



BANGSAMORO SUSTAINABLE ENERGY MASTER PLAN



Policy Brief

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ENERGY
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Background

The Bangsamoro Sustainable Energy Master Plan (BSEMP) emerges from a deliberate and collaborative effort to chart a low-carbon future for a developed Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). In 2023, the United Nations Office for Project Services (UNOPS), through the Southeast Asia Transition Partnership (ETP), partnered with the BARMM Ministry of Environment, Natural Resources, and Energy (MENRE) to develop the BARMM Power Sector Development Roadmap. That Roadmap identified the BSEMP as a priority initiative—a comprehensive framework to guide the region's entire energy sector toward a greater but responsible and judicious use of indigenous energy resources, improved energy service and system efficiency, all while upholding the values of moral governance.

BARMM Energy Vision

The BSEMP is primarily developed within the context of the Bangsamoro Organic Law (BOL) and the Bangsamoro Development Plan 2023-2028 (BDP 2023-2028). The BOL mandates the BARMM Government to develop comprehensive frameworks for sustainable development by properly conserving, utilizing, and developing natural resources. Guided by the overarching principles of the BOL, the BDP outlines the Bangsamoro government's development thrusts and priorities for this period. A key priority of the BDP 2023-2028 is energy security.

Economic and Energy Situation

BARMM comprises six provinces,¹ four cities, 116 municipalities, and 2,637 barangays, including the 63 barangays in North Cotabato collectively called the Special Geographic Area (SGA), which elected to be part of BARMM. As of the July 2024 census, BARMM's population was 5,691,583, accounting for 5.05% of the Philippines' total population.

BARMM has experienced notable socio-economic developments since its formation in 2019. The region's Gross Regional Domestic Product (GRDP) was projected to grow 4.5% in 2025 to PHP 313 billion, with further expansion expected in 2026. Agriculture will remain a key driver of BARMM's economic growth, with the development of the agri-based Halal food industry expected to accelerate it further. In 2023, all provinces within BARMM registered impressive economic growth, with Lanao del Sur and Maguindanao del Sur posting the fastest growth rate in the region.

BARMM has also seen the steepest decline in poverty incidence among Philippine regions, from 52.6% in 2018 to 28% in 2021 and 23.5% in 2023. However, this is still much higher than the national average of 10.9% in 2023. Also, at the provincial level, only Lanao del Sur and Sulu were above average, at 12.1% and 13.0%, respectively, while the rest of the provinces and Cotabato City were at or above 30%. This demographic reality suggests that energy solutions must be particularly sensitive to

¹ Sulu is not officially part of BARMM but remains included in this economic and energy study.

affordability, potentially requiring specialized subsidy programs or innovative financing mechanisms to ensure energy access for all population segments.

With Islam as the predominant religion (and Muslims comprising more than 90% of the population), BARMM exhibits significant ethnic and religious homogeneity that influences social structures and development patterns. This religious composition shapes community organization and may influence energy consumption patterns, particularly in relation to community facilities and service delivery models.

The residential sector accounts for the bulk of energy and electricity consumption in BARMM. Within the residential sector, wood accounts for the bulk of final energy consumption, and the small share of electricity indicates low access to electricity services in the region. All in all, BARMM has an average electrification rate of 46%, with more than 440,000 households remaining unserved,² compared to the national electrification rate of 94% and nearly 1.3 million unserved households. Four of BARMM's six provinces have an electrification rate below this average.

There are ten electric cooperatives, one private utility, and one municipal-owned utility distributing electricity in BARMM. Seven of the 10 Electric Cooperatives (ECs) are located in BARMM and serve as the main utilities for the six provinces of BARMM. Four of these seven ECs are considered "ailing" i.e., could not comply with any of the performance standards³, while the remaining three could only comply with one to three of the performance standards.

Based on the latest available data from MENRE, BARMM's power demand as of 2020 was 119 MW, representing less than 1% of the Philippines' total demand and about 6% of Mindanao's. Again, this indicates large unserved and suppressed demand, given that BARMM accounts for 5% of the total Philippine population.

Economic and Energy Outlook

Three economic scenarios were developed based on the projected or target GRDP growth rates in the BDP 2023-2028 and are summarized in [Table 1](#). Under the Business-as-Usual (BAU) scenario, it was assumed that the GRDP growth rate would remain at an average of 6.12% per year, the compounded average for 2020-2023, over the entire planning horizon through 2050. The BAU assumes that current conditions will persist. The Medium Growth (MED) scenario assumes that BARMM GRDP would grow 7.5% per year through 2035 and then 8% per year through 2050. On the other hand, the High Growth (HIG) scenario assumes that GRDP would grow 8.5% through 2035 and 9% per year through 2050. The MED and HIG scenarios assume that policies, plans, and programs in the national (Philippine Development Plan) and regional (BDP) development plans will be implemented. In addition, in the HIG scenario, the region will achieve the UN Sustainable Development Goals (SDGs).

² Households with no electricity access

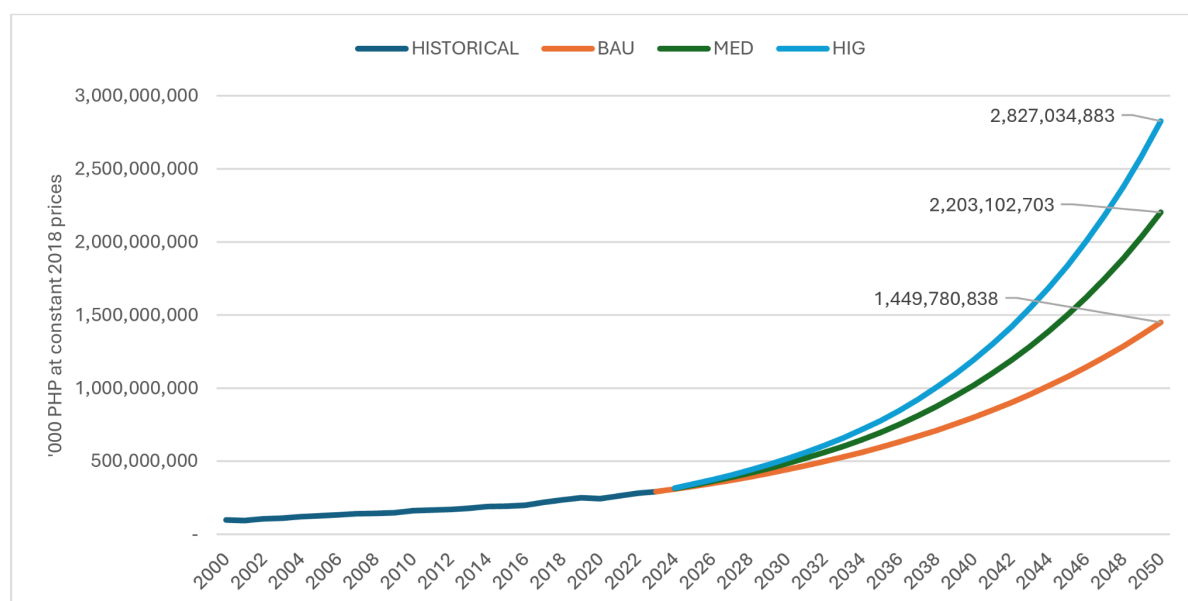
³ Pertaining to technical, financial, and institutional duties of distribution utilities

Table 1: Economic Scenarios Key Assumptions [%]

GRDP (constant 2018 prices) Growth Rate %						
GRDP growth scenarios	2020-2023	2023-2028	2028-2030	2030-2035	2035-2040	2040-2050
BAU	6.12	6.12	6.12	6.12	6.12	6.12
MED	6.12	7.50	7.50	7.50	8.00	8.00
HIG	6.12	8.50	8.50	8.50	9.00	9.00

Source: Project Team with concurrence of MENRE and BARMM TWG

The [figure](#) below summarizes the results of the economic projections, with BARMM GRDP reaching PHP2.83 trillion in 2050 under the HIG scenario, compared with PHP1.45 trillion under the BAU scenario and PHP2.20 trillion under the MED scenario.

Figure 1: BARMM GRDP Projections ['000 PHP Constant 2018 prices]

Source: Project Study-LEAP Model Results

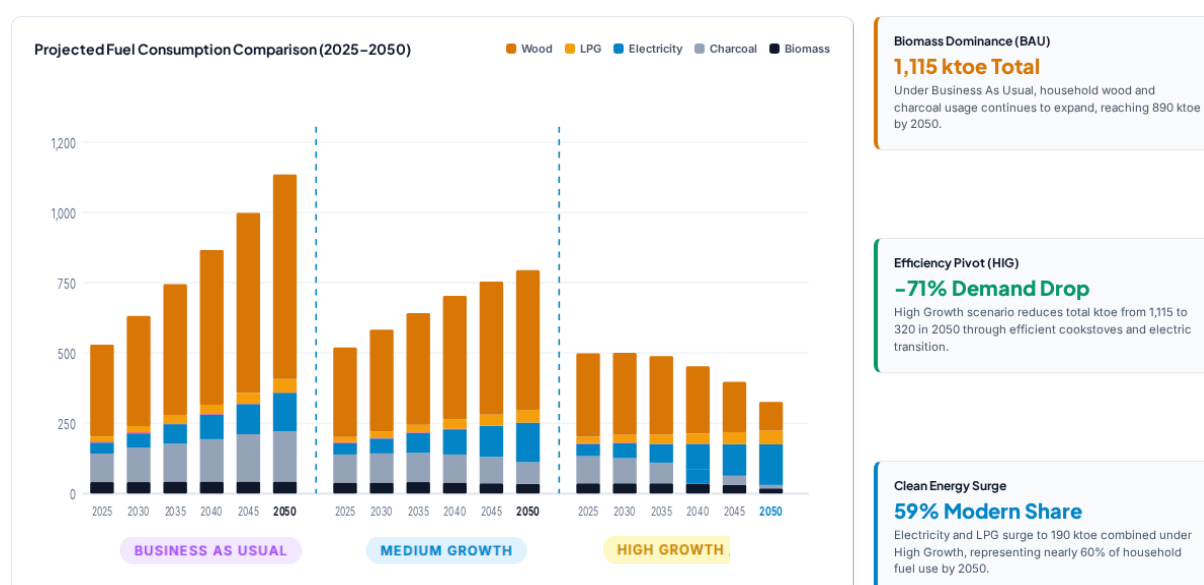
One interpretation of these projections is that the BARMM economy would reach the level of national gross domestic product (GDP) per capita in 2023 only after 2050 in the medium-growth scenario and after 2046 in the high-growth scenario. In other words, even under a high-growth scenario, it would take the BARMM economy more than 20 years to reach the national economy's current level.

It was also necessary to project population growth as another major determinant of energy demand growth. Recent statistics indicate that BARMM has a significantly higher population growth rate—around 3%—than the national average. It was decided to maintain a higher, but declining, projected population growth rate based on PSA projections.

With the BARMM population growing at an assumed average annual growth rate of 3.43% per annum between 2020 and 2025 and going down to 2.2% per annum by 2050, the BARMM total population is expected to more than double from 4.9 million and 5.7 million during the census years of 2020 and 2024, respectively, to about 11.9 million by 2050. This figure corresponds to a compounded annual growth rate of 2.91% between 2023 and 2050.

The above economic projections serve as inputs to the energy demand forecasts. Because of limited data, only the residential sector⁴ was modeled (see [Figure 2](#)), using end-use data and energy efficiency targets, with more aggressive electricity and clean cooking access targets and greater penetration of more efficient cooking fuels and appliances in the MED and HIG scenarios. The other sectors used energy intensity reductions as indicators of future energy efficiency improvements, applying the national targets for energy intensity reduction in the HIG scenario to achieve the full target across the BARMM region by 2050. For the MED scenario, moderate targets were adopted, set at half of the national target level.

Figure 2: BARMM Projected Residential Energy Demand by Fuel under the Three Scenarios [ktoe]

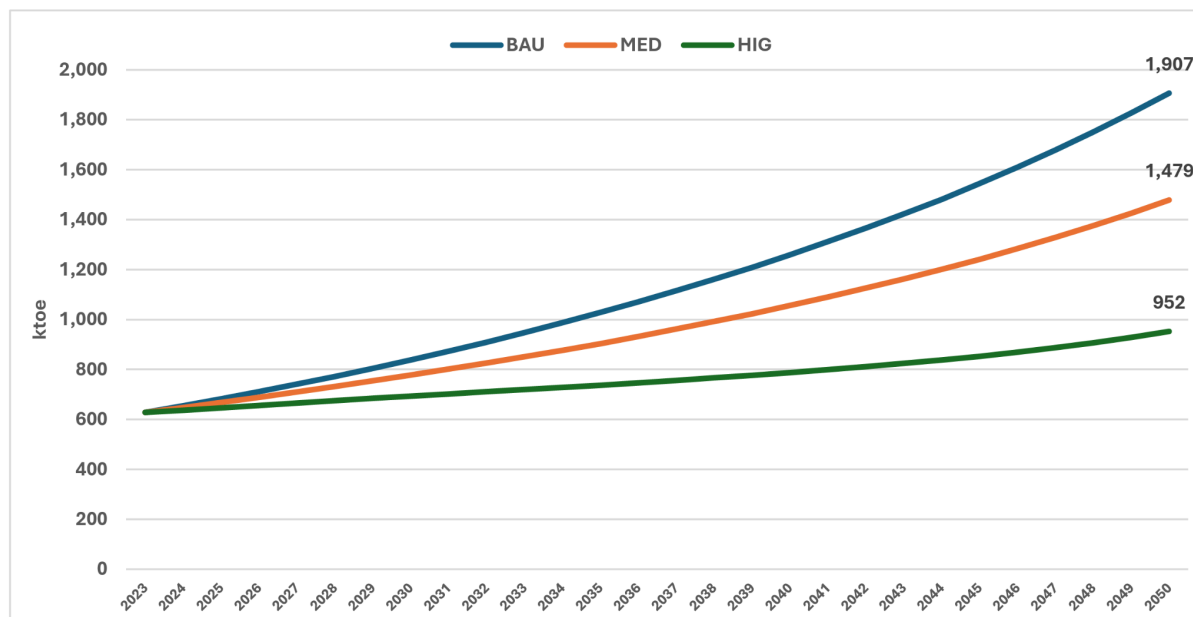


Source: Project Study-LEAP Model Results

In 2023, the total final energy consumption (TFEC) in the region was 628 ktoe and is projected to reach 1,907 ktoe by 2050 under the BAU scenario. In the MED scenario, demand reaches 1,479 ktoe by 2050, and in the HIG scenario, demand reaches 952 ktoe by 2050, as can be seen in [Figure 3](#).

⁴ Based on the 2023 Household Energy Consumption Survey (HECS)

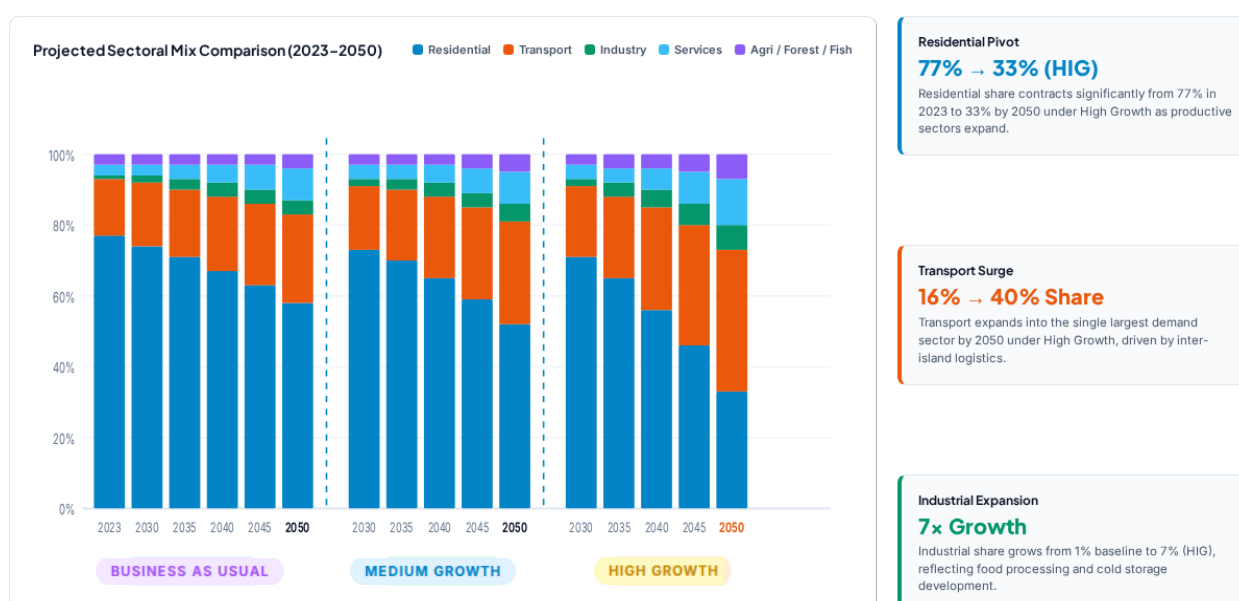
Figure 3: BARMM Projected Energy Demand All Scenarios [ktoe]



Source: Project Study-LEAP Model Results

The residential sector would continue to dominate BARMM energy demand, except by 2050 in the HIG scenario, when the transport sector, until then the second-largest energy demand sector, overtakes it as shown in [Figure 4](#). In fact, with economic growth, decreasing energy intensity, and increasing energy efficiency in the residential sector, the transport sector's share continues to rise across all scenarios. The industry, services, and agriculture sectors will exhibit similar trends.

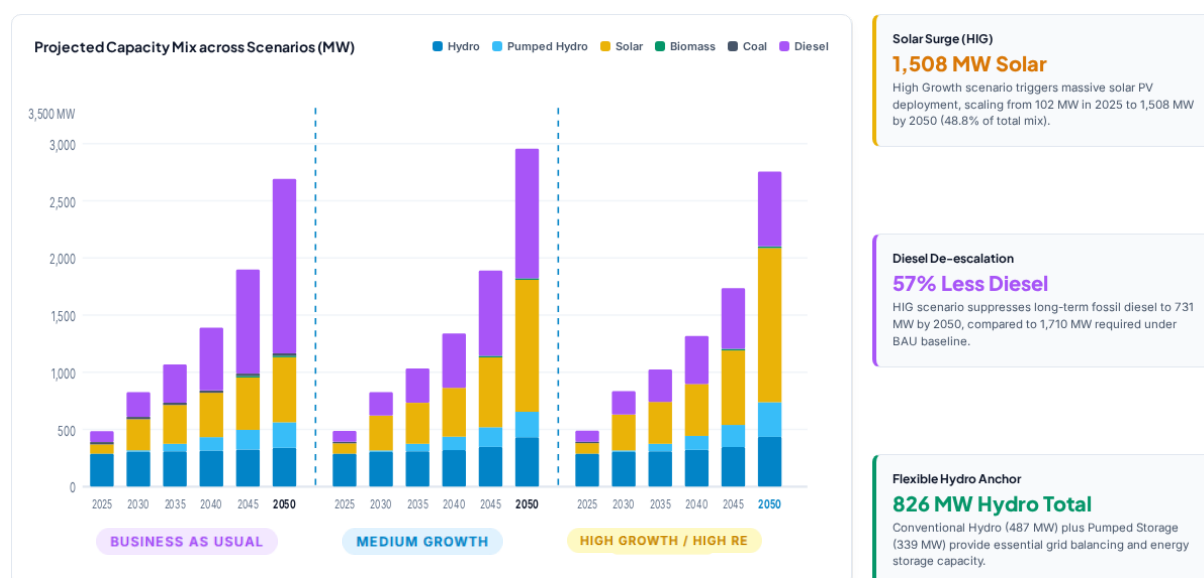
Figure 4: Structure of Projected Energy Demand



Source: Project Study-LEAP Model Results

The supply expansion plan charts how the projected growth in energy demand under the three economic scenarios will be met using the region's available energy resources and current technologies. The objectives of the BSEMP are to maximize the feasible utilization of indigenous energy resources by prioritizing renewable energy, reduce dependence on fossil fuels, including phasing out coal in the energy mix, and minimize energy imports. The BSEMP builds and maximizes the use of hybrid solar Photovoltaic (PV) with Battery Energy Storage Systems (BESS) and hydropower plants on both the mainland and off-grid islands, including the construction of new hydro-pumped storage on the mainland. However, it remained necessary to maintain the diesel power plants on the islands and to import electricity from the mainland to meet demand. The plan meets the 30% renewable energy (RE) target by 2030 in the MED scenario and misses the 50% RE target in the HIG scenario by only three percentage points. BARMM will have to continue to rely on diesel in the islands and on imported electricity on the mainland, but will substantially increase the use of hybrid solar PV-BESS and pumped-storage hydro to reduce dependence on fossil fuels in the power generation mix.

Figure 5: BARMM Projected Capacity Mix by Fuel Type, All Scenarios (2023 - 2050) [MW]



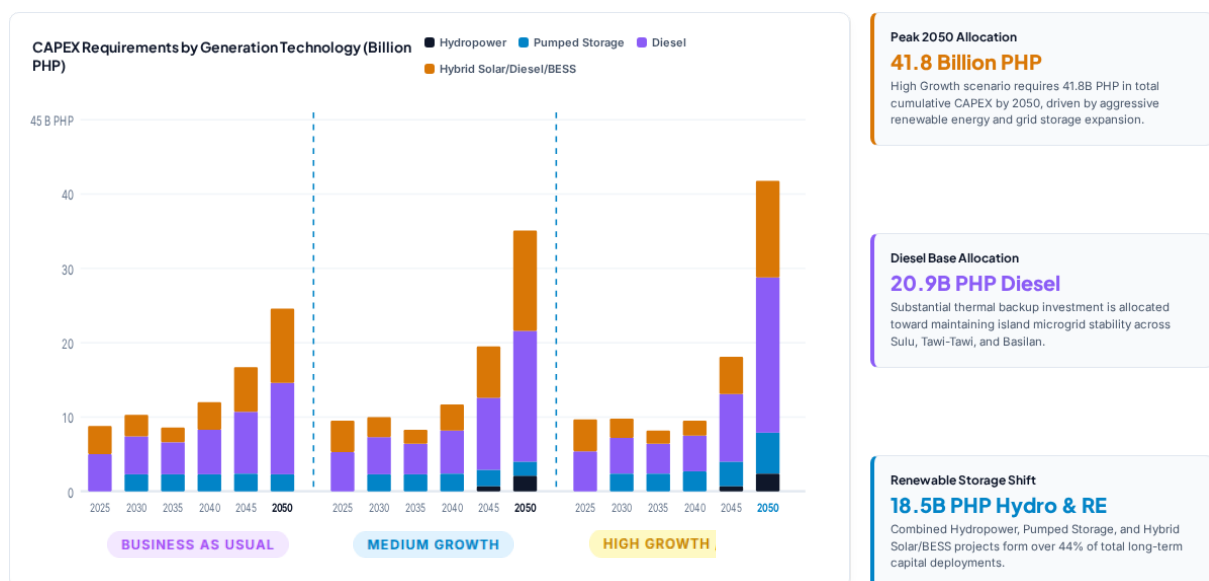
Source: Project Study-LEAP Model Results

Higher demand under the medium and high economic growth scenarios, particularly with greater penetration of energy-efficient technologies and renewable energy resources, implies higher investment costs. Compared to a total investment of PHP 25 billion in the BAU scenario by 2050, the BSEMP requires higher investments of PHP 35 billion in the MED scenario and PHP 42 billion in the HIG scenario.

The Master Plan requires significant investment in hybrid solar PV technologies to meet, particularly, the RE penetration targets. These costs increase from PHP 10 billion in the BAU scenario to PHP 13 billion in the MED and HIG scenarios by 2050 (respectively, 38% and 31% of total investments). In addition, under the HIG scenario, PHP 6 billion in Hydro with Pumped Storage investments are needed in the region by 2050, compared

to PHP 2 billion each for the other two scenarios. In a similar trend, the utilization of diesel plants to sustain power and use as thermal backup in island provinces entails an even higher cost requirement of PHP 17 billion in a MED growth and PHP 21 billion in a HIG growth scenario compared to PHP 12.3 billion baseline projected in 2050 (in both scenarios, diesel requirements contributes to 50% of the total investments). These are summarized in [Figure 6](#).

Figure 6: Investment Costs per Scenario (2025–2050) in Billion PHP



Source: Project Study-LEAP Model Results

The phase-down of existing fossil fuel assets follows two distinct approaches, shaped by geographic and regulatory constraints, carefully balancing decarbonization with grid stability and consumer affordability. On the mainland, the power sector must comply with national regulations, including the coal moratorium and the Renewable Portfolio Standards (RPS), to increase the share of RE in the power supply mix. In the off-grid islands, the master plan prioritizes the Accelerated Hybridization Program, which integrates existing diesel generators with solar photovoltaic panels and battery energy storage.

IMPACT

The primary impact of a sustainable energy master plan is that it will help the region achieve the Bangsamoro Development Plan's economic growth targets, as energy is a critical driver of economic growth.

Advancing sustainable energy development in BARMM offers a historic chance to do it right from the start, seamlessly weaving social progress, environmental stewardship, and women's empowerment into the region's foundation. These opportunities include:

- Enhanced energy access and resilience
- Economic growth and job creation

- Enhanced health and educational outcomes
- Empowered communities

Not to mention, the increased use of renewables in the power supply mix is generally associated with lower GHG and air pollutant emissions, thereby reducing long-term climate risks that come with a premium. Notwithstanding, a comprehensive strategic environmental assessment (SEA) should be conducted, taking into account life-cycle and value-chain impacts.

WAYS FORWARD

An essential aspect of BARMM energy planning and modeling that should be addressed immediately and consistently thereafter is the availability of economic, energy, and environmental data at both the regional and provincial levels. The availability of complete and reliable data will improve energy planning and modeling, from setting the base year to developing scenarios, making intelligent and more realistic assumptions, running the energy model, and interpreting the results.

As the lead agency for environmental, natural resources, and energy governance in BARMM, MENRE shall have responsibilities for legislative and policy advisory services, planning and implementation, monitoring and regulation, and stakeholder engagement, among others. The role of MENRE in ensuring the delivery of adequate, reliable, and affordable energy services in BARMM is critical. Yet its existing institutional capacity, including its structure and human resources, is not sufficiently equipped to carry out the functions required by its mandates as progress happens. Thus, there are three critical legislative initiatives aimed at empowering and strengthening the region's energy sector:

- 1) A separate Ministry of Energy is proposed that mirrors the Department of Energy (DOE) functions in a streamlined manner, with regional coverage, to ensure a continuous, adequate, and economic supply of energy in the region and one that would continue coordination with the other BARMM ministries.
- 2) The establishment of the Bangsamoro Electrification Administration (BEA), a government-owned and controlled corporation (GOCC), is also being proposed to oversee power and electrification programs in BARMM.
- 3) The Act creating the Energy Development Corporation of the Bangsamoro (EDCB) is pending the Parliament's engagement in the exploration, utilization, and development of energy resources in Bangsamoro, as well as the transportation, storage, importation, exportation, refining, supply, sale, and distribution of crude oil and petroleum products.

As part of a just and inclusive energy transition, an important aspect of governance is the participation and empowerment of women and communities, including indigenous peoples and other marginalized groups. MENRE, or the future Ministry of Energy, should hold regular public consultations with these groups to ensure their voices are heard and their participation in energy decision-making, including, most importantly, providing

data and information on the impacts of energy projects on them, and opportunities for them to provide opinions and feedback to help avoid or mitigate these impacts. Participatory approaches adopted in BARMM's renewable energy and energy efficiency initiatives will increase local engagement and strengthen social cohesion. By enhancing local participation and fostering collective problem-solving, the region's renewable energy development will significantly improve social capital within its communities. Community-owned or citizen-led renewable energy projects, including the implementation of energy efficiency and conservation practices, will foster a sense of ownership. This can potentially resolve the collection challenges faced by BARMM electric cooperatives as consumers gain an understanding of the energy services provided to them.

To implement the BSEMP, significant financing and strategic investment are needed. The present Master Plan estimates that between PHP 25 billion and PHP 42 billion will be needed to meet projected energy demand across the three scenarios. Funding will come from a combination of public sources, private investment, and development aid, with approaches customized to BARMM's specific requirements. Similarly, the goals and targets of the BSEMP cannot be achieved without strategic partnerships with the national government, the private sector, and the international development community. As a young regional economy, BARMM needs external support, as well as other resources to make investments.

Finally, the development of renewable energy in BARMM shall incorporate the principles of a just transition, including the creation of equitable employment opportunities and high-value jobs in emerging sectors. It emphasizes retraining workers from fossil-based industries to equip them with the competencies required for the green economy. Additionally, it advocates giving affected workers and communities a voice in shaping transition policies, respecting indigenous land rights, and ensuring the meaningful inclusion of marginalized groups, including women, the youth, persons with disabilities, and older people, in decision-making processes. Additional revenues that could potentially come from carbon-intensive industries are proposed to support vulnerable communities and provide investment capital in resilient infrastructure. Furthermore, establishing robust social protection systems, such as unemployment benefits and subsidies, is essential to support workers and communities facing economic disruptions.



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