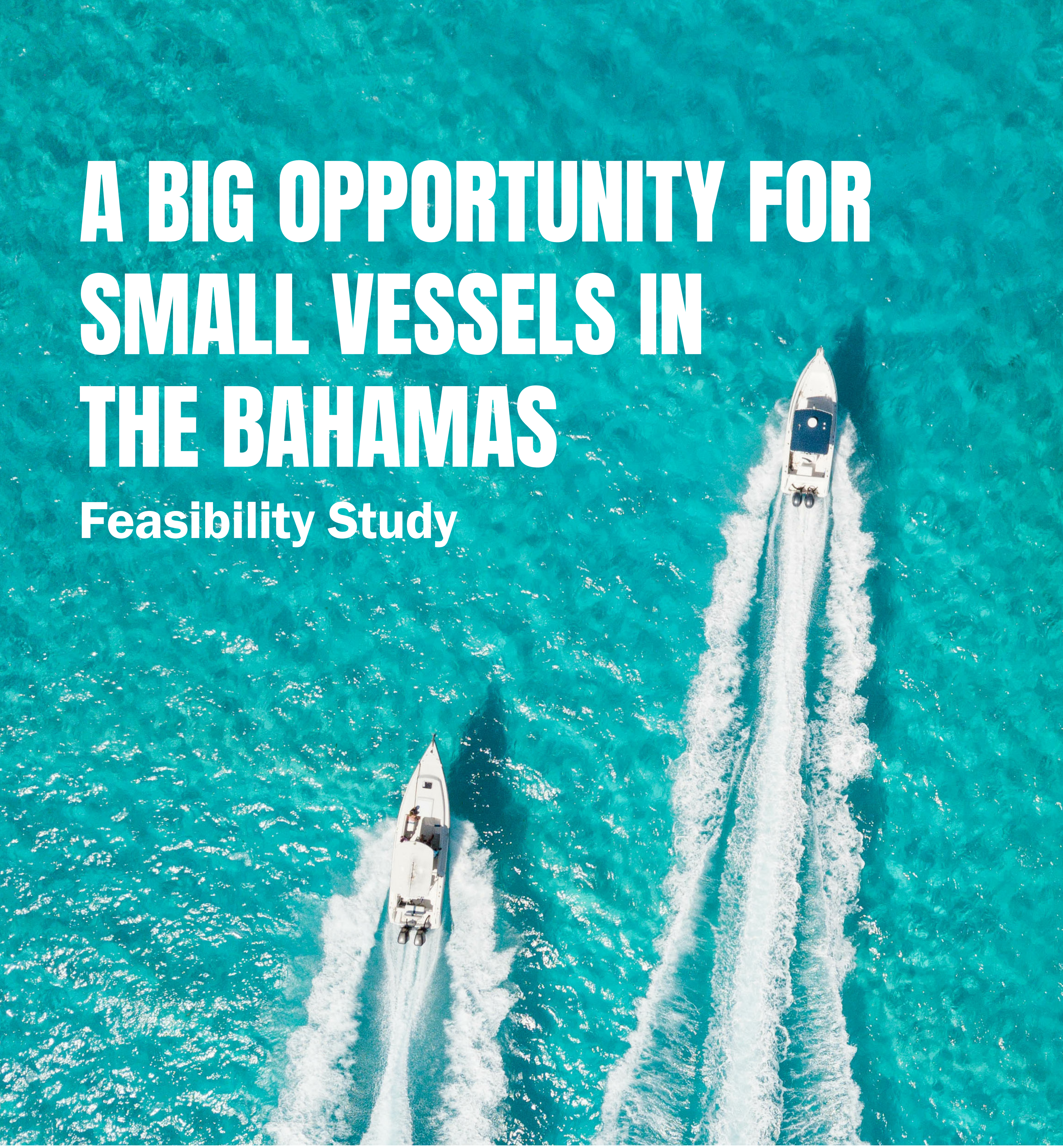
A BIG OPPORTUNITY FOR SMALL VESSELS IN THE BAHAMAS

Feasibility Study



Environmental Defense Fund

UNIVERSITY OF THE BAHAMAS

Bahamas Sportfishing Conservation Association

PHOTON

FEASIBILITY STUDY

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Acknowledgments
This report was informed by insights from community members on Acklins and Crooked Island, The Bahamas, who generously shared their time and insights through surveys, workshops and conversations. Thank you for your trust, openness, and willingness to engage in this process.

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Environmental Defense Fund is dedicated to protecting the environmental rights of all people, including the right to clean air, clean water, healthy food and flourishing ecosystems. Guided by science, we work to create practical solutions that win lasting political, economic and social support because they are nonpartisan, cost-effective and fair.

University of The Bahamas stands as a proud beacon of national transformation. With an illustrious legacy spanning 50 years, the institution has cultivated a rich tapestry of academic diversity, impactful research engagements, and transformative collaborations. UB has more than 22,000 alumni, more than 4,000 students, with locations in New Providence, Grand Bahama and San Salvador. Our students are shaped as not merely scholars, but as dynamic global citizens able to navigate the challenges of a global society.

Bahamas Sportfishing Conservation Association (BSCA) is a non-profit organization based in The Bahamas, dedicated to conserving marine habitats, educating local communities, and promoting the sustainable use of marine resources through local empowerment. BSCA focuses on advancing a trusted conservation model that prioritizes local citizen inclusion and empowerment, ensuring the sustainable use of today's marine resources for future generations.

Photon Marine is transforming commercial marine fleets with high-powered electric outboard motor systems and smart fleet management software, offering a cleaner, quieter, and more efficient alternative to gas-powered engines. By electrifying workboats, tourism vessels, and aquaculture fleets, Photon is helping to drive the transition to sustainable marine transportation.

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EXECUTIVE SUMMARY

In many small island nations, including The Bahamas, fishers and others reliant on marine transport face vulnerability due to volatile fuel prices. Despite The Bahamas' relatively strong economy overall, remote Family Islands like Acklins and Crooked Island experience economic disparities, lower household incomes, and higher living costs compared to the capital, Nassau. Fuel, often the most expensive input for marine livelihoods, significantly impacts profitability. Electric-powered vessels, which are cheaper to operate and maintain than their combustion engine counterparts, offer a promising solution. Powered by rechargeable batteries, these vessels reduce costs per mile, especially important in southern islands where fuel prices are up to 50% higher than in Nassau. Beyond the economic benefits, electric vessels can be charged using renewable energy, reducing carbon emissions, noise pollution, and health risks from fuel exhaust and spills. Renewable charging stations offer several co-benefits to the wider community, including reduced reliance on imported fuel, contribution to national decarbonization and climate adaptation goals, strengthening local energy resilience, and providing energy hubs during power outages and in remote areas with no existing infrastructure.

Electric marine vessels are still an emerging technology, requiring careful planning for adoption. This project not only has the potential to transform the economy and environmental sustainability of Acklins and Crooked Island but also serves as a replicable model for other Caribbean islands and coastal regions worldwide. To explore the feasibility of their implementation on remote Bahamian islands, a team from Environmental Defense Fund (EDF) and University of The Bahamas (UB), alongside clean energy company Photon Marine and the Bahamas Sportfishing Conservation Association (BSCA), conducted a preliminary study on Acklins and Crooked Island. The team surveyed fishers and fishing guides, held community workshops, and gathered insights on socio-economic and technical needs. The goal was to co-develop sustainable and appropriate solutions to small craft electrification with vessel operators on Acklins and Crooked Island. By focusing on community collaboration, the project ensures solutions are not imposed or biased, but rather developed in partnership, increasing the likelihood of success in similar contexts.

The findings will inform a pilot study, with proposed solutions and financing models aimed at improving livelihoods and environmental outcomes. In addition to technical and economic feasibility, the project identifies opportunities for broader socio-economic growth via livelihood diversification, job creation in infrastructure development, education, and ecotourism.

This report assesses the feasibility of a pilot scheme for battery-powered vessels and solar battery storage systems on Acklins and Crooked Island. Initial community engagement through surveys, workshops and conversations showed a strong interest with cautious optimism, highlighting areas for further exploration in the subsequent phases of this initiative. The report calls for further feedback from key stakeholders, particularly those involved in decarbonizing the energy, transport, and marine sectors in The Bahamas. Ultimately, this initiative outlines a pathway towards a just and equitable energy transition that can be adapted and scaled across other island communities.

INTRODUCTION

The Bahamas, an archipelagic nation of over 700 islands – of which 30 are inhabited – is known for its turquoise waters, vibrant marine ecosystems, and unique culture. Marine vessels are vital for connectivity and livelihoods, especially in the sparsely populated "Family Islands"[1] like Crooked Island and Acklins. These remote islands rely heavily on imports, but large ships cannot dock directly, forcing goods to be offloaded in Nassau and transported via smaller vessels like MailBoats, increasing costs.

Fossil fuels dominate the energy mix, with gasoline prices reaching $8–10 (USD) per gallon on remote islands - far above the U.S. average of $3[i]. For small-scale fishers, fuel can consume half their operating budgets. Fishing, tourism, and diesel-powered generators are all fuel-dependent, leaving communities vulnerable to global oil price fluctuations and supply disruptions, which are further exacerbated by the increasing intensity of storms driven by climate change[ii]. Events like Hurricane Dorian in 2019, which devastated infrastructure and left islands without fuel or power for weeks, demonstrate how climate-related extreme weather events are becoming more severe, amplifying both environmental and economic risks for these vulnerable communities. This highlights the urgent need for sustainable energy resilience solutions to support Family Island communities.

To address these challenges, EDF is collaborating with Crooked Island and Acklins communities, UB, Photon Marine, and BSCA to pilot battery-powered boats and solar-plus-storage charging stations. This initiative aims to bring renewable energy solutions to marginalized Family Islands, often overlooked in modernization efforts. We also plan to collaborate with local education providers to develop an upskilling program for guides, fishers, mechanics, electricians, and other community members, to maximize the local opportunities from this initiative.

This report summarizes findings from the project's yearlong feasibility phase, which involved engaging stakeholders to assess local conditions, evaluating e-outboard technology, and tailoring solutions to community needs. These insights will guide the design and implementation of the pilot fleet.

[1] The Family Islands are the islands that make up The Bahamas with the exception of New Providence Island, where the capital and largest city, Nassau, is located.

FEASIBILITY SCOPING

- Partnership development
- Stakeholder interviews
- Community meetings
- Develop energy profiles
- Co-develop project scope

DATA COLLECTION & DESIGN

- Vessel design
- Infrastructure planning
- Action community feedback
- Design upskilling element
- Identify financial mechanisms
- Trial e-vessel: iterative feedback & optimization
- Develop business plan

PILOT

- Technology sourcing & implementation
- Implement upskilling element
- Monitoring & support
- Iterative feedback & optimization
- Explore further applications
- Build a replicable framework

THE BAHAMAS: A CLIMATE CHAMPION

For Bahamians, the impacts of climate change are a daily reality. With 80% of its land area less than 10 m above sea level[iii], The Bahamas is highly vulnerable to the impacts of sea-level rise, coral degradation, coastal erosion and extreme weather events including storms and surges. These issues jeopardize the region's biodiversity, and the livelihoods and culture deeply tied to its marine environment.

Despite contributing minimally to global greenhouse gas (GHG) emissions (0.01%[iv]), The Bahamas is committed to ambitious climate action. Its Nationally Determined Contribution (NDC) aims to cut emissions by 30%, achieve 30% renewable energy, and reach 35% electric vehicle adoption by 2030, with a focus on fisheries, transportation, energy, and infrastructure for climate adaptation and resilience. Decarbonizing the energy mix not only supports emission targets but also reduces reliance on fuel imports, helping balance trade[v]. This commitment underscores the rationale for electrifying marine vessels as part of the country's broader climate and energy resilience goals.

In response to high import costs and frequent fuel shortages, Family Island communities are actively pursuing innovative solutions to build a more resilient and sustainable energy future, reducing reliance on costly and unreliable fossil fuel imports. Examples of collaborative efforts include the solar microgrid on Ragged Island[vi], which provides renewable power to every home, and solar-plus-battery resilience hubs at primary schools in Abaco[vii]. Complementing these initiatives is the Solar Assessment and Energy Auditor Training Program, facilitated by The Bahamas' Ministry of the Environment and Natural Resources and implemented by Rocky Mountain Institute (RMI), which equips local participants with the skills needed to contribute to renewable energy projects, creating new career opportunities for residents.

In 2022, The Bahamas government launched several solar initiatives, including a $35 million investment for solar photovoltaic installations in the Family Islands[viii], alongside efforts to increase participation of women and youth in the renewable energy sector[ix]. Supported by RMI, the Bahamas Power and Light (BPL) Family Islands Solarization Program[x] aims to deliver cleaner power generation, lower fuel costs, and reduce electricity expenses. With these programs in early stages, exploring additional renewable energy applications, such as electrifying small coastal vessels, presents a timely opportunity.

THE CASE FOR SMALL VESSEL ELECTRIFICATION

Today, the transportation sector accounts for almost **25% of global GHG emissions** – but with net-zero targets agreed both on a local and global scale, sights are set on transitioning to low- and zero emission fuels and reducing demand through efficiency technologies.

A **just and equitable** energy transition is one that is fair, inclusive, and mindful of social, economic, and regional disparities among nations and stakeholders. At the IMO, this could include, but is not limited to:

- Mitigating the economic impacts of policy measures on the most vulnerable.
- Addressing barriers to adopting greener technologies in regions with limited resources.
- Providing financial and technical support to facilitate the adoption of green technologies.
- Protecting and creating jobs through upskilling programs for new technologies.
- Supporting broader climate adaptation and mitigation efforts.
- Building resilience against trader distortions caused by shipping's energy transition.

In 2023, the International Maritime Organization (IMO) set ambitious goals in its 2023 Strategy on Reduction of GHG Emissions from Ships[xi]: striving for a 30% reduction in GHG emissions and 10% clean energy use by 2030, aiming for net-zero by 2050. IMO Member States agreed to deliver this strategy in a cost-effective, just and equitable way. Achieving these targets requires transitioning the sector to low-emission fuels and addressing challenges like limited green fuel supplies and fleet upgrades. Energy efficiency technologies are essential near-term solutions to reduce fuel demand, lower emissions cost-effectively, and provide a reliable pathway to meeting decarbonization goals.

Powering small coastal vessels with locally generated renewable energy offers a promising solution to reduce reliance on green fuels and feedstocks while cutting emissions and costs associated with fuel transportation. This approach is particularly impactful in small island developing states (SIDS), where the self-production of fuels is often impractical. Expanding this initiative further, solar and charging infrastructure could be scaled up in the future to support larger vessels, such as battery-hybrid MailBoats, or even other transport modes such as electric cars and mopeds, further reducing GHG emissions. Beyond transportation, local renewable energy production and storage can bolster energy independence and resilience. For example, strategically deployed or mobile Battery Energy Storage Systems (BESS) can provide critical backup power during outages. Additionally, e-vessels equipped with bi-directional charging capabilities could enable innovative energy-sharing models, such as vessel-to-vessel or vessel-to-grid systems, creating a more flexible and sustainable energy network.

Communities in The Bahamas rely heavily on small vessels for key economic sectors like commercial fishing and tourism. Recreational and commercial fishing support over 27,000 jobs and contribute $600 million annually to the economy[xii]. However, gasoline-powered outboards emit air and marine pollutants, posing severe threats to critical ecosystems such as coral reefs, seagrass beds, and mangrove forests. These essential habitats act as natural barriers against storm surges and erosion while supporting fisheries and tourism. Additionally, noise pollution and vibrations from fossil-fueled motors negatively impacts marine ecosystems and commercial operators[xiii][xiv], as it can disrupt fish behavior and reduce catch rates, while also diminishing the quality of the experience for tourists seeking tranquil, nature-based activities.

Small-scale fisheries sustain 95% of all livelihoods that rely at least partially on fishing, accounting for 89% of formal employment in the fishing sector[xv]. Electrifying the small vessels used in these fisheries presents a major opportunity to cut fuel consumption and reduce the fishing sector's GHG emissions, which include nearly 134 million tons of CO^2 annually[xvi].

On Acklins and Crooked Island, fishing lodges and guiding businesses are major revenue drivers, with many guides being fully booked months in advance. To support sustainable growth in this sector, fishing and guide vessels must deliver cost-effective performance while minimizing impacts on coastal ecosystems, which are vital for livelihoods and coastal protection. Electrification initiatives also present opportunities for livelihood diversification, creating jobs in infrastructure development, boatbuilding, education, ecotourism, maintenance, retrofitting, and installation. These opportunities are critical to addressing the concerning population shift from the Family Islands to New Providence, particularly among younger generations[xvii][xviii], who often migrate in search of stable employment and modern career paths. By introducing innovative, sustainable industries, these initiatives can attract and retain young people, fostering community development and preserving cultural ties to the islands.

With around 310 days of sunshine annually, The Bahamas is ideally suited for solar energy. According to RMI's Islands Energy Program, solar-plus-storage and other renewable systems offer lower-cost energy solutions than fuel imports in every scenario analyzed[xix]. This presents a promising opportunity to alleviate the economic pressure on small-scale fishers and guides caused by high gasoline costs, making the industry more attractive to new entrants and supporting its growth.

The Bahamas National Trade Policy aims to sustainably diversify export industries, focusing on marine and agricultural products like stone crab claws and cascarilla bark. Integrating clean and efficient technologies can drive blue and green economy growth while aligning with the country's ambitious decarbonization targets under its NDC.

COMMUNITY PERSPECTIVES

SURVEY HIGHLIGHTS:

- All boat owning respondents use gasoline for fuel.
- The main challenge for their operations is the cost of fuels.
- Around **77%** use boats for fishing, **46%** for leisure, **31%** for transportation, and **7%** for tours (with some boats being multipurpose).
- Nearly **85%** believe their businesses could benefit from lower fuel costs.
- **83%** expressed interest in using alternative fuels.
- **71%** were open to trying electrically powered boats.
- Concerns about the availabililty of charging stations were the main barrier for those uninterested

To kick off the initiative, we distributed a survey through Local Administrators to residents of Acklins and Crooked Island, aiming to understand energy needs related to marine transportation and the interest in trialing a new technology. Building on the interest shown in the survey responses, we held community meetings with local vessel owners, operators, educators, government officials, fishing association representatives, and industry experts. These workshops identified local challenges, explored renewable energy opportunities, identified vessel types for electrification, and what additional challenges could be addressed under this initiative.

Breakout discussions during the meetings provided insights into primary vessel types, usage patterns, costs, challenges with existing outboards, and hesitations towards e-outboards. While limitations like battery weight and range made certain use-cases less feasible at this time (e.g., flats fishing boats with shallow draft), four strong candidates for electrification emerged: commercial fishing boats, fishing guide boats, water taxis, and support vessels for a cascarilla bark harvesting cooperative on Samana Cay. These applications offer promising co-benefits, including clean transportation and resilient energy access to support local communities.

COMMERCIAL FISHING

Operating year-round with round-trip routes of 10-60 miles, local fishers primarily harvest lobster, conch, snapper and grouper (when in season), for export and subsistence. Electrifying fishing vessels would eliminate gasoline costs, supporting economic growth, advancing national targets to expand the industry, and reducing pollution to marine habitats. Diversifying catch efforts to include abundant yet underutilized species like tuna and wahoo could further enhance livelihoods and bolster the resilience of small-scale fisheries.

FLY FISHING GUIDES

As the highest-earning livelihood on the Family Islands, fishing guides typically operate routes of 20-60 miles, with some aiming to expand into offshore guiding to boost tourism. Electrifying guide boats offers co-benefits such as higher profit margins, lower pollution, quieter operations, and the potential to attract younger generations to the industry. This could slow outward migration and spur broader community development.

WATER TAXIS

The only public transport between Crooked Island and Acklins is a twice-daily small water taxi. A government subsidy provides these trips free to the community, but additional journeys are paid for by travelers with costs up to $100 per person. Electrifying this route could reduce operating costs, enabling additional subsidized trips and improving community connectivity, access to services, and tourism opportunities. This is especially critical for accessing public services, as the islands share one doctor.

CASCARILLA BARK HARVESTING

Cascarilla bark, a top Bahamian export, is harvested on the uninhabited Samana Cay, approximately 20 miles from Acklins and Crooked Island. The bark's essential oil is sought after for soap making, insect repellent, fine perfumes, and flavoring liquors like Campari. Electrifying support vessels and installing solar chargers on the Cay could provide energy access for harvesters during their 5-month stays, improving working conditions and supporting sustainable harvesting practices.

The surveys, workshops, and informal conversations with vessel operators revealed strong interest in electrification and a pressing need to reduce operating costs for guides, commercial fishers, and non-fishing community members. However, concerns were raised about the high upfront costs of e-vessels and e-outboards, their ability to meet performance and range requirements, the impact of heavy batteries on vessel performance, and questions around fire safety, reliability, and local servicing and maintenance. It should be noted that e-outboards require substantially less maintenance and associated costs than gas powered outboards.

Additionally, the infrastructure component plays a critical role not only in the adoption of electrification solutions but also in their long-term durability and benefits. For example, if the management of charging stations falters after a few years, the anticipated benefits and cost savings could be significantly undermined. Ensuring robust infrastructure planning and maintenance is therefore essential to realizing the full potential of electrification in this context.

All of these concerns will be prioritized in the next phase—data collection and design—to ensure that the pilot meets community needs without compromising performance.

ENERGY PROFILES

Participants provided detailed profiles of their daily trips. They shared how far they travel, how much time they spend at various speeds/revolutions per minute (RPM), and how much fuel they spend on their current internal combustion engine (ICE) outboard motor systems. They provided information about the types of vessels they use and what types of motor(s) are present on them.

This information was used by Photon Marine to create customer profiles[2] seen below, identifying which segments would be ready for electric propulsion without drastically changing how they operate their business.

Payback periods were calculated using multiple data sources. For each vessel profile, performance data from an ICE outboard motor company were used to model how a comparable hull would perform at various speeds and RPM, including fuel consumption. This was modelled against each vessel type to map hypothetical energy consumption based on the participant-provided data (e.g., fuel used per day, distance traveled, time at various RPM to achieve goals). Then, energy consumption was mapped to an electric motor, which is 90% efficient, and leaving a 20% energy reserve, to determine the baseline energy required per trip. A total cost of ownership model was developed, incorporating annual maintenance costs, energy expenses, and gas outboard replacement at 36 months.

The rest of the model was built using inputs from participants to abstract several use cases. In all cases except the water taxi, the vessel operating season was calculated at 8 months. The baseline engine is a 300HP gas motor. The electric motor is a 300HP Photon motor with either one or two batteries.

[2] The profiles assume an average price of fuel of $8.50 per gallon, a $0.36 per kWh cost of electricity, and routine motor maintenance performed by the operator (materials costs only). A second scenario contemplates the payback period when paired with solar, which would bring the electricity costs down to $0.168 per kWh. To arrive at this number, we calculated the blended electricity cost by combining the Levelized Cost of Energy (LCOE) for solar at $0.12/kWh with the utility rate of $0.36/kWh, based on solar offsetting 80% of the energy demand. The formula used was: (0.80 × $0.12) + (0.20 × $0.36) = $0.168/kWh, reflecting significant savings from solar integration while accounting for partial reliance on the grid.

TABLE 1

VESSEL TYPE	TYPICAL USAGE* (HOURS/DAY)	ENERGY CONSUMPTION/DAY (GALLONS)	BATTERY NEEDED/DAY (kWh)**	EST. PAYBACK PERIOD	EST. PAYBACK PERIOD WITH SOLAR	READINESS OF TECHNOLOGY
FLY FISHING BOATS (NON-LODGE)	3 hours	11 gal	136 kWh	39 months	36 months	Not ready with existing shallow draft hulls. Would require a larger boat to accommodate batteries or smaller outboard as well as charging infrastructure.
FLY FISHING BOATS (LODGE ORIGINATED)	3.2 hours of runtime across two trips	8.96 gal	109 kWh	49 months	37 months	Ready – could require a charge between trips depending on vessel configuration.
LOBSTER/ CONCH HARVESTING* **	4 hours	7.50 gal	92 kWh	72 months	72 months	Ready
WATER TAXIS	4 hours	17.60 gal	215 kWh	36 months	36 months	Ready, assumes charging between trips.
CASCARILLA BARK TRANSPORT	2.5 hours	15.95 gal	195 kWh	64 months	64 months	Would require charging at destination.

* Typical usage counts motor runtime during the day. It does not include time on the water where the motor is stopped (e.g., when scuba diving or flats fishing).
** Assumes 20% energy reserve, 90% electric motor efficiency.
*** The lobster conch profile only operates twice a week, hence the longer payback period and insensitivity to solar. If this case fished more often, the payback period could decrease.

The most difficult application to electrify within The Bahamas are the fly-fishing boats that travel 60 miles round trip at full speed. The size of the vessels and the shallow draft (distance between the hull and the ocean bottom) required for flats fishing do not allow for large battery systems.

On the other hand, the lodge-originated fly-fishing vessels we observed are excellent candidates for electrification. They travel short distances, keep their motors off when at their fishing locations to allow the fisher to wade and fish, and they return to a lodge where there is access to electricity. When paired with solar and local storage, the benefit to the lodge owner is not just the vessel electrification but offering additional security in case of a weather event or power outage.

Photon Marine's energy profiling demonstrates:

- Significant reductions in operating costs over gasoline engines.
- Cost parity within 3-5 years due to lower maintenance and energy expenses, with accelerated timeline seen when paired with renewable energy such as solar, wind, or tidal.

The lobster and conch vessels serve as good platforms for electrification. The operators we spoke with had fewer trips scheduled per week. It is unclear if this was unique to the fishers we spoke with, if others fished more often, or if the cost of fuel was limiting the number of weekly trips. This will be further explored during the next stage of this project.

INFRASTRUCTURE

Optimal infrastructure configuration, financing, management and deployment will be considered in partnership with industry experts and community members during the design phase of the project. However, initial site visits and community conversations have identified some key requirements for charging infrastructure:

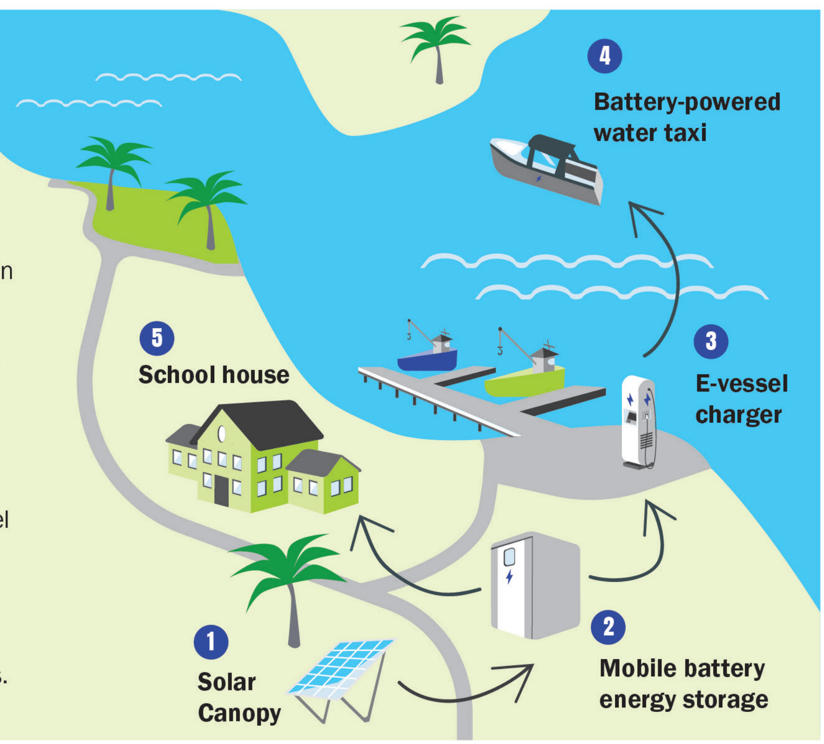
- **Accessibility:** Operators would prefer multiple charging stations accessible from various points along their routes. Floating charging stations[xx] were also discussed as a potential solution.
- **DC Fast Chargers:** Fast chargers will minimize operational disruptions when overnight charging is not feasible.
- **Off-Grid Capability:** There is a strong preference for the system to operate independently of the grid, relying solely on solar energy and battery storage. A backup diesel generator could be incorporated for emergencies.
- **Hurricane and Storm Resistance:** The system must be designed to withstand high winds and corrosion. One proposed solution is to install the PV and battery storage system on a trailer for easy relocation before storms or to different sites. Some companies are beginning to offer mobile battery energy storage systems that are compatible with both renewable and diesel energy sources.
- **Maintenance:** Upskilling local professionals to install and maintain the infrastructure will be essential.
- **Scalability:** As this is a pilot solution with the potential to support operational growth, the system should be designed with scalability in mind, allowing for the addition of solar panels, batteries, and charging stations as demand increases.

AN EXAMPLE SYSTEM:

Sustainable Marine Electrification for Remote Communities

Enhancing Energy Resilience and Connectivity in The Bahamas

1. A **solar-powered canopy** provides clean energy for charging stations, reducing dependence on imported fuels and lowering operating costs for vessel owners.
2. **Mobile battery energy storage** allows for flexible energy distribution, ensuring reliable charging even in remote locations and during power outages.
3. **Fast-charging stations** designed to support electric vessels help reduce downtime and enable efficient marine transport.
4. An **electric water taxi** offers a clean and cost-effective alternative for inter-island travel, cutting fuel expenses and reducing emissions.
5. A **local school** benefits from energy resilience, with solar-powered energy storage systems providing backup power and supporting educational initiatives.



FINANCIAL MODELS AND INCENTIVES

The current market offers a variety of electric outboards from 1 horsepower (hp) equivalent to 300 hp, suitable for many vessel applications. Globally, programs have employed diverse strategies to introduce these emerging technologies to remote communities. To close the upfront cost gap for boat owners transitioning to battery-powered vessels, innovative financial models tailored to the unique economic and social context of communities like those in The Bahamas are essential. Several potential models could help bridge this gap:

LEASE-TO-OWN PROGRAMS: Vessel operators lease the battery-powered vessel and pay monthly installments, with the option to own the boat after a set period. Reducing the immediate financial burden makes electrification more accessible. Payments could be structured to align with seasonal income from fishing or tourism.

Example: Companies like Tesla and Nissan have offered lease-to-own options for electric cars. This model could be applied to electric vessels. Applying a similar model to e-vessel ownership can allow operators to test the vessel before committing to full ownership. The lease period could be designed to coincide with warranty periods, reducing the risk of unexpected repair costs.

PAY-AS-YOU-GO (PAYG): Operators lease the e-vessel through monthly or one-off payments, tied to actual usage. This model eliminates the upfront cost, and the service can also include insurance and maintenance.

SUBSIDIES OR GRANTS: Governments, NGOs or international organizations provide partial or full subsidies to offset the higher upfront costs of e-vessels. This lowers the cost of entry for boat owners and accelerates the adoption of clean technologies. The Bahamian government, development banks or international climate funds could offer grants specifically for small-scale fishers and guides to transition to e-vessels.

Example: The Bahamas Development Bank provides 100% financing at low interest rates for businesses to acquire electric vehicles for their fleets[xxi]. This initiative aims to support economic diversification, enhance climate resilience, and enable businesses to realize immediate cost savings. A similar scheme could be offered by the government to encourage the update of battery-powered vessels.

MICROFINANCE PROGRAMS: Small, accessible loans provided to individual vessel owners, often through community-based organizations or NGOs. A microfinance institution could offer small loans specifically for e-vessel purchases, with repayment schedules aligned with fishing seasons.

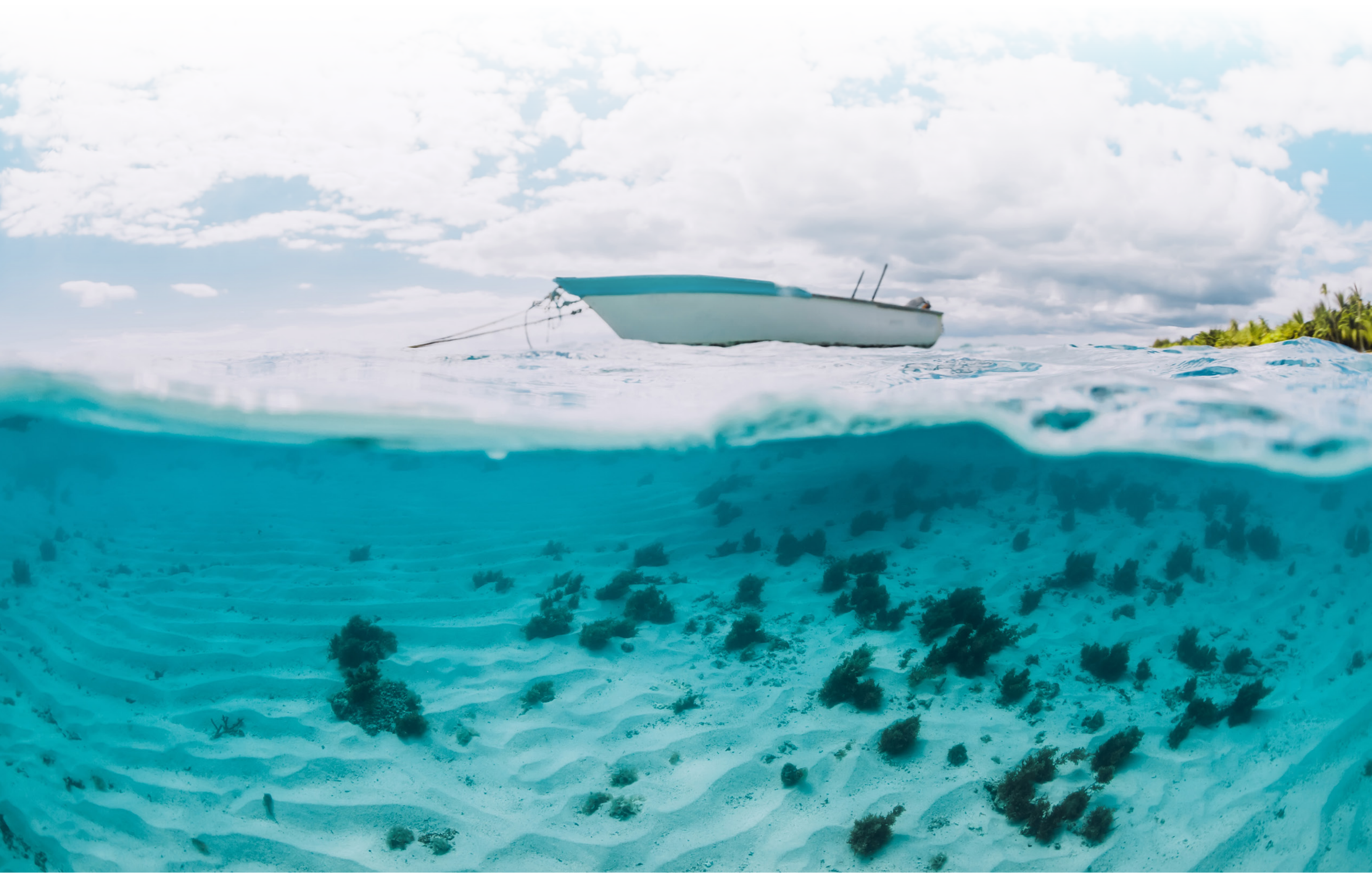
CARBON CREDIT FINANCING: Boat owners can earn carbon credits by reducing GHG emissions through electrification, which can be sold to generate revenue to offset upfront costs. Although not eliminating the upfront cost, this mechanism provides an additional income stream while incentivizing clean energy adoption and could be used in combination with another mechanism.

PUBLIC-PRIVATE-PARTNERSHIPS (PPPs): Vessel operators lease the battery-powered vessel and pay monthly installments, with the option to own the boat after a set period. Reducing the immediate financial burden makes electrification more accessible. Payments could be structured to align with seasonal income from fishing or tourism.

Example: In Norway, the EU and Rogaland County provided public funding to support the purchase of an electric ferry by the local public transport provider. Given the high upfront costs and risks associated with adopting new technologies, operators have stated that this investment would not have been feasible without public financial support[xxii].

COMMUNITY-BASED FINANCING: Local cooperatives, lodges or fishing associations pool resources to purchase e-vessels collectively, sharing costs and benefits among members. This approach reduces individual financial risk and fosters community ownership of the transition to clean energy.

By combining a number of these approaches, it is possible to secure the necessary funding to introduce electric vessels and other renewable energy solutions in its remote island communities, while mitigating the high upfront cost to the community. While these models are primarily considered for e-vessel ownership, some could also be applied to solar, energy storage, and charging infrastructure, as well as other models not mentioned here. These possibilities will be explored in greater detail during future workshops and stakeholder meetings in the next phase of this project.



NEXT STEPS

Exploring the feasibility of electrifying small vessels with communities on Acklins and Crooked Island has demonstrated significant potential to reduce fuel dependency, lower operating costs, and support sustainable livelihoods in remote island communities. This initiative not only addresses local economic and environmental challenges but also aligns with broader climate resilience goals for The Bahamas. Through surveys, workshops, and community engagement, it became clear that there is strong interest in alternative energy solutions, particularly among fishers, guides, and other marine-dependent operators. The findings highlight the many benefits of transitioning to battery-powered vessels, including reduced operating expenses, lower greenhouse gas emissions, improved working conditions, and enhanced energy resilience. Moreover, the quieter, cleaner technology can benefit marine ecosystems and touristic activities.

The study also identified key barriers, such as the high upfront costs of e-vessels, concerns about battery range and performance, and the need for reliable and effectively managed charging infrastructure. These technical and financial challenges could slow adoption if not addressed proactively and underscore the importance of co-designed solutions and innovative financial models, such as leasing programs, subsidies, and public-private partnerships, to make clean technologies accessible to small-scale operators. Additionally, the integration of renewable energy sources, such as solar, offers a promising pathway to further reduce costs, support sustainable growth, and enhance energy independence.

The next phase of this initiative will focus on data collection, technology design, and then pilot planning and implementation, ensuring that the proposed solutions are tailored to the specific needs of the communities and that the technology can meet and exceed current requirements. Ongoing community involvement will be critical to ensure the solutions remain practical and sustainable over the long-term. By addressing these challenges and leveraging the opportunities identified, this project has the potential to serve as a model for sustainable marine transportation in other SIDS. Success in this initiative can inspire similar efforts across the Caribbean and beyond, contributing to a global shift towards cleaner, more resilient marine industries.

We invite all interested parties, especially those working on energy, fisheries, and transportation decarbonization in The Bahamas, to discuss or collaborate on this transformative initiative. We also welcome feedback from industry experts, policymakers, community leaders, and those involved in similar efforts. Together, we can build a cleaner, more resilient future for the Family Islands and beyond.

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