



Eugene & Company

# PROJECT DAGITAB:

TAPPING THE POTENTIAL OF RICE HUSKS  
FOR RENEWABLE ENERGY GENERATION IN  
SAN ANTONIO, NUEVA ECIJA

ASEAN-CHINA-INDIA

YOUTH LEADERSHIP SUMMIT 2024

AUGUST 2024





91.10%

**HOUSEHOLD  
ELECTRIFICATION  
LEVEL**

**AS OF JUNE 2023...**



**2.454 MILLION  
HOUSEHOLDS**

**REMAIN WITHOUT ELECTRICITY**

Source: 2023-2032 National Total Electrification Roadmap | Department of Energy Philippines. (n.d.).  
<https://doe.gov.ph/announcements/2023-2032-national-total-electrification-roadmap#:~:text=As%20of%20June%202023%2C%20the,households%20are%20at%202.454%20million>

# Rotational brownouts to hit 1.3 million houses in 2023 — DOE

By: [Daphne Galvez](#) - Reporter / [@DYGalvezINQ](#) INQUIRER.net / 04:09 PM January 31, 2023

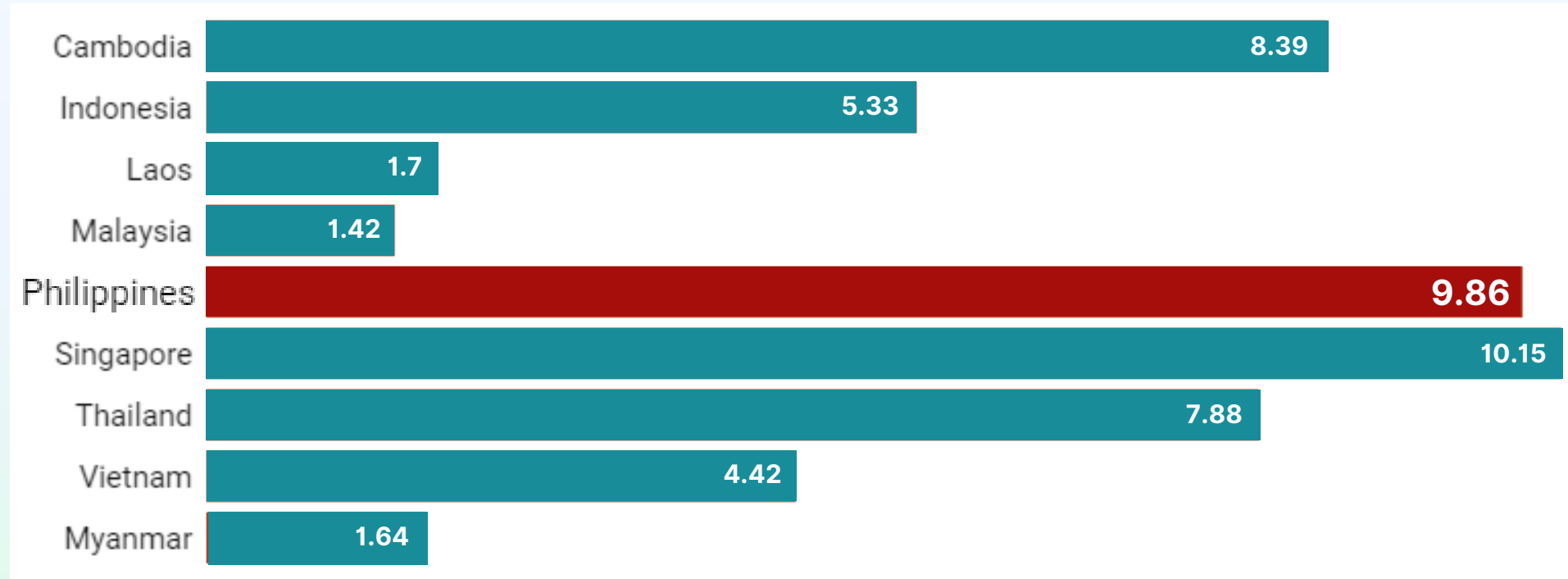


Extended and more frequent power interruptions are most concentrated in Luzon.

Sources: Galvez, D. (2023b, February 1). Rotational brownouts to hit 1.3 million houses in 2023 — DOE | Inquirer News. INQUIRER.net. <https://newsinfo.inquirer.net/1723516/1-3m-houses-to-experience-rotational-brownouts-in-2023-energy-officials>

RPN News. (2023, February 7). Consumer hours lost to brownouts up 10%. <https://www.pids.gov.ph/details/news/in-the-news/consumer-hours-lost-to-brownouts-up-10>

# AS OF JANUARY 2022...



**ELECTRICITY PRICES PER KWH IN SOUTHEAST ASIA**

**NATIONWIDE ELECTRICITY COST**  
**AMONG THE HIGHEST**  
**IN SOUTHEAST ASIA**

Sources: *Filipinos burdened with power rate hike amid livelihood inflation.* (2023, September 14). <https://english.news.cn/20230914/be3902d8e5d14d95bf22f41924bb632f/c.html>

Lopez, E., & Lopez, E. (2024, April 26). *Filipinos pay more for electricity compared to many Asean neighbors. What can Marcos do about it?* PCIJ.org. <https://pcij.org/2023/09/14/filipinos-pay-more-for-electricity-compared-to-many-asean-neighbors-but-what-can-marcos-do-about-it/>

"Sa gabi, apat na oras lang ang kuryente. Kapag may **malakas na ulan o bagyo**, tuluyang naputol... **Palagi kaming natatakot** na masira ang mga linya ng kuryente at mawawalan kami ng kuryente nang ilang linggo."



"Kailangan ng mga mangingisda ang mga ref upang maiimbak at mapangalagaan ang kanilang mga huli. Sa tuwing mapuputol ang kuryente, **kailangan nilang pumunta sa kapitolyo** para bumili ng yelo para hindi masira ang isda – **tatlong oras ang byahe** papunta roon."





"Ang inaalala ko ay **paano ang mga bata** [kapag walang kuryente]. Mas mahirap noong pandemic noong hindi ma-download ng mga bata ang mga aralin o makadalo sa mga online na klase kapag nawalan ng kuryente."

"5,700 pesos (halos 100 dollars) ang bill namin sa kuryente noong nakaraang buwan. Kung patuloy na tataas ang singil sa kuryente, **masisira ang daloy ng budget namin** kada buwan."

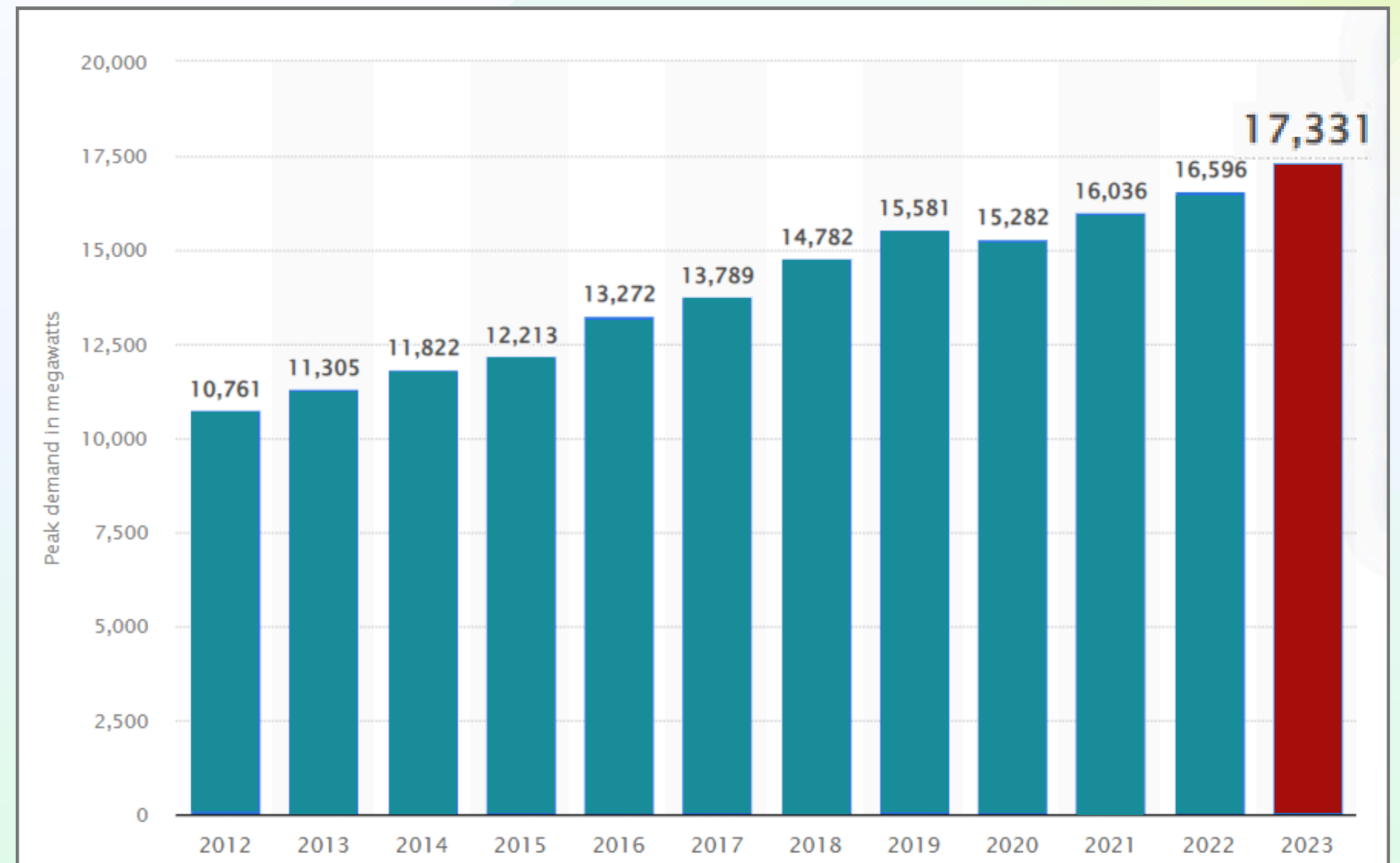


Sources: Filipinos burdened with power rate hike amid livelihood inflation. (n.d.). <https://english.news.cn/20230914/be3902d8e5d14d95bf22f41924bb632f/c.html>

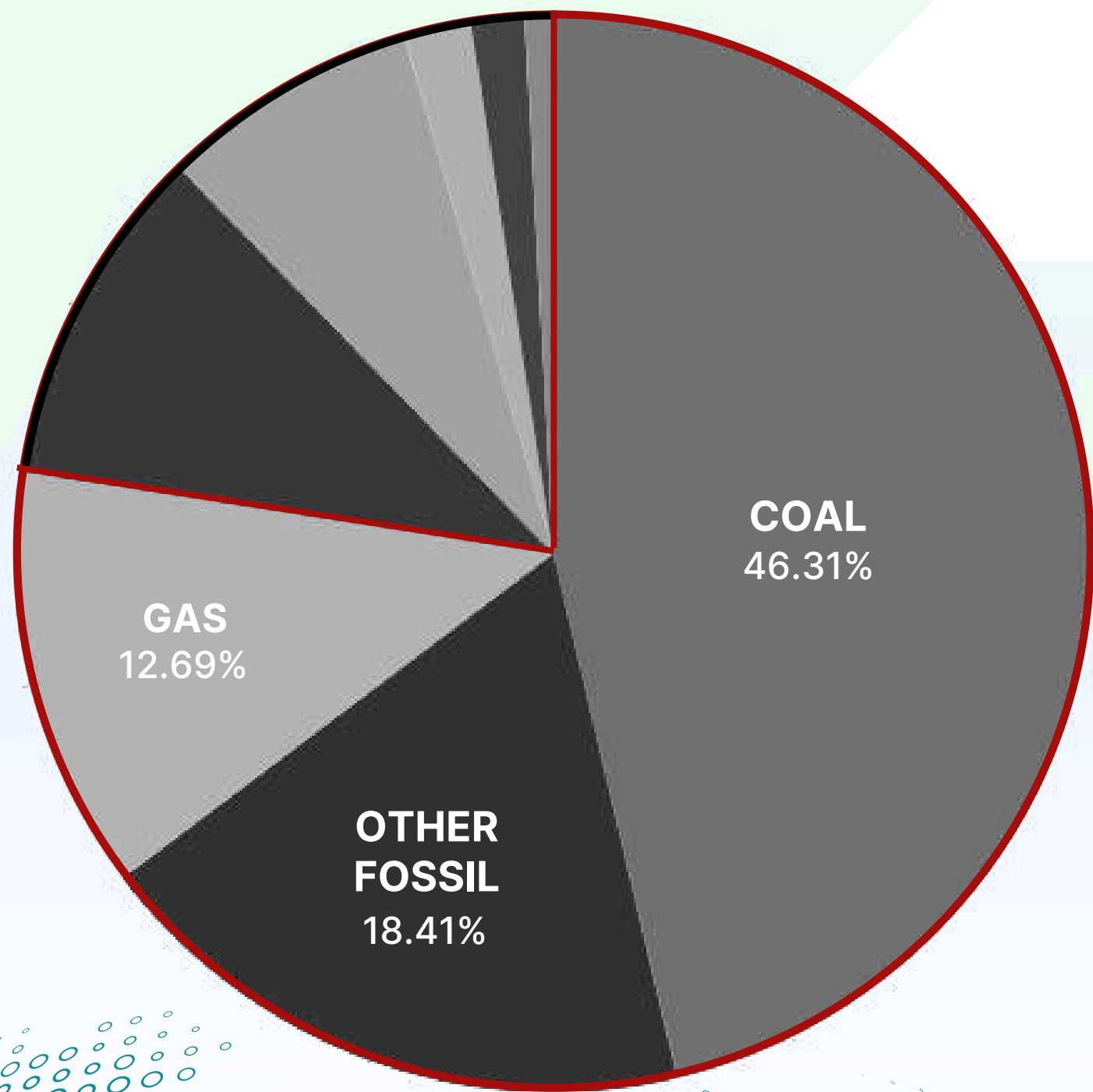
Silverio, I. (2023, March 8). Filipino women speak out on equitable energy access. Maritime Fairtrade. <https://maritimefairtrade.org/filipino-women-speak-out-on-equitable-energy-access/>



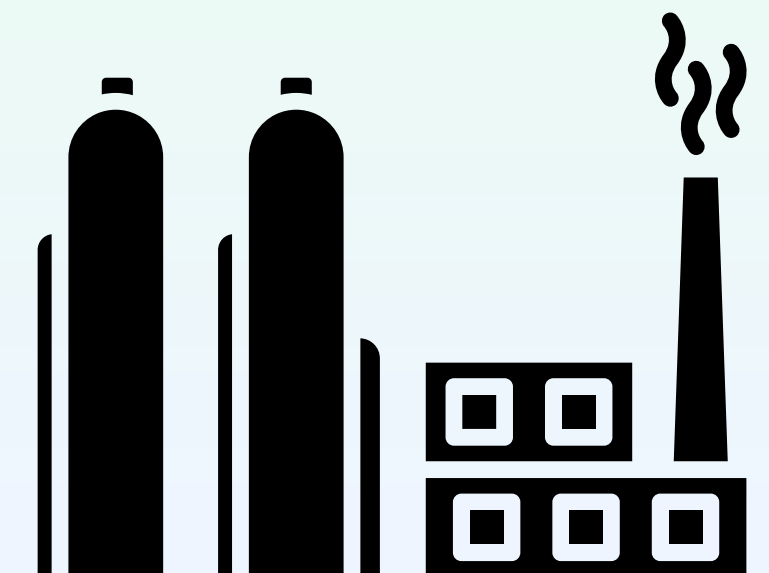
**17,300 MW**  
**PEAK POWER DEMAND**



**TOTAL PEAK POWER DEMAND IN THE PHILIPPINES FROM 2012 TO 2023**



77%



**ELECTRICITY  
SUPPLIED BY  
FOSSIL FUELS**

Source: Statista. (2024a, June 28). *Power production breakdown in the Philippines 2022, by source.*  
<https://www.statista.com/statistics/1237572/philippines-distribution-of-electricity-production-by-source/>



# BIOMASS

How might we bridge the gap in access to clean, reliable, and affordable energy resources among underserved populations, particularly in rural and remote areas in the Philippines, to ensure equitable energy access?

**SDG 7: Affordable and Clean Energy**



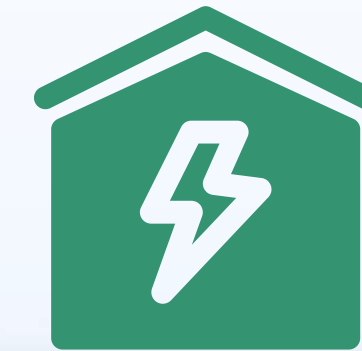
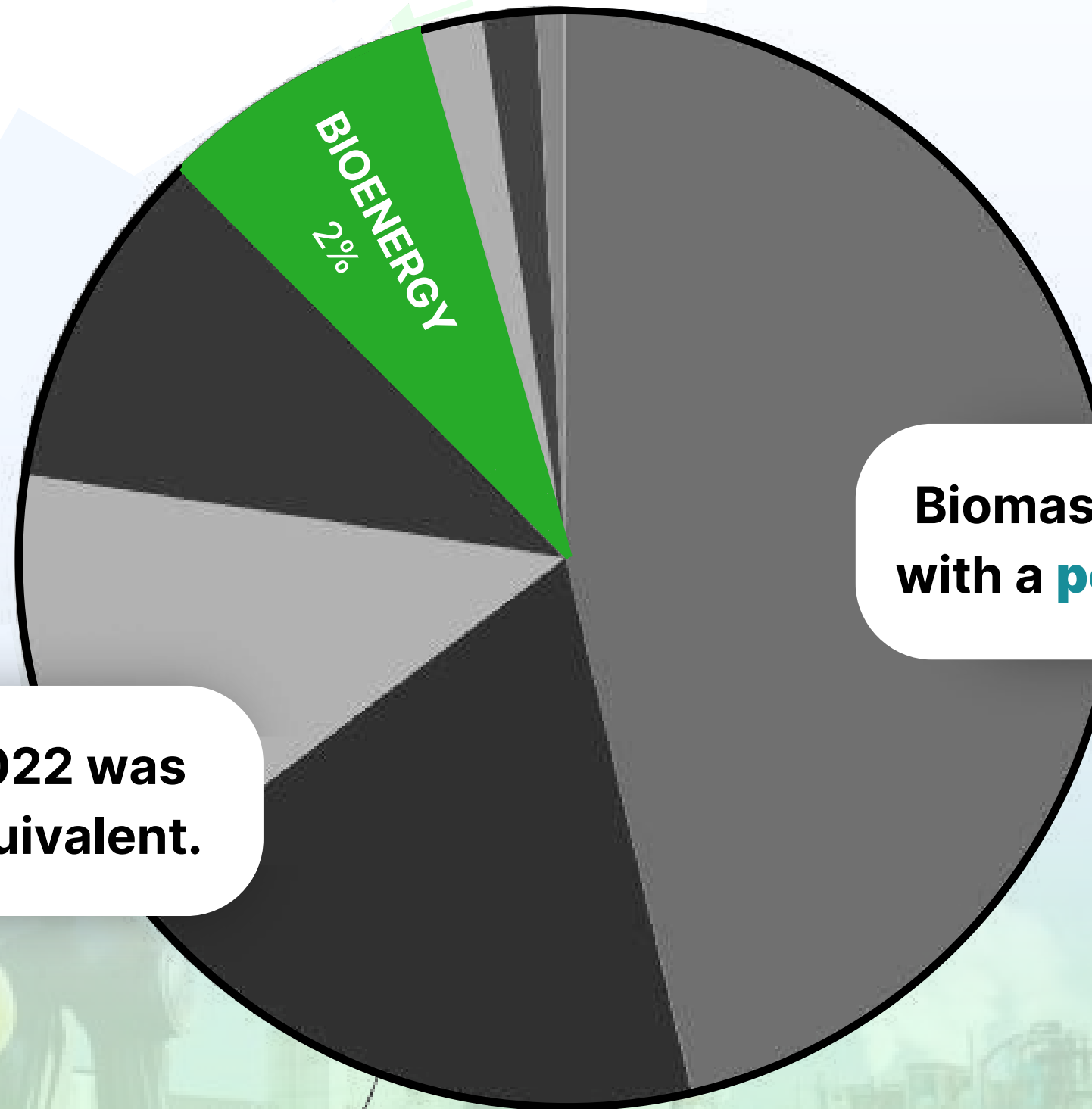


**Rice husks** are the most important underdeveloped biomass resource.

# 16 MILLION TONS

## ANNUAL AGRICULTURAL RESIDUES

Biomass supplies **nearly 30%** of the Philippines' energy needs, predominantly for **domestic needs in rural areas.**



Biomass production in 2022 was **7.73 million tons of oil equivalent**.

Biomass resources could power projects with a **potential capacity of over 200 MW**.

Sources: ASEAN Briefing. (2021, January 8). Biomass industry in the Philippines - ASEAN business News. ASEAN Business News. <https://www.aseanbriefing.com/news/biomass-industry-philippines/>

Statista. (2024a, January 23). Total biomass produced Philippines 2022, by fuel type. <https://www.statista.com/statistics/1275454/philippines-biomass-production-by-fuel-type/>



# WHY BIOMASS?



**ABUNDANT RESOURCE BASE**



**CLEAN AND COST-EFFECTIVE**



**FOSSIL FUEL INDEPENDENCE**



**RURAL DEVELOPMENT**



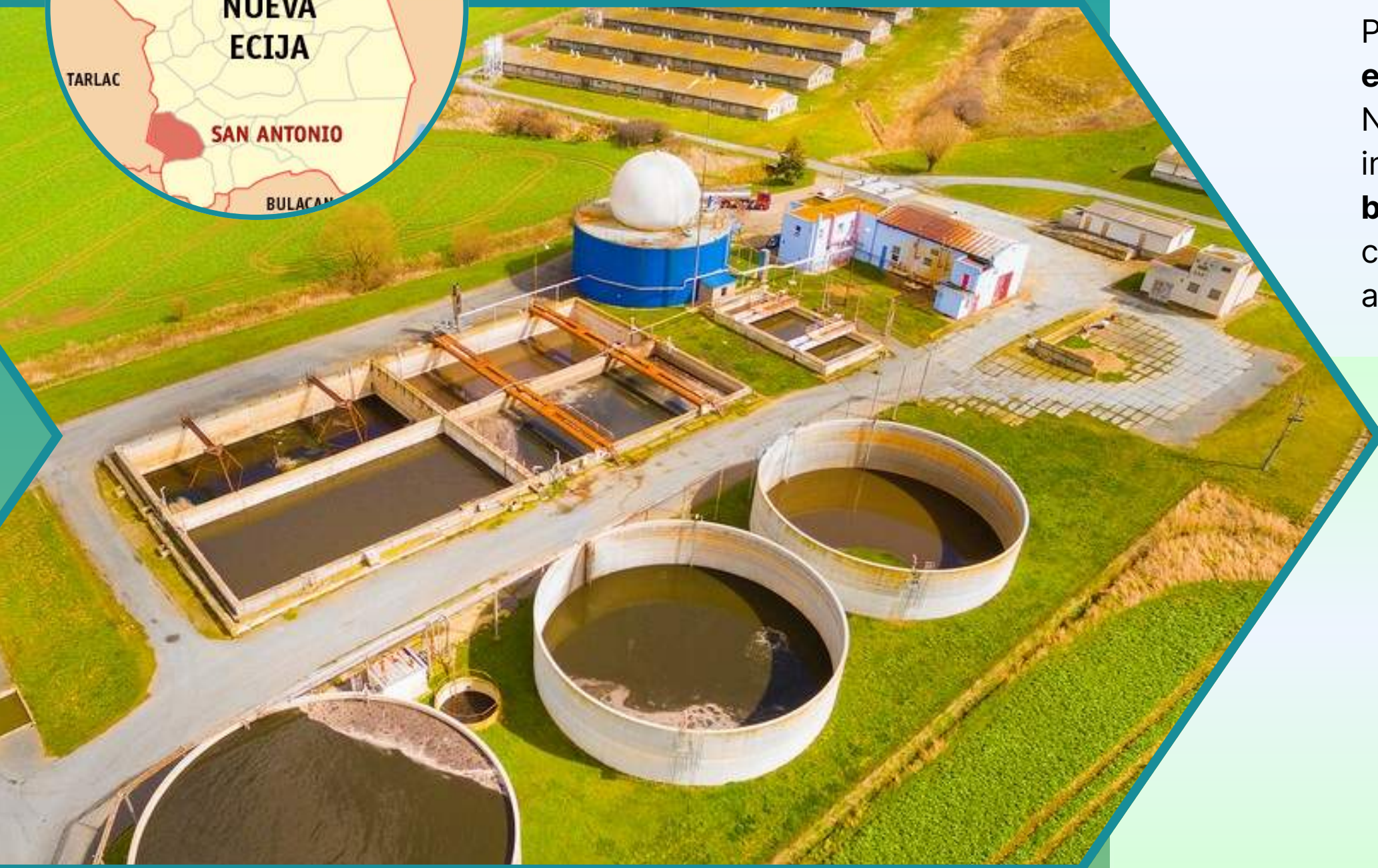
**WASTE REDUCTION**



**FARMER EMPOWERMENT**

# WHAT IS PROJECT DAGITAB?

Project Dagitab is a business venture devoted to bringing **biomass energy to rural areas in the Philippines**, starting with San Antonio, Nueva Ecija. Through its multi-stage cycle, it seeks to keep landowners involved as partners while targeting their **farmers as the main beneficiaries**. This initiative positions the company's ESG goals at the center of San Antonio's livelihood and allows the company to provide accessible and **affordable energy for the community**.



ELECTRICITY CREDIT POINTS

CASH GRANTS



PROJECT DAGITAB



**LANDOWNERS**  
RICE HUSKS FEEDSTOCK



**FARMERS**  
LABOR



## KEY LOCATION FOR PROJECT IMPLEMENTATION:



# SAN ANTONIO, NUEVA ECIJA

Based on Baltazar, et al's study: *Locating Potential Site for Biomass Power Plant Development in Central Luzon, Philippines using LANDSAT-Based Suitability Map*



### OPTIMAL LOCATION

Located in the Rice Granary of the Philippines, the municipality of San Antonio was shown to have the **highest available potential for biomass energy** in all of Central Luzon. Baltazar, et al (n.d.) calculated its score of 10,297.4 MJ/Ha, considering biomass energy potential, efficiency of the biomass collection procedure, and the area of the location.

### UNTAPPED POTENTIAL

Within Nueva Ecija, only the North Central cities have existing biomass power plants, specifically San Jose, Talavera, and Llanera. Baltazar, et al (n.d.) found that the area with the most biomass energy potential is the Southwestern part of the province. A plant in San Antonio would potentially power the homes of **83,060 individuals**, plus those of its neighboring cities.

# IMPLEMENTATION PLAN



0

Stage Zero

## INVESTMENTS AND PARTNERSHIPS

- Securing funding from loans and investors
- Investing in capital (e.g. machinery, land, and workers)



1

Stage One

## COLLECTION

- Truck collection for rice husks weekly



2

Stage Two

## CONVERSION

- Conversion for landowners - electricity credit points per kg of rice husks
- Conversion for farmers - cash grants per kg of rice husks
- Conversion rate for distribution to San Antonio



3

Stage Three

## ELECTRIFICATION AND DISTRIBUTION

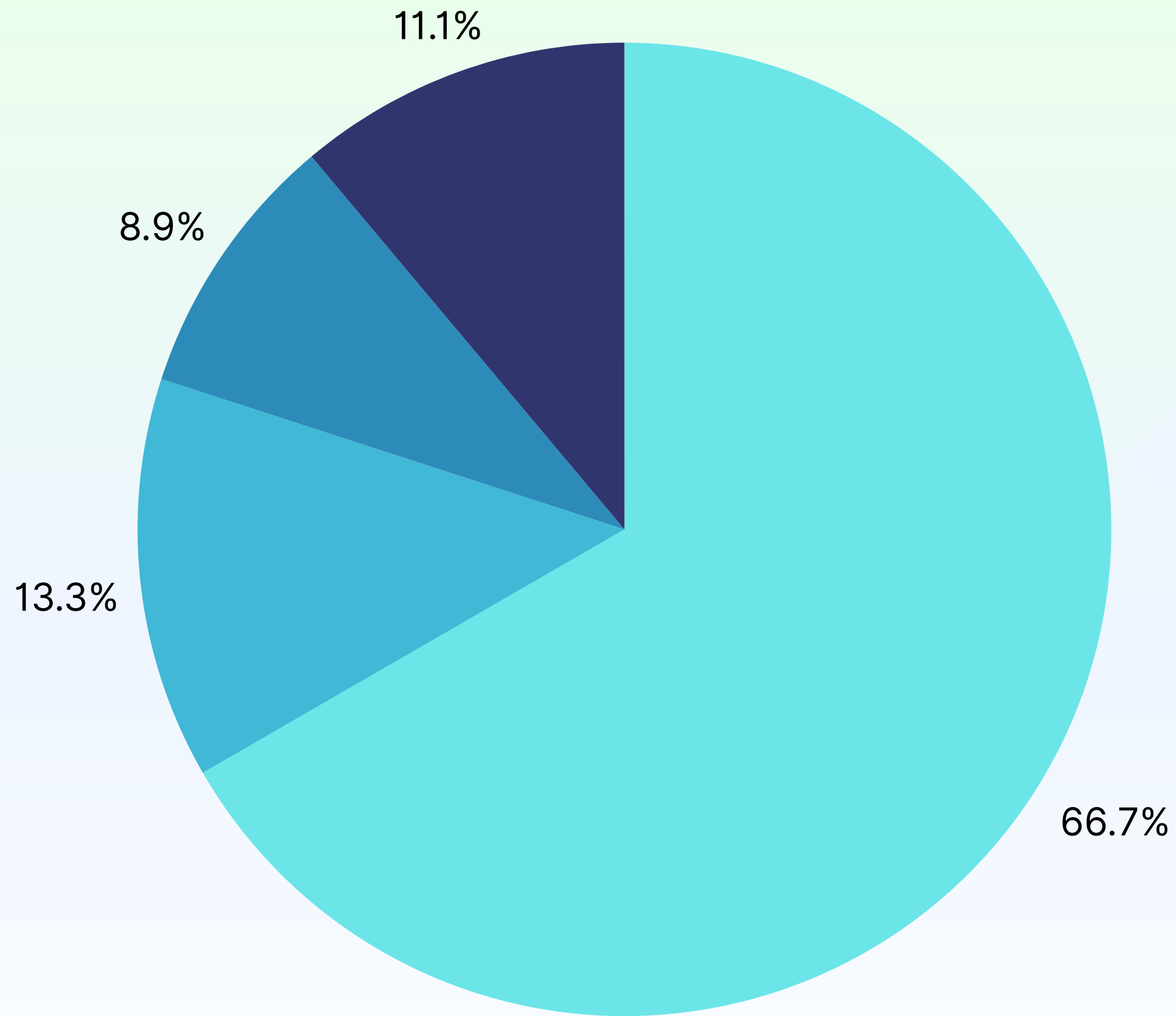
- Distribution of produced electricity through *Nueva Ecija 1 Electric Cooperative (NEECO-1)*
- Deduction of landowners monthly electricity bill through garnered electricity





# FINANCIAL PROJECTION



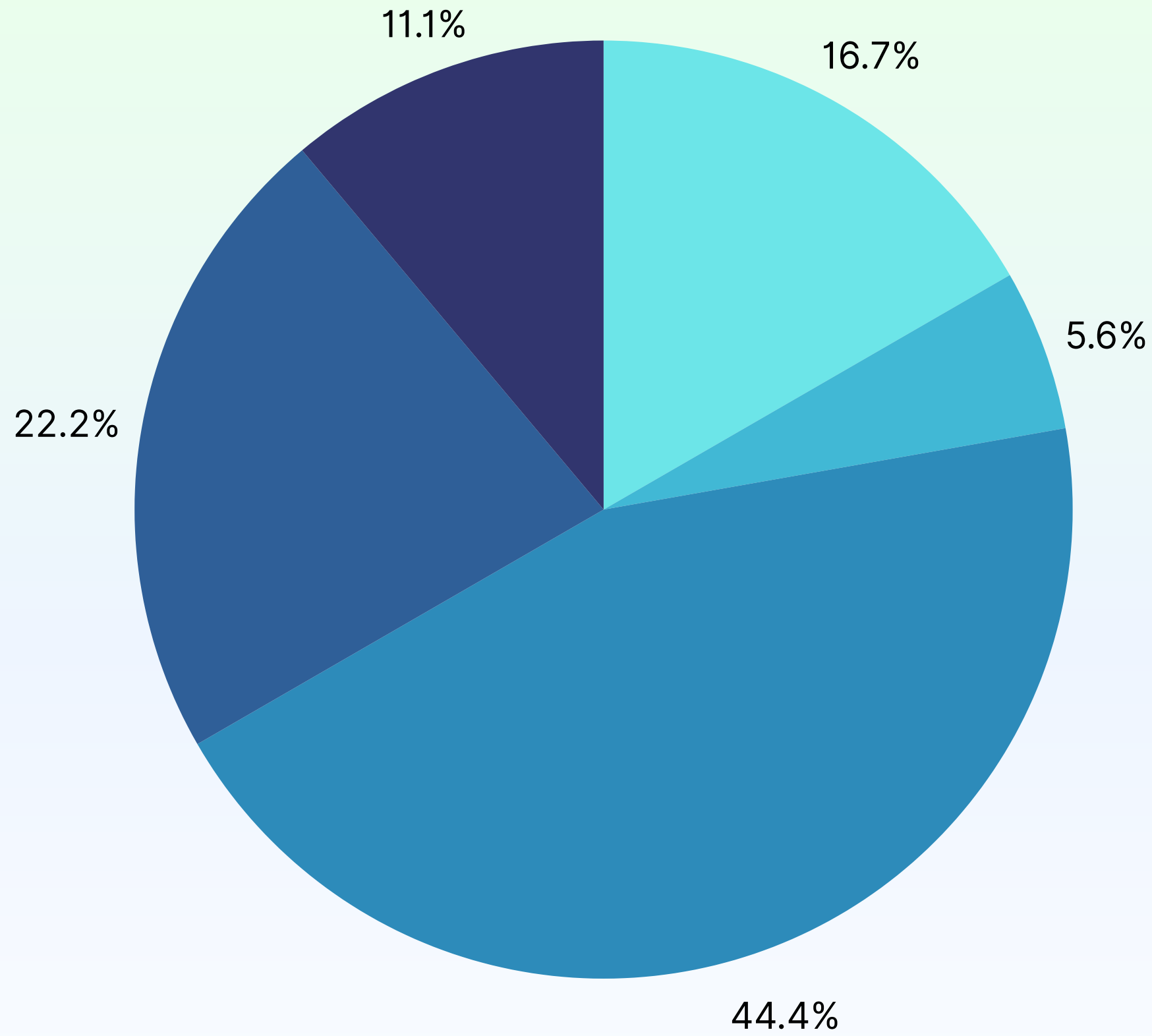


Particulars	Allocation	Percentage
Gasifier System	1500000	66.7%
Rice Husk Storage and Handling	300000	13.3%
Installation and Miscellaneous Costs	200000	11.1%
<b>Sub Total</b>	<b>2000000</b>	<b>91.1%</b>
Contingency Fund*	250000	8.9%
<b>Total Capital Expenditure</b>	<b>2250000</b>	<b>100%</b>

# TOTAL CAPITAL EXPENDITURE

\*Accounts to 10-20% of the Subtotal





# TOTAL OPERATING EXPENDITURE

Particulars	Allocation	Percentage
Fuel (Rice Husks)*	450000	16.7%
Maintenance	150000	5.6%
Labor	12000000	44.4%
Farmer's Pay**	600000	22.2%
Miscellaneous Fees	300000	11.1%
<b>Total Operating Costs</b>	<b>27000000</b>	<b>100%</b>

\*About 1,000 pesos/tonne

\*\*About 1428.57 pesos/tonne

# REVENUE PROJECTION



## ELECTRICITY GENERATION

If priced at 7.15 php/kWh\* and at 1.2 MW\*\* daily:

**Estimated Revenue from Electric Generation:**  
PHP 3,131,700/year

\*\*Diemuodeke, O. E., Mulugetta, Y., & Imran, M. (2021). Techno-economic and environmental feasibility analysis of rice husks fired energy system for application in a cluster of rice mills. *Renewable and Sustainable Energy Reviews*, 149, 111365. Chicago

\*\*Assuming 50% rate of eff

# ADDITIONAL REVENUE STREAMS



## CARBON CREDITS

By reducing carbon emissions, Project Dagitab can earn carbon credits which can be sold in carbon markets.

**Estimated Revenue from Carbon Credits:**  
PHP 220,000/year



## FERTILIZER PRODUCTION

The ash produced from burning rice husks can be sold as a soil conditioner or fertilizer.

**Estimated Revenue from Fertilizer Sales:**  
PHP 180,000/year

**TOTAL ADDITIONAL REVENUE:**  
PHP 400,000/YEAR

# MARGINS



Revised Total Annual Revenue

**3,531,700 PHP**



Revised Total Annual Profit

**831,700 PHP**



ROI

**~2.71 years**

# MARGINS



Gross Profit Margin

**23.54%**



Operating Profit Margin

**23.54%**



Net Profit Margin

**23.54%**



# IMPACT OF PROJECT DAGITAB ON ENERGY ACCESSIBILITY AND LIVES OF SAN ANTONIO RESIDENTS



## ENVIRONMENTAL

- Improves waste management and utilization systems
- Reduces soil erosion and water pollution
- Reduces carbon emissions (compared to fossil fuel counterparts)
- Serves as a sustainable and accessible energy source



## SOCIAL

- Provides a cleaner and healthier working environment for farmers
- Serves as a channel for the progression and integration, especially of far-flung communities
- Allows for residents to have more access to technology, giving residents more time for other ventures

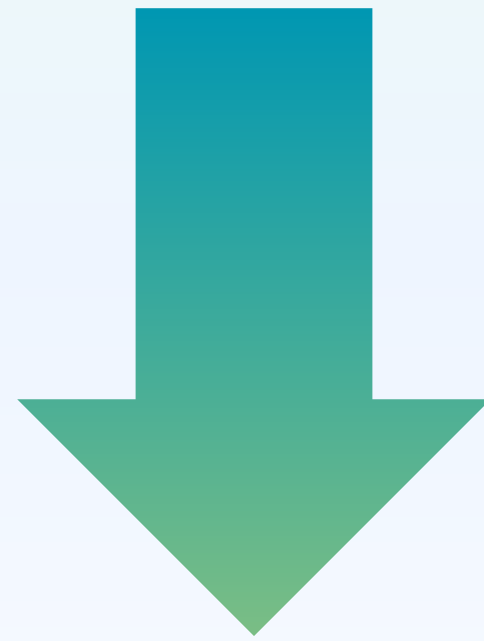


## ECONOMIC

- Solves the issue of oversupply and crop wastage
- Provides a consistent income source during non-seasonal times of the year for farmers
- Results in cheaper electricity rates for residents due to a new stream of energy supply
- Encourages growth of the country's agricultural sector
- Increases farmer wages



**3,638,431**



**1,839,859 IN NUEVA ECIJA ALONE\***

A person wearing a traditional conical hat is working in a golden rice field. The person is seen from the back, wearing a dark long-sleeved shirt and dark pants. The rice stalks are tall and golden, indicating they are ripe. The background is a vast field of similar rice plants under a bright, warm light.

IF ONE TONNE OF RICE HUSK  
COULD PRODUCE ABOUT **1 MW**  
OF ELECTRICITY...





## Residential

₱ 11.9574 / kWh

vs June 2024

₱ 12.8745 / kWh



by

Php 0.9171 / kWh



## Low Voltage

₱ 11.1705 / kWh

vs June 2024

₱ 12.0185 / kWh



by

Php 0.8480 / kWh



## Higher Voltage

₱ 9.7413 / kWh

vs June 2024

₱ 10.5813 / kWh



by

Php 0.8400 / kWh

Renewable Energy Pricing (php/kWh)	Difference for Residential Consumption (php/kWh)	Difference for Low Voltage Consumption (php/kWh)	Difference for Higher Voltage Consumption (php/kWh)
7.2*	4.7574	3.9705	2.5413
9.54*	2.4174	1.6305	0.2013
At 200 kWh**	483.48~951.48	326.1~794.1	40~508.26

\*\*Diemuodeke, O. E., Mulugetta, Y., & Imran, M. (2021). Techno-economic and environmental feasibility analysis of rice husks fired energy system for application in a cluster of rice mills. *Renewable and Sustainable Energy Reviews*, 149, 111365.Chicago

\*\*Pacudan, R. (2018). The economics of net metering policy in the Philippines. *International Energy Journal*, 18(3).

# Quantitative Benefits

## Farmers Incentivization

Farmers, as a whole, would be receiving around 50,000 php/month.

## Lowered Electricity Costs

At 7.2 php/kWh, an average household could save up to 951 php/month.

## Waste Products from Electrification could still be sold

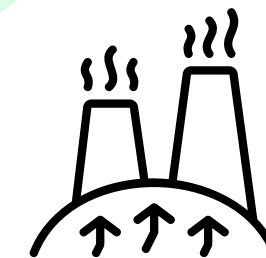
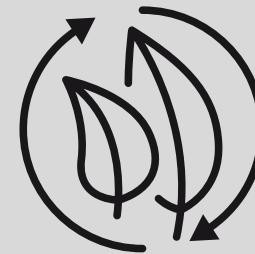
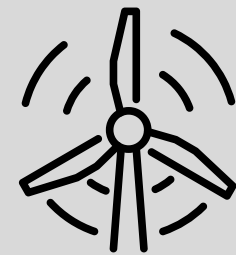
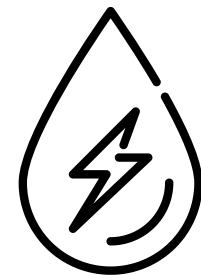
Additional revenue stream from selling char for charcoal production or as fertilizers for about 180,000 php/year

## Landlords' Payables to Earnings

A landlord would be able to receive 1000 php/tonne of rice husk regardless of its condition.

## Lessened Carbon Footprint

About 98.7%\* of carbon emission is reduced from producing electricity for utilizing rice husks than its non-renewable counterparts





**SAAN AABOT ANG  
20 PESOS MO?**





IF ONE HOUSEHOLD COULD ONLY  
SAVE **951 PHP** AT MOST...

**ELECTRICITY** SHOULD NEVER BE A  
PRIVILEGE OR A CHOICE





**THANK YOU**

