



Green Financing Options for Critical Infrastructure – Maritime Ports

ASEAN Ports and Shipping 2022









26 Oct 2022





- Shivaprakash heads the Consultancy and Energy transition in BMT, he is responsible for initiatives related to Energy Transition which includes pivot towards Offshore Wind, maritime decarbonization and Hydrogen
- Shivaprakash has over 28 years' experience in executing projects in the Energy Sector. His expertise is in varied industries like LNG, bulk liquid storage terminals, FPSO, Gas platforms, petrochemicals, refinery, specialty chemicals, pharmaceutical bulk drugs and port development. He is a Chemical Engineer by training with MBA in Finance, and a PMI certified Project Management Professional (PMP). Shivaprakash's geographical exposure includes Americas, Europe, Middle East, India, Malaysia, Myanmar and Indonesia.
- Shivaprakash has successfully implemented several types of projects ranging from feasibility studies, basic design, FEED preparation, contracting, construction, commissioning and project close-out. Under project management, the span of functional experience includes all aspects of planning and controlling of the project cost, schedule and scope.
- Shivaprakash's area of expertise are Market Studies, Economic Appraisal, Project Management, Process Engineering, Piping Engineering, Risk Management, Capital Planning and Advisory services.
- Shivaprakash is passionate about climate change, renewable energy and decarbonization, he has been a speaker at ASEAN Wind (2020), JACKS Forum (2021), EIC Wind Energy (2021), (SMW Singapore (2021) and OTC KL (2021).

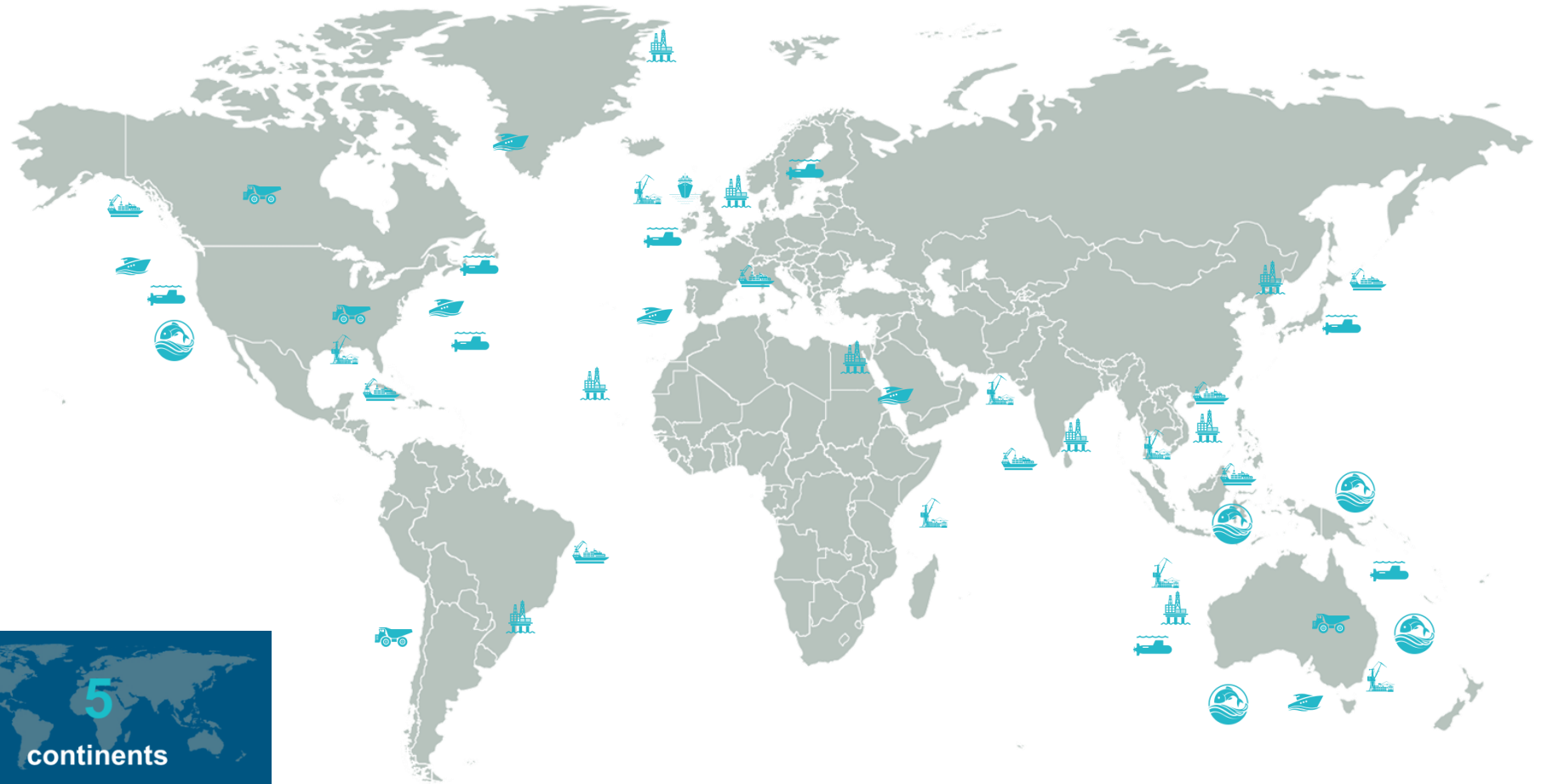
BMT - A network of knowledge and resources close to our customers

-  Coastal Infrastructure
-  Defence and Security
-  Marine Surveys
-  Mining and Machinery
-  Energy
-  Specialised Ship Design
-  Vessel Performance
-  Water and Environment

Established
1985

47
offices

5
continents



BMT Overview

BMT Asia Pacific has supported land-sea interface projects since 1985.

Design & Engineering delivers independent engineering and design capabilities for customers operating in the maritime sector. Our wide range of maritime engineering experience and capabilities allows us to develop optimised solutions in the early stages of a project, deploy advanced simulation techniques and deliver complex engineering projects under tight schedules. **Consultancy & Advisory** delivers independent advisory capabilities for customers operating in energy and the maritime sector. We deliver a wide range of technical support that allows you to confidently rely upon us to ensure your designs are optimised to reduce risks to personnel, environment and asset. We are a provider of engineering solutions for engineering challenges in the marine environment throughout Southeast and South Asia delivering to cost and schedule, adding value to your projects



Container



Dry Bulk



LNG



Oil & Petrochemicals



Multi-Purpose



Cruise & Ferry



Shipyards



Floating Structures



Marinas

Capabilities

Maritime Design

- Engineering Design Services
- Tender Support Services
- Project Management Consultancy (PMC)
- Construction Technical Support
- Construction Supervision
- Owner's Engineer Services
- Technical Due Diligence Services
- Dredging requirement Estimation
- Shore protection work/soil improvement
- Basic and detailed jetty design
- Geotechnical services

- Overall port layout
- Breakwater design

Floating Structures

- Mooring analyses (Orcaflex / Optimoor)
- Navigation simulation

Investment Support

- Technical due diligence
- Feasibility studies
- Socio-economic studies
- Market and economic assessments to estimate the market size
- Siting studies
- Optimisation and supply chain studies
- Lenders independent engineer

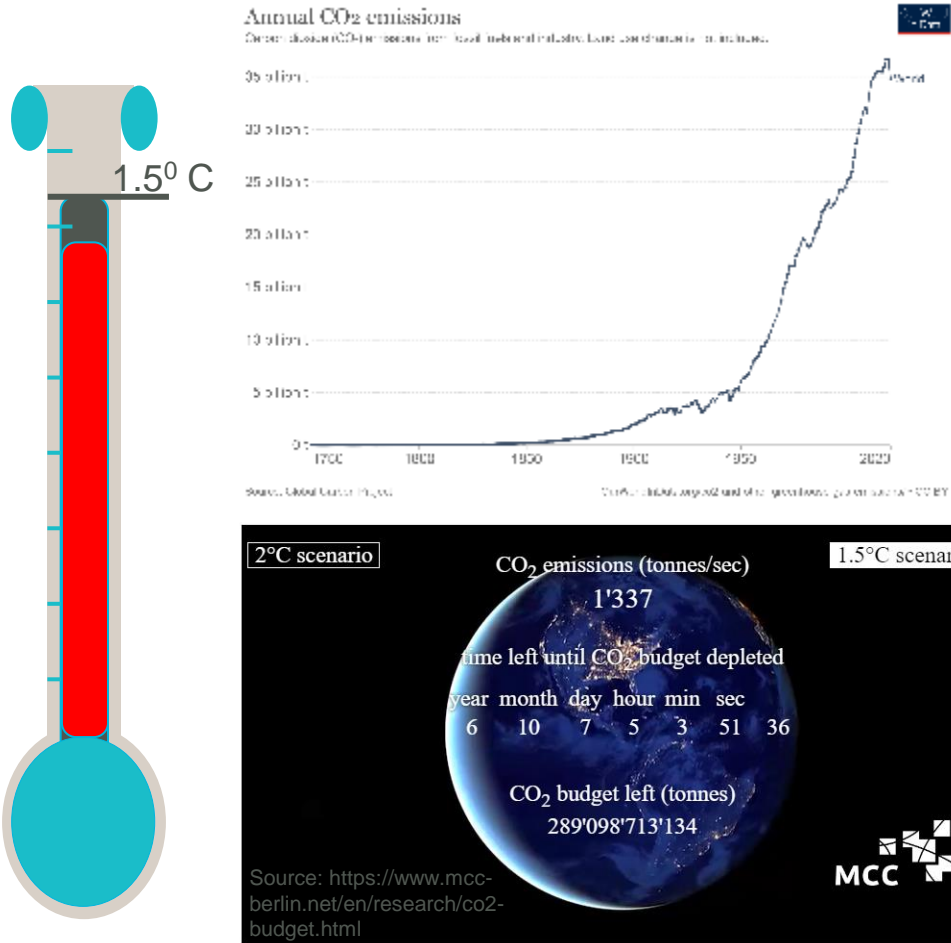
Risk & Modelling

- Hazard Identification (HAZID)
- Hazard & Operability (HAZOP), Simultaneous Operations (SIMOPS), Safety Integrity Level (SIL),
- Layer of Protection Analysis (LOPA),
- Hazards and Effects Register (HER),
- COMAH Report
- OHRA Report
- Fire Risk Analysis (FRA)
- Fire Safety Assessment (FSA),
- Smoke and Gas Dispersion Analysis (SGDA),
- Noise Assessments,
- Vibration Assessments,
- Hazardous Areas / Location Study,
- Emergency Escape Evacuation and Rescue Analysis (EERA),
- Human Factors Engineering (HFE),
- Quantitative Risk Assessments (QRA),
- Flare Study,
- Smoke and Gas ingress study,
- Safety Management Systems,
- Ergonomics
- Reliability, Availability & Maintainability (RAM) Modelling,
- Failure Modes Effects and Criticality Assessments (FMECA)

Context - Climate Change



Consequence



Carbon Budget

Sustainable Development underpins Green Finance

The SDGs provide worldwide guidance for addressing the global challenges facing the international community. It is about better protecting the natural foundations of life and our planet everywhere and for everyone and **preserving people's opportunities to live in dignity and prosperity across generations.**



Increasing importance of ESG in Finance

Environment

Manage environment of the port to minimize the impact to the surrounding ecosystem from port activities

Social

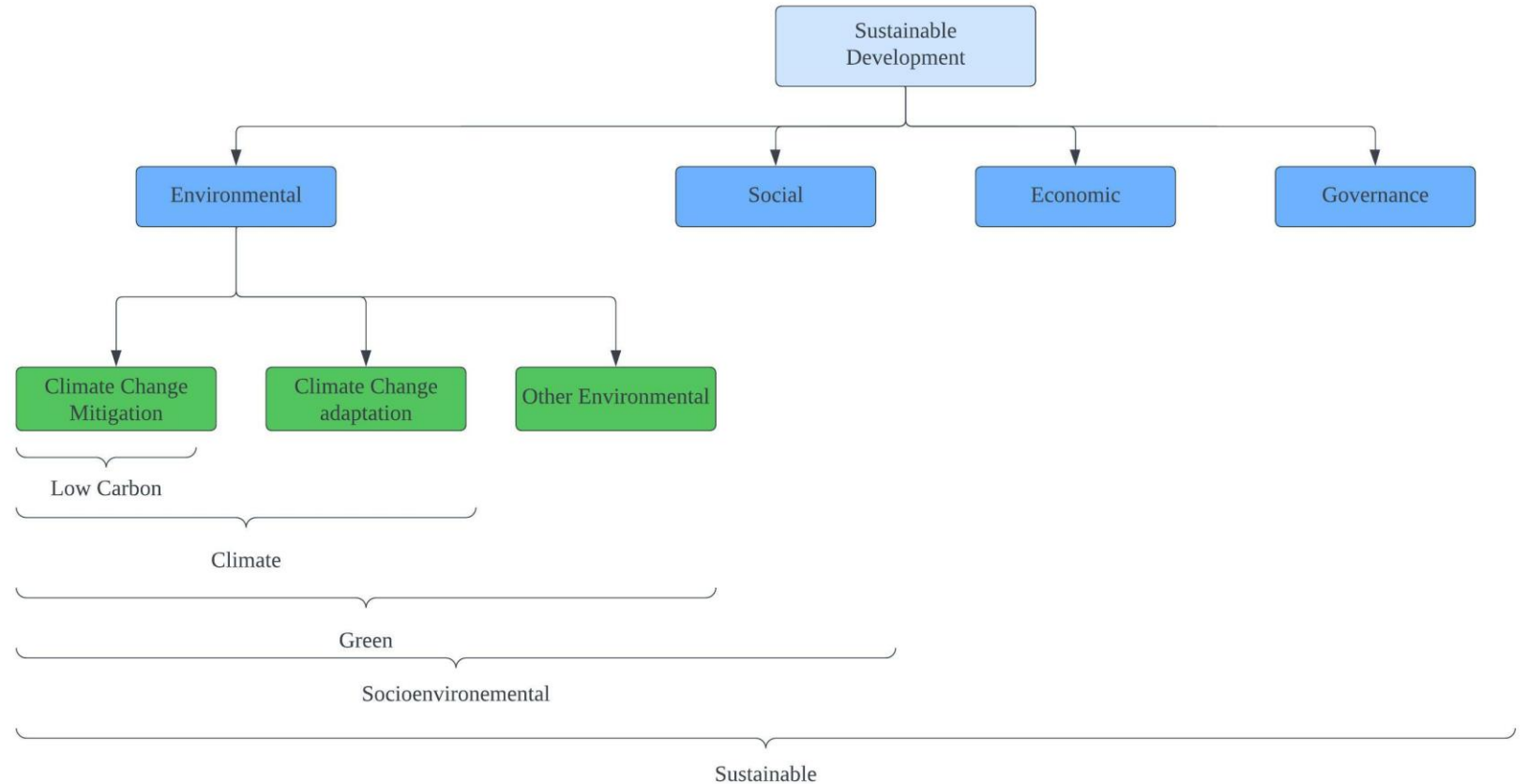
Positive, transparent and ethical interaction with all stakeholders; employees, regulators, government, contractors, suppliers, customers and local communities

Governance

Best in class governance practices and process underpinned by auditable and factual data and analysis

Defining Green

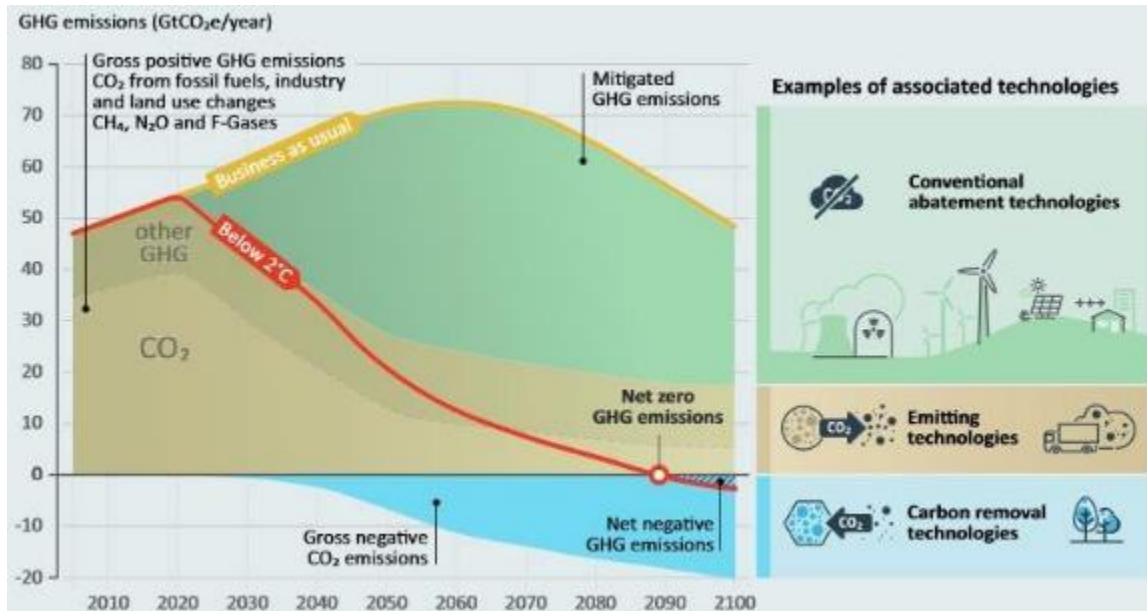
Green finance is any structured financial activity that's been created to ensure a better environmental outcome



Source: UNEP Green Projects

Role of Decarbonization

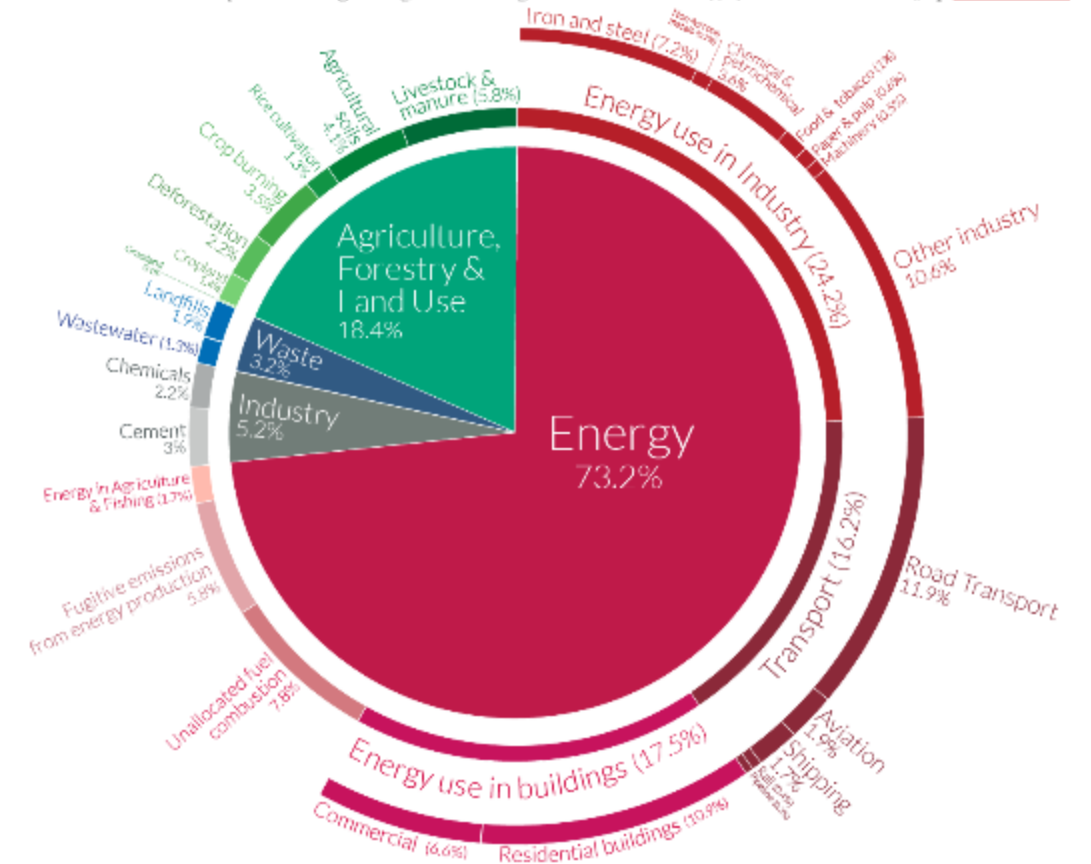
- Energy is largest contributor to GHG emissions at 73.2%
- The technologies going forward will be based on low carbon or zero carbon emissions



Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq.

Our World in Data

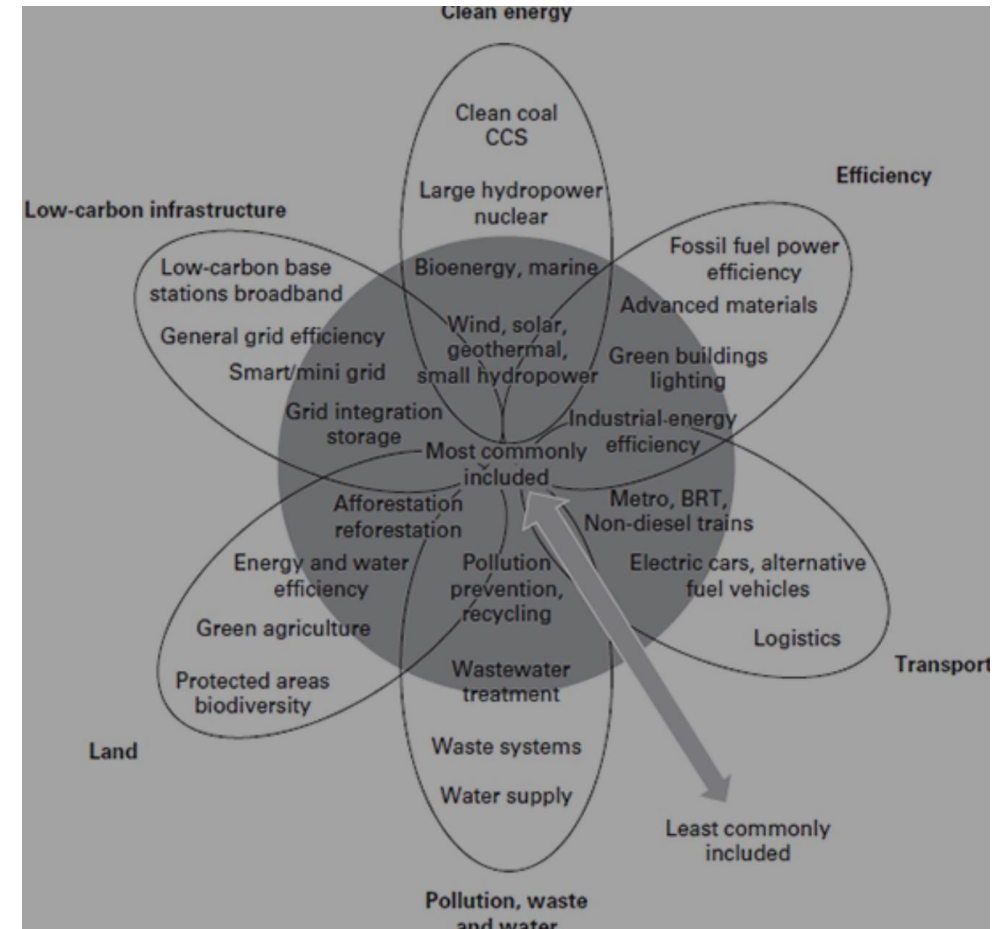


OurWorldinData.org Research and data to make progress against the world's largest problems.
Source: Climate Watch, the World Resources Institute (2020).
Licensed under CC BY by the author Hannah Ritchie (2020).

Green elements in Critical infrastructure

Which type of infrastructure qualifies for Green?

- Most definitions of green finance focus on its role in directing investment towards green sectors – those that protect or enhance the environment.
- Areas that are usually accepted as green with little controversy include renewable energy production, distribution and storage, energy efficiency in domestic and industrial buildings, green transport, recycling, pollution prevention, water conservation and forestation.
- Areas that are more contested or infrequently cited include carbon capture and storage (CCS), nuclear energy and fossil fuel efficiency.



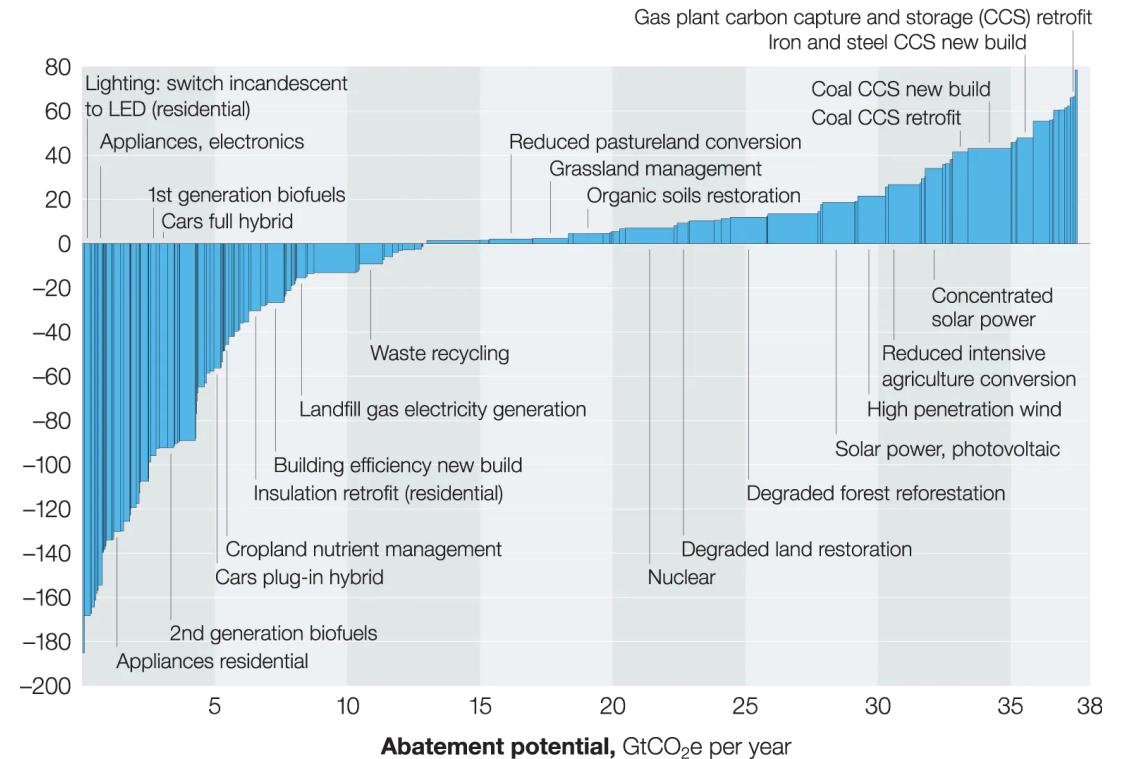
Source: UNEP Green Project Elements

Maximizing Green outcome

Maximizing Benefits while minimizing costs

- The opportunities can be best understood from a marginal abatement cost curve (MACC)
- A MACC presents the costs or savings expected from different opportunities, alongside the potential volume of emissions that could be reduced if implemented.
- The abatement cost curves can be used for option analysis to assess the relationship between total cost changes and CO₂ emission reductions to select the right alternative which provides the maximum green benefit for the least cost.

Abatement cost, € per tCO₂e

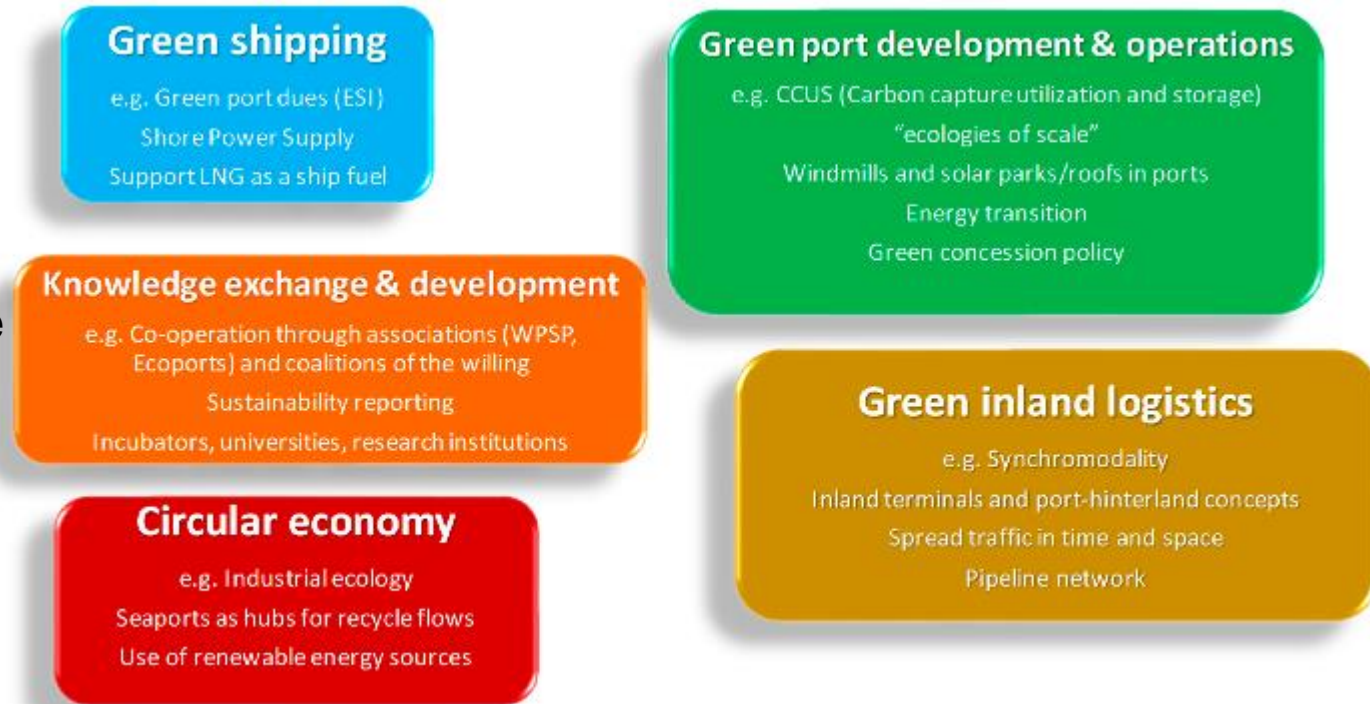


Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €80 per tCO₂e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.

McKinsey&Company | Source: McKinsey Global GHG Abatement Cost Curve v2.1

The case for Green Port - the larger picture

- Maritime ports will play an important role in the greening of supply chains
- Ports create concentrated cluster of economic activities where maritime shipping, trade and inland logistics confluence.
- From a green finance perspective there are five areas of critical infrastructure build-out that can maximize environmental outcome, i.e., green shipping; green port development and operations; green inland logistics; seaports and the circular economy and knowledge/digitization.
- Sectoral coupling with renewable energy sector such as offshore wind provide added advantage to Vietnam.



Source: UNEP Role of Seaports in Green Supply Chain;
Theo et al

Opportunity for Vietnam

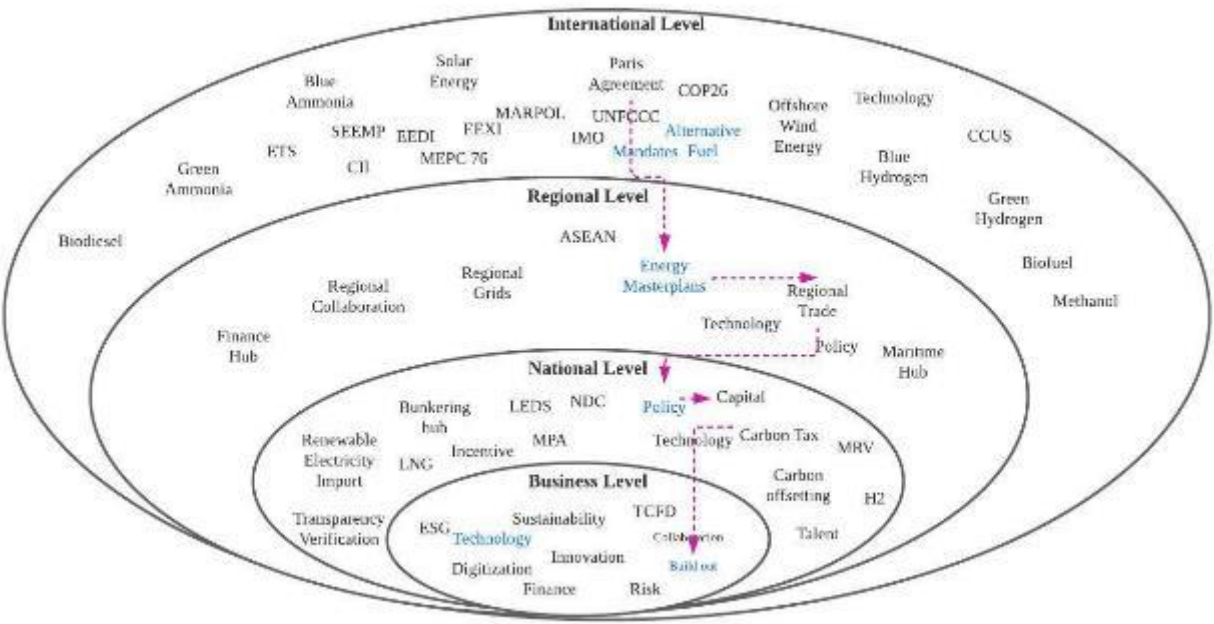


Vietnam Ports

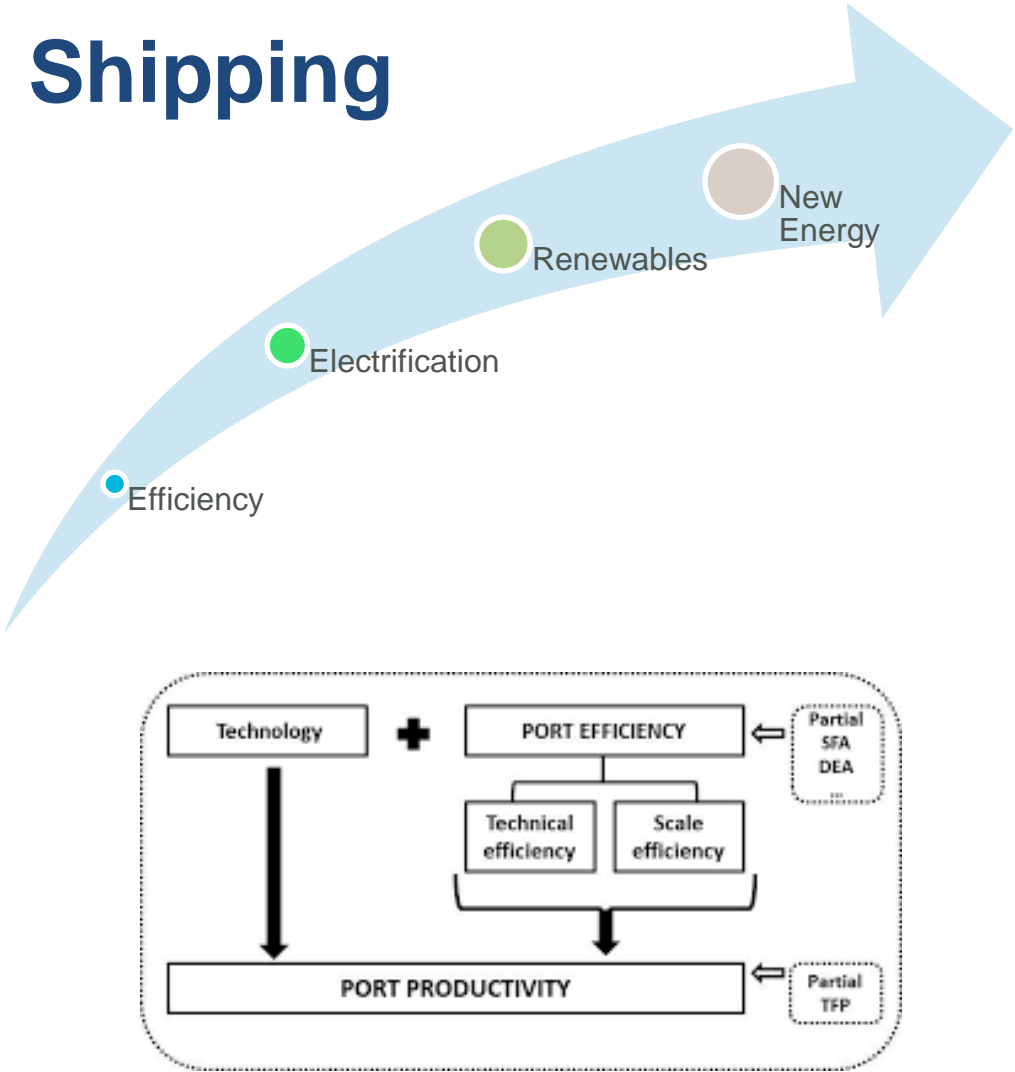
- | | |
|------------------------------|---------------------|
| 1.Quang Ninh port | 18.Binh Thuan port |
| 2.Hai Phong port | 19.Vung Tau port |
| 3.Thai Binh port | 20.Ho Chi Minh port |
| 4.Hai Thinh (Nam Dinh) port | 21.Dong Nai port |
| 5.Nghi Son port (Thanh Hoa) | 22.Binh Duong port |
| 6.Nghe An port | 23.Can Tho port |
| 7.Ha Tinh port | 24.Tien Giang port |
| 8.Quang Binh port | 25.Ben Tre port |
| 9.Quang Tri port | 26.Dong Thap port |
| 10.Thua Thien Hue port | 27.An Giang port |
| 11.Da Nang port | 28.Hau Giang port |
| 12.Ky Ha (Quang Nam) port | 29.Vinh Long port |
| 13.Dung Quat port | 30.Tra Vinh port |
| 14.Quy Nhon (Binh Dinh) port | 31.Soc Trang port |
| 15.Vung Ro (Phu Yen) port | 32.Bac Lieu port |
| 16.Khanh Hoa port | 33.Nam Can port |
| 17.Ca Na port (Ninh Thuan) | 34.Kien Giang port |

Challenges in Maritime Ports and Shipping

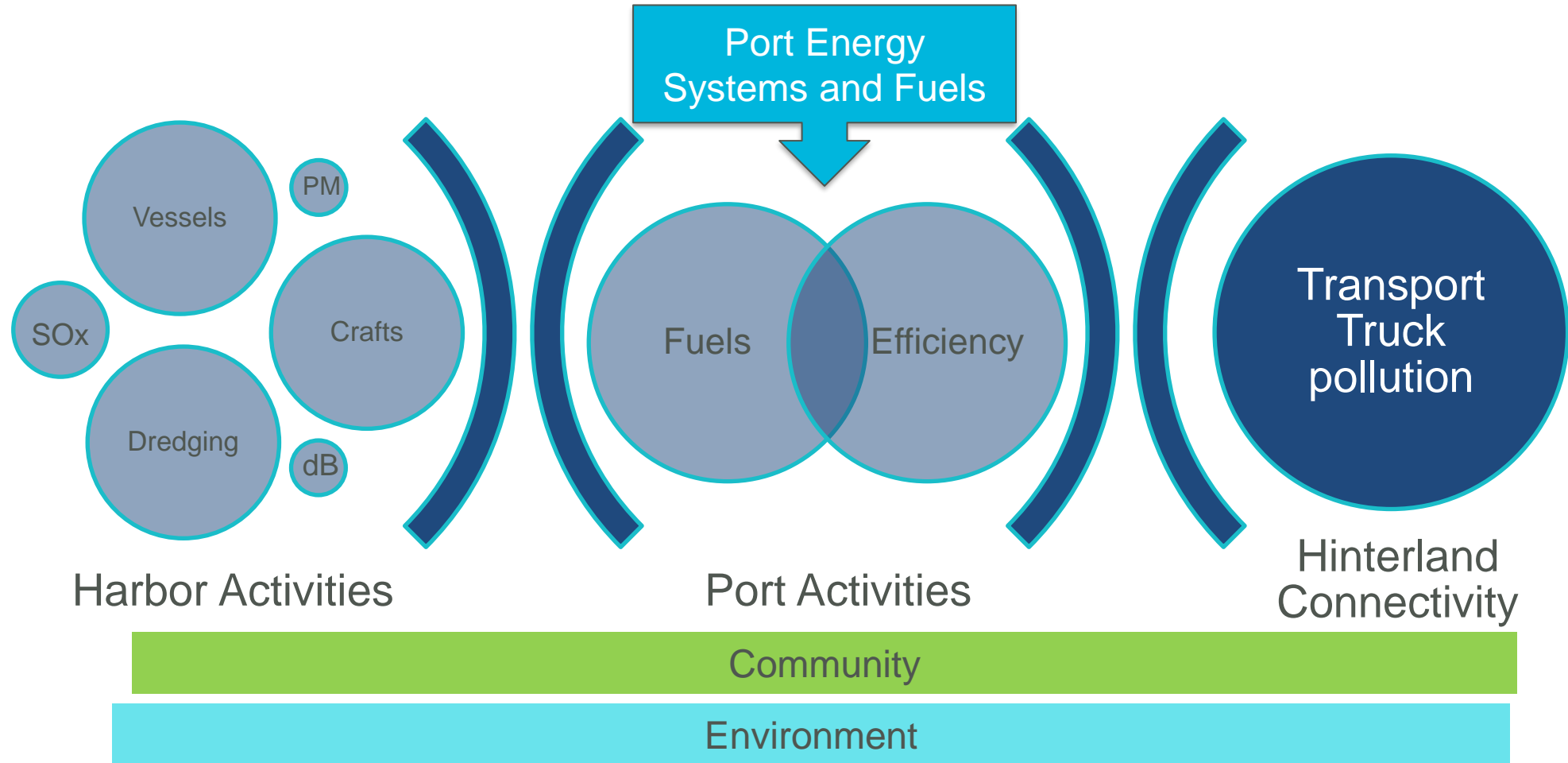
Reduce carbon foot print and at the same time improve shipping/port efficiency and competitiveness



Multi-level alignment (BMT)

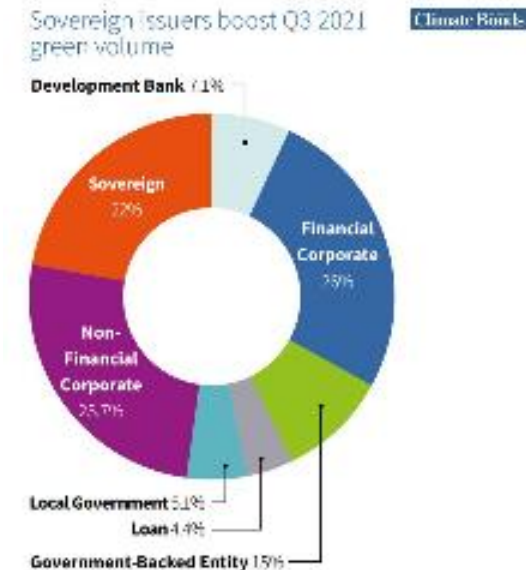
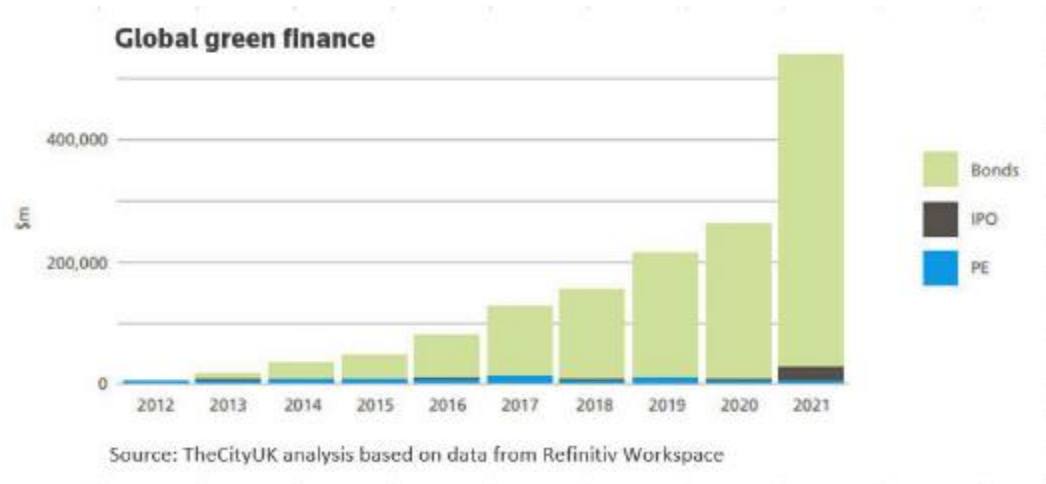


Targeted and Staged approach to Green Port



Green Finance Volumes and Options – Global Perspective

- Global borrowing by issuing green bonds and loans, and equity funding through initial public offerings targeting green projects, swelled to \$540.6 billion in 2021 from \$5.2 billion in 2012, according to the research.
- The data showed green bonds accounted for 93.1% of total green finance globally between 2012 and 2021. In 2021, global green bond issuance stood at \$511.5 billion, compared with \$2.3 billion in 2012.
- The value of green bonds traded could soon hit \$2.36 trillion.



Green Finance - Vietnam Perspective

- Vietnam need to have policy framework to accelerate green finance.
- The four preconditions lead to the growth of green-bond markets:
 - demand for the financing of projects with environmental benefits, such as renewable-energy and green infrastructure projects;
 - ensuring ESG finance products benefit banks and investors;
 - building a legal framework;
 - banks responding to the first three points proactively to creatively establish a market.
- While the first three preconditions already exist to a certain extent in Vietnam, banks have not yet fully created the capabilities to participate in the green-bond market.

Renewables finance has been the largest component of project finance in Vietnam in recent years.

Project finance in Vietnam by category, \$ billions

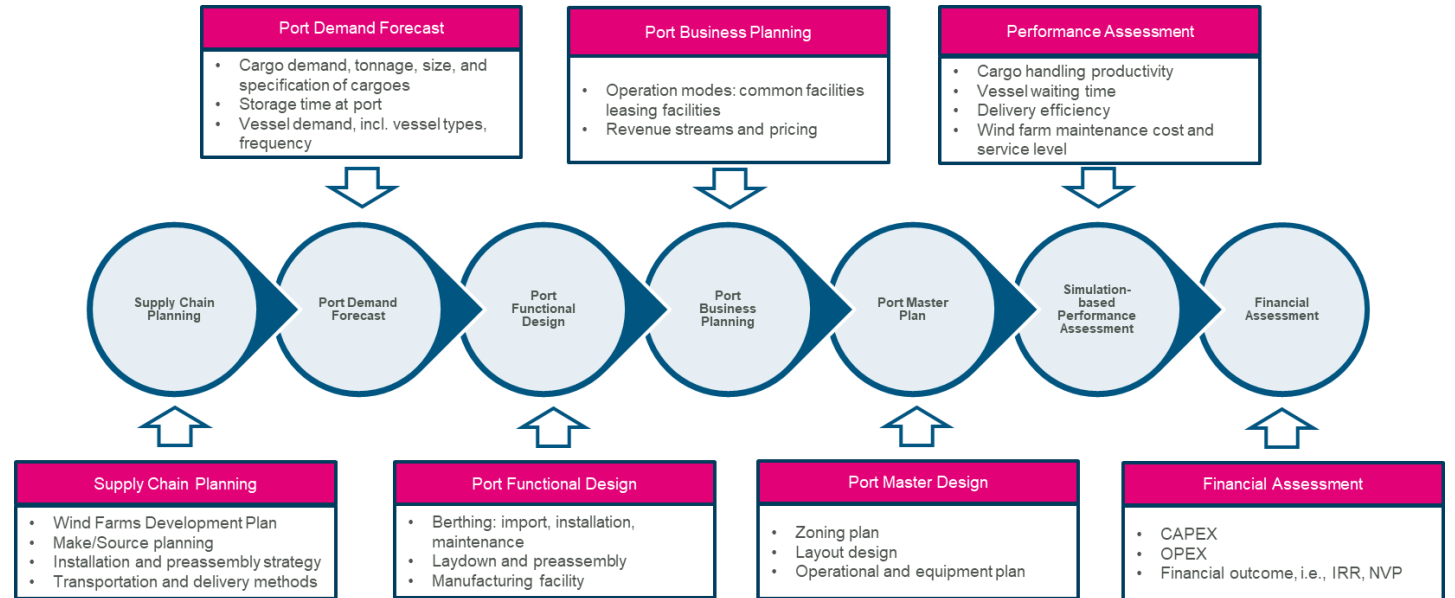


Source: UGlobal

McKinsey
& Company

Case: Port Readiness for Offshore Wind (Equity Financing)

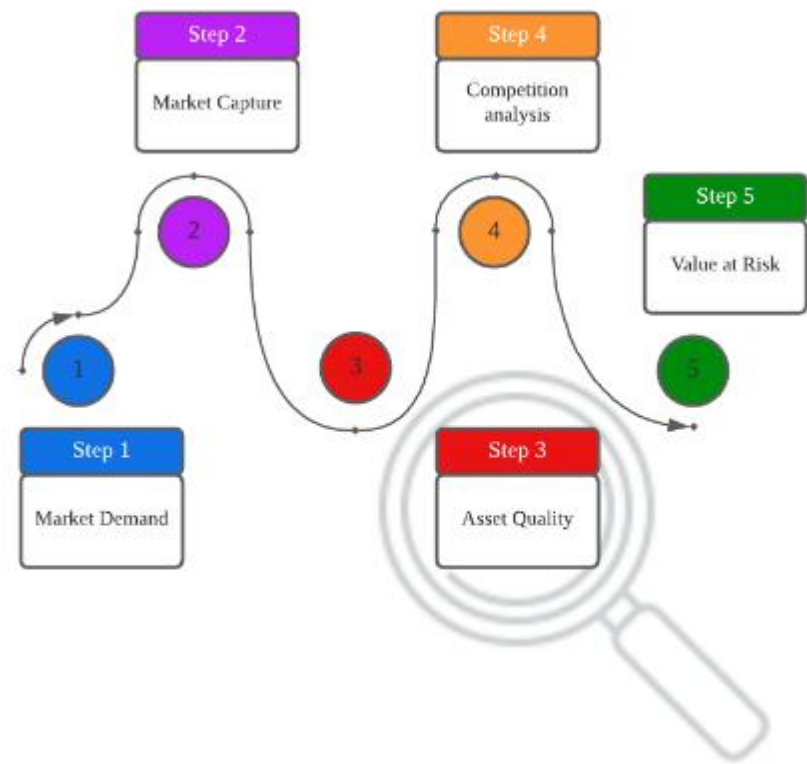
- Repurposing of existing port
- Assessment of wind farm base port to best service the offshore wind farm in the region, while optimizing the logistics efficiency and service level for wind farms.
- Port revenue models and revenue benchmarking



Green -> Zero Carbon



Case: Tug Fleet Valuation for (Lender Financing)



Green -> Low Carbon + Zero Carbon

BMT's tools and software capability

Investment Support

Maritime Shipping

Sectoral Knowledge

Technical Knowledge

Investment

- Market Demand
- Forecasting
- Players
- Competition Analysis
- Supply Chain
- Regulations

Shipping

- Vessel Design
- Vessel Inspection
- Charter Rates
- New Builds

Sectors

- Container
- LNG
- Petroleum
- Biofuel
- General Cargo

Technical

- Ports and Jetties
- Marine Operations
- Coastal protection
- Process Safety
- HSE
- Environmental
- Decarbonization
- Battery Storage

Tools

Econometric Models

BMT Deep

BMT Rembrandt

BMT TufLOW

Risk Assessment

Marine Traffic

Case: Tasmanian Ports Climate Strategy

- Decarbonisation strategy –
 - set targets
 - auditing of emissions
 - potential mitigation or offset measures to assess options to meet each target;
 - costing of options
- Physical Risk Assessment –
 - Across assets, operations, workforces, supply chains
 - Acute (extreme weather) impacts
 - Chronic impacts – sea level rise, heat, drought
- Will be used to inform **TCFD disclosure** and **sustainability strategy**

Green -> Climate Adaptation



Questions?



Thank you
