Over the years, prototype models have been tested in the Philippines, especially in distributed, community-based RE, yielding principles on how RE development can be facilitated by community-enhancing processes. For example, SIBAT (Sibol Ng Agham Teknolohiya) and a coalition of similar village development organizations have test-bedded decentralized energy supply systems established and maintained through multi stakeholder processes. These systems benefit from governance structures that ensure ownership of local organizations and pay specific attention to different modes of gendered ownership. As utility-scale RE enters the energy system, there is an opportunity to embed indigenous ownership, community-owned or co-owned models, drawing on such examples.[148]

Whether the transition realizes its full potential in delivering an ecologically safe and socially just energy system depends on all actors across the system recognizing the systemic nature of the challenges at hand, and thus the importance of collaborating across silos. It is in bringing together stakeholders who do not traditionally sit at the same table that we increase the prospect of unlocking that potential and accelerating the RE sector's ability to drive a transition that is fast, fair and just.

Indigenous and rural communities, enlightened companies and investors, and public-spirited governments are already demonstrating that it is not only possible but advantageous to build renewable energy projects that deliver shared prosperity and recognise Indigenous leadership.

Joan Carling, Executive Director, Indigenous People's Rights International; and Phil Bloomer, Executive Director, Business & Human Rights Resource Centre

SECTION 3

Overview of the key ecological and social impacts of RE technologies produced and deployed in the Philippines

This section shares insights into the current and anticipated ecological and social impacts associated with utility-scale production and deployment of RE in the Philippines. The initiative focuses on the following technologies: solar, floating solar, onshore and offshore wind, energy storage systems and small and mini hydro.

These impacts are considered in the context of how they interact with the challenges humanity faces in relation to:

The **finitude** or limited availability of physical and biological resources;

The **fragility** of ecosystems and their vulnerability to disruption - the impacts of which may not be immediately apparent due to system lags; and

Achieving **fairness** in the equitable and inclusive distribution or usage of available resources, which speaks to key Just Energy Transition principles,[149] such as the production and deployment being guided by rights-based approaches, and that those affected by RE policies and projects be granted a meaningful say in their design and implementation. Fairness also depends on the availability of - and adequate access to - effective remedies.

The Finitude, Fragility and Fairness ("3F") Framework[150] provides an important means of assessing whether the operations of a particular RE technology are able to meet the needs of humanity while remaining within planetary boundaries.[151] Furthermore, it enables a critical view of whether the deployment of the RE technology is holistically contributing to ensuring planetary resilience and to the well-being of its stakeholders or, if it is extracting resources and value in ways that weaken both.

For each technology, we provide a summary map of key risks and impacts across the 3Fs along the value chain. In these, we focus on the material issues being raised by sector and civil society experts, and recognize that additional risks may arise as understanding evolves.

The 3-F Framework: Finititude, Fragility, and Fairness

Finitude

Physical and biological resources are finite, and there are limits to how much we can use. This is true even for renewable resources (such as freshwater) if the rate of extraction is greater than rate of recharge.

RE technologies need different kinds of resources such as metals, minerals (including rare earth minerals) and fresh-water, either as raw materials or to keep them operating. These may be extracted across local, national and international boundaries.

Fragility

The vulnerability of an ecosystem to different kinds and scales of shock, at a given point in time. A combination of multiple shocks can lead to tipping points beyond which the system breaks down, causing social and environmental damage. Often, social and environmental shocks can compound or feed off each other to create unexpected or disproportionate impacts.

Activities within the RE value chain can risk exacerbating existing shocks to ecosystems or create new ones. For example, rapid land-use change driven by RE projects can impact ecosystem services. Social shocks like loss of traditional livelihoods for pastoralism can drive further land-use and socio-economic change.

Fairness

Recognition and protection of human rights, as well as the concepts of social and ecological justice. Both intra-generational fairness (fairness between different people and other species within the same generation) and intergenerational fairness (ensuring our actions are fair to future generations, while attending to our well-being).

RE technologies can lead to unjust outcomes, and also exacerbate existing injustices. For example, land acquisition for RE projects can benefit landowners to the detriment of other users of land (such as pastoralists, agriculture labour). The process can also have disproportionate economic impact on women, who experience higher degrees of land tenure insecurity.

Solar

The Philippines currently generates 896 MW of solar energy and the commitments under the National Renewable Energy Program (NREP) indicate that most growth in renewables will come from this sector.[153] Land-based, utility-scale solar installations are by far the largest category of solar installed in the Philippines. While its current share stands at 4%, it is expected to comprise approximately a third of generation capacity in 2040.[154] According to the DOE's most recent list of "Awarded Solar Projects" (31 August 2023), projects totalling 26.4 GW have been awarded to date, of which 1.35 GW have been installed.[155]

The top developers of Solar currently include ACEN, Solar Philippines and Citicore CREC. Other developers include Aboitiz Power, Terra Renewables, Pavi Green and San Miguel Corporation.[156]

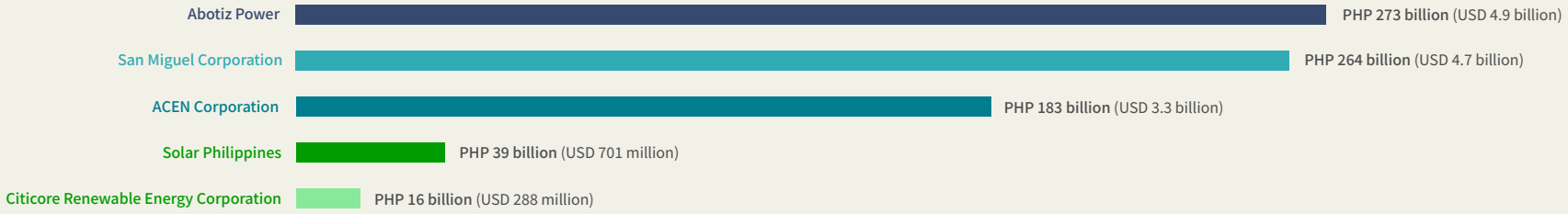
In June 2023, Solar Philippines initiated expansion of its 500 MW Nueva Ecija solar expansion project, aiming to achieve a total planned capacity of 4 GW.[157] This ambitious project is set to be one of the world's largest solar farms, spanning over 3,500 hectares of land.

Presently, there is limited PV module manufacturing capacity in the Philippines, with the majority of solar cells, modules and components being imported from China.[158] The first solar PV manufacturing plant was opened by Solar Philippines in 2017–2018. Meanwhile, SunPower, a US headquartered solar manufacturer, has been manufacturing solar cells in the Philippines since 2003 and is looking to invest USD 900 million in expanding its operations in the country.[159]

Estimates from ADB indicate that solar panel manufacturing can boost Philippine GDP by as much as USD 175 million.[160] A number of manufacturers are considering investing in solar manufacturing in the Philippines, including Trina solar, Longi, Jinko, Green Wing, JA Solar, Canadian Solar, BoViet Solar, and Dehui. Moreover, domestic solar farms are also relying on local manufacturers for parts, installations, and repairs.[161] Growth in manufacturing in the Philippines represents a critical opportunity for upholding labor rights at this crucial step of the value chain, boosting the country's market advantage in the process.

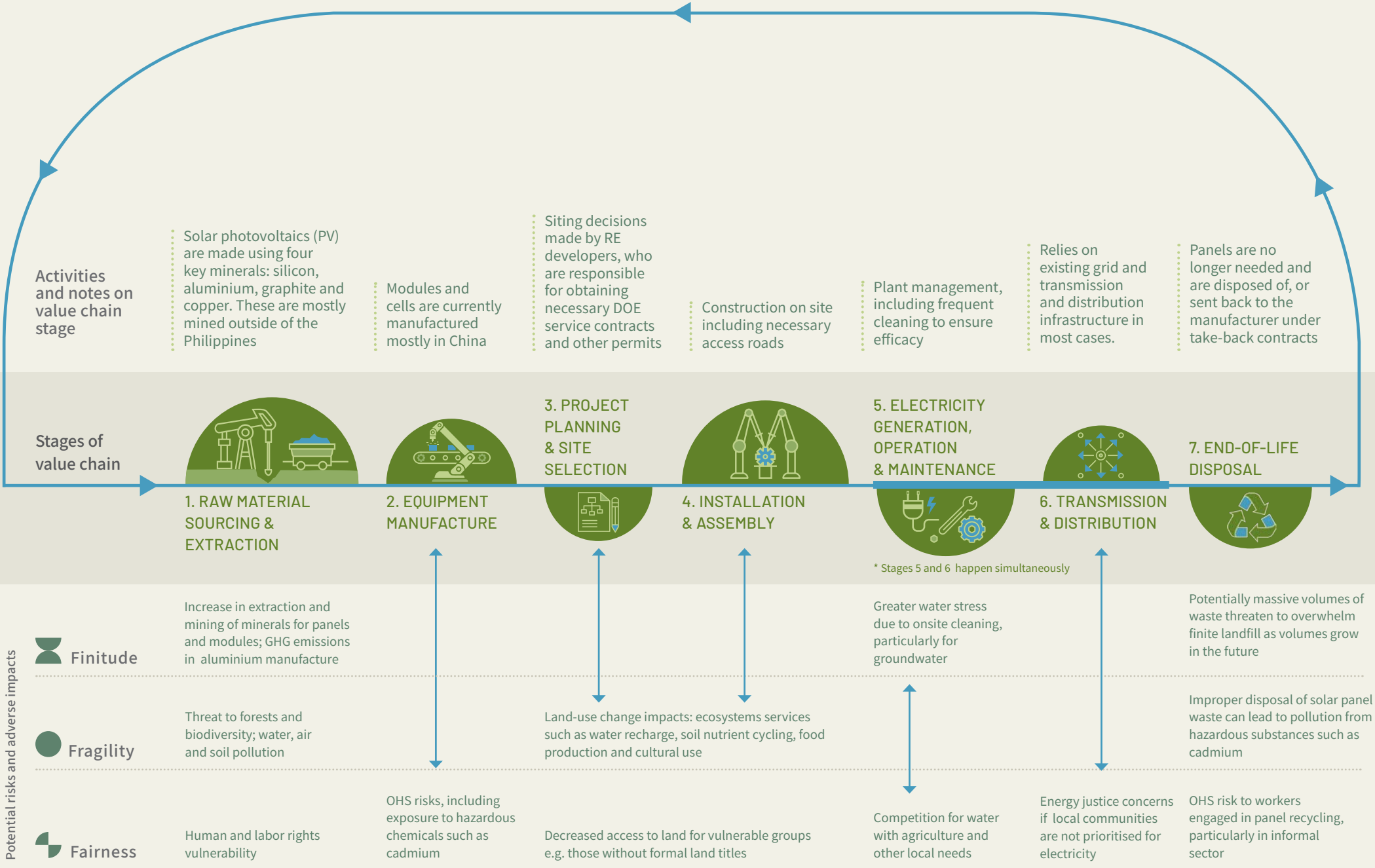
FIGURE 6

Top developers of solar



Source: Financial Times Market Data[117]

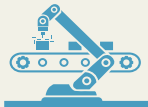
Key ecological and social risks across the solar value chain



Key ecological and social risks across the solar value chain

RAW MATERIAL SOURCING & EXTRACTION

Adverse environmental and health outcomes: Increasing market demand risks incurring rapid deforestation at a rate that reforestation programs may not be able to compensate for—particularly given the topography of where nickel mining is concentrated. Related soil erosion raises both biodiversity and food security related concerns. Adverse health and community welfare outcomes have also been identified with the extraction and local processing of nickel ore, including respiratory diseases, as well as skin lesions.[164] Repeated exposure to hexavalent chromium can additionally lead to lung cancer.[165]



EQUIPMENT AND MANUFACTURING

Reports of excessive working hours and forced labor: Minerals from the Philippines are mostly exported without processing, but this is poised to change as the government is considering taxes on nickel exports to encourage investment in domestic processing plants and add value to the mineral product.[166] The growth of this sector in the Philippines will provide an opportunity to local RE actors for yet greater visibility into their value chain. As for manufacturing, China's Xinjiang province—notorious for reports of forced labor—accounts for 40% of global polysilicon manufacturing. The fact that the Philippines imports most of its solar PV modules and inverters from China should prompt focused supply-chain due diligence to inform procurement choices.[167]

PROJECT PLANNING & SITE SELECTION

Food-energy nexus linked to land use changes: As a mountainous archipelago, only 16% of the Philippines' total mass is arable. Competition for limited land resources is becoming increasingly apparent in the context of food production and the development of solar farms in particular, as it is under flatlands that solar radiation is most easily captured.[168] This emphasizes the value of further innovations in solar system designs and agricultural practices that optimize both energy and agricultural production at co-located sites.

Cumulative impacts on biodiversity and wildlife: Although solar PV related impacts on conservation have not yet been extensively studied in the Philippines, wider research across Southeast Asia have identified both direct and indirect impacts of large-scale solar energy on biodiversity. In some instances, habitat fragmentation associated with the conversion of vast tracts of land for the installation of solar power has affected the migration patterns of local birds.[169] EIAs and ESG criteria are not currently equipped to assess risks of passing critical ecosystem thresholds. While some habitat loss may not have a large impact on wildlife, an entire population may be endangered or decimated when a certain threshold of fragmentation is surpassed.[170] Cumulative impacts will need to be taken into particular consideration within Competitive Renewable Energy Zones, due to the concentration of RE technologies in operation across these areas. They must also be taken into account in the context of expanding land banks, reaching over 2,000 hectares.[171]

OPERATION & MAINTENANCE

Potential impacts on natural food chain and groundwater: The increase in insects attracted to the light and warmth of solar panels during the operations segment of the life-cycle increases the prospect of attracting new predators, which in turn, may disrupt the natural food chain.[172] It additionally risks introducing exotic species invasion, which in turn, affects vegetation structures.[173] As for maintenance, the cleaning of solar panels can be highly water intensive. In turn, the use of chemicals or related seepage at solar facilities (for example, dust suppressants, dielectric fluids, herbicides) can result in contamination of surface or groundwater.[174]

END-OF-LIFE DISPOSAL

Chemical leaching and related soil contamination: There is a lack of clear regulations for disposal of solar panels and limited infrastructure for their recycling, presenting a significant risk of generating high volumes of hazardous waste if panels are sent to landfills. Solar panels contain heavy metals like lead, cadmium and improper disposal methods, such as leaving them in landfills or incineration without proper treatment, poses significant risks of chemical leaching and subsequent soil contamination.

The transition to solar energy comes with a host of positive outcomes, including the significant reduction in GHG and other air pollutants such as sulphur dioxide, nitrogen oxides, carbon monoxide, and volatile organic compounds. In addition to these benefits, construction and operation of solar facilities creates both direct and indirect employment and additional income in the regions where the development occurs—although continued attention needs to be paid to the equitable distribution of these benefits. Crucially, solar further lends itself to decentralized and locally owned energy generation, which can reach remote and low-income communities. To achieve the full potential of the shift to solar, it will be important for the sector to identify the ecological and social impacts that will emanate from production and deployment at utility-scale. Our research provides some indication of where these impacts are already surfacing as well as where they might in the future.

A number of measures can be taken to minimize the impact of solar energy on wildlife and biodiversity. This includes modifications in design, such as installing solar panels on raised platforms to create shaded areas that can provide habitat for wildlife. Additionally, measures such as bird diverters and wildlife fencing can be implemented to help reduce the risk of bird and animal collisions with solar panels.

In turn, locating solar power plants on land that has already been disturbed or degraded can help to minimize the impact on natural habitats and reduce the loss of biodiversity. This includes former industrial sites or agricultural lands that are no longer in use.

Taken further, solar power facilities can have a net positive impact on wildlife and biodiversity when they play an active role in the restoration of degraded or disturbed lands, which can help to increase biodiversity and provide new habitats for wildlife.[175]

Solar energy co-exists with agriculture through ACEN's agrivoltaics program

ACEN's newest landmark sustainability program has produced more than 1,700 kilos of crops since it was established early in 2022. ACEN's agrivoltaics program ensures that available land within the solar plants is optimized for food production, thus improving local food security while generating RE.

In this symbiotic farming system, the plants help keep the solar panels cool, making them more productive by generating up to 10% more electricity, and allowing for more solar energy to be harnessed. The planted crops, on the other hand, thrive in the additional shade that the solar panels provide. Since the crops are in a more protected environment, they become less stressed and yield more harvest. Moreover, with the shelter that the panels provide, the plants require less water, thereby reducing its overall consumption.

Apart from offering improved efficiency on the solar farm's output, food production and plant stress, the program also creates access to livelihoods.

ACEN's solar plants have identified local farming organizations from their respective host communities to partner with and enhance the food supply chain, namely: Alaminos Laguna Consumers Cooperative (ALACCO) for Alaminos Solar and Zambales Millennial Farmers and Producers Association for Palauig Solar. Through these partnerships, ACEN helps champion the communities as main stakeholders, as the company targets to scale up and replicate the project in its future solar projects across the Philippines.

Floating solar

Globally, floating solar has demonstrated significant growth in recent years, increasing by more than 250-fold between 2014 to 2020—from a total installed capacity of 10 MW at the end of 2014[176] to 2.6 GW by 2020.[177] The technology is receiving interest because of its potentially higher efficiency than ground-mounted solar PV and floating solar's complementarity with existing hydropower infrastructure. At some existing large hydropower plants, only 3-4% of the reservoir would need to be covered with floating solar panels to double the electricity generation capacity of the dam. By 2026, floating solar projects are already expected to generate up to 1,800 MW—the equivalent electricity demand of over two million homes.[178] Once completed, the combined projects will constitute the largest set of installations in Southeast Asia.[179]

Laguna de Bay—the Philippines' largest freshwater lake—has emerged as a key testing ground for this technology. Situated approximately 30 km south of Metro Manila, the lake hosts 35 shoreline municipalities and serves as a source of food, water and livelihoods.[180] A 2,000-hectare (4,900-acre), 1,300 MW FPV project is being planned in this location, with expected operations to begin in 2024. As the first large-scale operation on a natural lake in the Philippines or globally, the Laguna Lake Development Authority (LLDA) has been proactive in addressing a host of uncertainties by supporting four small-scale pilot projects—Baras and Cardona in Rizal province and Los Baños and Bay in Laguna province.[181] Each has been planned for one year, with the first initiated in 2018. These have been subject to a set of precautionary principles, most notably with regards to the establishment of water quality monitoring stations, water quality parameters, and hydrometeorological data to be collected.[182]

Water surface rights and access to natural resources

Floating solar has the advantage of circumventing land acquisition issues associated with traditional solar installations. It can therefore allow for power generation to be sited much closer to areas with high population density and competing uses for available land. However, the example of Laguna Lake—where scores of livelihoods depend on fishing and agriculture—foregrounds the likelihood of similar competition for limited resources.

The Laguna Lake Development Authority (LLDA) has thus additionally adopted requirements to consult with local fishermen and the local officials, with a view to gaining a better understanding of their needs and securing their consent.[183]

Freeze order

As numerous questions remain over the potential long-term effects of FPVs on the environment and local communities—particularly as in the case of large-scale installations—Environment Secretary Maria Antonia Yulo-Loyzaga issued a

freeze order in May 2023 to temporarily suspend the acceptance, processing and approval of environmental compliance certificates (ECC) for floating solar energy projects. This order extended to offshore wind, which is also new to the Philippines. The temporary order was designed to allow for the approval of guidelines and alignment of related processes across relevant departments.[184]

SunAsia Energy is a leading solar energy developer in the Philippines, with a strong foothold in the floating solar market. Its footprint of water surface in Laguna Lake is 1,000 hectares, with a generation capacity of 1,300 MW.[185] For six of the floating solar projects on Laguna Lake, totalling 610 MW of capacity, SunAsia has partnered with Blueleaf energy, a pan-Asian company that develops, finances, owns and operates RE and storage assets.

ACEN, in collaboration with its subsidiaries, has also entered into a Renewable Energy Contract Area Utilization (RECAU) agreement with the Laguna Lake Development Authority (LLDA). By securing the lease to 800 hectares of Renewable Energy Areas (REAs), ACEN will develop approximately 1 GW of floating solar capacity.

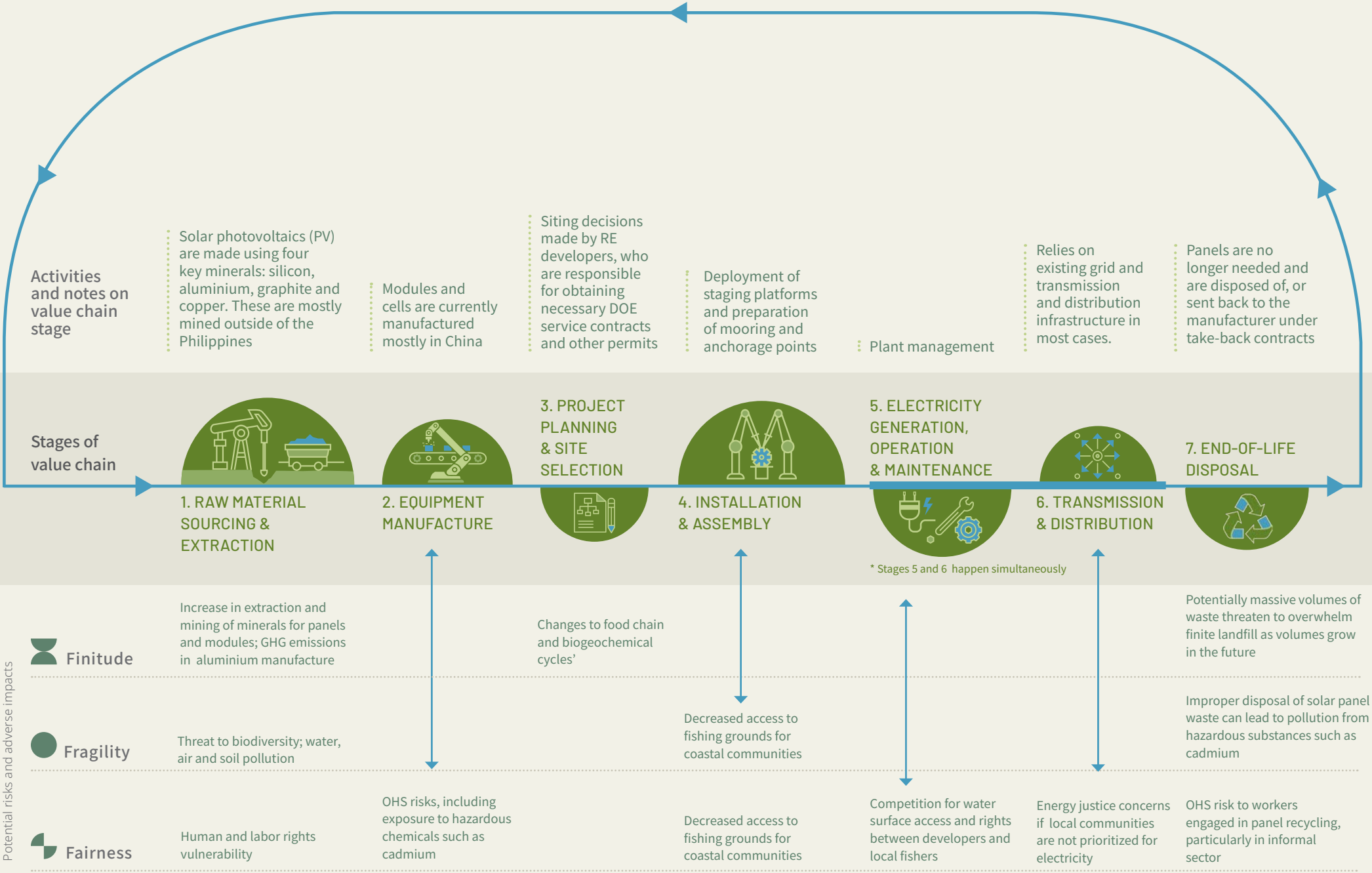
Smaller projects include a 100 MW floating solar farm in Negros Occidental, Philippines by Zonal Renewables.[186]

Agriculture Department Of Philippines And Solar Blue Sign MoU For Harnessing Solar Power For Aquaculture

In May 2023, the Department of Agriculture Senior Undersecretary Domingo Panganiban signed a Memorandum of Understanding with Solar Blue Inc. President Maria Theresa Capellan to introduce and establish innovative projects in food production, particularly in aquaculture. Solar Blue Inc., which is recognized for implementing projects aimed at boosting food production, shall be responsible for capacity building in the community to provide knowledge and skills on the construction, operations, and maintenance of solar technology.[197]

Solar aquaculture combines the production of RE with the production of food, to create an environmentally-friendly solution to raising and farming fish. This is a notable development given the misconception that aquaculture requires very little energy. To the contrary, the rapid productivity gains over the past several decades have forced aquaculture systems to rely increasingly on non-renewable energy, mainly for their pumps, feed dispensers and aerators to oxygenate the water, which are integral parts of an aquaculture setup.[198]

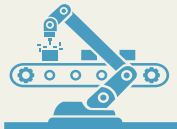
Key anticipated ecological and social risks across the floating solar value chain



Key anticipated ecological and social risks across the floating solar value chain

RAW MATERIAL SOURCING & EXTRACTION

Associated with high environmental and human rights risks: These risks are similar to those outlined in relation to those outlined in the ground-mounted solar section.



EQUIPMENT AND MANUFACTURING

Expanding opportunities to uphold ESG standards: The modules for the Philippines' first and biggest solar FPV testbed developed by SunAsia Energy have been manufactured in China.[188] While human rights risks associated with Chinese manufacturing in the context of ground-mounted solar remain relevant, a broader set of manufacturers of floating solar across countries such as Singapore, South Korea, Indonesia, and Japan offer new opportunities for constructive engagement in support of robust ESG standards.[189]

PROJECT PLANNING & SITE SELECTION

Disruption to ecological balance: When deployed on water reservoirs, the shading provided by FPVs reduce the sunlight required for photosynthesis, and can thus mitigate algal proliferation and improve the water quality.[190] Conversely, reduced sunlight can interfere with various levels of the food chain and biogeochemical cycles (water cycle, carbon cycle, nitrogen cycle) of the aquatic ecosystem.[191] Disruption of the ecological balance is likely to extend to the spawning behavior of fish. Adverse impacts may be amplified by coastal land use changes, including foreshore and coastal soil erosion due to the deployment of staging platforms and preparation of mooring and anchorage points. Construction and installation may also exacerbate sedimentation and siltation.

Impact on local livelihoods: While there is potential job creation through the installation and maintenance of the FPVs, one of the primary concerns raised by local fishers relates to how the scaling of FPVs could affect their catch.[192] This speaks to the value of drawing on their deep expertise of the lake's ecosystems to inform siting decisions that uphold fisherfolks' existing user rights. Yet, to date, CSOs claim that meaningful engagement in such decision-making is not taking place.

OPERATION & MAINTENANCE

Risks of chemical pollution: While FPV plants are intended to last up to 25 to 30 years, equipment corrosion can reduce their durability and require more maintenance, especially in waters with high salt levels.[193] Beyond this, negligible information is available at present on the environmental impacts of FPVs, although some concerns have been raised over risks of chemical pollution because of sudden or gradual releases of chemicals during the installation, maintenance, or lifetime of the FPVs as encapsulation degrades. Water pollution concerns further extend to the shedding of microplastics from floaters and other equipment.[195] In addition, electrical equipment—especially those that are directly in contact with water—could create electric fields, which might have an impact on the ecosystem.[196]

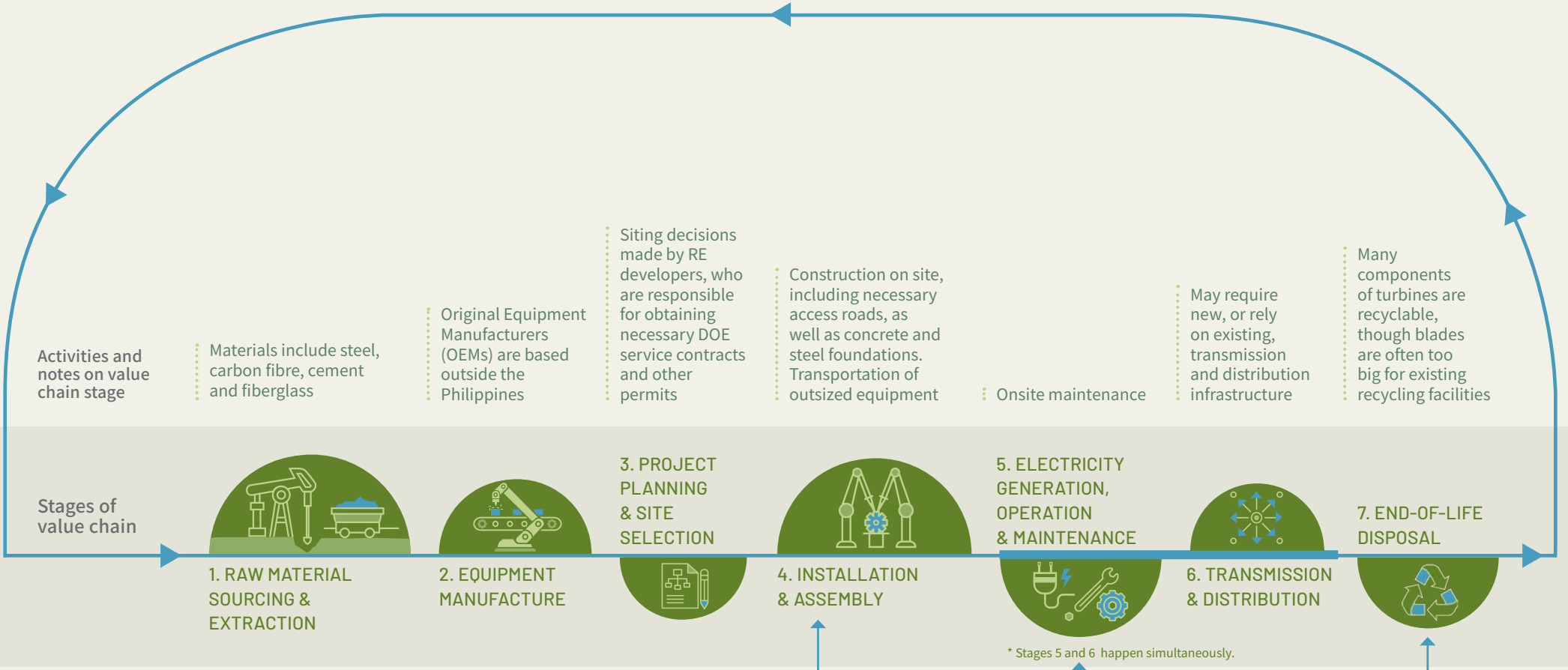
Onshore wind

The Philippine government has set a target of 5 GW of installed onshore wind power capacity by 2030. The country currently has 443 MW of onshore installed wind capacity, with the greatest source of wind energy being located in the northern and central areas of the country. Projects in the Ilocos Norte province make up more than half of this capacity, including the 150 MW Burgos Wind Power Project, one of the largest wind farms in Southeast Asia.[199] Additional projects include the Bangui Windmills in North Luzon, the Pililla Wind Farm in the mountains of Rizal, in the East of Luzon, as well as two further projects in Visayas.[200] Wind energy capacity in the Philippines is expected to further grow in the coming years, with 13 proposed projects currently being tracked.[201]

Currently, the three leading developers of onshore wind currently include ACEN, Energy Development Corporation (EDC) and Alternergy. ACEN currently has the largest wind portfolio in the country, and has completed the first 80 MW phase of its 160 MW Pagudpud wind farm in Ilocos Norte, with the remainder of the project due to be completed by 2025.[202] Upon completion, it will supersede EDC's 150 MW Burgos wind farm, also located in Ilocos Norte. ACEN's subsidiary, Giga Ace 6 Inc achieved a successful bid during the second round of the Green Energy Auction (GEA-2) for a 335 MW wind project that will extend across the municipalities of Pakil, Paete, Mauban in Quezon Province, and Kalayaan in Laguna.[203] Other developers entering this market include Aboitiz Renewables, Vena Energy (a leading RE company in the Asia-Pacific region) and Vivant Energy Corporation, a family-owned company based in the Philippines. Together, the three have entered into a joint venture partnership for a 206 MW San Isidro Wind Project in Central Philippines.[204] Mainstream Renewable Power, a global pure-play developer headquartered in Ireland, has also been developing a 90 MW Libmanan onshore wind project since 2017 with Aboitiz.[205]

Most of the components necessary to build utility-scale wind turbines are currently imported into the country. The Philippine Council for Industry, Energy and Emerging Technology Research and Development however, is building local capacity for resource assessment, repair, maintenance, design and fabrication of small-scale wind turbine prototypes.

Key ecological and social risks across the onshore wind value chain



Key ecological and social risks across the onshore wind value chain

RAW MATERIAL SOURCING & EXTRACTION

Emissions arising from steel production: Steel is the key material input in the production of wind turbines. Steel production is currently estimated to account for 7-8% of GHG emissions every year, and is the industrial sector with the fastest growing CO2 emission levels.[206] As technological routes for steel production determine the GHG emission intensity in the manufacturing process, the RE sector has an important role to play in supporting organizations working at the forefront of steel decarbonization. This is particularly so as 70% of steel is currently being made using coking coal.[207]

END-OF-LIFE DISPOSAL

Dumping of blade waste and associated challenges: The regulatory framework for disposal or recycling specifically for onshore wind system components have not been put into place. Only a general waste management program has been implemented and enforced country-wide.

PROJECT PLANNING & SITE SELECTION

Land use changes and competition with agricultural land: Similar to other infrastructure projects, one legal means of acquiring land for onshore wind and other RE technologies in the Philippines is through eminent domain. However, concerns have been raised with regards to requirements for conversion of land from agricultural to industrial uses being less onerous via this pathway than those set out under the Comprehensive Agrarian Reform Program (CARP).[208] Further alignment in the regulatory framework is needed to address these concerns will be crucial as RE scales.[209]

Deforestation and impact on forest ecosystems: Onshore wind in the Philippines has been associated with variable degrees of impact on forest ecosystems and biodiversity loss depending on scale of operation. For instance, EDC indicated that a total of 10,300 trees were felled for the creation of the Burgos wind farm.[210] While it has taken concerted steps to ensure that 100 new trees are planted for every tree cut, forest clearing for other projects such as the Northwind Renewable Energy windmill project in Pagudpud were met with a degree of opposition from local communities. Given the high concentration of onshore wind projects in northern and central Luzon, there is particular merit in assessing the extent to which these may lead to cumulative impacts.

OPERATION & MAINTENANCE

Threats to biodiversity and wildlife: In the Philippines, fauna collision with turbines include critically endangered species. The likelihood of this depends on factors like bird species, season, time of day, noise, and even wind speed or temperature.[211] As wind farm expansion continues, cumulative impacts are likely to surface due to habitat fragmentation, which can lead to changes in ecosystem functions and biodiversity loss, displacing local wildlife in the process.[212] Species affected by such impacts include the Negros bleeding heart, the Negros fruit dove and the Rufous-headed hornbill, which are all categorized as “critically endangered” by the IUCN. Those impacted among the “endangered” category include the Visayan hornbill, the Mindoro hornbill, the Green racquet-tail and Southeast Asian long-fingered bat.[213] With regards to flora, the *Sonneratia ovata*—categorized as “near threatened” by the IUCN—has been listed among those affected by onshore wind developments in the Philippines, along with the Camptostemon philippinense, which is categorized as “endangered”.[214] While technology has been developed for avian detection and monitoring solutions, key environmental considerations should still take precedent, such as planning in accordance with bird migration routes, seasonal breeding, feeding areas and sensitive habitats. Crucially, the detection and monitoring of birds should extend through the entire lifetime of the wind project.[215]

Land use impacts associated with the Burgos wind farm project

In acquiring the land for the Burgos Wind Farm—one of Southeast Asia's largest—the EDC Burgos Wind Power Corporation (EBWPC) secured access through eminent domain—a less onerous process than requirements set out under the Comprehensive Agrarian Reform Program (CARP). This arrangement granted the EBWPC control over the land without acquiring formal title, which is prohibited under CARP. The arrangement also did not run counter to the Asia Development Bank's involuntary displacement safeguards, as the ADB's involvement only commenced after access rights were secured.[216]

The impact of the project on the cattle-raisers previously utilizing the land within the wind farm were mitigated by the EBWPC through continuous engagement with the Burgos Agri-Business Association (BABA). While BABA members were allowed to maintain access to the area, a feedlot system for cattle fattening was introduced as an alternative to open grazing. In conjunction with this, a series of planning workshops and training to improve the livestock practices and capacity of BABA members were conducted. Through the course of the process, it emerged that BABA members continued to prefer the traditional way of grazing after realizing that the presence of wind turbines did not have negative impacts on their livestock and that their cattle are safer inside the wind farm because of the security measures imposed by EBWPC. BABA eventually established a livelihood project of cattle breeding, which still provides benefits to its members.

This case study highlights the mutually-beneficial outcomes that are possible by way of co-siting, as well as the added value of co-designed solutions. Equally, however, it foregrounds the potential risks to agricultural communities when, depending on which legal instrument is used, the nature of the rights and obligations of the affected community and the developer, relating to the land use change is altered.

Offshore wind

Though there is growing interest, there is currently no installed offshore wind capacity in the Philippines. In 2019, the World Bank estimated a total of 178 GW of wind energy potential within 200 km of the Philippine shoreline.[217] A subsequent roadmap released by the DOE and the World Bank Group (WBG) in April 2022 suggests that the Philippines plans to install up to 21 GW of offshore wind power by 2040.[218] The Offshore Wind Roadmap of the Philippines has identified at least six zones for possible offshore wind development, consisting of Northwest Luzon, the coastal area adjacent to Metro Manila, Northern Mindoro, Southern Mindoro, the Guimaras Strait, and Negros/Panay West.[219]

As of August 2023, the Department of Energy has awarded 77 offshore wind service contracts totalling around 60 GW.[220] Boosted by the opening of the RE sector to 100% foreign ownership, wind energy looks set to grow rapidly with foreign actors—particularly from Scandinavia—likely to play a key role.[221]

In May 2023, Environment Secretary Maria Antonia Yulo-Loyzaga issued a temporary freeze order to temporarily suspend the acceptance, processing and approval of environmental compliance certificates (ECC) for offshore wind in the Philippines, pending the approval of guidelines for these RE projects.[222] This was prompted by the many uncertainties surrounding their potential impacts. Particular concerns have been raised in relation to proposed projects mostly set to be built in the Verde Island Passage (VIP), a biodiversity-rich region that is regarded by experts as the "center of the center of marine shore fish biodiversity" in the world.[223] Additionally, Environment Undersecretary for Finance, Information System and Climate Change Analiza R. Teh signalled the importance of using the five-to-seven year pre-development stage wisely to conduct marine spatial planning, to further boost safeguards that will be integrated into the guidelines. The marine spatial planning will also help identify 'no-go zones' for protected areas, which should be set aside for conservation purposes.[224] Laying down such precautionary principles bodes well for the offshore wind sector to drive ecologically safe and socially just outcomes as it scales.

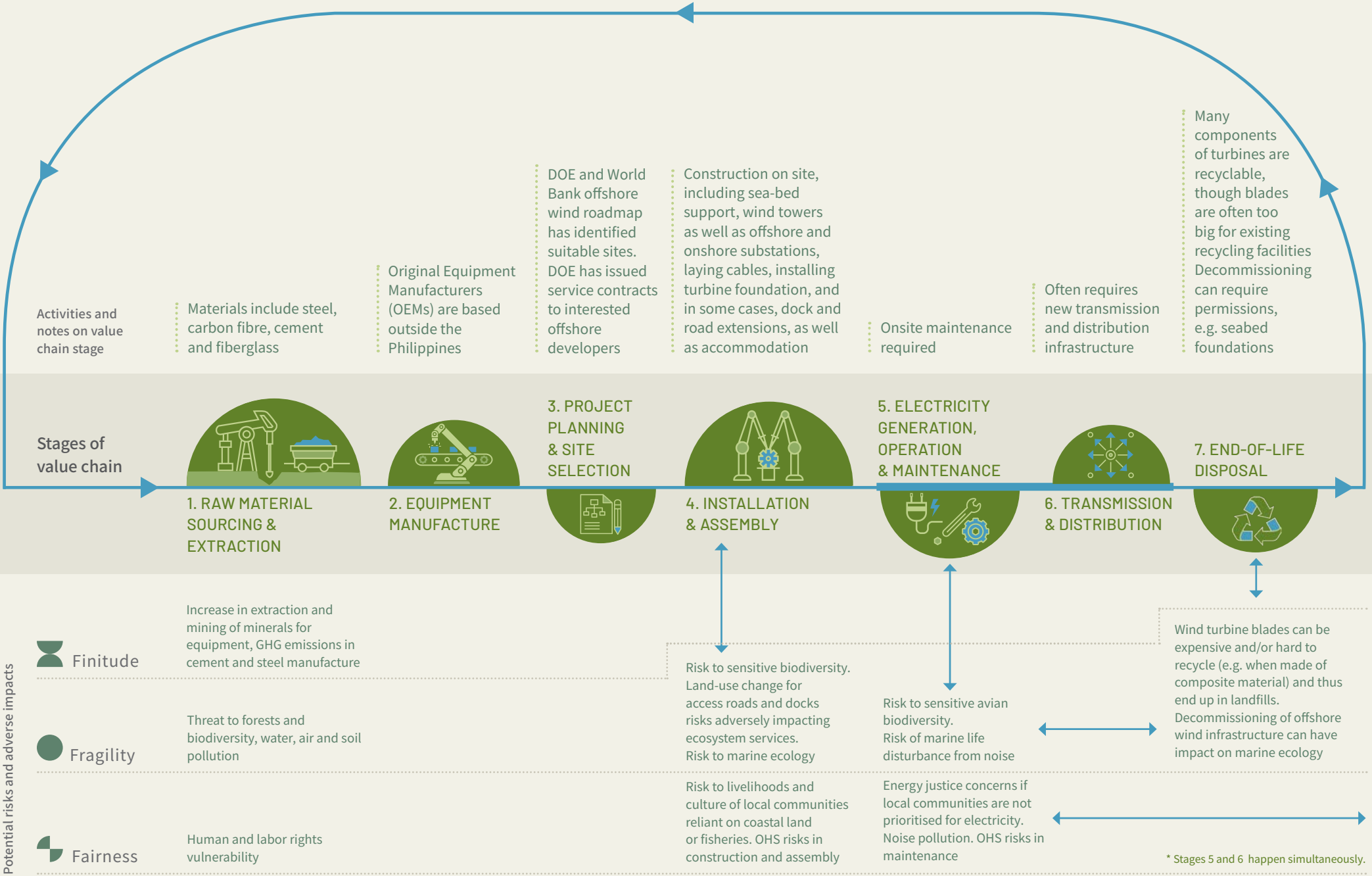
There are several foreign developers entering the offshore wind market in the Philippines. The largest project to date is from the Spanish offshore wind developer BlueFloat Energy, which is set to create a 7.6 GW offshore wind project portfolio in the Philippines, spanning four locations and backed by wind energy service contracts for capacities ranging from 1.5 GW to 3.5 GW.[225]

Other large contracts have been awarded to Triconti ECC Renewables to construct five offshore wind projects with up to 3.5 GW capacity in the upcoming years.[226] The Blue Circle and its partner CleanTech Global Renewables Inc. signed a contract to construct an offshore wind project in the Philippines with the capacity of 1.2 GW located in Bulalacao, Oriental Mindoro.[227] The Philippines' Department of Energy has also signed three contracts with a Danish fund manager, Copenhagen Infrastructure New Markets Fund, for offshore wind energy development projects with a total capacity of 2 GW.[228]

In addition to foreign developers, local energy incumbents such as Aboitiz also seek to enter the offshore wind market, with a target of 2400 MW in the next 10–20 years.[229]

Currently there is no domestic wind manufacturing in the Philippines, but the growth of offshore wind projects could attract major investments in manufacturing.[230]

Key anticipated ecological and social risks across the offshore wind value chain



Key anticipated ecological and social risks across the offshore wind value chain

PROJECT PLANNING & SITE SELECTION

Coastal land use changes: While the sector is nascent in the Philippines, impacts observed in other jurisdictions include foreshore and coastal soil erosion due to the deployment of required cable landing stations, staging platforms, as well as docks to support installation and maintenance tasks for wind turbine installations. Offshore wind projects have also been found to exacerbate sedimentation and siltation.[231]

Impacts on wildlife, marine ecology and livelihoods: The deployment of gravity-based foundations requires extensive seabed preparation, disturbing the seabed profile and temporarily increasing turbidity within proposed project sites. While the alteration of spawning grounds during installation are thought to adversely impact the habitat of some fish species, the creation of artificial reef effects can enhance the habitat of others and therefore should be specifically factored into the design of the installations.232 Appropriate site selection will be crucial in mitigating any impacts to endangered or threatened species of indigenous and migratory wildlife. Risks to local fisheries also need to be diligently assessed as part of the planning for site selection, particularly in project-dense areas.[233]

Land speculation: Anecdotal evidence also points to potential vulnerabilities associated with land speculation in proximity to prospective sites as offshore wind scales. This poses a particular risk to marginalized individuals and communities experiencing land tenure insecurity.[234]

RAW MATERIAL SOURCING & EXTRACTION

Emissions arising from steel production: As in the case of onshore wind, platforms for floating offshore wind power are primarily made of structural steel. The two technologies are thus associated with comparable impacts at this stage of the value chain.

OPERATION & MAINTENANCE

Disturbance to wildlife: The mechanical noise and electromagnetic fields associated with offshore wind may cause disturbance to fish, marine mammals, birds and seabed communities.[235] The degree of this impact will be determined by potential cumulative effects if the sector is to scale significantly in concentrated geographic locations in the Philippines.

Labor rights: Working in offshore wind is potentially hazardous by nature due to the location, the need to work at heights, the size of the components involved, and the presence of medium and high voltage electrical systems.[236] The World Bank Roadmap signals that the Philippines has a platform to build on, with its offshore oil and gas and onshore wind industry, but there is work to be done to ensure regulatory clarity and reinforce safety practices.[237]

TRANSMISSION & DISTRIBUTION

Effects of electromagnetic fields on marine life: Studies that examine electromagnetic field emissions from offshore wind power cables point to the sensitivity of certain fish species, including to their orientation in the water column and prey location.[238] Demersal fish (who dwell and feed on or near the bottom of the ocean) face the greatest likelihood of exposure to cables, especially given their sensitive life history stages from embryos to larvae, especially those with long incubation periods.[239] The proliferation of undersea cables in the Philippines must take into account the type of fishing methods used in a given area, including the likely penetration depth in relation to the seabed composition.[240]

END-OF-LIFE DISPOSAL

Waste build up and improper disposal: All components of the wind turbines and top-side of the offshore substation can be assumed to be removable for both floating and bottom-fixed foundations, whereas submarine cables and mooring systems may be more expensive to recover and recycle. In the absence of appropriate mechanisms to manage end-of-life wind energy systems in the Philippines, there is significant potential to generate high volumes of hazardous waste, chemicals, and toxic dust and metals for disposal in landfills.

Energy Storage Systems

Energy Storage Systems (ESS) store energy from different power generation sources and discharge it when needed. Given the intermittent nature of renewables like solar and wind, ESS are a solution for balancing the electric grid, providing backup power and improving grid stability, thereby also providing a vital solution for the wider adoption of RE in the Philippines. This technology is also relied upon to store electricity generated during off-peak hours for utilization during peak demand periods, thereby also replacing the need for conventional peaking capacity. Further, ESS can be used in combination with small-scale RE or conventional generation sources to enhance the installed capacity and operational hours of micro-grids.

As the country strives for 35% RE generation by 2030, the increasing influx of variable RE facility deployments has prompted the necessity of advancing the development of ess to further facilitate the smooth integration of RE, while ensuring the stability of the electric power infrastructure of the country.

DOE's circular from April 2023 on "Prescribing the Policy for Energy Storage System in the Electric Power Industry" includes Battery Energy Storage Systems (BESS), Compressed Air Energy Storage (CAES), Flywheel Energy Storage (FES), and Pumped-Storage Hydropower (PSH) in its non-exhaustive list of ESS.[242] Among these, CAES and FES are relatively novel technologies, while PSH builds upon the hydropower systems for energy storage. In turn, BESS have been the popular choice in the Philippines, based on the installed capacity of operational and pipeline projects. This is largely due to the capability of the technology to provide high power density, fast response, amenable to modularization, and ease of installation.

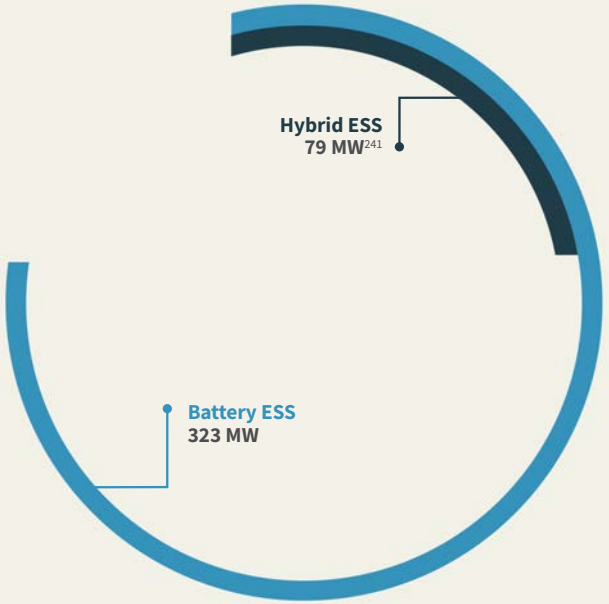


FIGURE 7

BESS and Hybrid ESS installed capacity as of August 2023

The Philippines' total installed BESS capacity in Q4 2022 stood at 144 MW. Approximately 66% of this capacity consists of BESS and RE+BESS installations, while the rest are hybrid diesel+BESS.[243] The DOE estimates that the pipeline of committed BESS projects will provide additional installed capacity for generation and ancillary services amounting to 2.8 GW (some 70 committed projects) by 2025 with the Luzon grid expecting the bulk of deployments.[244]

Implications of a rapidly increasing demand

The expanding utilization of conventional electrochemical batteries contributes to higher demand in mineral resources and the use of heavy metals. Several raw materials serve as inputs in the production of lithium-ion batteries, including nickel and cobalt—both mined in the Philippines. Additional minerals include iron, manganese, lithium, and graphite. With demand for production estimated to triple by 2030 for some minerals such as graphite, and to increase sixfold for others such as lithium,[245] it is imperative that actors across the value chain in the Philippines play an active role in strengthening the responsible sourcing of these minerals.

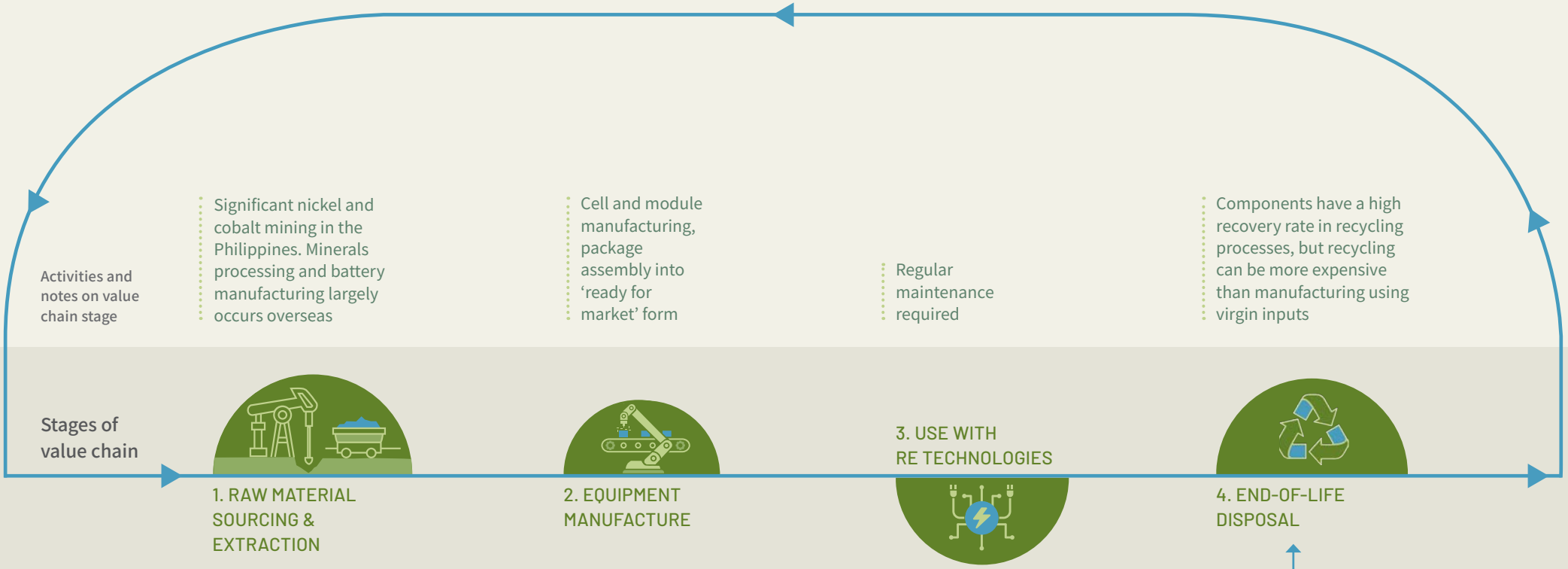
As of 2022, several BESS (typically using lithium-ion battery chemistries) have been commissioned and operating commercially in the country, including the Masinloc Advancion TM Energy Storage Array solution, the Kabankalan Battery Energy Storage project, the San Rafael Battery Energy Storage system and the Alaminos Energy Storage project.[246] A number of other initiatives for energy storage technologies have been put into place locally, including the development and utilization of flywheel energy storage.[247] Given the Philippines' mineral wealth and push for RE, President Marcos has also sought to scale up battery manufacturing facilities in the Philippines.[248]

Several new BESS projects have been initiated or are planned in the Philippines including Aboitiz Power's 49 MW BESS that has commenced operations,[249] Solar Philippines is building the world's first large-scale solar-battery baseload project to supply Meralco with up to 200 MW of baseload capacity in Batangas[250] and Ingrid Power's plans to build a 270 MW battery energy storage system in Rizal that is expected to cost nearly PHP 7 billion (~USD 126 million).[251] Meanwhile, the San Miguel Global Power is constructing 32 battery storage stations with a total of 1000 MW of power.[252] This is not only the first and largest battery storage network across the archipelago, but also among the largest integrated BESS networks in the world, thus positioning the Philippines to become a global leader in this technology.[253]

Alongside these developments, the DOE is also keen to introduce hybrid (solar-battery-diesel) systems in off-grid areas to help reduce power costs and developers are planning battery energy storage systems across hydropower facilities.[254] Pumped storage hydropower (PSH) projects are also being initiated, with Prime Infra's subsidiary Ahunan Power planning to use PSH as energy storage for its power supply to MERALCO.[255]

Key ecological and social risks across the BESS value chain

Given the number of different sub-categories associated with Energy Storage Systems, for brevity, this report only showcases the life-cycle of lithium-ion. This is partly due to specific risks identified at the end-of-life disposal stage.



Key ecological and social risks across the BESS value chain

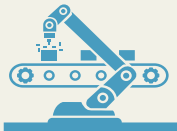
The use of energy storage systems has been observed to enhance the potential of RE technologies and presents potential solutions to several concerns, such as power disparities and the active reduction of carbon dioxide emissions. However, several related challenges have yet to be fully addressed.

RAW MATERIAL SOURCING & EXTRACTION

Water stress and biodiversity impacts: The mining of lithium-ion in particular is associated with accelerated onset of drought due to intensive water requirements, with correlated effects on agricultural yields and the food security of local communities.[256]

As highlighted in sections related to other technologies, the mining of transition minerals has also been associated with the disruption of biodiversity and habitats, soil erosion, siltation and contamination of waterways. The soot particulates released from crushing and pulverizing mineral ores has also been reported to contribute to heart and lung disease in surrounding communities.[257]

Beyond terrestrial reserves, more than 120 million tons of cobalt deposits have been identified in polymetallic nodules and crusts on the floor of the Atlantic, Indian, and Pacific Oceans. The seafloor is also littered with nickel and magnesium—both of which are particularly essential for batteries, alongside cobalt. This brings its own set of concerns given the lack of any functioning legal frameworks to prevent and manage environmental impacts.[258]



EQUIPMENT AND MANUFACTURING

Hazardous chemical waste and dust: Manufacturing of energy storage batteries generates large quantities of hazardous chemical waste and dust.[259] The hazards inherent in lithium-ion batteries include exposures to cobalt, manganese and nickel that come from mining, smelting, and recycling or disposing of these materials.[260] Exposure to cobalt can harm the eyes, skin, heart, and lungs. Over time it may also cause cancer.[261] In turn, accumulation of nickel and nickel compounds in the body through chronic exposure may be responsible for a variety of adverse effects on the health of human beings, such as lung fibrosis, kidney and cardiovascular diseases and cancer of the respiratory tract.[262] Such health risks are all the more concerning given that there are few controls in place to address the health impacts of manufacturing and recycling of lithium-ion batteries in most countries.[263]

OPERATION & MAINTENANCE

GHG emissions and safety: The amount of GHG emissions from the operation of a stand-alone BES system will depend primarily on the source of electric power to charge the system. BESS systems integrated or combined with RE technologies may be expected to provide lower net GHG emissions compared to systems charged through fossil-based sources. To this end, emissions will be considerable in Mindanao, which is mostly powered by coal, but negligible in instances where units are directly connected to solar, as is the case for ACEN in Arayat Papanga. In terms of safety, accidents involving explosions and fires in BESS installations have cast doubts on long-term operability and safety of these new technologies.[264]

END-OF-LIFE DISPOSAL

Soil contamination: There are risks associated with the leaching of metals when disposed in landfills, along with fires when not properly disposed of. Potential for leachate will remain high, even as more recycling sites emerge, unless appropriate mechanisms and regulatory frameworks are enforced to safely manage end-of-life BESS systems.

GRST'S SOLUTION

With the development of a new way to build and recycle vital lithium-ion batteries, GRST's solution offers a pathway to reducing demand for transition minerals.

GRST (Green, Renewable, Sustainable Technology), the 2023 winner of the Earthshot Prize, has come up with a cleaner process to make batteries that pollute less and use components that can be more easily recycled. Instead of using toxic solvents and hard-to-recycle materials, GRST has created a way to build the battery using a water-soluble binding composite, so that at the end of the battery's life, the lithium, cobalt and nickel can be more economically recovered and reused again in another battery, reducing demand for further extraction of transition minerals. While its application was initially recognized in the context of the global electric vehicle revolution, the innovation constitutes a positive signal for the evolution of energy storage systems.[265]

Small and mini hydro

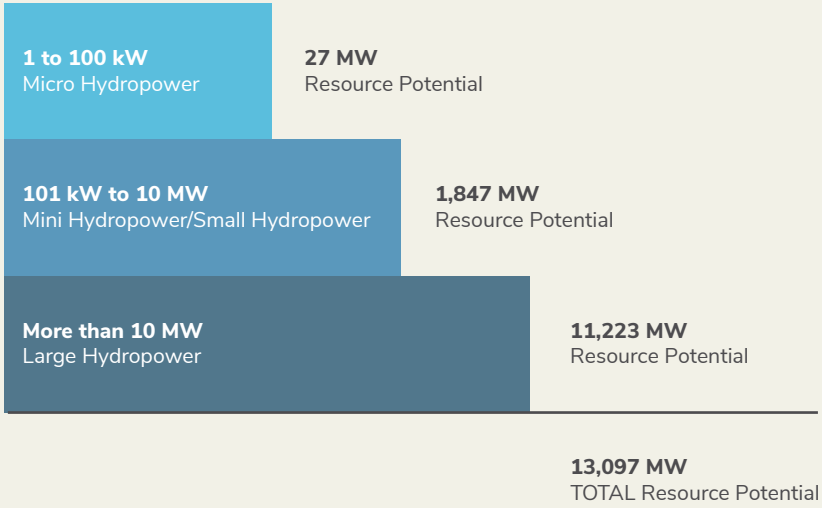
The Philippines' total hydropower resource potential has been estimated to approximately 13,097 MW and comprises the following categories: Micro Hydropower, Mini Hydropower/Small Hydropower, and Large Hydropower.[266]

Given the many issues plaguing large hydropower projects, the DOE has progressively shifted its focus towards smaller, more manageable run-of-river projects over the last few decades, as evidenced by the promulgation of Republic Act No. 7156, "Mini-Hydroelectric Power Incentives Act".[267] The implementation of run-of-river schemes has allowed a balance for the utilization of river ecosystems for hydropower projects, while providing communities dependent on the river for livelihood to co-exist. This section evaluates the environmental impacts in the value chain of run-of-river schemes with capacities up to 10 MW.

As a heavily fragmented market, several developers are involved in this sector.[268] One of the leading run-of-river hydro developers is Hedcor, a subsidiary of Aboitiz Power, which has developed and operated several small hydro facilities in the country for over 45 years. They currently manage and operate 22 hydropower plants that supply the country with over 278 MW of energy. Andritz is also noteworthy by virtue of having installed or rehabilitated more than 50 units in the country, with a combined capacity of about 1,600 MW.[270]

FIGURE 8

Estimated hydropower resource potential

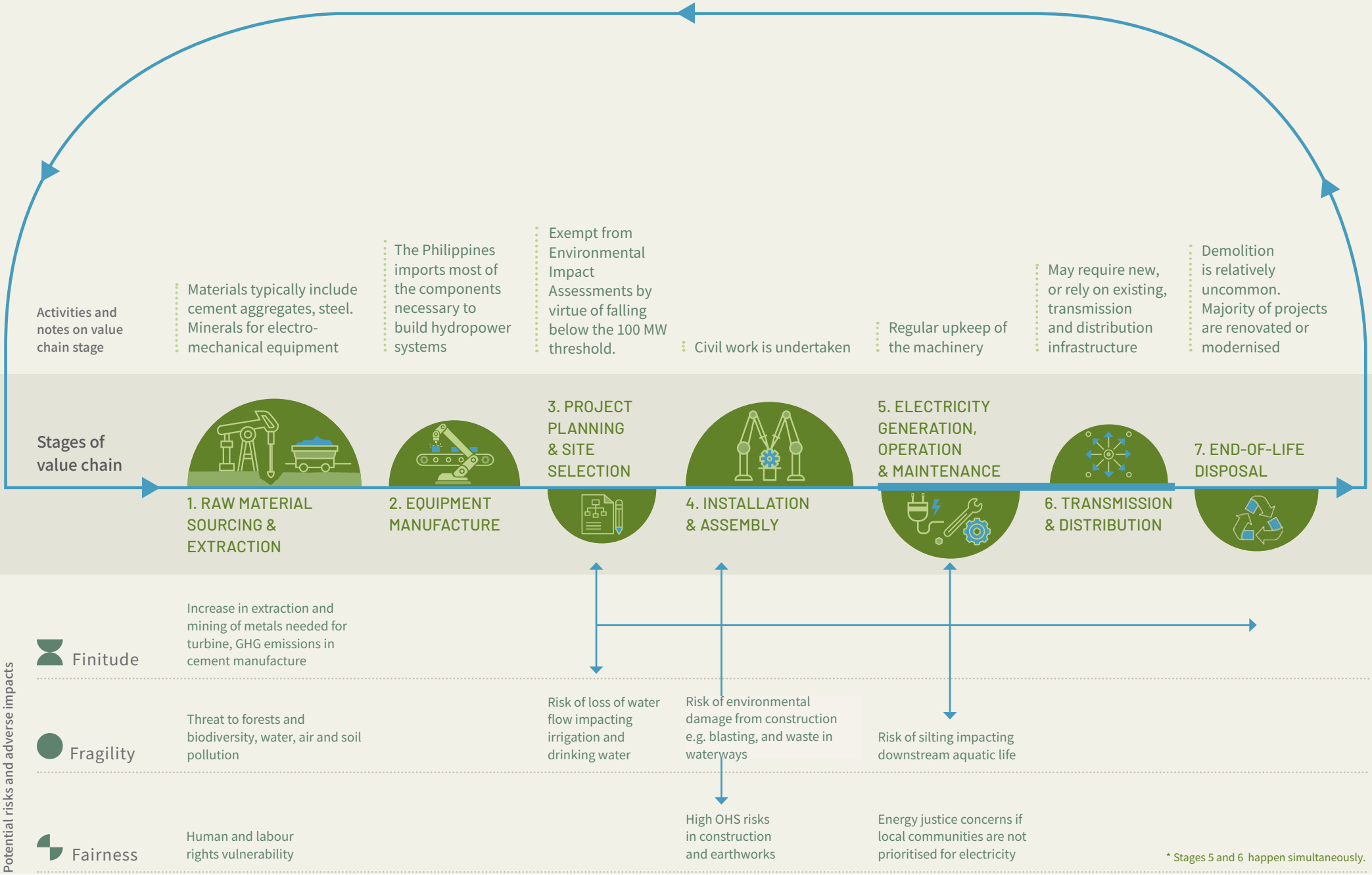


Another prominent developer is AV Garcia Power Systems, with a run-of-river hydro portfolio comprising over 10 projects.[271] Alternergy, a pure-play RE developer, also has a run-of-river hydro portfolio, with one project and three under commercial development.

Electric cooperatives in the Philippines also have the option of building their own power generation facilities and are often part owners in small hydro projects.[272] The State-owned Development Bank of the Philippines (DBP) has been active in bankrolling the development of mini hydroelectric plants, including credit assistance to the Leyte V Electric Cooperative, Inc. (LEYECO V) under the Bank's Financing Utilities for Sustainable Energy Development (FUSED), in support of the government's drive to increase to 35% the share of RE in the country's power generation mix by 2030.[273]

With regards to manufacturing, the Philippines imports most of the components necessary to build a hydropower system from various countries—predominantly China, Indonesia, Germany, Austria, Spain, Vietnam, and the US). In most cases, mini hydropower projects are implemented by selected EPC contractors as turn-key projects. Through technology transfer initiatives supported by multilateral development agencies and the government and capitalizing on linkages with local NGOs and the academe, several local turbine fabricators in the country have been trained in the fabrication of hydropower turbine equipment.[274]

Key ecologicl and social risks across small and mini hydro value chains



Key ecological and social risks across small and mini hydro value chains

RAW MATERIAL SOURCING & EXTRACTION

Land use changes and biosphere integrity impacts: Most of the raw materials used to produce cement have been extracted through local mining and quarrying—specifically, limestone, silica, alumina, and iron. Quarrying can cause disruption in habitat and biosphere integrity, affect ground and surface water, induce erosion, and produce significant amounts of dust.[275]

PROJECT PLANNING & SITE SELECTION

Changes in the river channels: Changes in the river channels from introduction of diversion canals or weirs may cause disruption in the stream flow. This can exacerbate channel erosion and flooding, as well as terrestrial and aquatic habitat fragmentation, affecting biodiversity. Other potential impacts include changes in pedology and soil nutrient content in areas previously considered as floodplains, as well as localized erosion in laying out penstock (either buried or on thrust blocks).[276] Further studies must be undertaken in order to estimate the impact of mini hydro or small hydro installations to seasonal flooding arising from the release of water from large impounding dams located upstream.

Potential cumulative impacts of cascaded systems: While the impacts of individual small reservoirs and weirs will usually be limited, the combined river regularization effect once the hydropower projects are in place are likely to be significant.[277] Increases in streamflow variations may affect the dynamics of both sediment and nutrient transport, impacting conditions for aquatic fauna and flora development.

OPERATION & MAINTENANCE

Hazardous waste: Micro and mini hydro projects run the risk of introducing hazardous waste into the watershed area due to the use of lubricants and industrial cleaners necessary to maintain the hydropower systems. Mitigating such risks is critical in instances where the river constitutes surrounding communities' primary source of potable water and irrigation system.

END-OF-LIFE DISPOSAL

Pollution: Pollution associated with the discarding of components and demolition spoils at the decommissioning stage of the life-cycle highlight the importance of recovering and recycling materials such as aluminum, copper, steel and iron. This again speaks to the finitude of transition minerals, and thus the anticipatory steps that must be taken collectively to mitigate resource depletion and related shortages that could ultimately undermine the scaling and mainstreaming of RE.

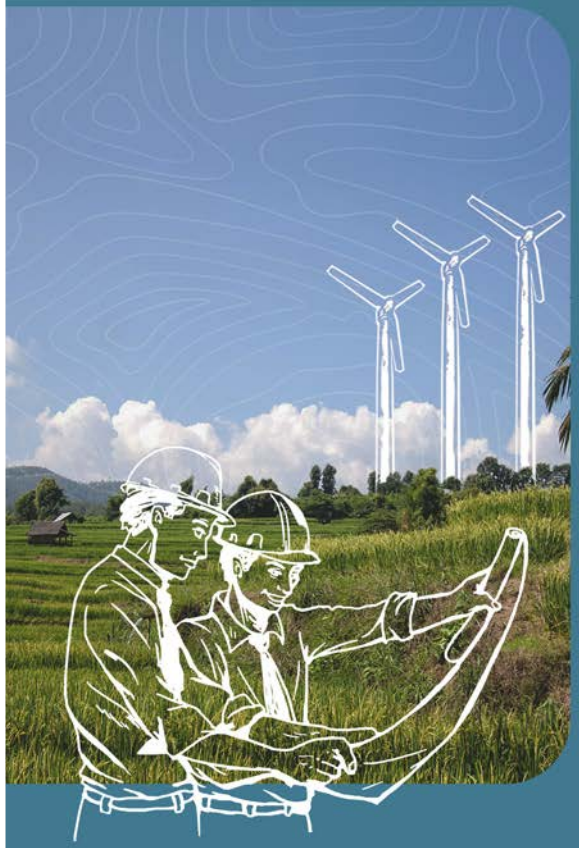
Ifugao Ambangal mini hydro power plant is featured by UNESCO in the world catalogue of good practices in energy sustainability, where electricity generation serves to enhance food security and protect areas of cultural significance.

The Ifugao Rice Terraces of the Philippine Cordilleras are beautiful ancient structures invested with historic and cultural significance. They are also the major source of livelihood for local residents. In 1995, UNESCO registered them as a World Heritage Site. The World Heritage Committee described the rice terraces as *"outstanding examples of living cultural landscapes. They illustrate the traditional techniques and a remarkable harmony between humankind and the natural environment."*

Deforestation, modernization and climate change, however, threaten to destroy the rice terraces. Hence, in 2001, confronted with the deterioration of the rice terraces and citing deficiencies in conservation planning for the rice terraces, UNESCO placed them on the List of World Heritage in Danger.

In becoming aware of this situation, the e8—composed of ten leading electricity companies from the global electricity sector—recognized the unique opportunity to provide much needed electricity to the region, while contributing to the protection of a World Heritage site. In keeping with its mission to promote sustainable energy development through electricity sector projects and human capacity building activities in developing nations, it proposed to the Philippine authorities the development of a 200 kW run-of-river hydropower project that would generate sustainable revenues allocated to the maintenance and stabilisation of the rice terraces, and irrigation systems to reverse their deterioration.

By providing clean renewable electricity to the region and regular revenues for the Rice Terraces Conservation Fund (which was created as part of the initiative), the Ifugao-Ambangal Mini Hydro Project has been described as a model of local sustainable energy-based development, regional vitalization and heritage conservation.[278]



A way forward towards an ecologically safe and socially just RE sector

Call to Action: Towards an ecologically safe and socially just sector

The research conducted for this report reveals that while RE must be a dominant—and eventually sole—source of energy to achieve a low carbon future, action needs to be taken to put in place the business models and strengthen the governance frameworks to achieve a responsible RE system in the Philippines.

As the industry grows, it is clear that there are many ecological and social risks that are likely to scale if left unmanaged, leading to the undesirable consequence of slowing down the much-needed energy transition. This would not only be an unacceptable outcome from a climate perspective, but also from an energy security and accessibility perspective. Moreover, the longer we wait, the more likely poor practices could become entrenched into the RE sector, making it harder for it to achieve its full potential in driving fair and just social transitions to a low carbon future.

Now is the time to move to a more proactive, forward-looking stance by leaders in the RE sector to create the conditions for a safe and just renewable energy system to emerge. Furthermore, as some of the challenges are also shared with other sectors, actors across the RE value chain have the opportunity to encourage cross-sector collaboration to achieve this goal.

Recognizing environmental and social implications, along with implementing robust ESG approaches are necessary first steps on the journey towards ensuring an ecologically safe and socially just trajectory for the sector.

From these first steps, there is a real opportunity to move beyond doing less harm, to enabling social justice and economic resilience, as well as regenerating ecosystems.

It demonstrates the possibility that efforts to achieve a just transition towards a low carbon future can, and should, go far beyond traditional definitions to also look at the impacts of what is transitioned to, and how. This moment of exponential scaling is an opportunity to enable broad reaching transformation that sets the Philippines up for long-term prosperity.

Next steps

If you are involved in RE in some capacity, there are steps you can take to help drive this transformation. Learning from the successes and shortcomings of past approaches in other industries can accelerate the move to responsible practices that prioritise positive ecological and social outcomes:

1. Challenge the notion that because the energy production itself is sustainable, the RE value chain is inherently sustainable: The sector and supporting ecosystem of actors raise awareness of the importance of looking beyond and beneath the positive credentials associated with the production of low carbon energy and recognise the need to better understand and to address the ecological and social risks throughout the RE value chain.

2. Build a deeper collective understanding of sector impacts: RE companies, investors and financiers, civil society actors and other decision makers collaborate to map and take action to mitigate emerging adverse impacts, before they become a blocker to energy transition efforts.

3. Set up well-coordinated governance mechanisms that work systemically to prevent or mitigate risks, and where necessary, to remediate. This involves strengthening coordination and complementarity between the governance mechanisms in ways that create the conditions to support value chain actors in mitigating, managing and remediating ecological and social risks, and which ensure effective monitoring, enforcement and continuous improvement of systems to achieve ecologically safe and socially just outcomes.

4. Operate responsibly by having the right policies and processes in place to identify risks and take action to address them. As a starting point, this involves ensuring that all operating policies are designed to identify ecological and social risks and to find ways to create positive outcomes instead.

a. For developers, establish robust impact monitoring over the entire life-cycle of projects and throughout the value chain, preferably using independent bodies, reporting transparently to globally recognized standards. Also consider establishing operational-based grievance mechanisms based on engagement and dialogue that are designed to identify patterns and serve as a source of continuous learning.

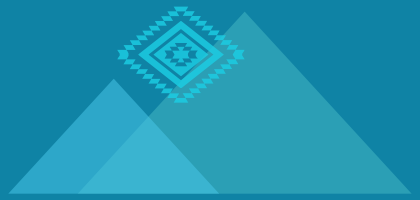
b. For procurers, treat RE as any other product or service in best practice sustainable procurement. This involves understanding and evaluating choices based on impacts throughout the value chain and understanding the whole life costs in environmental and social as well as financial terms.

c. For investors and financiers, ensure that ESG considerations are meaningfully integrated in all decisions relating to financing RE development, with active engagement to support systemic interventions by developers and manufacturers to achieve ecologically safe and socially just operations and impacts.

The steps are easier written than done. There may, for example, be structural and systemic reasons for why they are not already happening.

In some cases, it is simply that one organisation alone cannot make the necessary change, and there is a perceived first-mover disadvantage in such a competitive industry. In others, meaningful change requires questioning deeply held assumptions and structures upon which management practices, policy and norms are built.

A deep, collective inquiry into where there are ways to shift understanding and approaches will help the RE sector to achieve its full potential to build a responsible energy system.



The Responsible Energy Initiative Philippines creates a platform for leaders across the RE value chain to come together with civil society and public policy-makers to undertake this inquiry. We invite you to join us in a program to better understand the issues and opportunities to act, and to set a collective vision for a safe and just RE system.

For more information on the program, please visit: forumforthefuture.org/renewable-energy-responsible-energy-initiative

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S&P Global Foundation

S&P Global Foundation supports inclusive sustainable economies and thriving global communities. S&P Global Foundation is more than philanthropy—it's making a difference by finding and developing essential connections between the knowledge and skills of S&P Global and the needs of society. We make sure the work we do maximizes opportunities to engage S&P Global's employees and has a genuine impact on the global community. We focus our efforts where we can make a real difference in Diversifying Tech and Data and Creating Environmental Resilience.

Disclaimer: This document is an output from a project funded by the S&P Global Foundation and implemented by the partners of the Responsible Energy Initiative. The views expressed are not necessarily those of the S&P Global Foundation.

Tara

The Tara Climate Foundation is a regionally-based philanthropic foundation with a vision of a just and thriving society in Asia powered by renewable energy. Our mission is to support a diverse group of partners to accelerate Asia's energy transformation, by harnessing the power of collective action. We believe that a just energy transition is necessary to ensure that the transition to a low-carbon economy is both effective and equitable, and no one is left behind in the process.

Disclaimer: The views and opinions expressed in this report are those of the research partners and do not necessarily reflect the official policy or position of the Tara Climate Foundation.

About the partners

About Institute for Climate and Sustainable Cities (ICSC)

The **Institute for Climate and Sustainable Cities (ICSC)** is an international non-government group advancing fair climate policy and low carbon, climate-resilient development. Based in the Philippines, it is engaged with the wider international climate and energy policy arena, particularly in Asia. It is recognized for its role in helping advance effective global climate action and the Paris climate agreement.

About Forum for the Future

Forum for the Future is a leading international sustainability non-profit. For more than 25 years we've been working in partnership with business, governments, and civil society to accelerate the shift towards a just and regenerative future in which both people and the planet thrive. Our strategy is focused on enabling a deep and urgent transformation in how we think about, produce, consume and value both food and energy and the purpose of business in society and the economy. It comes as momentum for change is building, but social and environmental challenges are continuing to intensify.

About Business & Human Rights Resource Centre

The **Business & Human Rights Resource Centre** is a main global source of information on business and human rights, tracking the positive and negative human rights impacts of more than 10,000 companies worldwide in 10 languages on our digital action platform. BHRRC's vision is centered on businesses respecting human rights and providing redress for abuse, where people are leaders in shaping a rights-respecting and sustainable future for markets and business, and where shared prosperity through greater equality of power and wealth is enjoyed by all. Three core approaches help realize that vision: strengthening partners, allies, and movements; influencing decision makers; and driving accountability for abuse.

About FES Philippines

Friedrich-Ebert-Stiftung Philippines is a German foundation committed to the values of social democracy. Its focus is on the promotion of democracy and the strengthening of social and ecological dimensions of economic development through education, research, political dialogue, and international cooperation. The FES Philippine Office cooperates with national and local government institutions, trade unions, political and social movements, non-government organizations, media practitioners and groups, scientific institutions, individual experts, and other international organizations.

About CentRE

The **Center for Empowerment, Innovation and Training on Renewable Energy (CentRE)** is a not-for-profit association of RE advocates, developers, researchers, experts and social impact investors pursuing full deployment of RE in the country to address energy poverty, high electricity rates, and climate change in a just, sustainable and democratic manner. With diverse expertise of its members, the CentRE is envisaged as a hub for knowledge, social innovation, policy studies, advocacy and community empowerment.

About Oxfam Pilipinas

Oxfam Pilipinas is part of a global confederation of 21 organizations networked together in 87 countries as part of the global movement for change. In the Philippines, Oxfam is a humanitarian, development, and campaigning organization that has been working with partner organizations nationwide for 35 years to achieve a just and equal future for all.

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