Understanding Community Perception Around Ocean Renewable Energy

SURVEY REPORT

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Executive Summary:
This report presents the findings of the Perceptions on Ocean Energy (P.O.E.) survey, conducted to better understand community awareness, perceptions, and engagement related to ocean renewable energy in Guam. A total of 552 responses were collected, including 361 fully completed surveys, providing insight into community attitudes across multiple demographic groups.

Overall, findings indicate that while familiarity with specific ocean renewable energy technologies remains limited, respondents generally expressed openness and support for their development. Many participants identified potential benefits such as increased energy independence, job creation, and environmental sustainability. However, uncertainty persists regarding environmental impacts, economic feasibility, and potential effects on existing industries such as fishing and tourism.

The results also highlight the importance of accessible and trusted information sources. Participants reported relying heavily on digital platforms, particularly social media, for learning about energy topics, though active engagement in public forums remains limited. Additionally, respondents expressed greater comfort discussing these issues in private or informal settings rather than in formal or public spaces. These findings suggest a need for continued public education, transparent communication, and targeted outreach strategies to support informed community engagement as Guam explores the development of ocean renewable energy.

Project Background:

As an island thousands of miles away from the United States mainland, Guam is heavily dependent on imported fuels for a functioning energy system. From frequent storms to unpredictable power outages, the island continues utilizing non-renewable energy based on these circumstances, leading to a recent push to secure cleaner and more resilient energy systems. On October 31, 2019, the Governor Lourdes A. Leon Guerrero administration and the 35th Guam Legislature amended Bill No. 80-35, a bill authored by Senator Amanda Shelton, that aims to protect the environment and ratepayers by increasing renewable energy targets for Guam Power Authority. This bill then was signed into law as Public Law No. 35-46, helping to increase Guam's renewable energy portfolio to 50% by 2035 and eventually 100% by the year 2045. At the University of Guam Center for Island Sustainability & Sea Grant, the organization continues to lead and support the transition of the island's region toward sustainable practices.

In that context, Perceptions on Ocean Energy or "P.O.E." was developed to capture the perceptions and opinions of the Guam community on ocean renewable energy and its potential development. Principal investigator, Dr. Austin J. Shelton and Co-Principal Investigator, Dr. Francis Dalisay, were awarded and granted funding in October 2023. The project's main goal is to produce and develop a community-wide survey to gather responses to information based on this form of renewable energy. From there, the following responses would be implemented towards the aforementioned strategic energy commitment to transfer Guam to 100% renewable energy by 2045. After careful consideration and development, P.O.E officially launched its survey in August 2024, initiating its recruitment for survey participants.

Methods:

After the project's inception, UOG CIS & Sea Grant organized and hosted a town hall meeting in November of 2023 addressing the challenges of Guam's current energy system to gather stakeholder input on ocean renewable energy's viability. Over 50 representatives from various public and private sectors attended the meeting and offered professional expertise to inform P.O.E. Moving forward, Dr. Francis Dalisay and former project associate Morgan Leon Guerrero, drafted and developed the questions and format of the online survey. *See Figure A for various methods of community engagement.*

This questionnaire was developed in QuestionPro, a free online survey software that features 80+ question types and ready-made templates. In the case of this study, the final iteration of the survey's structure consisted of a total of **116 questions** dispersed into general sections, or "blocks", that ask the participant's overall thoughts and opinions on ocean renewable energy and other relevant topics. With that said, there were **9 general sections**, with the first section or "Block 1" serving as an implied consent form briefly describing the project, its purpose and survey's time commitment. This one-page section also provides the participant the benefits and risks following their voluntary participation and reminds them that all responses will be anonymous aside from their participant ID numbers. If they had any additional questions about this study, participants could email Dr. Francis Dalisay or the University of Guam Institutional Review Board, UOG Office of Research & Sponsored Programs, specifically to review their rights as a research participant. Before starting the survey, participants were allowed to take a screen shot or print a copy of the first section for their own reference.

Moving forward in the survey, the next 7 blocks revealed the questions using the multiple choice format. **Block 2** consists of **10 questions** regarding the different types of ocean renewable energy, providing visual examples and brief descriptions on its technologies respectively. The different types of ocean renewable energy technologies mentioned in Block 2 were wave energy, tidal energy, marine current energy, ocean thermal energy conversion (OTEC) and offshore wind energy. Transitioning to **Block 3**, to assess interest in ocean renewable energy, participants indicated how strongly they felt the need to learn about the topic and their current knowledge, using a 0-5 scale. The rest of Block 3's questions consisted of general statements about ocean renewable energy where the participants were asked if they personally agreed or disagreed. More multiple choice questions about ocean renewable energy were introduced in **Block 4**, but focused on inquiring other people's stances, like family and friends, on the participants' opinions of the topic.

In **Block 5**, **22 questions** were posed to the participant on their usage of information sources, like specific news outlets and social media platforms, and if they would use the following sources to actively learn more about ocean renewable energy. General statements about the potential development of this renewable resource were also addressed as participants were again asked if

they agreed with the sentiment or not. **Blocks 6 and 7** explored the depths of ocean renewable energy and how willing participants would go to voice their opinions on the topic and other aspects like climate change and its impact on human life. Like Block 5, Block 7 also proposes scenarios to the participant on their usage of social media platforms, but instead in the context of finding media on climate change. **Block 8** then asks the participant for personal information, including their age, biological sex, race/ ethnicity, educational status, and general statements about being a part of the Guam community.

In the final section, Block 9 expresses gratitude to the participant for their commitment and gives them the option to enter a drawing to win one of 100 $50 gift certificates to PayLess Supermarkets, Inc., a local grocer chain in Guam. If selected, the participant would automatically be placed into another page asking to enter their contact information for when they are randomly selected as a winner. The survey officially closed on November 25, 2024 as the 100 winners were named but notified individually to preserve their identity. Participants had until December 12, 2024 at 5:00pm to claim their gift certificates at the UOG CIS & Sea Grant office in Mangilao, Guam.

Scan the QR Code on public flyer	Use the provided electronic tablet	Use the provided laptop computer

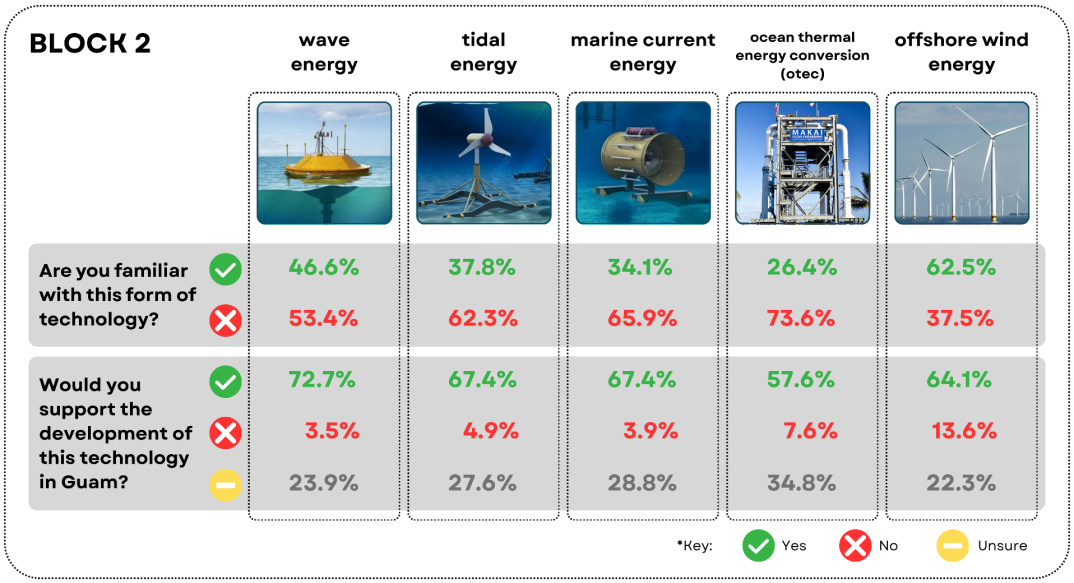
***Figure A:** *During any public outreach event, the online survey could be taken in 3 ways: scan the flyer's QR code with a personal mobile device, take the survey on the provided electronic tablet, or take the survey on the provided laptop computer.*

Guam Residents' Perceptions of, and Engagement with Ocean Renewable Energy		
Block #	**Description**	**Number of Questions**
Block 1	This is the first block on the online survey serving as an implied consent form describing the project, how long it will take, benefits and risks, and more details on the voluntary participation.	Not applicable
Block 2	Types of Ocean Renewable Energy "Thanks for choosing to take this survey! First, we would like to begin this survey by briefly describing what is **ocean renewable energy** and get your opinions on its different forms"	15 questions
Block 3	"We would now like to ask you questions regarding ocean renewable energy in general."	27 questions
Block 4	"We would now like to ask you about your **perceptions of how other people in Guam feel** about ocean renewable energy."	6 questions
Block 5	"We are half-way through the survey and we appreciate your responses thus far. Now, we would like to ask you some questions about the **information sources** you would use to learn about ocean renewable energy."	22 questions
Block 6	"We would now like to ask you a few questions about **your willingness to express your opinions** regarding ocean renewable energy."	8 questions
Block 7	"We are almost finished. In this section, we would like to ask you about **your perceptions regarding climate change**."	26 questions
Block 8	"Just a few more questions based on your **personal information**."	17 questions
Block 9	"Si Yu'os Ma'åse and thank you again for your participation. You will be re-directed to another page where you can enter your information if you wish to **enter the drawing for one of one hundred (100) $50 gift certificates from Payless**, please complete the following information."	Not applicable

Analysis:

From August to November 2024, the P.O.E. survey received 552 total responses, including 361 fully completed surveys, resulting in a 65.4% completion rate. The average completion time was approximately 19 minutes. As an online survey administered through QuestionPro, response counts vary across questions due to partial completions. Data were collected both independently and through outreach events where participants accessed the survey using personal or provided devices.

Looking at Figure 1, results from Block 2 indicate that participants were most familiar with offshore wind energy, while ocean thermal energy conversion (OTEC) was the least recognized (approximately 26%). Despite varying levels of familiarity, respondents generally expressed support for all forms of ocean renewable energy. This pattern suggests that while technical knowledge may be limited, there is broad openness to exploring these technologies.



BLOCK 2	wave energy	tidal energy	marine current energy	ocean thermal energy conversion (otec)	offshore wind energy
Are you familiar with this form of technology? ✓	46.6%	37.8%	34.1%	26.4%	62.5%
Are you familiar with this form of technology? ✗	53.4%	62.3%	65.9%	73.6%	37.5%
Would you support the development of this technology in Guam? ✓	72.7%	67.4%	67.4%	57.6%	64.1%
Would you support the development of this technology in Guam? ✗	3.5%	4.9%	3.9%	7.6%	13.6%
Would you support the development of this technology in Guam? −	23.9%	27.6%	28.8%	34.8%	22.3%

*Key: ✓ Yes ✗ No − Unsure

***Figure 1:** *Results of survey responses on the knowledge and acceptance of different ocean renewable energy technologies found in Block 2.*

Participants reported moderate levels of knowledge about ocean renewable energy, with nearly 30% selecting a midpoint rating (3 on a 0-5 scale). However, responses also indicate a strong desire to learn more, with higher ratings observed for ideal knowledge levels. This gap highlights an opportunity for targeted education and outreach.

BLOCK 2

Rate your knowledge about ocean renewable energy (0 = knowing nothing to 5 = everything you possibly could)					
0	**1**	**2**	**3**	**4**	**5**
17.4%	**21.2%**	**22.8%**	**29.9%**	**6.1%**	**2.6%**

***Figure 2a:** *Results from participants' current knowledge and ideal extent of knowledge on ocean energy.*

BLOCK 2

Rate the ideal extent of how much you need to learn about ocean renewable energy (0 = knowing nothing to 5 = knowing everything you possibly could)					
0	**1**	**2**	**3**	**4**	**5**
3.8%	**7.7%**	**12.4%**	**33%**	**24.9%**	**18.2%**

***Figure 2b:** *Results from participants' current knowledge and ideal extent of knowledge on ocean energy.*

Findings from Block 3 suggest that respondents perceive multiple potential benefits of ocean renewable energy, including job creation, increased energy independence, and reduced electricity costs. Approximately 70% expressed agreement that these developments could positively impact Guam's energy system and economy. However, respondents also indicated a preference for prioritizing more established renewable sources, such as solar and wind, which are already being implemented locally.

Despite general support, respondents expressed uncertainty regarding the environmental and economic impacts of ocean renewable energy. Many were unsure whether technologies such as underwater turbines could affect marine life, while others raised concerns about potential disruptions to fishing and tourism. This uncertainty suggests the need for clearer communication and accessible information about potential risks and trade-offs.

Participants generally supported government involvement in the development of ocean renewable energy, with over 60% indicating that GovGuam should play a role in funding or supporting these initiatives. In contrast, fewer respondents favored relying solely on private sector investment, reflecting a preference for shared responsibility in energy development.

In Block 4, respondents reported greater confidence in their own support for ocean renewable energy then in the perceived views of others. While many believed their friends may be supportive, a large portion remained uncertain about the opinions of family members and the

broader community. This suggests that perceptions of social consensus are less defined than individual attitudes.

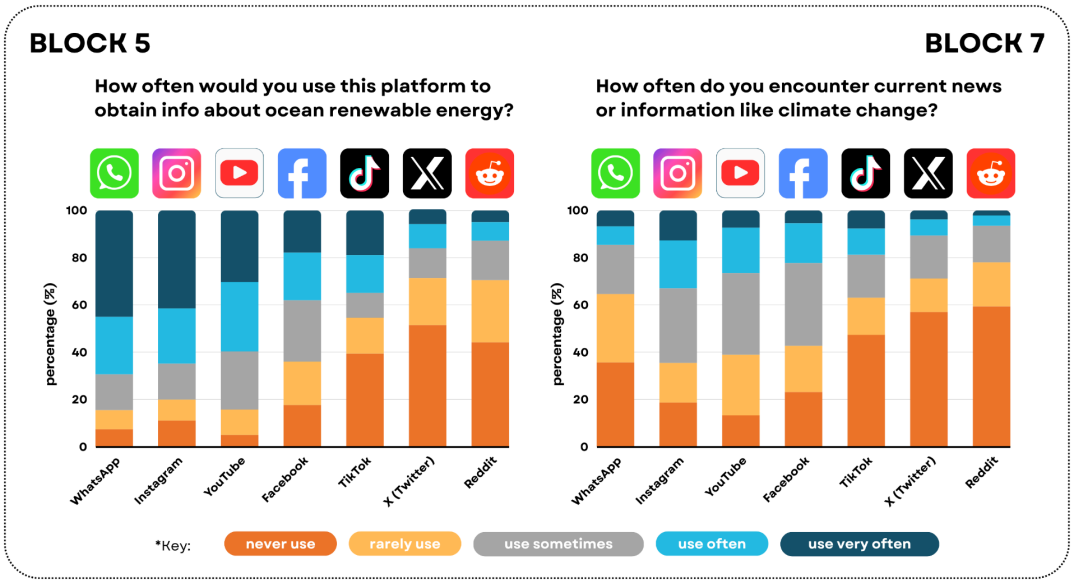


***Figure 3a:** *Results from participants' usage of the following online platforms for renewable energy education.*

Responses from Block 5 indicate that participants primarily rely on digital platforms for information, with WhatsApp, Instagram, and YouTube identified as commonly used sources. Traditional media outlets were used less frequently, suggesting a shift toward social media as a primary channel for information dissemination. These findings highlight the importance of leveraging digital platforms for outreach and education efforts.

Continuing on within **Block 5**, the participants were again asked to examine their personal usage of other sources like local newspapers and radio shows to potentially learn about ocean renewable energy. The participants would use the following information sources occasionally on obtaining information on renewable energy below in Figure 3b. With the remaining news sources, many responses noted their lack of usage when researching or acquiring information for renewable energy development. The Marianas Business Journal was noted to be the least utilized news source, whereas 18.9% of responses regarded TikTok as a main source for environmental education. Although traditional news outlets stem from the mass media industry, many utilize social media to expand their reach to audiences as means to deliver their news. Thus, the results could explain the rising popularity of social media over the drastic decrease in traditional media viewership when learning about new information, reports, or accounts of current events.

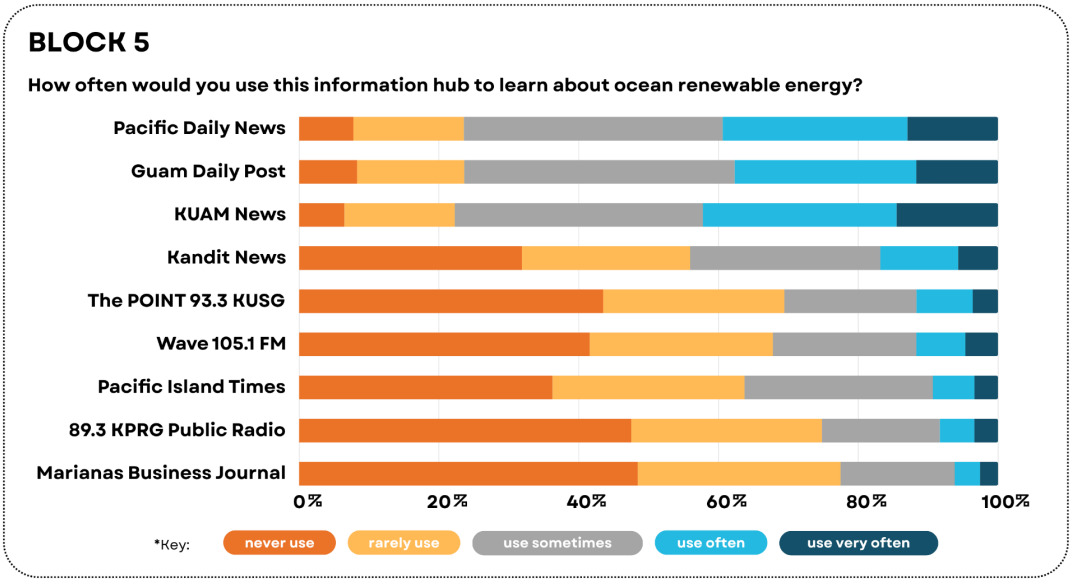


***Figure 3b:** *Results from participants' least-used information sources for renewable energy education.*

Participants reported greater comfort discussing ocean renewable energy in informal settings, such as with family and friends, than in public or formal environments. While some expressed willingness to engage through social media, fewer indicated comfort with activities such as attending public meetings or contacting officials. This suggests that engagement strategies may be more effective when tailored to informal or digital spaces.

Responses from Block 7 indicate that most participants acknowledge the existence of climate change and its potential impacts on Guam's environment, economy, and public health. Participants also reported moderate levels of knowledge, alongside a continued interest in learning more. These perceptions may help contextualize support for renewable energy development.

BLOCK 7

Rate your knowledge about climate change (0 = knowing nothing to 5 = knowing everything you possibly could)					
0	**1**	**2**	**3**	**4**	**5**
4.4%	**11.8%**	**22.1%**	**35.3%**	**19.4%**	**7.1%**

***Figure 4a:** *Results from participants' current knowledge on climate change.*

BLOCK 7

Rate the ideal extent of how much you *need* to learn about climate change. (0 = knowing nothing to 5 = knowing everything you possibly could)					
0	**1**	**2**	**3**	**4**	**5**
3.8%	**7.7%**	**12.4%**	**33%**	**24.9%**	**18.2%**

***Figure 4b:** *Results from participants' ideal extent of knowledge on ocean energy.*

As shown in the previous sections, any news and/or information on climate change is not as widely popular among participants as they've occasionally encountered it through Facebook, Instagram and YouTube. Additionally, most of the participants have never experienced coming across this topic in the remaining online networking sites: WhatsApp, X (Twitter), TikTok, and Reddit. Towards the end of the survey, Block 8 asks the remaining participants for their individual demographics. Like the other sections, the participants must choose from the multiple-choice questions provided to them for accuracy. Note that this is only reflective of the 361 responses that have completed the survey and not all 552 responses generally. The following figures showcase the demographic data based on the participants' responses to each question:

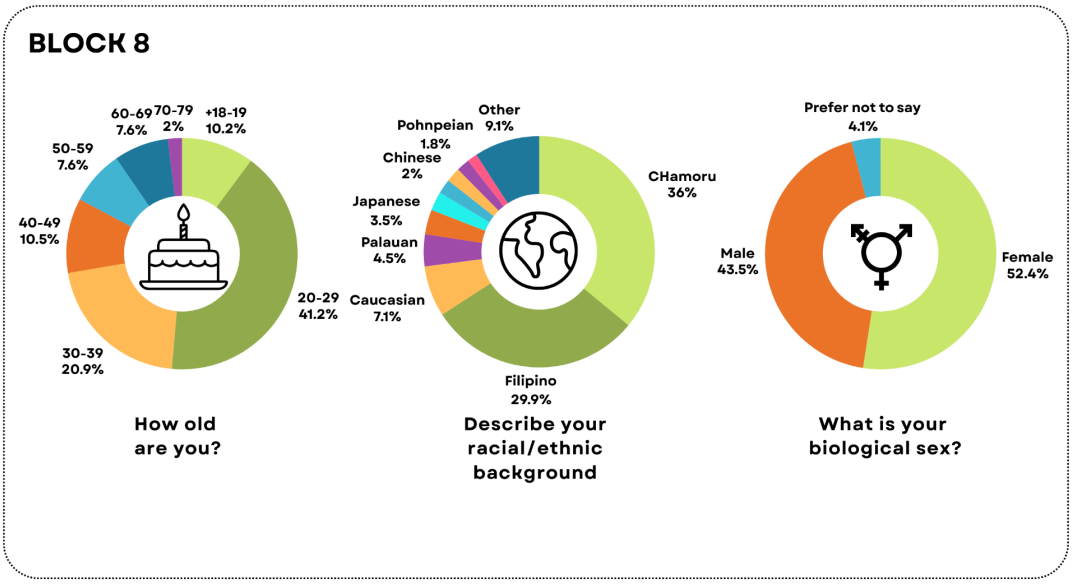


***Figure 5a:** *Display of dataset asking the age, racial/ethnic background and biological sex of participants.*

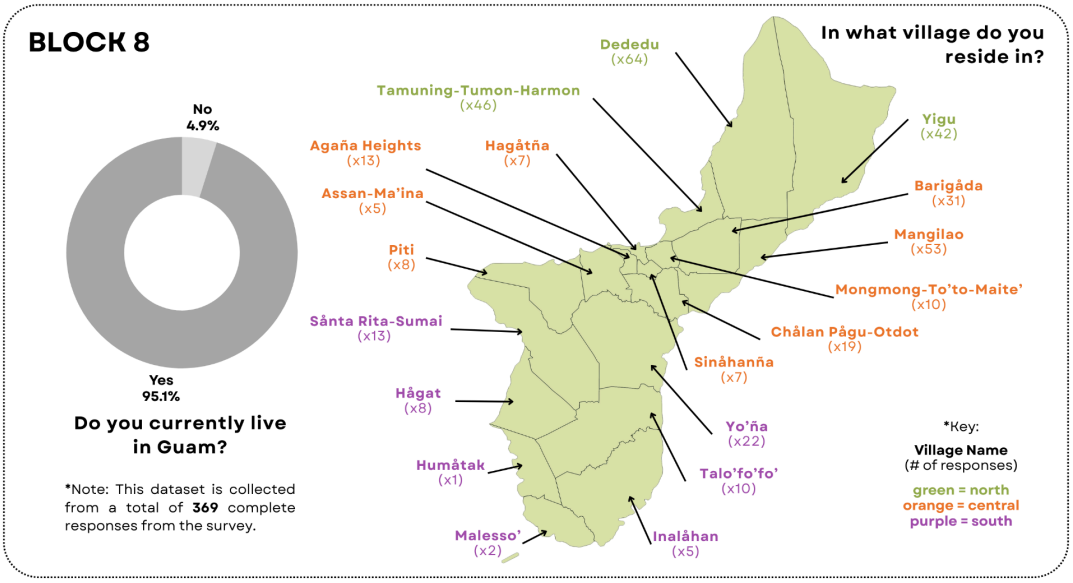


***Figure 5b:** *Display of dataset asking the participants' current residential status and village residence.*

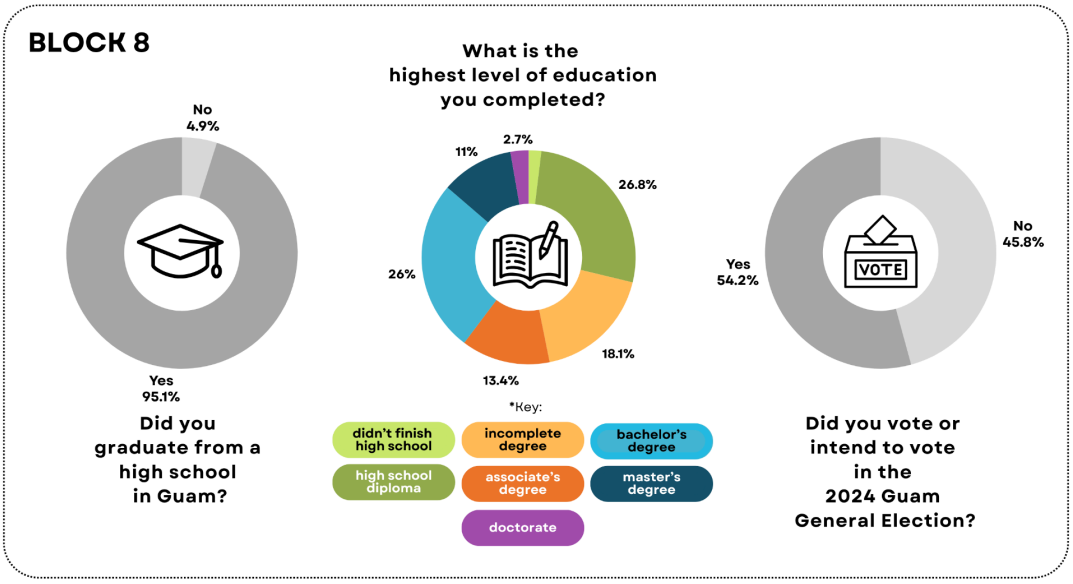


***Figure 5c:** *Display of dataset asking the participants' current educational status and voting as of 2024.*

Demographic data from completed responses indicate a diverse participant pool, with a higher representation of young adults, females, and individuals identifying as CHamoru or Filipino. Most respondents resided in northern Guam and reported completing at least a high school education, with many holding a bachelor's degree. While not representative of the entire population, these demographics provide context for interpreting survey findings.

A majority of respondents reported household incomes below $40,000, reflecting broader economic conditions during the survey period. Participants also indicated varying levels of engagement with coastal and recreational activities, with many reporting a strong sense of belonging to the Guam community. These factors may influence perspectives on energy development and environmental issues.

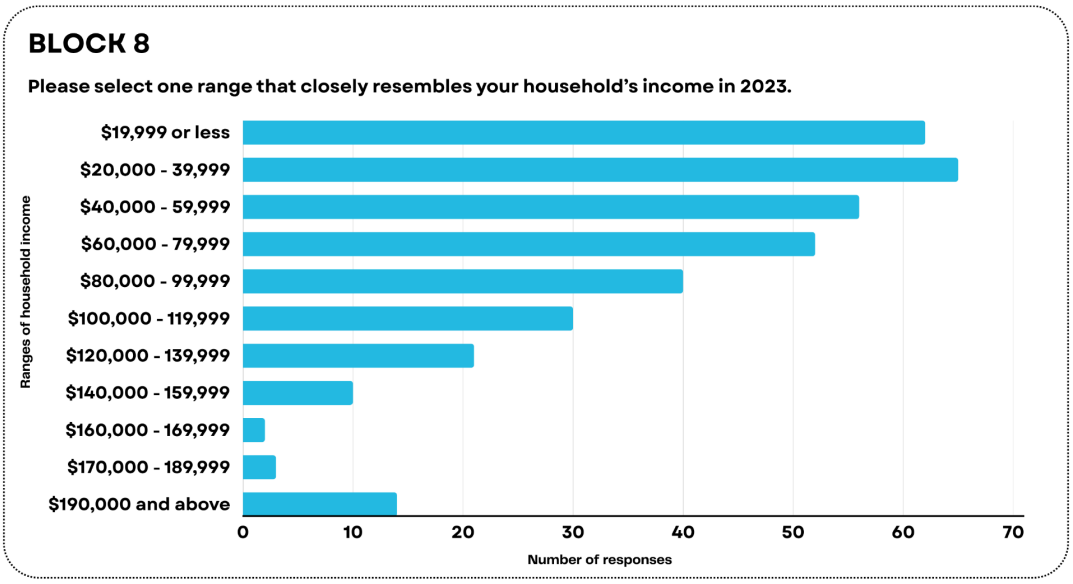


***Figure 5d:** *Results from participants' combined household income in 2023, the year the survey was awarded.*

General Recommendations:

As the responses uncovered multiple perspectives within Guam's community, we can understand that the topic of renewable energy can still continue outside of the online survey. Here are some general recommendations for the participants and others who want to continue learning about renewable energy or practice sustainability personally:

A) **Express your opinions in townhall meetings and community workshops.** Although CIS & Sea Grant held a townhall meeting with stakeholders in the energy industry for this survey, there will be other events waiting to be scheduled for more community feedback. By being in the same room as the industry leaders and researchers, the public will have several chances to voice their thoughts and opinions and be on equal footing.

B) **Understand your power usage at home.** As residents of Guam, we pay our monthly electricity bills to the Guam Power Authority, the sole provider of electricity. Aside from the cost of the bill, it's important to look at the breakdown of your power usage at home through visuals. From your A/C units to your refrigerator in the kitchens, understand that these appliances and other amenities are the main sources of power being used most frequently. This recommendation isn't meant for you to completely strip yourself of these amenities, but prioritize where energy should be used mostly. For example, turn off the A/C unit every now and then to promote natural air flow through open windows and doors.

C) **Attend and participate at future community outreach events.** As researchers and program associates, it is our job to engage with the community, closing the gap between the public and authority figures. As a result, community outreach events are always happening in public areas and usually during the weekends. These events are a great way to learn more about topics like renewable energy as associates can provide helpful resources and solutions that you can't get if you're busy.

D) **Continue researching on your own and keep up with news as much as you can.** As revealed in the results, Guam residents aren't the most familiar with ocean renewable energy compared to solar and wind energy. However, this interaction allows others to do more research on their own even if it means using Google to search unfamiliar words. Journal articles, news, blogs, videos and other publications are made available on the Internet at the user's convenience. People can utilize these pieces of media and be informed on their own interests. This conversation on ocean renewable energy can happen in both physical and digital platforms especially.

Post-Survey Efforts:

Moving forward, UOG CIS & Sea Grant continues to participate in efforts supporting the exploration and development of ocean renewable energy in Guam. Following the survey, the National Laboratory of the Rockies implemented working group meetings with energy leaders and stakeholders to discuss Guam's priorities and needs through the Guam Energy Strategies (formerly Guam100). Members of UOG CIS & Sea Grant have attended and actively participated in these discussions, contributing perspectives from the organization's ongoing energy research and community engagement efforts.

UOG CIS & Sea Grant has also continued energy outreach and community engagement in collaboration with partners such as Guam EPSCoR, Pacific Northwest National Laboratory (PNL), Sandia National Laboratories, and the National Laboratory of the Rockies (NLR). Following the survey, researchers have worked with UOG to organize community town hall meetings presenting research on the potential development of Ocean Thermal Energy Conversion (OTEC) and Sea-Water Air-Conditioning (SWAC), including investigations of potential deployment sites on Guam. These discussions have emphasized that implementation would require long-term planning and consideration of factors such as funding, regulatory requirements, environmental impacts, and local community needs.

Internally, UOG CIS & Sea Grant is also pursuing technical assistance through the U.S. Department of Energy's Energy Technology Innovation Partnership project (ETIPP). One potential effort involves conducting a feasibility study of the existing Fadi'an Hatchery in Mangilao as the proposed site of the UOG Blue Economy Innovation Center. This site is also in close proximity to the proposed site of a hospital facility that's currently in development. The UOG Blue Economy Innovation Center project has received $4 million in funding from the Government of Guam, with opportunities for additional funding as planning progresses.

The proposed center is envisioned as a research facility supporting fisheries, aquaculture, and ocean energy development. Based on ongoing stakeholder discussions, potential opportunities include examining how technologies such as OTEC and SWAC could support land-based aquaculture and other facility operations. Continued collaboration with national laboratories, government agencies, and other stakeholders will be important in assessing the technical and practical feasibility of these applications.

Collectively, these post-survey efforts demonstrate conversation surrounding ocean renewable energy in Guam are continuing beyond the POE survey. The survey provides a community perspective that can complement ongoing technical research, stakeholder discussions, and public outreach as Guam considers its future energy options.

Conclusion:

Based on these results of the online survey, the data concludes that many of the respondents do support ocean renewable energy but eagerly request for more information and transparency from their most trusted sources and the local experts of the industry when development occurs. Although these responses don't represent all of Guam's community, it's safe to assume that their responses reflect the tentative attitude and open-mindedness from different generations towards new forms of energy and the ever-changing landscape of the island's economy. By understanding the general perception of community members, these results can guide energy stakeholders to spearhead their projects towards a sustainable future.