WORLD BANK GROUP
OFFSHORE WIND
DEVELOPMENT PROGRAM

OVERVIEW – JUNE 2020
Program Introduction
WBG Offshore Wind Development Program

Accelerating the uptake of offshore wind in emerging markets

Program Objective: To support the inclusion of offshore wind into the energy sector policies and strategies of WBG client countries and the upstream work needed to build a pipeline of bankable projects

Led by

Energy Sector Management Assistance Program
ESMAP is a partnership between the World Bank and 21 development partners and private non-profits to help low and middle-income countries reduce poverty and boost prosperity through environmentally sustainable energy solutions

In partnership with

International Finance Corporation
Member of the World Bank Group and the largest global development institution focused exclusively on the private sector in developing countries
WBG Offshore Wind Development Program

- 5 year program, started in April 2019
- Approximately $10m budget for;
  - Global knowledge generation and advocacy
  - Grants for in-country studies and policy development

TARGET RESULTS

➢ Engage with at least 10 client countries to integrate 20 GW of offshore wind into their policies and plans
➢ Develop a pipeline of investable projects, with at least 5 GW of capacity receiving WB/IFC finance
➢ Maximize women’s employment and skills development in offshore wind in multiple client countries
Program’s Support Options
Typical Activities Supported by the Program

Global Work

Knowledge generation, dissemination and exchange:
- Reports on good practice, lessons learned and opportunities for emerging markets
- Mapping to identify and quantify offshore wind development potential
- Events, workshops and training to inform, educate and gather country support (in collaboration with GWEC)

Country Specific Work

Exploratory country studies and planning work:
- Provide funding for roadmaps, planning and pre-feasibility level activities
- Demand-led, focus on countries with potential for bankable projects within 3-4 years

Preparation of investment plans:
- Assistance in scoping and funding detailed feasibility & site investigation work
- Draw on Best Practices for technical, E&S, procurement
Typical Country Activities Supported by the Program

These are some of the activities that can be supported by the program. Each market has its own needs, so activities and timing will differ. The support offered is flexible.

<table>
<thead>
<tr>
<th>Market Development Activities (Upstream)</th>
<th>Project Development Activities (Downstream)</th>
<th>WBG Financing for Projects and Infra</th>
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<tbody>
<tr>
<td>Policy &amp; Regulatory Studies</td>
<td>Site Characterization Surveys</td>
<td>World Bank: Public Sector Lending (grid, ports &amp; infra etc)</td>
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<tr>
<td>Market Strategy Advice</td>
<td>Wind Speed Measurements</td>
<td>IFC: Private Sector Lending (offshore wind projects, ports, supply chain etc)</td>
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<td>Marine Spatial Planning</td>
<td>Environmental &amp; Social Assessments</td>
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<tr>
<td>Grid Integration Analysis</td>
<td>Stakeholder Engagement</td>
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<tr>
<td>Port &amp; Infrastructure Assessment</td>
<td>Tender Design &amp; Management</td>
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<tr>
<td>Supply Chain &amp; Economic Analysis</td>
<td>Capacity Building &amp; Technical Advisory</td>
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Initial Workshop → Roadmap

Client Government Request for Support
### WBG Offshore Wind Development Program: Support Options

<table>
<thead>
<tr>
<th>Phase</th>
<th>Objective</th>
<th>Support Available</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>To stimulate interest in offshore wind, engage client countries, and provide global knowledge</td>
<td><strong>Global Resources (not country specific)</strong>&lt;br&gt;• Resource assessment, including report on technical potential, Global Wind Atlas, and country maps&lt;br&gt;• Global seminars and study tours (UK event in June 2019, next event scheduled for late 2020)&lt;br&gt;• Report: Key Factors for Successful Deployment of Offshore Wind in Emerging Markets, to be delivered in 2020&lt;br&gt;• E&amp;S guidance to support framing of in-country work, particularly marine spatial planning for offshore wind&lt;br&gt;• Introductory workshops carried out in-country using global staff/resources as a precursor to obtaining an official request from client government</td>
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<tr>
<td>1</td>
<td>To engage government officials and stakeholders in-country and develop a work program for WBG support</td>
<td><strong>Country Workshops</strong>&lt;br&gt;• Policymaker workshop: Undertake Offshore Wind Market Readiness Assessment through a structured workshop with key players&lt;br&gt;• Stakeholder workshop: Provide introduction to offshore wind developments, opportunities and challenges and discuss next steps in developing the market&lt;br&gt;• Country resource assessment: update global resource assessment study with additional in-country data on grid infrastructure, load centers, environmental constraints, and other relevant data – to present at workshop(s)</td>
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<tr>
<td>2</td>
<td>To provide evidence upon which government can develop policy, engage with key stakeholders, and take a decision on development of initial rounds of projects</td>
<td><strong>Offshore Wind Roadmap</strong>&lt;br&gt;Upstream Bank-executed technical assistance covering some or all of the following:&lt;br&gt;• Geospatial analysis: More detailed technical assessment of offshore wind potential using geospatial planning tools using in-country and generated datasets (wind resource, water depth, metocean data, seabed geology, oil &amp; gas installations, shipping routes, pipeline infrastructure, fishing grounds, marine conservation zones, Ramsar sites, etc);&lt;br&gt;• Economic analysis: Assessment of likely costs for offshore wind in the country (including both fixed and floating foundations) over time (e.g. out to 2030) and under different scenarios (e.g. with/without regional approaches to supply chain development; assuming different cost declines in developed markets etc.); and considering what the volume of economically attractive offshore wind in the next 10-15 years would be compared to supply from other sources;&lt;br&gt;• Financial analysis: Financing of offshore wind projects and the elements that impact the bankability of offshore wind projects (e.g. macro context, off-taker credit worthiness, tariff support, forex, PPA, etc.) and the ability to attract international financing;&lt;br&gt;• Environmental &amp; social assessment: Impacts, risks and opportunities around both environmental (birds, marine mammals, fish, habitats) and social (livelihoods, jobs, leisure activities, community acceptance) issues, and consideration of how to open up job opportunities for women;&lt;br&gt;• Supply chain and infrastructure: High-level infrastructure requirements to develop offshore wind at scale at a national and regional level, considering ports, logistics, grid infrastructure (note that this would not be an exhaustive study); and considering supply chain capabilities at national and regional level.</td>
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<td>3</td>
<td>To provide evidence to guide market development and provide a signal to developers</td>
<td><strong>Deployment Strategy</strong>&lt;br&gt;- Study on procurement options, including FIT, competitive bidding, pilot projects, and support for innovation (e.g. floating wind deployment)&lt;br&gt;- Grid integration analysis to determine theoretical limits and grid upgrade requirements as well as other offtake options such as industry/hydrogen&lt;br&gt;- Integration into national policy/masterplan, including development of targets and indicative procurement/bidding rounds&lt;br&gt;- Stakeholder consultation workshops</td>
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<td>4</td>
<td>To prepare for project development including identifying wind energy zones for subsequent developer solicitation</td>
<td><strong>Downstream Technical Studies</strong>&lt;br&gt;- Geophysical and geotechnical&lt;br&gt;- Environmental &amp; social&lt;br&gt;- Metocean modelling and measurements&lt;br&gt;- Wind resource measurement campaign (i.e. floating LIDAR)&lt;br&gt;- Hard, and soft, constraints&lt;br&gt;- Stakeholder consultation&lt;br&gt;- Gender analysis&lt;br&gt;- Capacity Building&lt;br&gt;- Building up of a policy or delivery unit in Government/utility&lt;br&gt;- Training courses and study tours</td>
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<td>5</td>
<td>To carry out competitive bidding and/or award projects to developers</td>
<td><strong>Transaction Advisory</strong>&lt;br&gt;- Preparation of tender materials (pre-qualification and RFP)&lt;br&gt;- Running of the tender</td>
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<td>6</td>
<td>To support project financing and implementation</td>
<td><strong>World Bank (Public Sector)</strong>&lt;br&gt;- Shared infrastructure – i.e. electrical grid&lt;br&gt;- Risk mitigation&lt;br&gt;- Tariff support&lt;br&gt;- TA and capacity building&lt;br&gt;- <strong>IFC (Private Sector)</strong>&lt;br&gt;- Project finance&lt;br&gt;- Blended finance</td>
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Program’s Activities – Past, Present & Future
Study Tour to the UK – June 2019

UK Study Tour, June 24 – 28, 2019

24 representatives from eleven countries including:

- Argentina
- Algeria
- Brazil
- Costa Rica
- India
- Indonesia
- Morocco
- Sri Lanka
- South Africa
- Turkey
- Vietnam

- Workshop and roundtable discussions with leading firms and industry experts
- Attendance at the Global Offshore Wind 2019 Conference, London
- Visit to the Port of Blyth and offshore wind supply chain facilities in the North East UK
Going Global Report – October 2019

- **Methodology** for assessing the technical potential for offshore wind using GIS analysis, wind speed data derived from the [Global Wind Atlas](#) and [GEBCO bathymetry](#).

- Eight case studies on the technical potential for offshore wind in Brazil, India, Morocco, the Philippines, South Africa, Sri Lanka, Turkey, and Vietnam.

- These eight countries have a total technical potential of approximately 3.1 TW, including 1,016 GW of fixed capacity and 2,066 GW of floating capacity.
• Using the methodology developed for the Going Global report, **maps were produced** and the technical potential estimated for 48 countries and regions

• Total technical potential of 15.6 TW for 48 emerging markets, including 5.5 TW of fixed potential and 10.1 TW of floating potential

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<tr>
<th>Region</th>
<th>Total technical potential</th>
<th>Highlights</th>
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<tbody>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>6.3 TW</td>
<td>Highest regional potential, strong wind resource, good proximity to demand centers</td>
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<td>East Asia Pacific</td>
<td>4.4 TW</td>
<td>Strong offshore wind resource, China has the largest potential of any country</td>
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<tr>
<td>Sub-Saharan Africa</td>
<td>2.3 TW</td>
<td>Strong potential primarily in floating wind due to relatively deep waters off the southern coast</td>
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<tr>
<td>Europe &amp; Central Asia</td>
<td>1.2 TW</td>
<td>Favorable conditions in the Black Sea and the Caspian Sea which could become regional markets</td>
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<tr>
<td>Middle East &amp; North Africa</td>
<td>1.1 TW</td>
<td>Moderate resource in Northern Africa, primarily in floating wind</td>
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<tr>
<td>South Asia</td>
<td>306 GW</td>
<td>Some good but limited resources, primarily in fixed foundation offshore wind</td>
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Country Roadmaps

• Procurement from a roster of six experienced, international consultancy firms; Arup, BVG Associates, COWI, DNV-GL, Everoze & RCG

• Partnerships with local consultancies is essential for local market insights

• Study scope is discussed and agreed with client government. This will depend on any previous activities, the potential size of the market and any particular objectives

• Typical scope could include:

1. Geospatial mapping & zoning
2. Economic analysis
3. Financial analysis
4. Environmental & social analysis
5. Permitting, consenting,
6. Identification of stakeholders
7. Transmission upgrades
8. Economic impact assessment
9. Supply Chain Analysis
10. Health and safety analysis
11. Infrastructure capabilities
12. Scope, timing and cost of downstream technical studies
13. Recommended actions
Country Roadmaps - Status

- **Vietnam**: Engaged BVG in February 2020 to undertake roadmap. Initial roadmap drafted for focused consultation
- **Sri Lanka**: Procurement ongoing. Highly engaged; focus on Gulf of Mannar – possible link to India grid interconnection
- **Turkey**: Procurement ongoing. Focus on economic analysis, regulatory gap analysis, E&S risks. Building on work commissioned by Danish Energy Agency.
- **Azerbaijan**: TOR under discussion with Government. Procurement in mid-2020
- **Brazil**: Stakeholder workshop event postponed due to COVID-19. Continued engagement with EPE on possible support options
- **Columbia**: Recent interest expressed by government; in scoping
- **India**: Continuing dialogue with MNRE & SECI. Exploring interest in Tamil Nadu demonstration project.
- **South Africa**: Stakeholder workshop event postponed due to COVID-19. Engagement with CSIR. Possible event at Windaba in late 2020.
PROBLUE is a new Multi-Donor Trust Fund, housed at the World Bank, that supports the development of integrated, sustainable and healthy marine and coastal resources.

Offshore Wind Program has been awarded +$1m of funding from Pillar 3 of PROBLUE to enhance the sustainability of offshore wind in emerging markets.

Environmental Framework
- Commissioned in April 2020, ending October 2020. Led by Natural Power
- Objective; enable WBG client governments to adequately plan for and roll out a country-scale spatial assessment of environmental risks and opportunities associated with the offshore wind sector in a new market.
- Framework will support the planning and siting of offshore projects with lower environmental risks and possibly opportunities, to help ensure bankability and uptake of good practice.
- Important to be appropriate and practical for developing countries.

Social Framework
- Procurement ongoing. Similar in scope to the Environmental Framework but focused on Social aspects as per WB ESS and IFC SPS.
Coming Up…

• Virtual study tour – September 2020:
  — Three day event with virtual tours around offshore wind supply chain firms, seminars on key development topics, Q&A sessions with experts

• Offshore Wind MOOC (Massive Open Online Course):
  — Online training course covering a wide range of topics relevant to offshore wind development

• Key Factors for the Successful Development of Offshore Wind:
  — Flagship report to capture important lessons learnt, good practice, useful sources of information and relevant recommendations for government and stakeholders developing offshore wind in emerging markets

• REZoning, geospatial planning tool for renewable energy:
  — Online geospatial planning tool incorporating constraints and economic analysis to identify and prioritise potential development zones for offshore wind

• Design aspects for large-scale green hydrogen offshore wind projects in developing countries:
  — Report analyzing the main design considerations when incorporating green hydrogen production into offshore wind projects
THANK YOU

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