

# **Strategic Framework for Resilient and Decarbonized Port Infrastructure Financing in Antigua and Barbuda**



# Charting the Way Forward for Inclusive Port & Maritime Infrastructure Resilience and De-Carbonization Financing for SIDS:

The Antigua and Barbuda Approach to  
Sustainable Infrastructure Financing

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# **Overview of SIDS Climate Challenges and Economic Context**

# Introduction

## Context

Small Island Developing States (SIDS) face existential climate threats including rising sea levels and extreme weather events.

Antigua and Barbuda's economy heavily relies on maritime assets for tourism, trade, and fishing.

## Objective

Our goal is to showcase a replicable model for climate-resilient, resilient, decarbonized port infrastructure using innovative blended finance approaches and public-private partnerships.

# The InGReD Initiative Overview

## Overview

### 1 Vision

Transform ports and marinas into climate-smart, sustainable infrastructure through the Inclusive GreenPort Resilience & De-Carbonization Carbonization Project (InGReD).

### 2 Key Components

Renewable energy (solar, wind), desalination for water security, nature-nature-based solutions (mangroves, coral coral reefs), shore power for vessels, and and programs to empower communities communities and MSMEs.



# Maritime Assets & Data Context



## Cruise Ships

530 annual calls, 10-10-18 hours berth berth time, 10MW 10MW demand



## Yachts

4,500 annual visits, 3-10 days stay, 0.5MW demand



## Cargo/Tankers

604 annual calls, 3-3-10 days stay, 5-8MW demand

**Economic Impact:** 60% of \$1.7B GDP from tourism/trade

# Holistic PPP Framework

## Public Sector Leadership

ABPA leads coordination with APUA and Ministry of Environment. Regulatory updates focus on IMO compliance, NDCs, and NAPs.

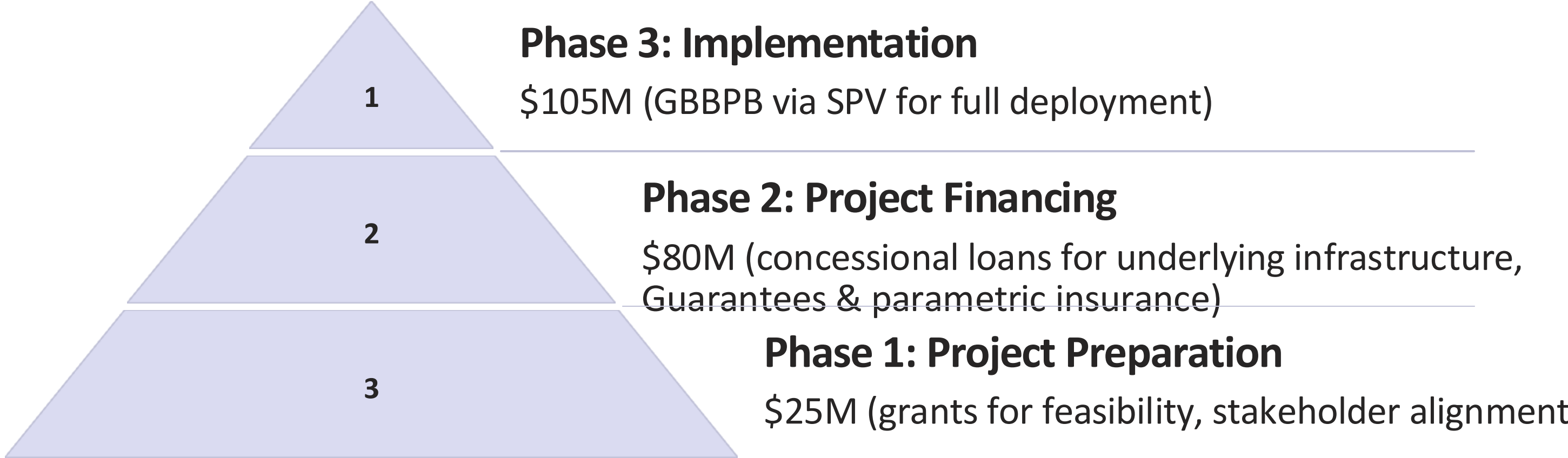
## Private Sector Innovation

GreenBerth Cluster (Alixum, Quintessence, Valerie Capital, PACCS, Green Energy Management) provides technical expertise in areas like ZEETUGs and financial advisory.

## Community Inclusion

Training programs target 50 individuals, with 60% women/youth participation. Job creation focuses on renewable energy and green tech sectors.

# Blended Finance Structure



**Total Investment: \$210M** blending grants, concessional loans, and private capital

# Green Berth Blended Performance Bond (GBBPB)

## Structure

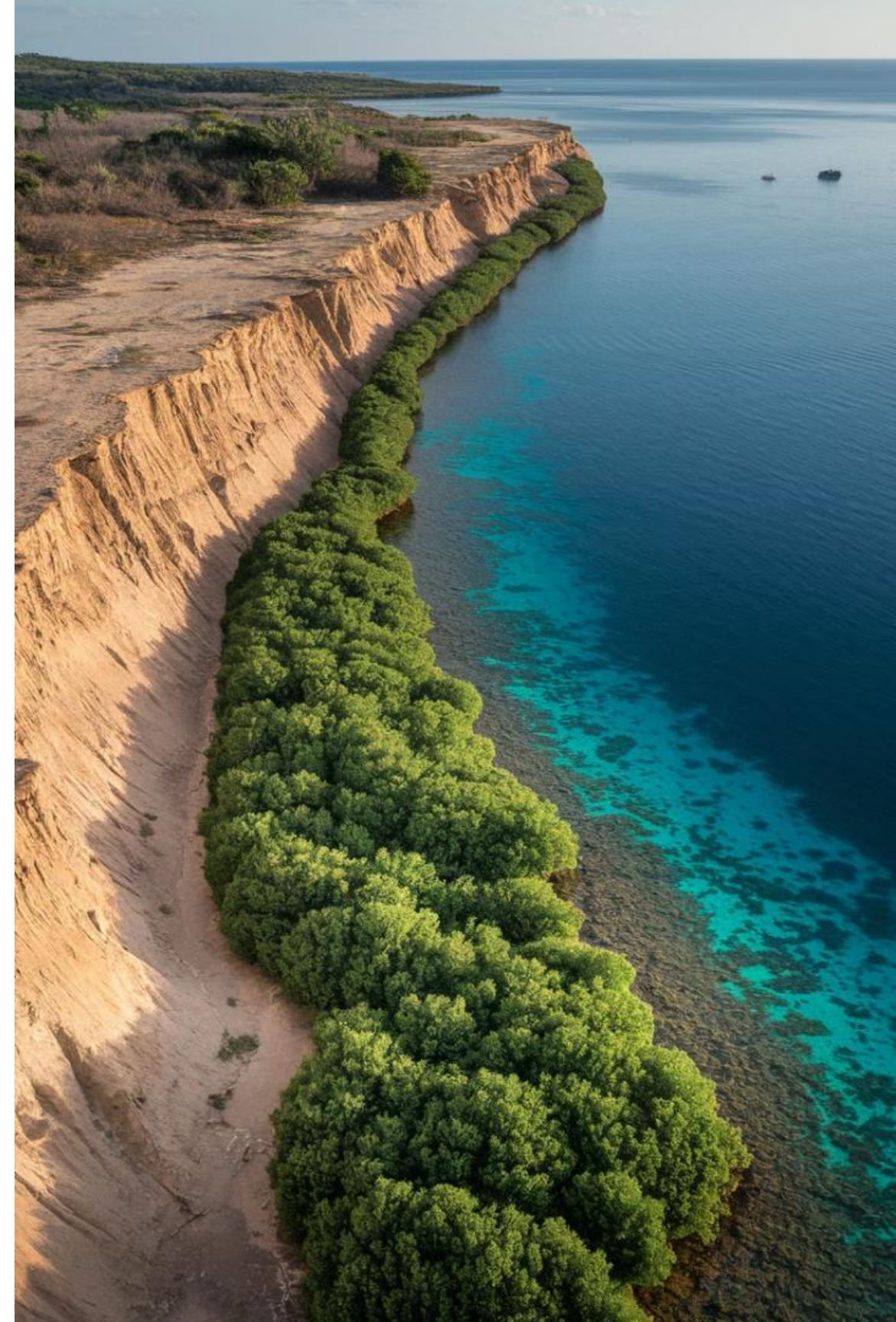
\$210M bond issued issued via SPV (APBA + (APBA + GreenBerth GreenBerth Cluster), Cluster), blending public grants, concessional loans,

## Innovations

Demand dividend mechanism for investors and parametric insurance for climate climate risks.

## Alignment

Funds shore power, desalination, and nature-based solutions.



# Prospective Donor Mapping

Phase	Timeline	Funding	Purpose	Potential Donors
<b>Preparation</b>	Months 1-12	<b>\$25M</b>	Feasibility studies, stakeholder engagement	IDB, CAF, GCF, OFID, World Bank
<b>Financing</b>	Months 12-24	<b>\$80M</b>	Concessional loans, risk instruments	OFID, CDB, GCF, EIB, Afreximbank
<b>Implementation</b>	Months 25-48	<b>\$105M</b>	Full deployment via GBBPB	ESG investors, institutional investors

# IMO Regulations & Tariff Implications

## IMO 2023 Strategy

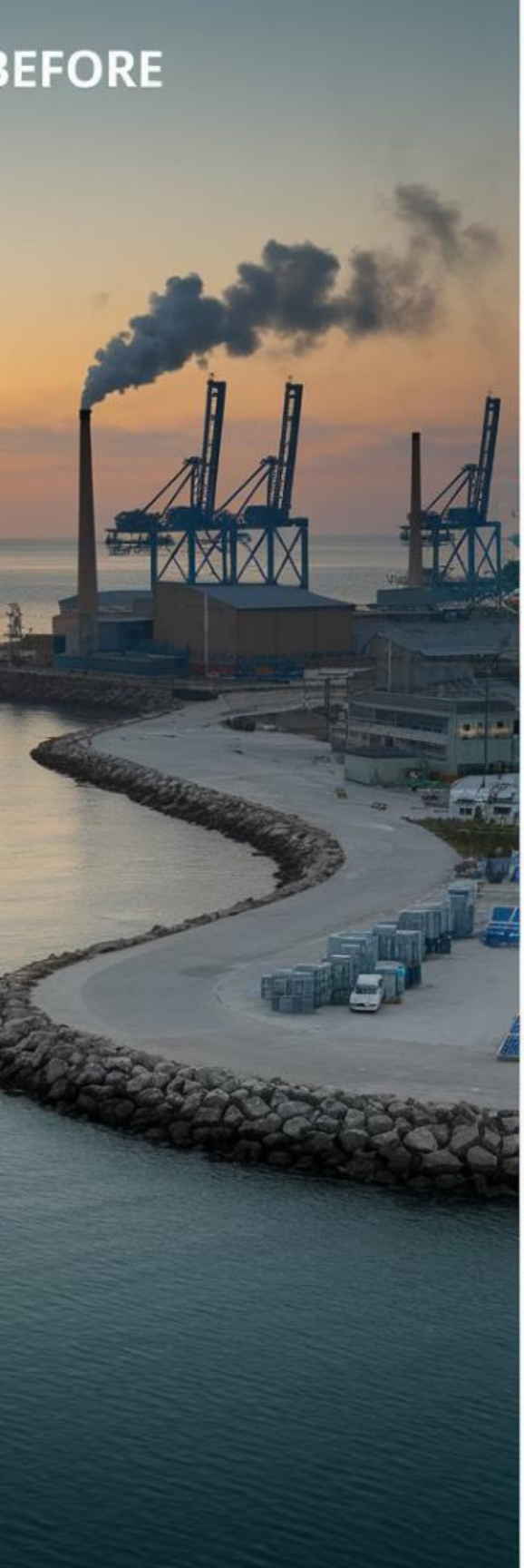
Net-zero by 2050, CII mandates, carbon pricing (\$25-\$100/ton CO<sub>2</sub>)

## Antigua's Risk

\$2.35M-\$9.42M annual tariffs if unmitigated

## InGReD's Strategy

Avoid tariffs through shore power, leverage tariffs to redirect revenues to GBBPB (e.g., \$2.35M/year for infrastructure)



BEFORE



AFTER

## Environmental Outcomes

**94,184**

**CO2 Reduction**

Tons per year

**399**

**SOx Reduction**

Tons per year

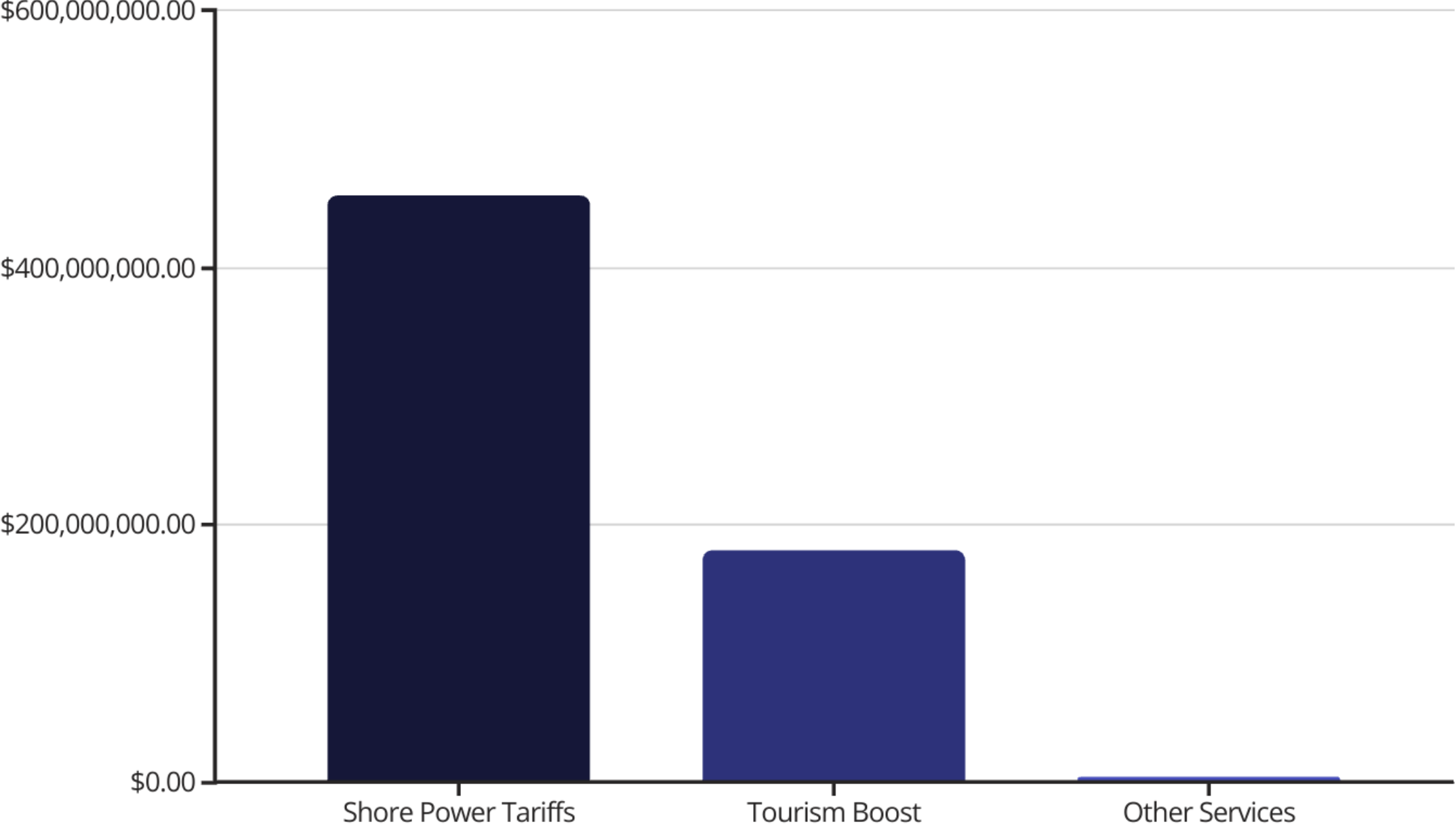
**223**

**NOx Reduction**

Tons per year

Enhanced coastal resilience via nature-based solutions

# Economic Outcomes



Total potential annual revenue: \$320M-\$640M (18.8%-37.6% GDP boost)

# Social Outcomes



## Job Creation

50+ green jobs  
initially,  
scalable to  
hundreds



## Public Health

Improved air  
quality from  
reduced  
emissions



## Community Empowerment

Training  
programs for  
local workforce



# Blue Ocean Opportunity

## 1 Untapped Market

Sustainable port services in the Caribbean maritime sector

## 3 Innovation

Solar-powered desalination and nature-based based solutions address water scarcity and and coastal erosion

## 2 Differentiated Value

Shore power and climate-smart infrastructure attract eco-conscious operators operators





# Market Expansion Potential

**600K**

**Cruise Passengers**

Projected annual visitors  
visitors post-fifth berth  
berth completion

**4,500**

**Yacht Visits**

Annual yacht arrivals

**604**

**Cargo Vessels**

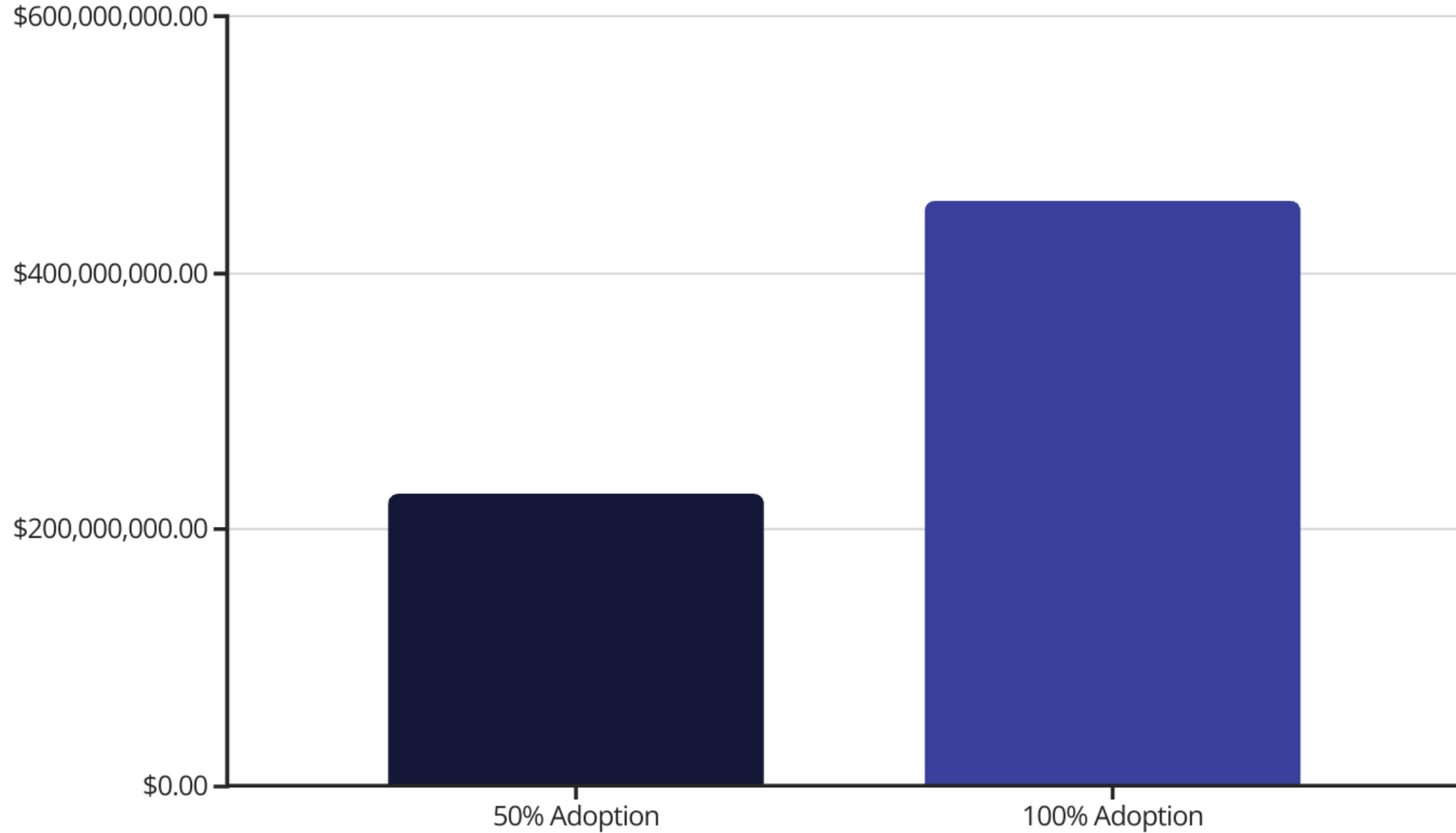
Annual cargo and tanker calls

# Shore Power Electricity Demand

Vessel Type	Annual Calls	kWh per Call	Total kWh (100% Adoption)
Cruise Ships	530	170,000	90,100,000
Yachts	4,500	84,000	378,000,000
Container Ships	384	840,000	322,560,000
Tankers	220	1,344,000	295,680,000

Total potential annual demand: 1,086,340,000 kWh

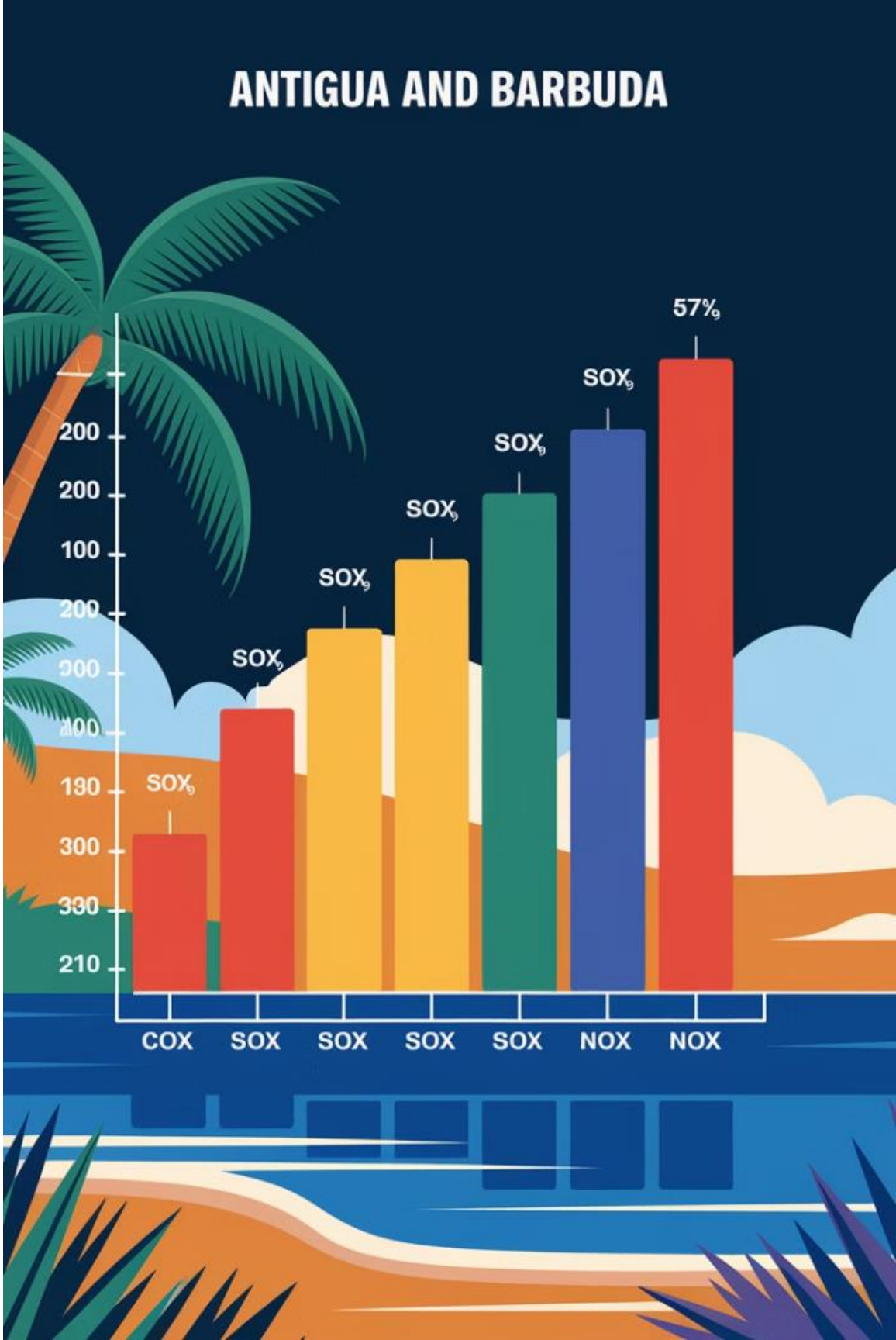
# Shore Power Revenue Potential



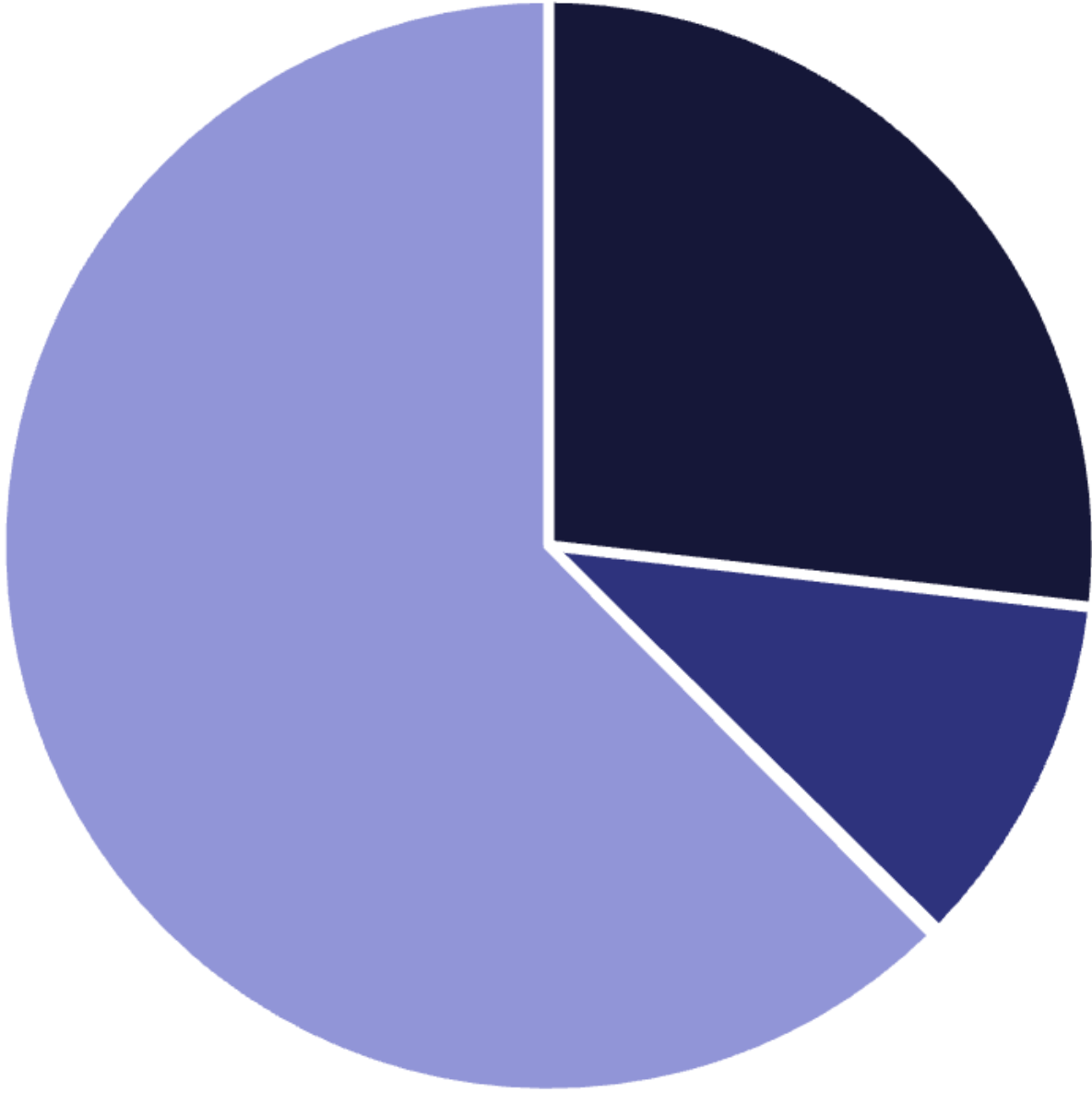
Revenue calculated at \$0.42/kWh tariff rate

# Environmental Impact Assessment

Metric	Baseline (tons/year)	Reduction Target (50% Adoption)	Reduction Target (100% Adoption)
CO2 Emissions	94,184	47,092	94,184
SOx Emissions	399	199.5	399
NOx Emissions	223	111.5	223



# Economic Impact on GDP



■ Shore Power Revenue    ■ Cruise Passenger Spending    ■ Job Creation    ■ Existing GDP

Total potential GDP contribution: 37.6% with full adoption

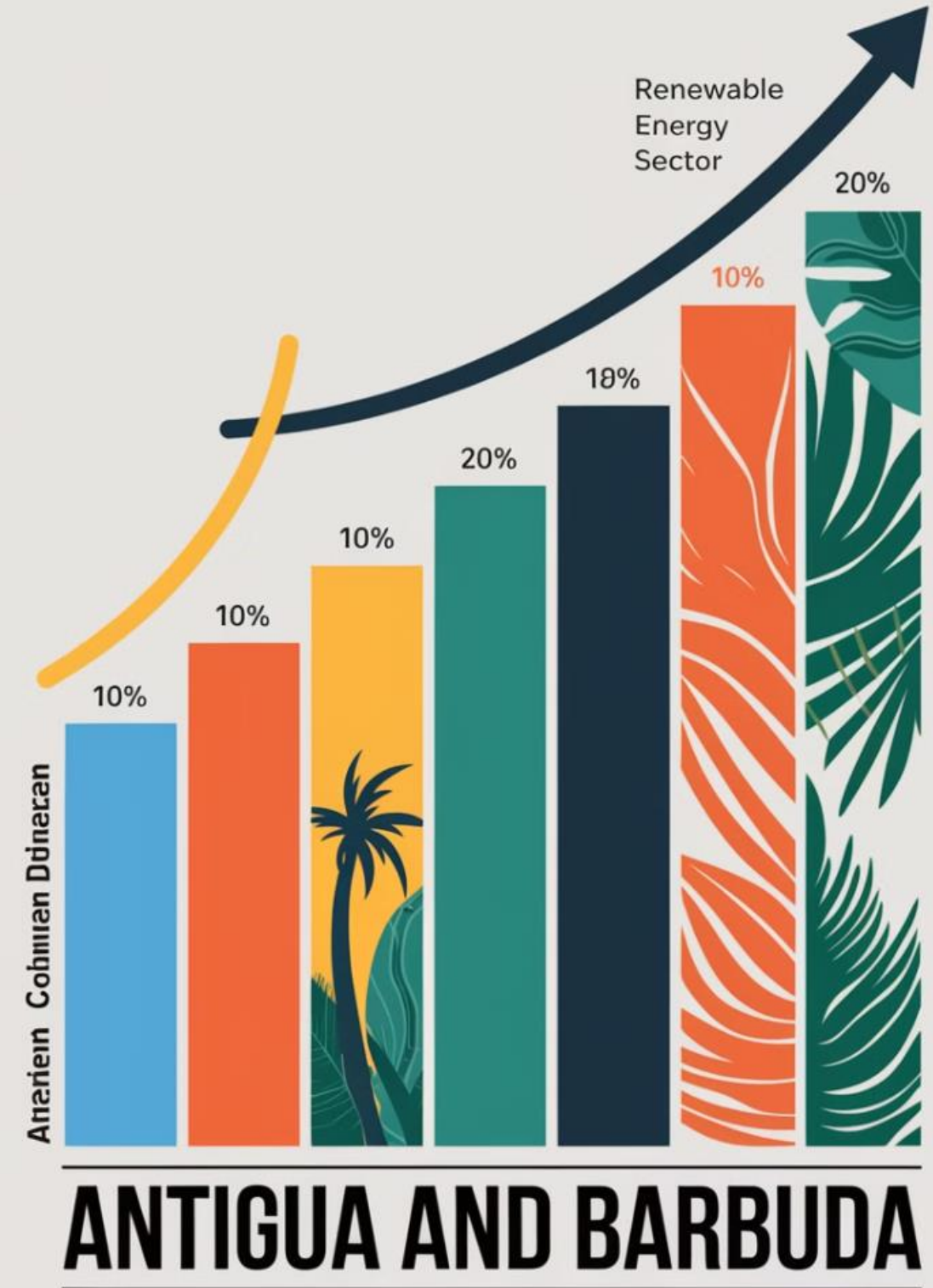
# Direct Economic Boost

## 1 Shore Power Revenue

Could add 13.4%-26.8% to GDP, transforming ABPA and APUA into significant revenue generators

## 2 Economic Diversification

Full adoption revenue (\$456.3M) rivals current tourism contribution, reducing economic dependence on a single sector



# Indirect Growth Potential

## Extended Berth Times

Longer stays for cruise ships, yachts, and cargo vessels increase local expenditures on fuel, provisions, and tours

## GDP Impact

Potential to double cruise-related GDP impact from ~10% to 20%+

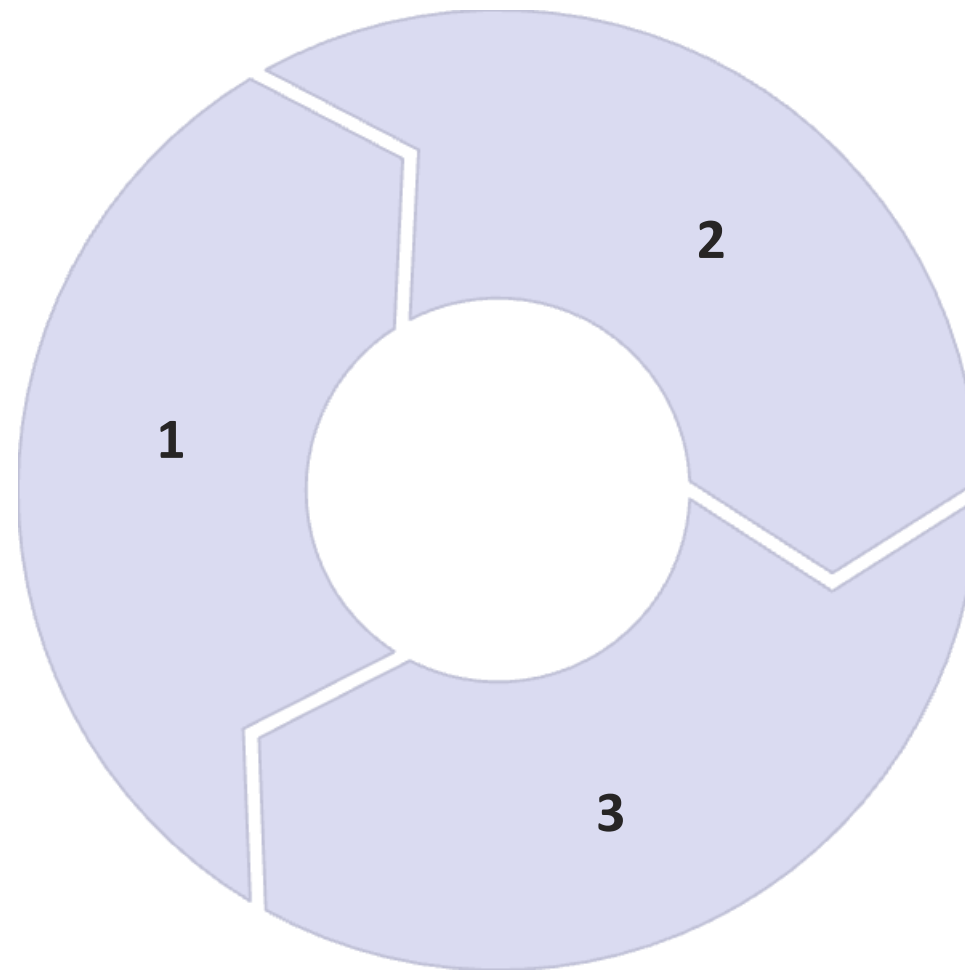
## Fifth Berth Capacity

New berth's 1 million passenger annual capacity amplifies economic effects

# Blue Economy Leverage

## Sustainable Maritime Services

Tapping into an untapped  
untapped frontier per  
OECD and UNCTAD  
analyses



## Green Port Hub

Positioning Antigua and  
Barbuda as a leader in  
sustainable port operations

## Eco-Conscious Attraction

Drawing environmentally  
environmentally  
responsible operators and  
and boosting trade  
competitiveness



# Resilience and Sustainability Benefits

## Emission Reduction

Mitigates climate risks  
risks and improves  
local air quality

## Water Security

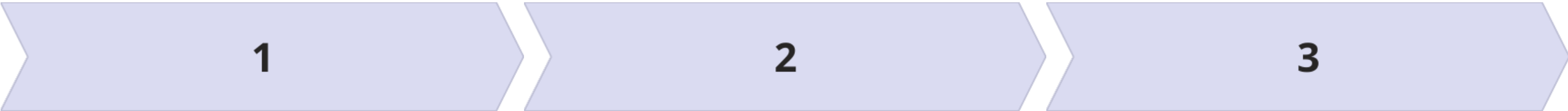
Desalination enhances  
enhances resilience to  
to drought and water  
water scarcity

## Coastal Protection

Integrating Nature-based solutions to safeguard  
Port & Marina Infrastructure against erosion and  
storm surges



# Scalability & Regional Model



## 1 Replicable Framework

PPP and blended finance  
finance model adaptable  
adaptable for other SIDS  
SIDS

## 2 Global Funding Gap

Addresses part of the \$95  
\$95 trillion global net-zero  
zero funding challenge

## 3 Caribbean Leadership

Positions Antigua as a  
model for sustainable  
maritime development

# **International Alignment**

## **IMO Regulations**

Complies with International Maritime Organization mandates for decarbonization and shore power infrastructure

## **Paris Agreement**

Contributes to global climate resilience resilience goals and nationally determined determined contributions (NDCs)



# Project Components from Pre-Feasibility Study

## Phase 1: Green Tug & Port

2.1MW solar power, battery storage, e-cranes, initial cold ironing  
ironing

1

## Phase 3: Green Marina

Renewable energy for marinas, shore power, nature-based solutions  
solutions

2

## Phase 2: Green Port Expansion

50MW wind power, 3.5M tons/year desalination, expanded cold  
cold ironing

3

# Infrastructure Development



## Renewable Energy

50MW capacity capacity from solar and wind wind



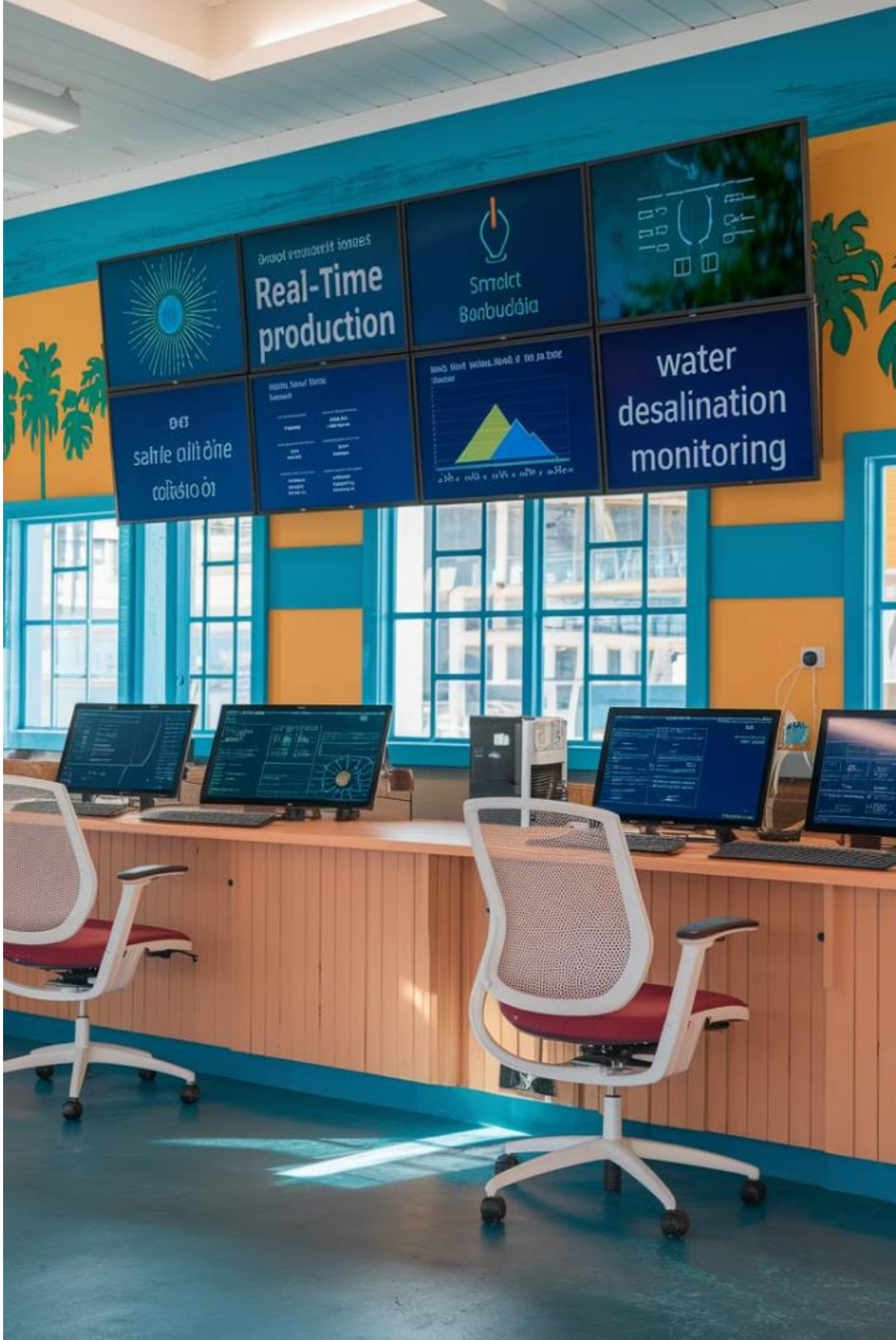
## Desalination

3.5M tons/year water production



## Smart Systems

IoT/AI monitoring for for real-time impact tracking tracking



# Financial Innovation Details

## SPV Structure

GBBPB issuance via Special Purpose Vehicle (APBA + GreenBerth Cluster)

## Demand Dividend

Tiered returns for private investors based on project performance

## Risk Instruments: GBBPB Guarantee & Parametric Insurance

Downside Risk Protection:  
Guarantee Instruments to Protect Bond Holders  
Climate-triggered payouts for hurricanes and storm surges



# Return on Investment Projections

Phase	ROI (without carbon sales)	ROI (with carbon sales)
Phase 1	3.79 years	3.63 years
Phase 2	2.06 years	1.81 years



# Nature-Based Solutions



## Mangrove Restoration

Enhances coastal protection and biodiversity



## Living Shorelines

Reduces erosion while supporting marine life



## Coral Reef Protection

Preserves marine ecosystems and natural barriers



# Stakeholder Collaboration

## **GreenBerth Cluster**

Supports project structuring, provides technical expertise for renewable energy, port decarbonization, and desalination

## **Risk Instrument Target Partners**

GuarantCo, Munich Re, Swiss Re contribute to climate risk mitigation strategies

## **Local Community**

Engagement in training programs and job creation initiatives



## Co-Benefits: Health and Economic



### Air Quality

Reduced diesel emissions  
emissions improve public  
health outcomes



### Green Tourism

Shore power systems  
position Antigua as an eco-  
eco-friendly destination



### Fishing Industry

Nature-based solutions  
restore marine biodiversity  
biodiversity and protect  
coastal ecosystems



# Key Takeaways

1

## Innovative Solution

InGReD offers a bankable, scalable approach for SIDS to address climate resilience and decarbonization

2

## Financial Model

Blended finance and PPPs unlock climate-resilient infrastructure investment

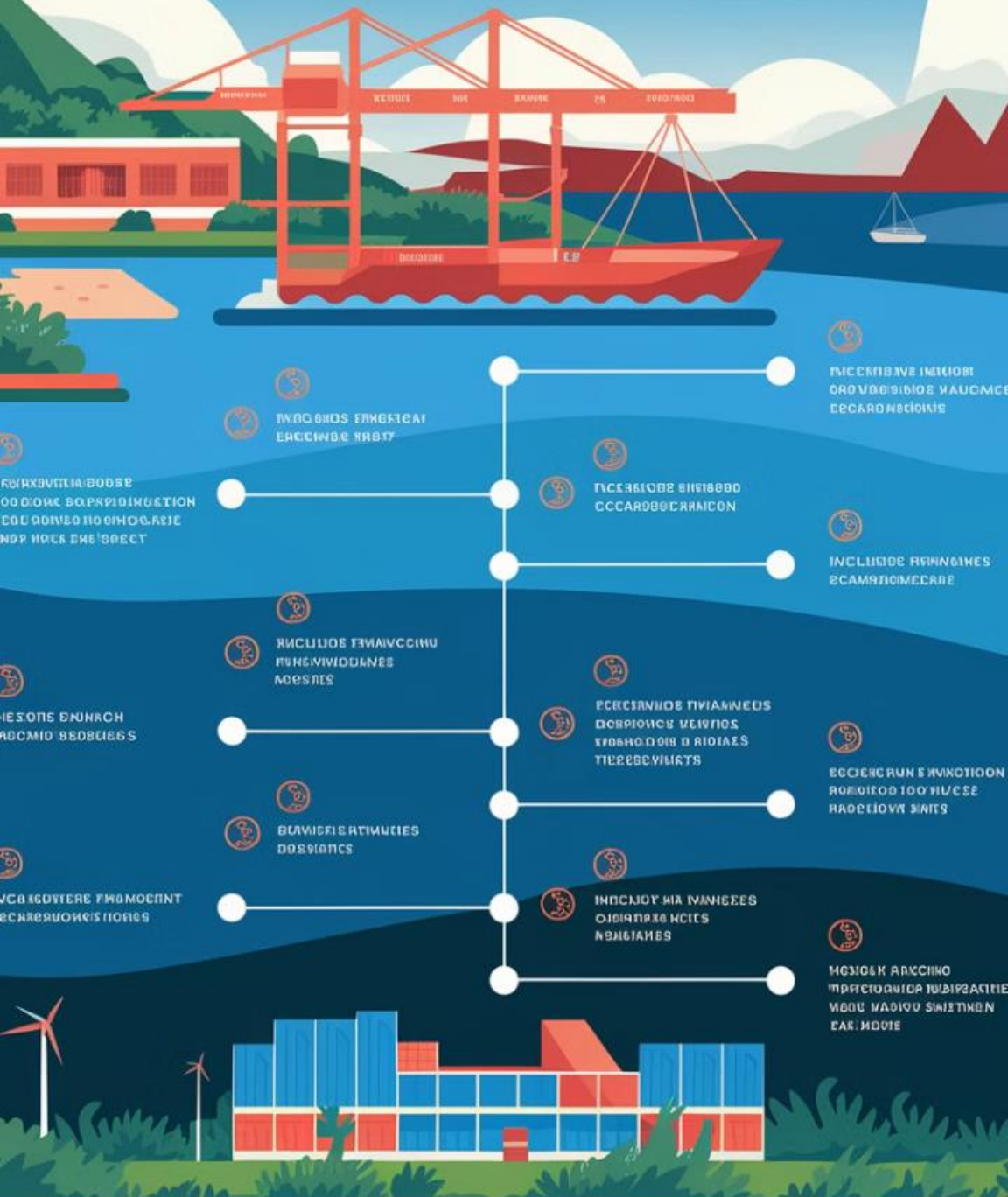
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## Transformative Impact

Potential to boost GDP by up to 37.6% while achieving significant environmental benefits

# GREEN BERTH

GREEN BERTH BLIŹED KŁEPIŃE YOON MIEUXTNIG OAMLIOND  
MNCANŃ THOB OIŹBI ENO.VIHS ECCLOR ANB BANBUZA



## Next Steps



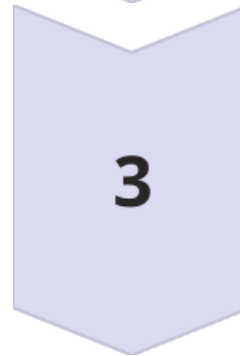
### Finalize Donor Agreements

Secure commitments for Phase 1 (\$25M) (\$25M) preparation funding



### Detailed Design

Complete engineering and financial structuring for



### GBBPB Launch

Target Q3 2026 for Green Berth Blended Blended Performance Bond issuance

# Contact Information

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**GreenBerth Cluster**

For technical and financial inquiries

Thank you for your attention.

We welcome your questions and look forward to potential collaborations in realizing this transformative project for Antigua and Barbuda and other SIDS.

