

Selection process #: RG-T4175-P00X

## **TERMS OF REFERENCE**

### **Development Pathways for Offshore Wind Power**

*COUNTRY: Regional*

*Project Number: P00X*

*Technical Cooperation Number: RG-T4175*

*TECHNICAL COOPERATION NAME: Promote marine renewable energy, and shipping and port services decarbonization in the Caribbean.*

#### **1. Background and Justification**

- 1.1. Caribbean countries face several common energy and shipping challenges. Most of the targeted countries rely heavily on imported liquid fossil fuels for power generation and transport, thus impacting their macroeconomic balances and increasing exposure to oil price volatility. The Caribbean geographic location and market size contribute to higher costs of alternative energy and technology solutions such as off-shore wind and green ports on a country-by-country basis. Large distances between countries severely constrain options for transporting electricity between islands, thus power systems are characterized by larger installed capacities and poorer load factors than interconnected systems, resulting in high energy costs. Moreover, global technology suppliers and project developers tend to focus on larger, developed markets making knowledge and technology acquisition processes difficult.
- 1.2. Integration of the fragmented island energy markets has been identified as key for obtaining a better bargaining position of the region *vis-a-vis* technology suppliers and fuel traders. RE project scales can be increased by developing a regional portfolio and procure and finance under an umbrella approach. Upscaling may be particularly relevant in a global context in which demand greatly outmatches supply of RE technology. Furthermore, regional integration would assist Caribbean countries harmonize technical standards on low carbon technologies<sup>1</sup>, optimize intra-regional logistics (including maritime transportation and supply of equipment and services), and exploit energy trading and improve energy security.
- 1.3. Shipping and port services are of key importance to Caribbean countries<sup>2</sup> for logistics and trade. Direct and indirect value added and economic integration from maritime transportation places the sector among the most important in terms of GDP. Nevertheless, shipping is one of the most air and water polluting industries<sup>3</sup>. The International Maritime Organization (IMO) has mandated a 50% GHG reduction for all vessels by 2050<sup>4</sup>. To reach these goals, Caribbean countries must implement comprehensive net-zero emission programs over the next decade that consider the

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<sup>1</sup> Regarding EE, the Caribbean region falls back on legal and regulatory frameworks, e.g., none of the countries has minimum performance studies, neither EE labeling nor an EE law.

<sup>2</sup> Except Guyana and Suriname

<sup>3</sup> The International Maritime Organization, a UN agency, works to get an agreement to limit GHG emissions and sulfur content in fuels from 3.5 to 0.5 per cent; while Paris Agreement set environmental binding goals.

<sup>4</sup> Resolution MEPC.304(72) adopted April 13, 2018, Initial IMO strategy on reduction of GHG emissions from ships, International Maritime Organization, [imo.org](https://www.imo.org).

implementation of energy efficiency measures in fleets, and green ports and corridors initiatives defining trading routes between major port hubs where zero-emission solutions are supported. Green ports and corridors create the enabling conditions for decarbonization, for they would allow policy makers to create an ecosystem with targeted regulatory measures, financial incentives, and safety regulations.

- 1.4. Private sector involvement is affected by ineffective development frameworks. Demand side challenges preventing the uptake of low carbon technologies include outdated policy frameworks lacking provisions to ensure price transparency and fair infrastructure access to third parties; outdated incentives for power and transport suppliers to increase efficiency and reduce costs; and weak financial position of utilities and public entities for ongoing investment in generation and green infrastructure. The build-up of experience with decarbonization technologies is low, talented professionals seek business elsewhere and local RE ecosystem hardly develops. On the other hand, there is awareness among policy makers and the public that energy and transport services in the Caribbean need to increase resilience to the impacts of extreme natural events, including frequent hurricanes and flooding - which are exacerbated by climate change.
- 1.5. Caribbean Countries have set ambitious NDC<sup>5</sup> targets to reduce environmental impacts from power generation and transportation<sup>6</sup>. Decarbonizing the energy sector and increasing renewable energy (RE) capacity are part of the region priorities to reduce Greenhouse Gas emissions (GHGs) and oil dependence. All together the region has set a target of 47% RE contribution to total electricity generation by 2027, thus requiring 4 GW of added capacity and approx. USD\$ 9 billion in investments<sup>7</sup>. Given the land constraints for deploying large scale energy infrastructure, strong consideration is given to harness MRE potential to increase RE capacity. One promising technology is offshore wind power following a regional approach to increase economy of scale. Off-shore wind is a well-established commercial technology with a good track record on competitive levelized cost of energy achieved in Europe and Asia<sup>8</sup>.

## **2. Objectives**

- 2.1. The general objective is to assess suitable offshore wind technologies and project development options to include in a strategy and action plan for the deployment of wind power capacity in the Caribbean.

## **3. Scope of Services**

- 3.1. Assessing current infrastructure and market attractiveness. The consultancy must describe power generation infrastructure and analyze the potential market size for offshore wind.

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<sup>5</sup> National Determined Contributions. See: <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>

<sup>6</sup> IRENA, 2022. <https://www.irena.org/irenaforcip/Caribbean-Islands#:~:text=The%20Member%20States%20of%20the,to%20comply%20with%20their%20NDCs.>

<sup>7</sup> Source

<sup>8</sup> IDB, 2021. Ocean energy in the Caribbean. <https://publications.iadb.org/publications/english/document/Ocean-Energy-in-the-Caribbean-Technology-Review-Potential-Resource-and-Project-Location-Guidance.pdf>

- 3.2. Evaluation of opportunities, deployment options and barriers. Opportunities for offshore wind development and options of regional integration, economies of scale and energy security must be characterized, specifying feasibility conditions. Also, the market and regulatory barriers must be described, including possible environmental, and economic impacts of wind farms.
- 3.3. Regional Strategy and Action Plan. Ambition setting guiding the short/mid/long -term actions to achieve net zero emissions by 2050 describing current and future barriers and risks when adopting measures.

#### **4. Key Activities**

- 4.1. Assessing current infrastructure and market attractiveness. Includes the description of power generation infrastructure: age, dominant technologies, energy mix, etc. Identify market size related to regional commitments toward net-zero emissions by 2050 including expected growth rate and average profit margins. Identify preliminary barriers- financial, market readiness, governance, data and others.
- 4.2. Evaluation of opportunities, deployment options and barriers. The evaluation includes (i) assessing competitive landscapes including mapping main power generators in the Caribbean Region identifying targeted competitors, competitors' share and their competitive advantages when compared with offshore wind power, (ii) describing offshore wind capabilities mapping its strengths and weaknesses in consideration to different local conditions in the region, and identifying potential synergies with other industries, (iii) estimating profitability projecting expected revenues and costs, economic benefits and calculating break-even periods for a set of scenarios and (iv) identify market, regulatory and institutional capacity gaps. And main risks during the project lifetime.
- 4.3. Regional Strategy and Action Plan by 2030. Prepare three options to deploy offshore wind in the Caribbean. Recommend (one) development strategy describing selection method and justifying target setting and expected benefits. Describe technology readiness, actions, and time frame for implementing the selected strategy. Identify additional benefits such as resilience, employment creation, competitiveness, etc. Identify barriers to implement the selected strategy and actions to address them (financial, incentives, policies, regulations, capacity building, institutional strengthening, data gathering, research and development, technical cooperation, etc.).
- 4.4. Facilitation of workshops with energy sector stakeholders provide an overview of the report and solicit feedback.

#### **5. Expected Outcome and Deliverables**

- 5.1. **Deliverable 1:** Develop a workplan and Inception Report – overview of the Caribbean context
- 5.2. **Deliverable 2:** Prepare Report based on Activity 4.1 to 4.3
- 5.3. **Deliverable 3:** Deliver the Final Report on the Development Pathways for Offshore Wind Power

#### **6. Project Schedule and Milestones**

- 6.1. The duration of the Consultancy will be 9 months

Deliverables	Estimated Duration
Workplan and Inception Report	Within 30 days of contract signing
Draft Report on Activities 4.1 – 4.3.	Within 4 months of contract signing
Final Report on the Development Pathways for Offshore Wind Power	Within 8 months of contract signing

## 7. Reporting Requirements

7.1. All reports must be completed in English. Reports should contain a contents page and an executive summary.

## 8. Acceptance Criteria

8.1. Deliverables will be accepted based on agreements on scope of services herein and approach reached with consultants at inception. Additionally, deliverables will be reviewed and approved by Mr. Roberto Aiello, Principal Regional Energy Specialist.

## 9. Other Requirements

9.1. It is expected that the work will be carried out by at least four experts: one senior project lead, an expert in offshore wind, an energy economist and senior engineer.

## 10. Supervision and Reporting

10.1. The Energy Portfolio is supervised by Mr. Roberto Aiello, Principal Regional Energy Specialist (INE/ENE) based in CJA. The Consultancy will be supervised and report to Mr. Roberto Aiello.

## 11. Schedule of Payments

11.1. Payments will be made in United States Dollar (USD) and will be paid based on the submission of the following:

Deliverables	%
Workplan and Inception Report	25%
Draft Report on Activities 4.1 – 4.3.	35%
Final Report on the Development Pathways for Offshore Wind Power	40%

Selection process #: RG-T4175-P00X

## **TERMS OF REFERENCE**

### **Decarbonization Pathways for the Maritime Transportation**

*COUNTRY: Regional*

*Project Number: P00X*

*Technical Cooperation Number: RG-T4175*

*TECHNICAL COOPERATION NAME: Promote marine renewable energy and shipping decarbonization in CCB*

#### **1. Background and Justification**

- 1.1. Caribbean countries face several common energy and shipping challenges. Most of the targeted countries rely heavily on imported liquid fossil fuels for power generation and transport, thus impacting their macroeconomic balances and increasing exposure to oil price volatility. The Caribbean geographic location and market size contribute to higher costs of alternative energy and technology solutions such as off-shore wind and green ports on a country-by-country basis. Large distances between countries severely constrain options for transporting electricity between islands, thus power systems are characterized by larger installed capacities and poorer load factors than interconnected systems, resulting in high energy costs. Moreover, global technology suppliers and project developers tend to focus on larger, developed markets making knowledge and technology acquisition processes difficult.
- 1.2. Integration of the fragmented island energy markets has been identified as key for obtaining a better bargaining position of the region *vis-a-vis* technology suppliers and fuel traders. RE project scales can be increased by developing a regional portfolio and procure and finance under an umbrella approach. Upscaling may be particularly relevant in a global context in which demand greatly outmatches supply of RE technology. Furthermore, regional integration would assist Caribbean countries harmonize technical standards on low carbon technologies<sup>9</sup>, optimize intra-regional logistics (including maritime transportation and supply of equipment and services), and exploit energy trading and improve energy security.
- 1.3. Shipping and port services are of key importance to Caribbean countries<sup>10</sup> for logistics and trade. Direct and indirect value added and economic integration from maritime transportation places the sector among the most important in terms of GDP. Nevertheless, shipping is one of the most air and water polluting industries<sup>11</sup>. The International Maritime Organization (IMO) has mandated a 50% GHG reduction for all vessels by 2050<sup>12</sup>. To reach these goals, Caribbean

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<sup>10</sup> Except Guyana and Suriname

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<sup>12</sup> Resolution MEPC.304(72) adopted April 13, 2018, Initial IMO strategy on reduction of GHG emissions from ships, International Maritime Organization, imo.org.

countries must implement comprehensive net-zero emission programs over the next decade that consider the implementation of energy efficiency measures in fleets, and green ports and corridors initiatives defining trading routes between major port hubs where zero-emission solutions are supported. Green ports and corridors create the enabling conditions for decarbonization, for they would allow policy makers to create an ecosystem with targeted regulatory measures, financial incentives, and safety regulations.

- 1.4. Private sector involvement is affected by ineffective development frameworks. Demand side challenges preventing the uptake of low carbon technologies include outdated policy frameworks lacking provisions to ensure price transparency and fair infrastructure access to third parties; outdated incentives for power and transport suppliers to increase efficiency and reduce costs; and weak financial position of utilities and public entities for ongoing investment in generation and green infrastructure. The build-up of experience with decarbonization technologies is low, talented professionals seek business elsewhere and local RE ecosystem hardly develops. On the other hand, there is awareness among policy makers and the public that energy and transport services in the Caribbean need to increase resilience to the impacts of extreme natural events, including frequent hurricanes and flooding - which are exacerbated by climate change.
- 1.5. Caribbean Countries have set ambitious NDC<sup>13</sup> targets to reduce environmental impacts from power generation and transportation<sup>14</sup>. Decarbonizing the energy sector and increasing renewable energy (RE) capacity are part of the region priorities to reduce Greenhouse Gas emissions (GHGs) and oil dependence. All together the region has set a target of 47% RE contribution to total electricity generation by 2027, thus requiring 4 GW of added capacity and approx. USD\$ 9 billion in investments<sup>15</sup>. Given the land constraints for deploying large scale energy infrastructure, strong consideration is given to harness MRE potential to increase RE capacity. One promising technology is offshore wind power following a regional approach to increase economy of scale. Off-shore wind is a well-established commercial technology with a good track record on competitive levelized cost of energy achieved in Europe and Asia<sup>16</sup>.

## **2. Objectives**

- 2.1. The general objective is to prepare a strategy and action plan for the decarbonization of port services and shipping/maritime transportation in the Caribbean

## **3. Scope of Services**

- 3.1. Mapping stakeholders and value chains. The consultant must trace the value chain of port services and shipping activities identifying scope 1 and 2 CO<sub>2</sub> contributions.

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<sup>15</sup> Source

<sup>16</sup> IDB, 2021. Ocean energy in the Caribbean. <https://publications.iadb.org/publications/english/document/Ocean-Energy-in-the-Caribbean-Technology-Review-Potential-Resource-and-Project-Location-Guidance.pdf>

- 3.2. Identify feasible low carbon investments and estimate CO<sub>2</sub> reduction. Prepare cost-benefit analysis of decarbonization measures in ports and fleets. Include current demand and projections of services by 2050 to illustrate net zero pathways.
- 3.3. Assess opportunities and barriers in the Caribbean. Describe untapped local conditions that might favor regional integration and fast track decarbonization of maritime transportation. Analyze market, regulatory and institutional capacity gaps.
- 3.4. Identify inputs to prepare a Regional Strategy and Action Plan. Propose target areas, and ambition setting guiding the short/mid/long -term actions to achieve net zero emissions by 2050 describing current and future barriers and risks when adopting measures.

#### **4. Key Activities**

- 4.1. Mapping stakeholders and value chains. Includes the description of ports and shipping infrastructure: fleet age, dominant technologies, energy mix of energy consumed in ports and shipping, describing ports and harbor infrastructure, shipping building industry based in the Caribbean and main technology providers to the region. Landscape toward net-zero emissions by 2050 implementing short term, mid-term and long-term measures to decarbonize the sector (scope 1 and 2).
- 4.2. Assess prospect measures for decarbonization. Identify feasible low carbon investments and estimate CO<sub>2</sub> reduction in ports and shipping fleets. This entails analyzing technical and operational energy efficiency measures for both new and existing fleets, speed optimization, logistics and planning, fuel replacement, power supply from renewable energy, and infrastructure for zero-carbon fuels.
- 4.3. Identify opportunities and barriers of implementation. Describe decarbonization opportunities encouraging regional integration in the value chain, specifying feasibility conditions. Barriers must include market (technology providers, costs), regulatory and institutional capacity gaps actions to address them (financial, incentives, policies, regulations, capacity building, institutional strengthening, data gathering, research and development, technical cooperation, etc.)
- 4.4. Summarize key insights to include in a Regional Strategy and Action Plan by 2030. Propose target areas, and ambition setting to achieve net zero by 2050 describing priority areas, actions, and key stakeholders in charge of implementation.
- 4.5. Facilitation of workshops with energy sector stakeholders provide an overview of the report and solicit feedback.

#### **5. Expected Outcome and Deliverables**

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