Final Report

Increasing Capital Investments in Ports – A Practical Toolkit

20 February 2025

C40 CITIES

ClearSeas

mtbs
maritime & transport business solutions

Maritime & Transport Business Solutions

address	Wijnhaven 3[E,]
	P.O. BOX 601
	3011 WG Rotterdam
	The Netherlands
telephone	+31 (0)10 286 59 40
e-mail	info@mtbs.nl
internet	www.mtbs.nl

document title	Increasing Capital Investments in Ports – A Practical Toolkit
document status	Final
date	20 February 2025
project name	Port Investment Toolkit
MTBS reference	MTBS reference 827260
client	C40 & Clear Seas
client reference	

Index

Glossary and List of Abbreviations

Term	Definition
AAPA	American Association of Port Authorities
AFIR	Alternative Fuels Infrastructure Regulation of the European Union
CBA	Cost-Benefit Analysis
CEF	Connecting Europe Facility
CFD	Contract for Difference
CN	Canadian National Railway Company
CO_2	Carbon Dioxide
CPA	Canadian Port Authority
EIB	European Investment Bank
ESG	Environment, Social, and Government
ESPO	European Sea Ports Organisation
ETS	Emissions Trading System in the European Union
EU	European Union
EUR	Euro (Official Currency of the Eurozone)
FDI	Foreign Direct Investment
Financing	Providing capital for investments.
Funding Gap	The negative difference between the net present value of the investment costs and the net present value of the operating profits. A negative difference implies the investment project is commercially not feasible.
GBER	General Block Exemption Regulation: regulation established by the EU to streamline and simplify the granting state aid process by exempting certain categories of aid from the requirement of prior notification and approval by the European Commission, if the aid category meets certain pre-specified criteria.
GHG	Greenhouse Gas
Grant	Public financial instrument without repayment.
IADB	Inter-American Development Bank
IAPH	International Association of Ports and Harbors
IFI	International Financial Institution: this includes institutions such as the World Bank, regional development banks which are subject to international law, and the International Monetary Fund.
IMO	International Maritime Organization
JDA	Joint Development Agreement
JV	Joint Venture

Term	Definition
LCO	Local Development Order
LNG	Liquefied Natural Gas
Loan	Financial instrument with repayment involved, can be either commercial or non-commercial (i.e. international financial institutions).
MEIPOR	Spanish methodology for economic impact assessment of ports.
MTBS	Maritime & Transport Business Solutions
OPS	Onshore Power Supply
PA	Port Authority
PDC	Port Development Company
PDR	Permitted Development Rights
PMB	Port Managing Body: this is the general term that encompasses both public sector embedded port authorities (PAs) and state- or privately-owned port development companies (PDCs).
PO-PDC	Private Port Development Company
PPP	Public Private Partnerships: a cooperative agreement between a public entity and a private entity to develop, operate, or manage (port) infrastructure and services. PPPs are typically formalised through a legal agreement, such as concession contracts.
Public Funding	Grants and non-commercial loans.
RVO	The Netherlands Enterprise Agency (Rijksdienst voor Ondernemend Nederland)
SDE++	Subsidy Stimulation Sustainable Energy Production and Climate Transition of the Dutch government.
SECA	Sulphur Emission Control Area
SOE	State-Owned Enterprise
SO-PDC	Corporatised State-Owned Port Development Company
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Transport Network
TEU	Twenty-Foot Equivalent Unit
UAE	United Arab Emirates
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
US	United States
USD	United States Dollar (Official Currency of the United States)
WB	World Bank

Page intentionally left blank.

1 Introduction

Port authorities across the world face challenges in investing in infrastructure to keep up with the evolving demands of global trade. To improve the efficiency, sustainability, reliability, safety and resilience of maritime supply chains, the sector needs to invest in advanced technologies, infrastructures, and sustainability measures – initiatives that demand substantial capital.

This report presents a Port Investment Toolkit that aims to be helpful for governments seeking to develop policy frameworks that enable such investments, as well as port managing bodies aiming to make investments in ports. The report is focused on advancing the understanding of the most suitable policy frameworks, financing instruments and organisational models to meet the financing challenges.

This report differentiates between investments related to the roles of ports as *transport nodes* and their role as *energy hubs*. Ports often have developed into large logistics-industrial ecosystems, which include activities such as fuel and steel production, large scale warehousing and storage of goods. The development challenges of many ports thus go beyond accommodating freight flows transport and include attracting and enhancing industrial activities in ports.

Many port investments included in the report are driven by the changing fuel landscape. The 2023 IMO Greenhouse Gas (GHG) Strategy aims to phase out GHG emissions related to shipping as soon as possible. The costs of the implementation of this decarbonisation strategy are estimated to amount to USD 1-2 trillion, with a large share for developing countries. On top of these investments to decarbonise maritime transport, ports will play a large role in the overall energy transition, as hubs of production, conversion, storage and distribution of clean energy. In view of this, total private and public investment in ports might reach around EUR 2 trillion over the next 10 years[1].

This report builds on previous studies, including the ESPO (2024) analysis of investments and associated financing challenges for European ports, the World Bank's Port Reform Toolkit discussion on port financing, and a study published by IAPH on the investment needs of developing countries for port decarbonisation and climate adaptation (IAPH & MTBS, 2024)[2]. The toolkit is developed based on lessons learned from specific cases and best practices.

After this introductory chapter, Chapter 2 outlines the conceptual approach. Chapter 3 demonstrates the best practices for financing investments in port development. Chapter 4 presents the practical port investment toolkit. Appendix I provides detailed case studies. Appendix II includes the summaries of policy frameworks for selected countries. Lastly, Appendix III presents the list of interviewees.

[1] A total of around EUR 46 trillion investments is estimated to be needed in the next 10 years to decarbonise in line with the 1.5C pathway. Ports may be well positioned to absorb a sizable share (say 3 to 4%) of that.

[2] The investments of port managing bodies (PMBs) are generally linked to the well-established Sustainable Development Goals, some port managing bodies, such as Valencia, Rotterdam and Tanger-Med explicitly refer to these. See also Jansen (2023).

2 Investment Challenges in Ports

Developing a port investment toolkit is challenging, as it must account for the vast diversity of ports, including differences in organisational 'port models', types of investments, and the effects of such investments. This section discusses this diversity and the challenges for financing port investments.

2.1 Investment Roles in Different Types of Ports

The central organisation in port development is termed the 'port managing body' (PMB) in this report[3]. Ports are identified and organised according to two axes: the port's governance model and the port's business model.

Three distinct governance models are described:

- A private port development company (PO-PDC);
- A corporatised state-owned port development company (SO-PDC);
- A public sector embedded port authority (PA).

The core difference between the SO-PDC and the PA is that the PA is embedded in the public sector (which is the case in countries such as the US and Spain), while the SO-PDC is a corporate entity with real autonomy and consequently a very limited involvement of civil servants and or politicians in decision-making (countries with this model include the Netherlands and Chile). Most ports around the world can be classified in these three categories[4], even though there are some 'grey areas'[5].

The second axis of the port typology relates to the business model of the PMB. This business model can be either a landlord or an integrator model:

- Landlord model: the port managing body owns the land and core infrastructure (e.g. quays) but leases it to third parties, which manage and operate the terminals and provide port services. These third parties invest in and operate the terminals, warehouses or industrial plants in the port based on concession or land lease contracts with the port managing body.
- Integrator model: the port managing body invests in and operates terminal and warehousing facilities 'in-house'. The port managing body is fully responsible for the terminal(s) and the corresponding activities. Revenue is directly generated by the port services rather than through leasing agreements with third parties.

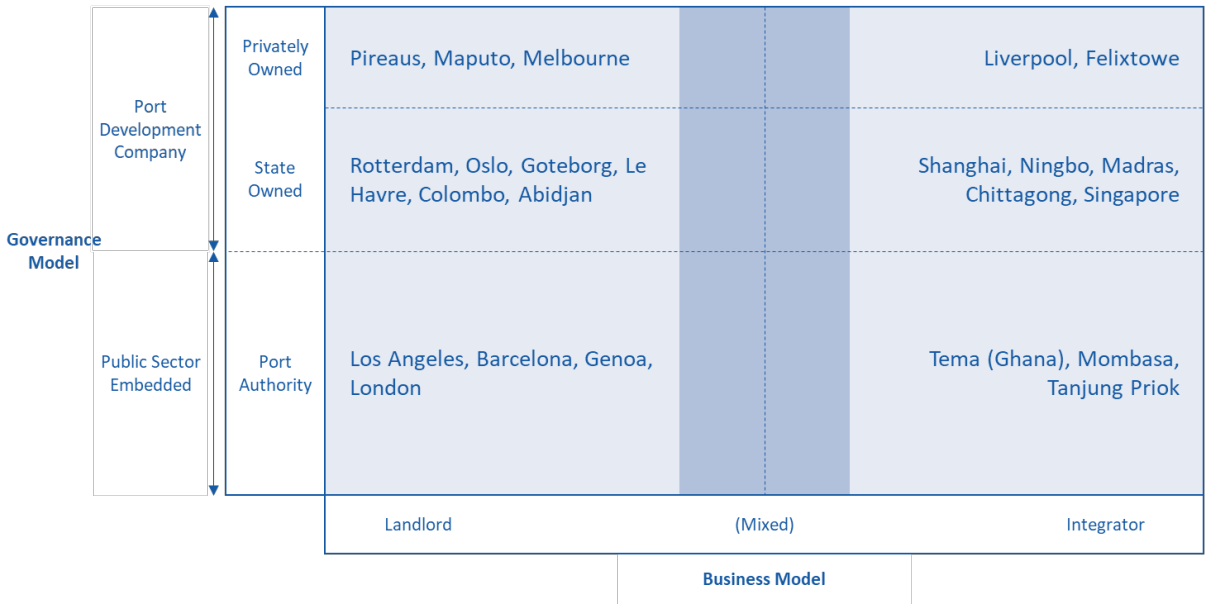
While port managing bodies can be classified in one of these two models, some of them operate with 'mixed' business models, retaining some terminal operations in-house while working with third parties in other cases. Figure 2-1 shows the resulting typology, with examples of ports for each of the stylised port types.

[3] This is in line with previous studies, for instance ESPO (2024).

[4] In a small minority of cases, ports have evolved in a 'fragmented public sector' model, in which there is no single entity with a responsibility for port development. Instead, private terminal operators have invested in specific terminals (either on private land or based on a concession agreement with a government), with limited or no investment in common infrastructure. Cartagena and Hong Kong are examples of this exceptional approach.

[5] More specifically: some ports are partly privately and partly publicly owned, in some cases with a part of the shares publicly listed. In those cases, the ports are classified based on who owns the majority of shares. In addition, some ports operate in a corporatised setting but do not have 'de facto autonomy', due to direct political influence. These ports are treated as public sector embedded entities.

Figure 2-1 Port Typology of Port Managing Bodies



This distinction in 'port models' is relevant as the actor or set of actors best positioned for a specific investment depends on the port type. For instance, in a landlord port, terminal equipment investments are the responsibility of a third party that operates a terminal, whereas, in integrator ports, the port managing body is responsible for these investments.

On top of this distinction, some PMBs are active nationally (i.e. a centralised model, such as in Kenya, South Africa and Sri Lanka), while in other countries various PMBs are active and compete with each other (such as in the Netherlands, the US, Brazil and India). Finally, PMBs are embedded in the political systems of the country in which they operate, which can range from autocratic to democratic. These national political systems also deeply influence policy frameworks for ports investments.

2.2 A Distinction Between Different Types of Investments

The financing challenges of projects differ across types of investments. For instance, unless onshore power supply (OPS) is mandatory for port users, investments in OPS are hard to finance through direct user fees because using OPS is substantially more expensive than using ship engines. For such investments, a *funding gap* often needs to be bridged to make port investment projects financially feasible. This contrasts with investments in new terminal equipment, which are generally covered from users through fees for the terminal services they receive. Building on established investment typologies[6], Table 2-1 shows the types of investments included in this toolkit[7].

[6] Including ESPO's report on financing challenges of Europe's ports from 2024 and MTBS's study on Investment Requirements of Developing Countries for Port Decarbonisation and Adaptation to Climate Change for IAPH.

[7] This list of investments is not complete. For instance, digital services aimed at improved port efficiency are not included as these often are not 'investments' in an accounting sense, but 'expenditure' in the sense that they do not lead to assets that are depreciated over time. Investments in infrastructure not meant for commercial use and therefore generally paid for by the State, such as coastal protection, light houses, 'and maritime access', are also not included, since in most cases national government is responsible.

Table 2-1 Types of Investments in the Toolkit

Investments for the Port as Transport Node	Investments for the Port as Energy Hub
• New sites for terminals • Terminal equipment and 'superstructure' like warehouses • Landside port infrastructure (in the port area)[8] • Onshore power supply and electricity infrastructure	• Land for port industries such as fuel production • Production of electricity (e.g. solar, wind) and fuels • Pipelines for fuels, steam, CO_2, or heat

2.3 Organisational Models for Investments

PMBs can deploy different organisational models to make investments. Three frequently used options are:

- On its own balance sheet: the PMB finances investments with internal sources and directly owns resulting assets. For PMBs with a landlord business model, this model is used for making investments in assets (e.g. quay-walls, jetties), some of which are leased to private tenants.
- Off its balance sheet: a separate subsidiary is created to handle the investment, usually funded through project financing. The subsidiary ensures clear financial accountability and focused management.
- A joint venture (JV) between the PMB and one or more partners, which may be public sector or private sector partners: the PMB generally uses such a model as a tool to utilise capabilities of partners. Reducing the financial burden generally is not an important reason for developing JVs.

Table 2-2 Organisational Models per Type of Investment

Investment Type	Approach(es) in a Landlord Port	Approach in an Integrator Port
New sites for terminals	A PMB investment (with commercial risk) or a partnership between PMB and an operator.	PMB investment and commercial risk.
Terminal equipment and 'superstructure' like warehouses	Investment by third party. In some cases: investment by PMB based on lease contract with the third party.	PMB investment and commercial risk, potentially in a JV with a private sector partner.
Landside port infrastructure (in the port area)	PMB investment and initiative, potentially in JV with a state-owned rail infrastructure company.	In some cases, PMB investment and initiative, in others government or rail infra company initiative.
Onshore power supply and electricity infrastructure	Partnership between PMB, terminal operator and electricity provider.	Partnership between PMB and electricity provider.
Land for port industries such as fuel production	PMB investment and commercial risk.	PMB investment and commercial risk.
Production of electricity (e.g. solar, wind) and fuels	Investments are generally done by a third party tenant, potentially in a partnership structure.	A PMB investment (with commercial risk) or a partnership between PMB and an energy company.
Pipelines for fuels, steam, CO_2, or heat	A PMB investment or a joint investment of PMB and users.	A PMB investment or a joint investment of PMB and users.

[8] Landside infrastructure outside the port area generally is the responsibility of national or regional government; with limited involvement of the PMB.

Investments that are often undertaken in a joint venture organisational model include OPS (often with a terminal operator and/or an energy company) and pipelines (often with a dedicated pipeline operator and/or pipeline users). PMBs with an integrator model increasingly use JVs with dedicated terminal operators.

Case Study – Porthos

The Porthos project involves the development of an underground CO_2 facility in the North Sea to store CO_2 from the industry in the Port of Rotterdam in the Netherlands. This initiative is a joint venture set up by the Port of Rotterdam Authority, Gasunie (a Dutch energy network company), and EBN (a Dutch public state-owned energy company). The joint venture model leverages the expertise of the participating organisations:

- Port of Rotterdam Authority: knowledge on the local situation and market.
- Gasunie: specialised in gas infrastructure and transport systems.
- EBN: expertise on subsurface geology and offshore infrastructure, adding expertise to the storing of CO_2 safely underground.

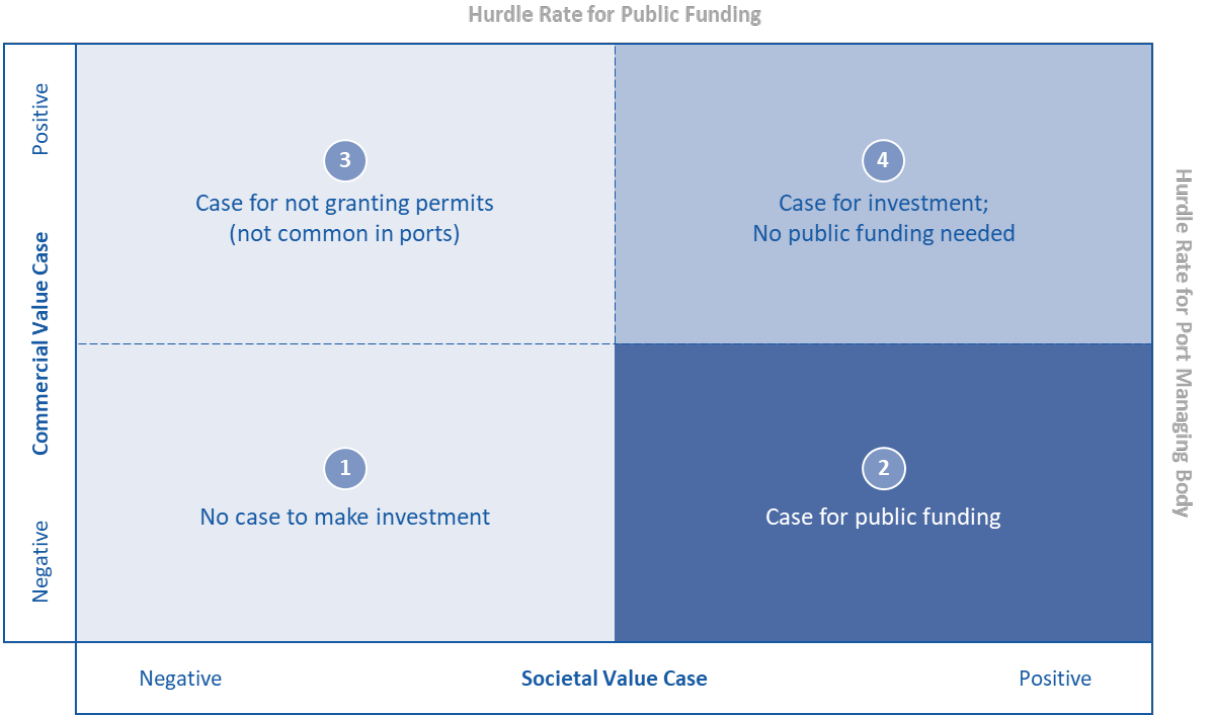
Source: PorthosCO_2

2.4 The Business Case and 'Value Case' of the Investments

Investments create value for port users, which can be captured through fees and therefore included in a business case, referred to as the *commercial value*. Investments can also create value for society, which cannot be captured from users. This *societal value* is an external benefit and provides a rationale for public funding. Society at large (internationally, national or regionally) is better off when public funding is provided for projects that have a positive 'value case' but cannot be undertaken on a commercial basis. Based on the commercial value case and the societal value case, projects can be classified in four types of investment projects as in Figure 2-2[9].

[9] This framework is also included in ESPO (2024) and De Langen (2020).

Figure 2-2 Types of Investment Projects



The commercial value case for the port managing body may be negative, while the societal value case is positive. For such types of investments (type 2 projects in the figure above), port managing bodies are faced with a 'funding gap'. Many investments in port development are 'type 2' projects, with an imbalance between the commercial value and societal value case, which explains the widespread public funding for investment projects in ports[10].

Understanding the societal value of investments, often measured through cost-benefit analysis (CBA), is key to public funding decisions. While each case requires tailored analysis, Table 2-3 provides an understanding of the commercial and societal value for each of the identified investment types.

Table 2-3 Value Creation for Each of the Investment Types

Investment Type	Revenue Stream Port Managing Body	Commercial Value	Societal Value
New sites for terminals	Land lease / concession revenues	Land to provide terminal services	More competitive trade sectors
Terminal equipment and 'superstructure' like warehouses	Only relevant in integrator model: terminal handling rates	Attractive terminal services for shipping lines and shippers	Carbon emission and noise reductions in case of greening or modernisation of facilities

[10] As reported in a study commissioned by IAPH, on the challenges for green port investments: 'Throughout the study, we have seen that often investments are not made due to low budgets, stringent regulations, lack of a national strategy or lack of available space. The most prominent reason for placing initiatives in stand-by is market uncertainty and the high prices of green alternatives.'.

Investment Type	Revenue Stream Port Managing Body	Commercial Value	Societal Value
Landside port infrastructure	Often no direct revenue stream, in some cases tolls or other infrastructure charges	Faster, cheaper and more reliable inland transport	Reduction of congestion and emissions
Onshore power supply and electricity infrastructure	Charges for electricity use	More environmentally friendly alternative to engine generated electricity	Lower emissions (CO_2, small particles and others)
Land for port industries such as clean fuel production	Land lease / concession revenues	Land for industrial activities	Attracting (foreign direct) investment; contributing to the transition to green fuels
Production of green electricity (solar, wind) and fuels	Rates for electricity	Availability of sustainable energy	Carbon emission reductions
Pipelines for sustainable fuels, steam, CO_2, or heat	Charges for pipeline use	Reduced transport costs; opportunities for re-using heat and cold	Carbon emission reductions

Quantifying the societal value case in a cost-benefit analysis is complex, but best practices have been developed. For instance, 'shadow prices' of emissions have been calculated/estimated in various studies[11]; the same applies to the external costs and benefits of investments in transport infrastructure[12].

2.5 Mechanisms for Financing Capital Investments in Ports

Regulatory mechanisms can reduce the funding gap for port infrastructure investments by making certain facilities (such as waste reception facilities and OPS) mandatory or by aligning the 'business case' with the 'societal value case' through pricing externalities[13]. In addition, governments often develop funding instruments to close funding gaps. PMBs can use various sources to finance capital investments. Table 2-4 provides an overview of the most common financing sources, both public funding instruments[14] and commercial financial market instruments. The example cases refer to the case studies included in Appendix I.

Table 2-4 Common Financing Sources, Including Public Funding (in Grey)

Financing Sources	Description	Example Case(s)
Local/Regional Grants	Financial support provided by local or regional (public) bodies for projects with societal value. Grants do not require repayment.	Port Rail Transformation

[11] See for instance a World Bank report: http://documents.worldbank.org/curated/en/099553203142424068/IDU1c94753bb1819e14c781831215580060675b1

[12] See for instance a European Commission publication: https://data.europa.eu/doi/10.2832/51388

[13] The most widely used regulation of this type is an emission trading system (ETS). This reduces the funding gap for investments related to green energy and green production technologies.

[14] There is a variety of additional mechanisms including Contracts for Difference (CFD), guaranteed offtake contracts or other guarantees. CFDs guarantee a fixed price per unit of electricity generated, ensuring investors achieve a minimum return regardless of market fluctuations. CFDs secure the offtake of the generated electricity, enhancing the financial viability of energy projects.

Financing Sources	Description	Example Case(s)
National Grants	Financial support provided by national (public) bodies for projects with societal value. Grants do not require repayment.	Porthos, Shore Power Cruise, Burnaby Rail Corridor, Centerm Expansion and South Shore Access, Cargo Handling Equipment Modernisation Program
International Grants	Financial support provided by supranational (public) bodies, such as the European Commission, for projects with societal value. Grants do not require repayment.	Porthos, Sea Lock Ijmuiden, CO_2 Terminal Esjberg, NEXIGEN, Zagreb Deep Sea Container Terminal
International Financial Institution (IFI) Loan	Loans provided by IFIs generally have lower interest rates and longer payback periods than loans from commercial banks to support development-focused projects and infrastructure investments. IFI's generally work with an 'additionality principle': they only provide loans in cases where commercial banks are not willing to do so.	Gas Access to Europe Terminal, Sea Lock Ijmuiden, Zagreb Deep Sea Container Terminal, New Container Terminal
Commercial Bank Loan	Commercial banks offer loans at market interest rates, which must be repaid over time. These loans often require security, like property or project assets, to guarantee repayment. Following sustainable banking initiatives, loans often have a slightly more attractive interest rate for sustainable investments.	Gas Access to Europe Terminal
Internal Financing	Utilising the company's own financial resources, such as equity, retained earnings, reserves, or balance sheet assets.	Sea Lock Ijmuiden, Circulands, CO_2 Terminal Esbjerg, Shore Power Cruise, NEXIGEN, Zagreb Deep Sea Container Terminal, Burnaby Rail Corridor, Centerm Expansion and South Shore Access, Cargo Handling Equipment Modernisation Program, Port Expansion, New Container Terminal, Deep Water Berths, Port Rail Transformation

2.6 Assessing the Funding Gap

A major challenge for governments that develop funding instruments to make sure that 'type 2' investments will take place is accurate assessments of societal benefits. It has been clearly demonstrated that there is a tendency to overestimate such societal benefits[15]. Specifically in relation to ports, the EU Court of Auditors found that public funding often did not generate the expected benefits, in some cases because it was underutilised and in other cases because it was not put to use at all[16]. Thus, an analysis of risks can make an important contribution to selecting the right investment projects. Table 2-5 shows important risks for each of the identified investment types as well as instruments to mitigate risks of ineffective use of public funding.

[15] See Flyvberg,(2011).

[16] The projects included in this study were generally funded with regional cohesion funds, which were allocated by regional governments, without scrutiny at the EU level. The more recent EU funding mechanism (CEF, detailed elsewhere) has better mechanisms in place to scrutinise investment projects.

Table 2-5 Risks per Investment Type

Investment Type	Main Risks for not Generating Expected Benefits	Instruments to Mitigate Risks of Inefficient Use of Public Funding
New sites for terminals	Commercial risk, i.e. insufficient interest to lease land to invest in a terminal	Funding conditional on a 'launching customer' that has committed to investing in the terminal
Terminal equipment and 'superstructure' like warehouses	Commercial risk, i.e. insufficient interest from users	Only public funding for replacing/greening existing assets
Landside port infrastructure	In case of 'intermodal facilities' (rail and inland waterways): lower volumes than forecasted	Funding conditional to commitments of main users
Onshore Power Supply and electricity infrastructure	Market risk, i.e. lower volumes of ships using OPS	Obligatory use of OPS in specific conditions
Land for port industries such as fuel production	Commercial risk, i.e. insufficient interest to lease land to invest in clean fuel production	Funding conditional on a 'launching customer' that has committed to investing
Production of electricity (solar, wind) and fuels	Production cost gap with alternatives larger than foreseen, insufficient demand	'Contract for differences' type of public funding
Pipelines for fuels, steam, CO_2, or heat	Market risk, i.e. lower utilisation than expected	Funding conditional to commitments of main users

The overview of the types of port managing bodies, investments and associated risks, benefits and funding challenges and instruments provided above, demonstrates that unlocking investments in ports is challenging and requires concerted efforts by policymakers, PMBs, and other partners. The next chapter discusses good practices for developing effective policy frameworks and good practices for enhancing the investment capacity of port managing bodies.

3 Good Practices for Unlocking Investments in Port Development

This chapter outlines good practices for unlocking investments in port development. Two types of good practices have been identified:

- Good practices in developing effective policy frameworks, primarily relevant for policymakers.
- Good practices enhancing the investment capacity of port managing bodies, primarily relevant for managers of port managing bodies.

The good practices have been developed based on the case studies of port investments, the analysis of policy frameworks and interviews with experts from various stakeholders, including port authorities and (development) banks.

3.1 An Overview of Policy Frameworks for Port Investments

The *policy framework* to encourage port investments consists of all public funding and regulatory instruments used to reduce the funding gap[17]. The policy framework for PMBs consists of public funding and regulatory instruments at the local/regional, national, and international level. When designing a policy framework, governments generally apply a 'subsidiarity principle', i.e. policies are developed at the lowest appropriate spatial scale. This implies policies to tackle global challenges (like climate change) are best developed by global institutions (i.e., the United Nations), while local challenges (like metropolitan transport systems) are addressed mostly through local/regional policies. In practice, challenges are often relevant at various levels and require a coordinated policy framework across different levels. The toolkit includes a matrix with three policy-making layers and two policy instruments that can be used to develop a policy framework for port investments, as depicted in Figure 3-1.

Figure 3-1 Policy Frameworks and Policy-Making Layers

	Local/Regional	National	International
Regulatory Instruments			
Funding Instruments			

International organisations, countries and regions develop tailored policies for specific investments, such as OPS. This section describes policy frameworks for two specific investment types in a specific country: sites for port terminals in the United Kingdom (UK) and OPS facilities in the Netherlands. Key characteristics of policies for more investment types in a larger set of countries are summarised in Appendix II.

[17] The instruments often are interrelated. For instance, a GHG levy is an important mechanism to reduce GHG emissions in shipping. The primary effect of the levy is to drive emission reductions. In addition, it generates resources, which can be deployed, for instance for a grant instrument for green fuel production investments.

Table 3-1 Detailed Policy Framework for Investments in New Sites for Terminals; the UK

	International	National	Local/Regional
Regulatory instruments	No relevant international regulation.	Legislation grants port developers 'permitted development rights' (PDR) without planning approval and allows central government to issue a Development Consent Order, which is similar to an LCO.	A local government can grant a 'local development order' (LCO) for an area. This reduces risks, as automatic consent is granted for specific investments in port development.
Financial instruments	No relevant international financial instruments.	No structural public funding mechanism for port investments, a special grant scheme to help UK ports invest in necessary facilities following the 'Brexit', the freeport initiative provided financial resources to regional public entities.	UK's 'freeports' initiative provided funding to regional public entities to provide (relatively minor) grants for port investment projects.

In the UK, private port companies take the initiative to develop port expansion plans. There are no structural national public funding mechanisms for investment in new terminal sites. Regional governments can provide minor funding on a case-by-case basis, partly under the 'freeport' policy initiative[18]. This policy framework has worked well; there is no structural ship congestion in the UK ports and productivity and ship time spent in ports is comparable to other advanced economies[19].

Table 3-2 shows the policy framework for OPS in ports in the Netherlands.

Table 3-2 Detailed Policy Framework for Investments in OPS; the Netherlands

	International	National	Local/Regional
Regulatory instruments	EU regulation (Alternative Fuel Infrastructure Regulation-AFIR) obliges all ships in two segments (cruise and container) to use OPS. AFIR also obliges EU core ports to offer OPS.	The Netherlands has implemented the EU AFIR regulation in national law.	The PDC of Amsterdam 'de facto' makes use of OPS obligatory for cruise ships through prioritising entry of OPS ready ships and making OPS obligatory for those.
Financial instruments	Grant instrument (as part of CEF) to promote OPS investments.	Grant instrument to promote OPS investments in seaports, with a maximum of 35% of total investment.	Some municipal governments (including the municipality of Rotterdam) have provided public funding to develop OPS facilities.

In the Netherlands, the PDCs develop OPS facilities with partners. Revenues from OPS are limited. The mark-up between OPS electricity prices and general electricity prices is not sufficient for viable investments in OPS (mainly because of their initial low utilisation). Thus, both the EU, the Dutch and local governments provide grants for investments in OPS, based on the substantial positive effects of OPS on both global emissions and local air quality. The PDCs frequently seek and receive public funding, at local, national and EU levels. Due to EU regulation, which the EU member countries translate in national legislation, the use of OPS is

[18] Two characteristics of the UK explain why this approach works well in this context. First, there is a strong 'decoupling' of economic growth and maritime freight transport; the total volumes handled by UK ports have declined >25% from their peak in the late 1990s, while the UK economy has grown. Therefore, there has been no need for major port expansion schemes involving new breakwaters and so forth. Second, given that the UK is an island, the competition with ports outside the UK is limited, and there is no 'policy competition' in the form of public investments in ports to spur economic development.

[19] See for a World Bank productivity metric in the container segment Open Knowledge Repository, and for UNCTAD data on time spend in ports PortCalls

mandatory from 2030 onwards, if all conditions are met. Dutch ports have developed instruments to make sure OPS is used by OPS ready vessels as soon as it is available. Because of this policy framework, the five large Dutch ports that are identified as 'of national interest', have OPS facilities either in operation or under development.

These two descriptions show that policy frameworks have a regulatory dimension as well as public funding instruments to enable investments with a positive value case but without a positive business case. The policy framework deeply impacts the types of investments PMBs can make. The next paragraph provides good practices on policy frameworks for investments in port development.

3.2 Good Practices on Policy Frameworks for Investments in Port Development

This paragraph presents thirteen 'good practices' for developing a policy framework for investments in port development. These good practices are based on the case studies (Appendix I), the analysis of the policy frameworks (Appendix II), and expert interviews (see Appendix III for a list of interviewees). The good practices cover four different components: policy objectives, regulations, public funding mechanisms and governance of the PMBs (see Figure 3-2).

Figure 3-2 Overview of Good Practices on Policy Frameworks for Investments in Port Development

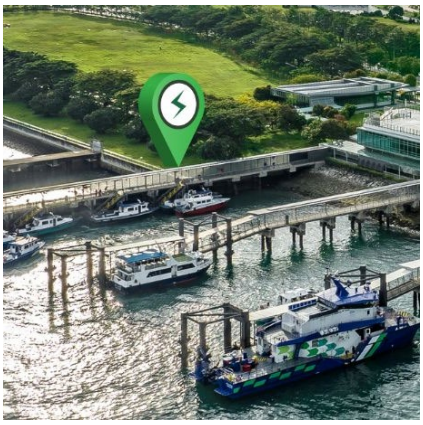
Policy Objectives	1) Set Clear, Measurable, and Long-Term Policy Objectives
Regulation	2) Develop Investment-Friendly Regulation 3) Harmonise Regulatory Frameworks 4) Focus on Enforceable Mechanisms
Funding Instruments	5) Develop Adequate Public Funding Instruments 6) Include Positive Externalities in Public Funding Business Cases 7) Account for Value Creation of Ports beyond their Role as Transport Node 8) Frontload Public Funding 9) Favour Open Competitive Processes 10) Address Demand and Country Risks through Non-Commercial Loans 11) Focus on Flexible and Accessible Instruments
Governance of PMBs	12) Give PMBs Agency over their Financial Management 13) Consolidate Smaller Port Authorities to Increase Investment Capacity

Good Practice 1: Set Clear, Measurable, and Long-Term Policy Objectives

Clear measurable long-term policy objectives provide stakeholders with clarity regarding the goals and enable the development of collective efforts to achieve them. Long term policy goals may set ambitious goals for a time horizon of 10+ years, so that there is sufficient time to develop initiatives to achieve those goals. Careful analysis of the desired 'end state' is needed, as in some cases various transitory steps are required to reach the end state. In such situations, investors need clarity on the desired end state and the transition path to make sound investment decisions. Engaging in a dialogue on setting policy goals with stakeholders provides the opportunity to tap into their knowledge and may provide a basis for broadly supported policy goals. However, given the different interests of different stakeholders, policymakers need to make sure policy goals are in line with the overall interests of their constituents.

Case Study – National Electric Harbour Craft Charging Infrastructure Masterplan in Singapore

Singapore has set the goal of transitioning to a sustainable fuel hub. As one of the initiatives to achieve this goal, Singapore has developed regulation specifying that from 2030 onwards, all harbour crafts are required to be fully electric or powered by zero-emission fuels, such as hydrogen and biofuels. To achieve a zero emission harbour craft fleet, the Maritime and Port Authority of Singapore (MPA) has a national masterplan for electric harbour craft charging infrastructure, which includes standards for charging. A pilot trial has been launched, along with a call for proposals in which operators of harbour craft can apply for government support. The Singaporean government has ensured that investments related to this transition are eligible for two financial instruments to support this specific port development: the Enterprise Financing Scheme-Green and the Energy Efficiency Grant, of which the latter can provide a grant of up to USD 350k per company. This case demonstrates the establishment of clear objectives and their translation into policy initiatives.



Source: Maritime and Port Authority of Singapore

Good Practice 2: Develop Investment-Friendly Regulation

Regulation is a powerful instrument to encourage investment in port development. Good regulation provides investors with a stable and secure environment. Regulation is critical in achieving a transition to zero-carbon economy. Increasing environmental standards are a powerful driver of the transition of maritime fuels and the energy system at large. They unlock investments in clean energy production, logistics and distribution.

Examples of important regulatory steps that have led to new markets and investments include:

- The obligatory use of OPS (which has led to investments in OPS facilities)
- The ban on heavy fuels in specific SECAs (which has led to investments in the production and provision of clean fuels)
- Regulation concerning depositing ship waste (which has led to investments in ship waste collection and processing)
- Regulation concerning activities of private terminals (which has led to large new investments of private terminal operators[20])

Regulation to put a price on carbon emissions also sends powerful incentives for investments in zero-emission facilities. Experience in ports and shipping as well as in other sectors has shown that regulation with clear future requirements and sufficient time for companies to make investments to meet those requirements can be an effective mechanism to achieve public goals. Such regulation provides 'legal certainty' for investors.

[20] A good example is Brazil, where prior to regulatory adjustments, it was unclear whether private common user terminals could be developed. Once regulatory reform created clarity, huge investments in developing private terminals were made.

Case Study – Regulation of the Use of Onshore Power Supply in Europe

By 2030, EU core ports in the TEN-T network are required to provide shore-side electricity for container and passenger ships (including cruise ships) over 5,000 gross tonnages, as mandated by the EU Alternative Fuels Infrastructure Regulation (AFIR). Not only are the ports are obligated to provide OPS facilities, users in these segments are also obligated to use OPS by 2030. This regulation has prompted or encouraged ports to invest in OPS and has prompted shipowners to invest in making their ships OPS ready. This initiative will reduce ship emissions at berth substantially.

Source: Hans Kristian Riise / Port of Oslo

Good Practice 3: Harmonise Regulatory Frameworks

As discussed in the previous section, a policy framework consists of funding and regulatory instruments at the local/regional, national, and international level. Policymakers at these different geographical levels often have related policy goals and therefore benefit from coordinated policy frameworks across different levels. There is a need for coordinated regulations across all spatial scales. For instance, standardisation and global compatibility of technologies is required to prevent different requirements for shipowners, for example, regarding OPS regulations. Ports cooperate internationally in the International Association of Ports and Harbors (IAPH) to establish aligned regulation and standards.

Case Study – Aligned Regulation on Public Funding in the EU

The EU regulatory framework is aimed at securing that companies compete on equal terms in the Single Market. Thus, state aid is in principle prohibited. In line with this approach, EU regulation stipulates that port managing bodies must have independent and financially transparent accounts. Furthermore, the economic activities undertaken by the port managing bodies must be taxed in the same way as other companies to avoid distortions of competition. At the same time, the EU regulatory framework acknowledges that individual countries may have valid reasons for to publicly fund certain port investments. Consequently, under the general block exemption regulation, Member States can make substantial public investments with full legal certainty and without prior approval by the Commission. This approach secures Member States have a common regulatory framework, while also allowing countries sufficient freedom for policies in line with the needs of the specific Member State.

Good Practice 4: Focus on Enforceable Mechanisms

Regulatory measures often impose limits on private companies. Examples include mandatory safety standards, fuel standards, and reporting standards, such as on CO_2 emissions. In other cases, regulation imposes requirements on service provision. Examples include the obligation to provide equal services for all users, or the obligation to provide OPS services. In all these cases, policymakers need to develop an effective compliance regime. This compliance regime consists both of detection/control of non-compliance as well as consequences of non-compliance. The absence of an effective compliance regime increases uncertainty amongst market players and may deter investments. In a compliance regime, accredited *private sector verifiers* can play an important role in making sure that the reporting of companies is accurate. This approach has been adopted in the FuelEU Maritime Regulation. This regulation requires companies to submit a monitoring plan and annual monitoring reports with data such as the amount of each type of fuel consumed at berth and at sea, its emission factors, and the use of OPS. Other countries may benefit from the emergence of verifiers to streamline their compliance regimes.

Case Study – Compliance with Sulphur Limits

The United Nations International Maritime Organization has introduced a regulation that sets a 0.50% m/m Sulphur limit for marine fuel from 2020, which has been adopted by virtually all IMO member states. In the North Sea, a SECA was introduced with even stricter sulphur limits. In both cases, an effective enforcement regime is key to ensure compliance. However, there was a period with a lack of certainty regarding the enforcement regime, which led to widespread concern among industry actors. Non-compliance reduces the operating costs of a shipowner, so adequate enforcement measures of the regulation are critical. Given the cost-competitive market structure, global compliance depends on enforcement and penalties that are higher than potential savings from non-compliance. Ineffective enforcement of the regulation could lead to advantages for non-compliant shipping setting in motion a downward spiral towards non-compliant behaviour. Major shipping lines, as well as some leading ports have developed substantial joint efforts to secure an effective enforcement regime.

Good Practice 5: Develop Adequate Public Funding Instruments

As discussed above, a good regulatory framework is often a necessary condition for enabling investments in port development. However, it may not be a sufficient condition to achieve a desirable investment level. Sometimes regulation at a national or even international level may create a distorted global playing field, leading to a shift in investments away from countries with tight regulation. In addition, uncertainty (for instance regarding best new technologies) may discourage investments. Thus, regulation often is more effective when combined with public funding to establish and build up markets that are still in an early stage. For example, there are different technologies to comply with regulation to make OPS mandatory (such as fixed or mobile OPS systems which can be based on various sources, such as battery packs or hydrogen). Public funding of pilot and demonstration projects may be needed to secure various technologies – all suited for specific market segments – reach full market maturity. Likewise, public support through guaranteed offtake agreements may be a good complement to regulations for clean fuels, as they reduce uncertainty for both fuel producers and fuel users (such as shipping companies that need to make investment decisions with associated fuel choices).

Case Study – Support for PD Ports Initiative to Replace Diesel with Hydrogen

In the UK, the government has committed to covering the gap between the costs and revenues for selected hydrogen projects to accelerate the ramp-up of hydrogen production. GBP 2 billion UK government funding is available over a 15-year period to strengthen the country's position in the hydrogen sector, contributing to the national net-zero objectives. One of the successful applicants is a coalition including PD Ports. This initiative has received government funding, which enables PD Ports to substitute diesel for hydrogen in its vehicle fleet.

Good Practice 6: Include Positive Externalities in Public Funding Business Cases

The logic for public funding depends on two conditions: public funding leads to investments that generate 'external' value for society and is necessary to bridge a funding gap[21]. Table 3-3 gives a general indication of the funding gap for each of the identified investment types.

[21] The 'user pays approach' can be considered a 'first best' option. In case investments can be recovered from users through fees, such as port dues or electricity charges, that is the preferred option; public funding only is justified when applying the user pays approach does not lead to sufficiently high and rapid investments.

Table 3-3 Indicative Range 'Funding Gap' for Each of the Investment Types

Investment Type	Indicative Range 'Funding Gap'
New sites for terminals	Depends on competitive landscape and development level of country. Generally, between 0 and 30%.
Terminal equipment and 'superstructure' like warehouses	There is only a funding gap in exceptional cases like green equipment, in those cases generally <10%.
Land for port industries such as fuel production	Depends on competitive landscape and development level of country. Generally, between 0 and 15% unless additional land needs to be reclaimed from the sea.
Onshore Power Supply and electricity infrastructure	Generally substantial (>50%) in the early stage of OPS introduction, no funding gap once OPS is obligatory and OPS facilities have a high utilisation.
Landside port infrastructure	Generally substantial (>50%) unless the PMB can implement specific charges for the use of the infrastructure.
Production of electricity (e.g. solar, wind) and fuels	There is only a funding gap in exceptional cases, generally <10%, given the rapid decline of alternative fuel costs.
Pipelines for fuels, steam, CO_2, or heat	There generally is a funding gap (0-50%), with huge differences between projects, based on user commitment and volumes.

In general, public funding is necessary for large scale port expansion projects, especially of these projects involve dredging and coastal protection. In line with this, the EU has developed a general block exemption (GBER), allowing public funding of up to 60% of eligible costs for large maritime port projects (and a higher percentage for smaller projects). Investment in land in port areas for activities that do not need quays (such as fuel production, food processing or logistics activities) often have no funding gap or a relatively low funding gap. Investments for commercial activities in ports (like investments in terminals or energy production) generally have no funding gap; only in specific cases, such as green terminal equipment, can funding be instrumental in reducing pollution.

Case Study – Spain's Harmonised Method for Impact Assessment

Spain has a decentralised port development approach in which 28 port authorities are responsible for the development of one port or a few ports located in close proximity. While these ports have substantial autonomy regarding investments, they need to assess the economic impact of the investments with a harmonised method (termed MEIPOR), developed centrally by 'Puertos del Estado'. In this approach, an analysis is made of the national or regional impact of a port. This analysis provides a method for assessing the direct economic impact as well as additional economic impact through its value for activities with a structural dependence on the port (i.e. an impact beyond the mere use of ports to maritime transport), such as specific tourism or processing activities.

Good Practice 7: Account for Value Creation of Ports beyond their Role as Transport Node

In general, the energy transition increases the role of ports as *energy hubs*. This value creation may not be fully understood when a port is regarded as merely a *transport node*[22]. For instance, the availability of port land is critical for the offshore wind ambitions of many countries. The 'value for society' of offshore wind ports lies less in the volume of goods transported and more in their role in

[22] The Spanish public body 'Puertos del Estado' has developed a set of guidelines for cost-benefit analysis for infrastructure investments (MEIPOR). This approach is very useful for harmonising cost-benefit studies across all Spanish ports and forcing the Spanish port authorities to be rigorous is cost-benefit analysis. MEIPOR is updated periodically; future updates may include more attention for energy.

offshore wind logistics, including assembly, storage, maintenance and repair. As a second example of the value creation of ports beyond transporting freight, ports are often attractive locations for circular activities, which in term, may enhance the *strategic autonomy* of countries. These forms of 'value for society' may justify public funding for particular investments in ports, such as an 'energy island' developed in Amsterdam's port area.

Case Study – The Role of Oman's Ports in Attracting FDI

Oman is a large country with a relatively small population and a long coastline. Oman is highly dependent on the oil and gas sector and aims to reduce this dependence significantly in the period until 2040. Directing foreign investments to Oman is a key instrument to achieve this transition. The ports in Oman, especially Sohar Duqm and Salalah, play an important role in attracting FDI, not only in logistics, but also in port-related manufacturing activities such as steel and energy plants, which are located in the port-industrial complex. Over the last 10 years, more than 50% of all FDI into Oman landed in the three large port industrial areas. The aim for the next decade is to continue to attract a large share of Oman's inward FDI.

Good Practice 8: Frontload Public Funding

Public funding is especially instrumental in an early, or even pre-, development stage of a port or port service. For instance, in Oman, large scale public funding was needed to develop the large-scale industrial port of Sohar. Roughly 20 years after opening, Sohar has attracted more than USD 25 billion in foreign direct investment and grown into a world scale port-industrial complex. Further expansion of this port complex does not require the same level of public funding as was the case in the initial development stage. The same logic applies to new port services such as OPS services. Once this market has matured in terms of technologies and business models, public funding for OPS is no longer instrumental. The example of the UK also shows that once a country has an advanced economy, with a decoupling of economic growth and maritime trade volumes, there may no longer be a rationale for public funding of land for new terminals and other port activities, whereas in developing economies, public funding is justified for such investments.

Case Study – The H2Global Mechanism

H2Global is a contract for difference (CFD) initiative related to hydrogen projects. The main aim is to stimulate a ramp-up of worldwide hydrogen operations. The supply side of hydrogen (producers) sets the necessary price to produce hydrogen, while the demand side sets their willingness to pay. The difference between the necessary price for the supply side and the highest willingness to pay is the 'funding gap'. With the use of a CFD, the funding gap is covered by public funding, and both the supply and demand sides can stick to their prices, which facilitates growth in the hydrogen market. The Egypt Green Hydrogen project has secured a contract in the H2Global tender, ensuring a fixed price of renewable ammonia produced using green hydrogen technology. This achievement has led to the first shipment of green ammonia in 2023.

Good Practice 9: Favour Open Competitive Processes

Public funding carries a risk of distorting the playing field for competing ports as well as a risk of misuse of public funding. To minimise both risks, competitive open processes to allocate grants to proposals from ports is a good practice. Where appropriate it makes sense to include all types of applicants as eligible (i.e. not just the port managing bodies, but any party), provided they make investments that match the aim of the grant. In this approach:

- The playing field is not distorted as all port managing bodies and potential recipients can apply for funds.
- The competitive nature can be expected to increase the societal impact of the public funding.
- The risk of direct political influence on the grant allocation is lower.

The larger the geographical scale (e.g. all European ports or all Canadian ports as opposed to only Dutch ports or ports in Nova Scotia), the more effective the competitive process. Likewise, in general it is effective to develop funding programs that are 'technology neutral' as much as possible, in the sense that different technologies that may be instrumental in achieving policy goals (like for example zero emission supply chains) are eligible for funding.

Case Study – Open Competitive Public Funding Programs for Ports in the US

In the United States, the government makes use of a competitive process to support port infrastructure development. There are two main relevant open competitive programs for ports:

- The Port Infrastructure Development Program (PIDP): eligible for ports and other relevant stakeholders and managed by the US Maritime Administration.
- The Infrastructure for Rebuilding America Grant Program (INFRA): eligible for a broad range of infrastructure projects, ports have also received money from this program and managed by the US Department of Transportation.

These two programs are funded through the Bipartisan Infrastructure Law. Both programs provide competitive public funding to US ports through an open grant application process with predefined eligibility criteria.

Good Practice 10: Address Demand and Country Risks through Non-Commercial Loans

Loans from non-commercial development banks like the World Bank (WB), the European Investment Bank (EIB), the Inter-American Development bank (IADB) or one of the many others all have in common that the loan conditions are more favourable than those of commercial banks[23]. The benefits may include a grace period before loan repayment starts, long loan periods and/or low interest rates. An additional advantage of a loan is that it leads to scrutiny of the viability of the investment, which helps to prevent investments that do not create the intended value, for instance because market growth is more limited than expected. Loans are thus especially useful for projects with demand risks. In addition, loans only have a substantial impact in terms of reducing the funding gap, for large projects with long payback periods.

Case Study – EBRD Damietta Container Terminal II

A consortium of international institutions is supporting the development of a second container terminal in Damietta Port in Egypt, which will triple the port's container capacity and improve its competitiveness. Damietta Alliance Container Terminals is a Special Purpose Vehicle (SPV) with partners including Eurogate and Hapag Lloyd. This SPV will design, develop, operate and maintain the terminal under a 30-year concession. Various IFIs including EBRD, IFC, AIIB, DEG and Proparco provide a USD 455 million financing package to the SPV. As part of the Project, the Damietta Alliance Container Terminals will develop its environmental and social management system in line with the lenders' environmental, health and safety guidelines and international best practice. Financing will also support vocational training for residents living near the port with a focus on creating gender inclusive jobs.

Good Practice 11: Focus on Flexible and Accessible Instruments

Port-related infrastructure projects often experience delays, mainly due to:

[23] While the conditions of IFI loans are often more favourable than those of commercial banks, IFI loans have additional goals/requirements such as inclusion and other ESG goals.

- Complex decision-making processes which involve many stakeholders, such as local and national governments, PMBs, port users and (state-owned) rail and pipeline infrastructure companies. The priorities, and risk tolerance levels of these stakeholders differ and evolve over time.
- Lengthy approval processes, especially for 'contested projects' with negative local impacts.
- Structural uncertainty of demand for port services and port land, often due to geo-political dynamics.

As a result, investment projects often face delays or need to be modified. This implies that public funding mechanisms need to be sufficiently flexible to allow for some deviation of the originally submitted projects, in terms of scope and planning.

Good Practice 12: Give PMBs Agency over their Financial Management

Port development inherently involves uncertainty, and investment projects may face delays due to factors such as market conditions, permitting issues, or reliance on other delayed investments. This can result in 'investment waves', where multiple projects are undertaken in a short time, leaving the PMB with substantial cash reserves beforehand. In such situations, the PMB must have enough flexibility to generate revenue from its available cash, which may be limited by the state's low risk tolerance as the PMB's owner. For example, in Barcelona, an investment wave totalling over EUR 2 billion is planned and underway over the next 5 to 7 years. Before this wave, financial management faced constraints.

Case Study – Borrowing Limits of the Canadian PMBs

The Canadian Port Authorities (CPAs) play a key role in providing international accessibility for Canadian firms and consumers. A very substantial (CAD 110 billion) need for port infrastructure investments was established in 2022[24].
The Canadian ports can borrow money to invest, for instance by issuing bonds. The borrowing capacity of the CPAs is subject to a fixed limit set out in their letters patent. Currently, the process for changing the limit is lengthy, with no reliable timeframes for completion, introducing significant uncertainty. The Canadian CPAs are asking for more financial flexibility through increased lending limits and a quicker process for amendments or through the addition of risk-based formulas developed with the financial services industry.

While freedom to optimise financial management can be instrumental in increasing the investment capacity – especially in countries where country risk is considered high – PMBs may still face limited access to international commercial capital markets, even when demonstrating strong financial performance.

Good Practice 13: Consolidate Smaller Port Authorities to Increase Investment Capacity

Worldwide, there is a trend of increasing consolidation of local public PMBs into larger regional entities. This can be observed in countries like China, Belgium, Canada, Italy and Finland. These mergers have various potential benefits, one of them is that increased scale leads to reduced operating costs thus to increased investment capacity. This is especially relevant for relatively small ports that are well-positioned to attract new offshore wind activities (or other 'ocean related economic activities' including offshore mining, fish and algae farming). Local municipalities may be confronted with large investment projects and associated financing challenges. Stronger regionally operating port groups may be better placed to undertake such major investments, as risks are spread among more shareholders.

[24] https://tc.canada.ca/sites/default/files/2022-10/supply-chain-task-force-report_2022.pdf

Case Study – Jiangsu Port Group

One of the many cases of mergers, in countries such as Belgium, Canada, the US, Italy and China, is Jiangsu Port Group. This group is the result of a merger of all the major port companies in China's Jiangsu province, including Nanjing Port, Lianyungang Port, Dafeng Port, Nantong Port, Taizhou Port, Suzhou Port, Wuxi Port, Taicang Port and Jiangyin Port. This consolidation has led to a company with an asset value of over RMB 100 billion (USD 14.5 billion). The group focuses on developing an integrated network of ports and also offers transport services. The group has grown container throughput volumes faster than the national average and the Yangtze River Delta regional average.

3.3 Good Practices for Augmenting the Investment Capacity of Port Managing Bodies

The 13 good practices detailed above indicate how the PMB can create a favourable environment for investments in ports. The extent to which a PMB can create value through investments depends on:

- Organisational capabilities
- Financial investment capacity

Six good practices to increase this investment capacity are derived from the interviews and case studies (see Figure 3-3).

Figure 3-3 Overview Good Practices for Augmenting the Investment Capacity of Port Managing Bodies

Organisational Capabilities	1) Develop Initiatives to Unlock the Investment Capacity of Commercial Third Parties 2) Secure Flexibility and Cost-Effectiveness through a Phased Fit-For-Purpose Design 3) Start Developing Early in View of Long Planning and Approval Processes
Financial Investment Capacity	4) Augment Investment Capacity through Tight Control of Operating Costs and High Asset Utilisation 5) Increase Share of Lease Incomes for More Stable Revenues 6) Strengthen Capabilities to Seize Public Funding Opportunities

Good Practice 1: Develop Initiatives to Unlock the Investment Capacity of Commercial Third Parties

The PMBs focus on developing the port as a vital economic complex. Third parties can often strengthen the port complex by bringing in additional capabilities such as:

- Technological
- Commercial
- Operational

PMBs with an integrator business model, in which the vast majority of port services is provided in-house, may benefit from developing partnerships in which third parties play a larger role in the provision of port services. This entails a shift to a 'landlord' or mixed business model. Many public sector-embedded port authorities and state-owned PDCs have changed their business model through partnerships with third parties. Most of the successful partnerships with third parties are due to operational, commercial and technological capabilities of partners. Partnerships with commercial financial players such as pension funds may increase the financing capacity of PMBs. However, financing by commercial parties is likely to be more expensive than loans with non-commercial banks that are guaranteed by the public shareholder of the PMB. Table 3-4 shows the most frequently observed partners for each type of investment[25].

[25] The use of 'Design, Construct and Finance' contracts is an additional partnership model which reduces investment needs of PMBs. Such contracts can for instance be used for (capital) dredging investments, in which contractors receive a yearly fixed payment for the availability of a deepened maritime access. This reduces investment costs for the PMB.

Table 3-4 Examples for Partnerships for Each of the Investment Types

Investment Type	Value of Investment Partners
New sites for terminals	Especially for expansions for one specific operator, terminal operating companies are useful investment partners in view of securing an optimised design of sites for new terminals.
Terminal equipment and 'superstructure' like warehouses	High value of partners; commercial third parties generally bring in additional commercial, technological and operational capabilities. This explains the widespread use of the 'landlord' business model.
Land for port industries such as fuel production	Limited value of investment partners, this is the core service of the PMB.
Onshore Power Supply and electricity infrastructure	Both terminal operators and energy companies are potentially valuable investment partners.
Landside port infrastructure	Limited value of investment partners, given the lack of direct revenue streams from investments in landside port infrastructure.
Production of electricity (e.g. solar, wind) and fuels	Energy companies are valuable investment partners, given their technological and commercial capabilities.
Pipelines for fuels, steam, CO_2, or heat	Pipeline users are potentially valuable investment partners.

Case Study – Expanding the Port of Tema through a Public-Private Partnership (PPP)

The Port of Tema is undergoing expansion through a public-private partnership. Meridian Port Services is the terminal operator and is a joint venture between three companies:

- Ghana Ports and Harbours Authority: 30%, a public entity
- Africa Global Logistics: 35%, a private entity
- APM Terminals: 35%, a private entity

The PPP model leverages the government's commitment in becoming self-reliant, while benefitting from the private partners' expertise in terminal construction and operations. The first phase of the expansion was completed and was quickly operational at full capacity. The first phase alone already generated over five thousand jobs, contributing towards the local economy. The project received financing from the International Finance Corporation (IFC), a financial institution specialised in supporting the private sector in developing countries.

Good Practice 2: Secure Flexibility and Cost-Effectiveness through a Phased Fit-For-Purpose Design

Potential disruptive developments can deeply impact port development and investment projects. For instance, the closure of coal-fired power plants and oil refineries, the steep reduction of volumes of petroleum products, the containerisation of specific bulk and automotive flows and the changing geo-political landscape can have a deep impact on port development. As a result, ports are faced with structural uncertainty, which necessitates flexible port development[26]. A phased approach to port expansion is an important mechanism to increase flexibility.

[26] Looking back on port plans from say 15 or 20 years ago is eye-opening: most of them turned out in hindsight to have been wrong in most dimensions (volume of flows, type of cargo flows, required terminal dimensions, land use).

Case Study – Phased Development Investments in the Port of Gdansk

In the Port of Gdansk, investments are divided into separate projects, one project for each phase of the port development, and for each phase, separate financial instruments are secured. The Port of Gdansk is currently building a third container terminal. Port of Gdansk has split up the construction of the quays into smaller parts to increase cost-effectiveness, by delaying capital investments. The phasing of development is related to growth in demand and based on the capacity utilisation of the previous phase. In this way, expensive capital investments are delayed until expected revenues can be generated.

Good Practice 3: Start Developing Early in View of Long Planning and Approval Processes

The approval process for most investments in port development require careful assessment of the economic and environmental impacts. Undertaking such studies requires time; for instance, in the US 18 months is taken as an indicative period for completing environmental impact assessments. Furthermore, port development projects are often contested projects in the sense that there is serious opposition from one or more interest groups. This also adds to the time span between project idea and final approval because in many countries, stakeholders can appeal approval decisions. Governments are advised to secure port development options in spatial planning by identifying sites for future development. For PMBs, starting early with developing investment projects is advisable, even though this implies committing substantial resources to investment projects whose execution is uncertain.

Good Practice 4: Augment Investment Capacity through Tight Control of Operating Costs and High Asset Utilisation

A tight control of operating costs is critical for increasing the investment capacity. This challenge is especially relevant for state-owned PMBs, as research on state-owned companies in general show the risks of weak operating cost control of SOEs[27]. A case analysis of the post corporatisation performance of Port of Rotterdam shows corporatisation had a strong and positive effect on operating cost control, which led to a substantial growth in investments post corporatisation[28]. Various countries have mechanisms in place to control operating costs of PMBs.

Case Study – Operating Costs of Port of Aarhus

Port of Aarhus is one of the ports that manages to control operating costs. Total operating costs rose from DKK 197 million in 2016 to 246 million in 2023, an annual growth of 3.2%, very similar to the growth of the total volume handled in the port (2.8%). The volume growth is especially relevant in this case as Port of Aarhus is an operating port. Keeping in mind inflation, which was 2.3% per year in Denmark in the same period (and much higher internationally), this case can be considered as an example of tight operating control. It is also lower than the growth of operating costs in a sample of other ports that were assessed. The tight cost control of Port of Aarhus allowed Port of Aarhus to invest about 50% of its annual total revenues. This investment activity is also high compared to other ports.

Good Practice 5: Increase Share of Lease Incomes for More Stable Revenues

PMBs with a landlord business model have two principal revenue streams: port dues and land fees. The lease revenue stream is stable, as land lease agreements are for long periods, and generally automatically adjust for inflation. Port dues vary with the volumes handled in the port and are more uncertain, especially in advanced economies, where a sharp decline of volumes in some segments, like crude oil, coal and petroleum products is likely given the ongoing transition away from fossil fuels. Thus, a relatively large share of land rents leads to more stable future cash flows of PMBs. This is important in view of attracting external funding.

[27] There is a huge number of studies on SOE performance and risks, see for instance Megginson (2017).

[28] De Langen & Heij (2014).

Case Study – Port of Amsterdam

Port of Amsterdam is a large-scale port-industrial complex, with significant activities in metal, food processing, petrochemical energy and circular activities. The port is developed by a PDC with a landlord business model. The PDC is owned by the city of Amsterdam, which has developed shareholder policy that values leadership in sustainability transition. This transition implies that the tonnage handled in Amsterdam of fossil energy sources, such as coal and fuels, is decreasing. However, Port of Amsterdam also needs to invest substantially in projects to accelerate the energy transition. In this context, the increasing share of land lease fees in Port of Amsterdam's total revenues has been critical in securing its investment capacity. This share has grown from about 50% in 2010 to well over 60% in 2023. The share of port dues has decreased from around 40% to 30% in the same period.

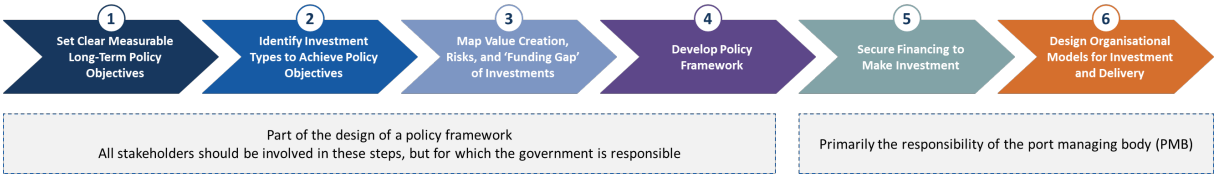
Good Practice 6: Strengthen Capabilities to Seize Public Funding Opportunities

Governments at various levels have developed a large set of public funding instruments, partly through organisations such as international financing institutions, development aid organisations and national state-owned (development) banks. This provides PMBs with a range of funding opportunities. However, specific capabilities are needed to benefit from these funding opportunities. In some cases, cooperation with other PMBs and/or other industry stakeholders is instrumental in attracting public funding. Other important capabilities include the ability to effectively demonstrate the 'Societal Value Case' of proposed investment projects, as well as transparent procurement processes, often with attention for social and environmental sustainability. In jurisdictions where the rights of Indigenous peoples are impacted, PMBs can benefit from facilitating partnerships with Indigenous groups to improve access to capital (both public and private) and improve community acceptance. The capability to seize public funding opportunities are important, also critically depends on the availability of ready-to-go investment projects (see Good Practice 3).

4 Port Investment Toolkit

The insights from the good practices as described in the previous chapter can be summarised in a step-by-step approach for designing a port investment framework. These steps are stylised and in practice often iterative rather than linear. The aim is to provide a useful starting point for stakeholders involved in developing policy frameworks and undertaking investments in port development.

Figure 4-1 Step-by-step Approach for Designing a Port Investment Framework



After the last step, it is recommended to monitor and evaluate results, which can contribute to improving the policy framework.

Step 1: Set Clear Measurable Long-Term Policy Objectives

As a first step, set clear and measurable policy objectives for the ports industry. These policy objectives often relate to aspects such as port capacity, maritime access, hinterland corridors, sustainability, efficiency, safety and resilience. Measurable goals may include items such as ship waiting times, ship turnaround times, maritime connectivity, modal split, and carbon footprint of port operations.

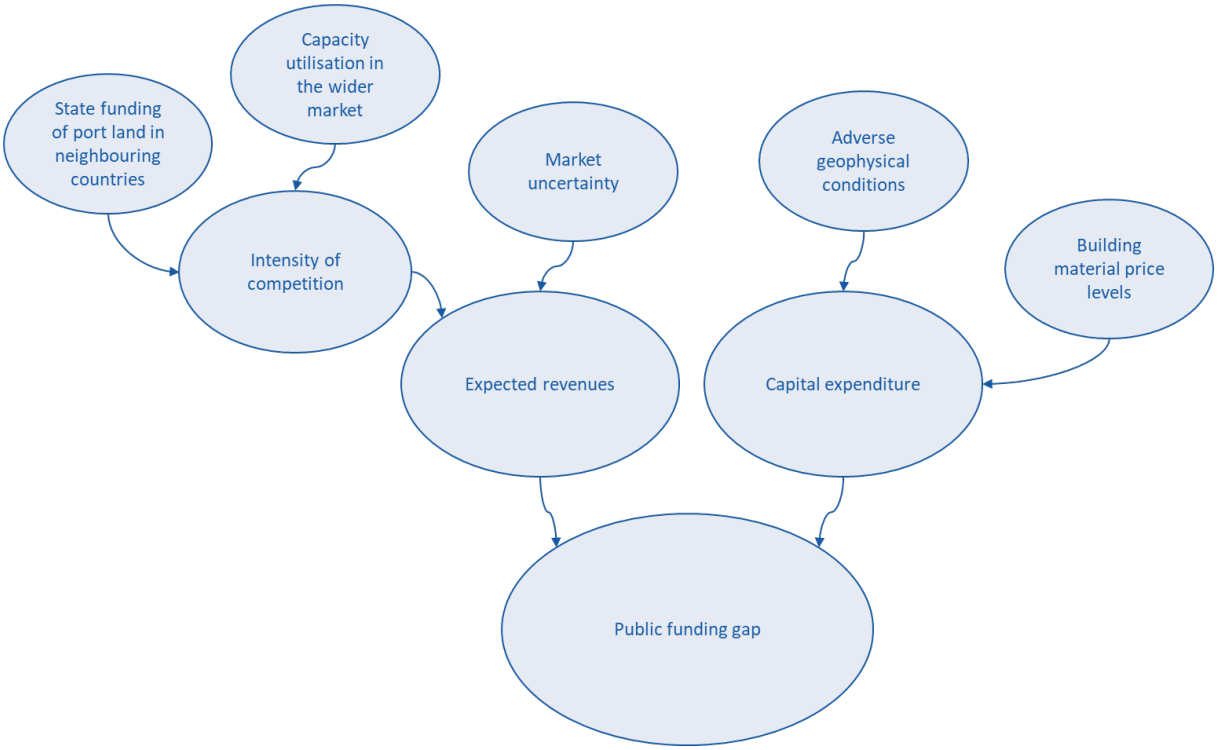
Step 2: Identify the Types of Investments Required to Achieve Policy Objectives

Second, port industry stakeholders need to identify the investments that are needed to achieve the policy objectives. National and international policies for a transition to net zero lead to an increased share of 'green' investments. Investments needed to meet the policy objectives may include new sites for terminals, better landside connections, OPS facilities, pipeline infrastructure and others. Examples include investments in OPS, investments in land to service (the construction of) offshore windfarms and investments in bunkering facilities for low or zero carbon fuels. The EU and Canada are examples where an assessment of the investment needs has been made.

Step 3: Map the Value Creation, Risks and 'Funding Gap' of These Investments

Assess the value creation, i.e. the financial business case for the PMB and the value investments may create for society. Such a value creation analysis needs to demonstrate whether or not there is a 'funding gap'; Figure 4-2 shows an example of the main drivers of a funding gap for a capacity expansion project. In addition, the 'spatial scale' of value creation (local/regional, national or global) needs to be assessed, as this is directly relevant for developing the right public funding mechanisms to close the funding gap. The mapping of value creation should also include an assessment of the risks associated with the required investments to achieve the policy goals (see Table 2-5 from the previous section).

Figure 4-2 Drivers of a Funding Gap



Step 4: Develop a Policy Framework with Regulatory Initiatives and Funding instruments

Based on the steps above, a policy framework can be developed. Policy frameworks are required and need to be aligned at the international, national and regional levels. Especially at the international level, regulation is often the cornerstone of a policy framework, while funding instruments are often shaped through IFI's like the World Bank. Table 4-1 provides the main policy recommendations for international policymakers.

Table 4-1 Policy Recommendations for International Policymakers

Policy Recommendations for International Policymakers (like IMO)
1. Develop regulation in which mandatory requirements (especially regarding environment and safety) to protect global public goods take a central place. 2. Allow for exceptions for countries/regions if justified by specific circumstances. 3. Secure an effective compliance regime by focussing on enforceable mechanisms.

National policy frameworks will often include regulatory instruments, adjustments of governance of the PMB and funding instruments. A comparison of the different instruments to close the funding gap, from the perspective of an efficient allocation of risks, is central to the design of funding instruments.

Table 4-2 makes a distinction between countries with one central state-owned PMB and countries in which various autonomous PMBs, often with local/regional ownership, are active. The recommendations for the central state-owned PMB also apply to countries with one large port.

Table 4-2 Policy Recommendations for Countries with State-Owned PMBs with a Landlord Business Model

Central State-Owned PMB	Decentralised State-Owned PMBs
1. Set clear, measurable, long-term policy objectives. 2. Develop regulation with mandatory requirements for environment and safety. 3. Give PMBs agency over their financial management. 4. Limit public funding to large scale projects of national interest.	1. Set clear, measurable, long-term policy objectives. 2. Develop regulation with mandatory requirements for environment and safety. 3. Harmonise regulatory frameworks. 4. Frontload public funding. 5. Favour open competitive processes in grant distribution. 6. Address demand and country risks through non-commercial loans. 7. Consolidate smaller port authorities to increase investment capacity. 8. Give PMBs agency over their financial management. 9. Focus on flexible and accessible instruments.

For countries with state-owned PMBs with an integrator business model, the additional policy recommendation is to develop partnership models in which third parties invest in and contribute to the ports industry. For countries with private PDCs, the recommendation to secure development options is even more important, as private PDCs cannot be expected to commit as many resources in initiating uncertain investment projects as public PMBs do.

At the regional level, planning and environmental regulation often takes a central place, while funding is generally more limited than at the national scale.

Step 5: Secure Financing to Make the Identified Investments

Once the policy framework is established, it is up to the PMBs to secure financial resources to be able to execute the identified investments that are needed to achieve the policy goals. PMBs need various capabilities to secure financial resources, including 'development capabilities' including the capability to make use of available instruments to bridge the funding gap. To augment investment capacity, PMBs can make use of the good practices, such as moving towards a partnership model in which third parties bring in financial resources and capabilities.

The use of financial tools and instruments differs across public and private PMBs. Private PDCs more often make use of project finance and commercial bank loans, whereas the corporatised state-owned port development companies and public sector embedded port authorities more often make use of grants and IFI loans.

For the state owned PMBs, building and improving government relationships can enhance access to resources. For example, if the Ministry of Finance provides a guarantee, international lenders are more likely to approve loan requests. Additionally, government can also support in approaching IFIs.

Table 4-3 Financial Tools and Instruments for PMBs (Public Funding in Grey)

Financial Tools and Instruments	Advantage	Disadvantage	Success factors
Grants (regional, national, international)	Effective to bridge funding gap • Predictability • Sustainability	• Substantial administrative burden • Risk of developing projects to fit in the grant scheme, instead of seeking funding for projects	• Sufficiently high grant size • Presence of a grant program with a very good fit with pre-existing investment projects • Demonstrated value for society of the investment project

International Financial Institution (IFI) Loans	• Good conditions: interest rates and payback period	• Substantial administrative burden and ESG obligations	• Sufficiently high loan size • Mature project, ready for execution • Demonstrated value for society of the investment project • Port reliability
Commercial Bank Loans	• Scrutiny of commercial viability of the investment • Faster approval process compared to IFI loans	• No contribution to closing of the funding gap	• Commercial viability • Mature project, ready for execution • Port reliability
Internal Financing	• Better use of available financing capacity • Return on investment set by the (often public) shareholder	• Reduces investment capacity	• Clear and reliable estimates of financial return • Mature project, ready for execution

Internal financing should be considered as the first option among the financial tools and instruments, as it is the simplest option and avoids complex and time-consuming processes if sufficient resources are available. Within internal financing, additional equity can be raised, for example, by the issuance of extra shares to public shareholders.

Financing for investments can be done via corporate (balance sheet) financing and project financing. As an alternative, PMBs can attract finance for specific investment projects.

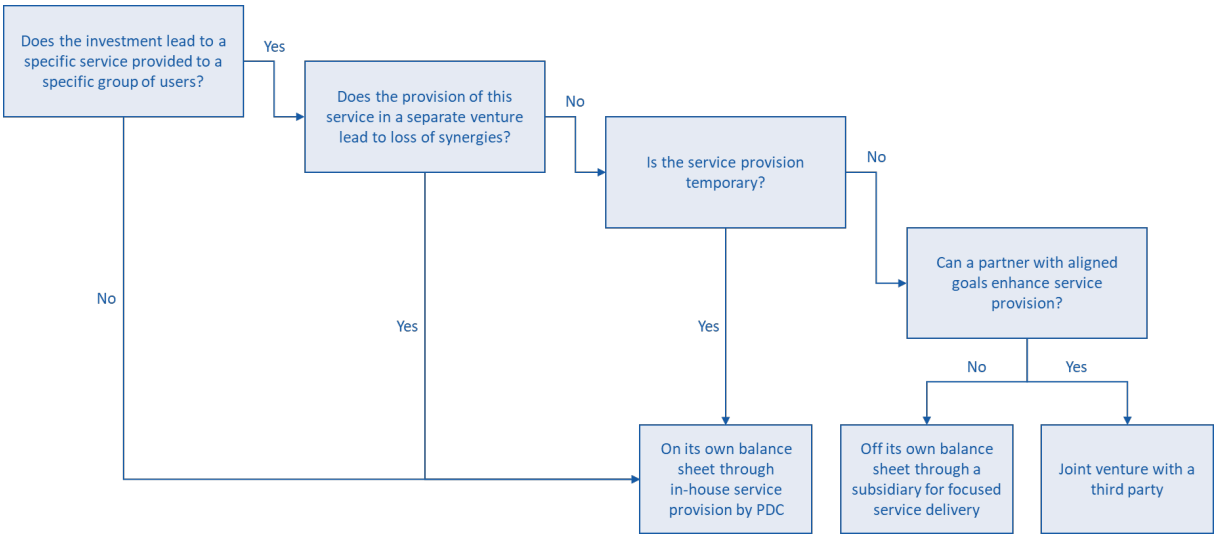
Table 4-4 Overview of Financing Categories

Financing Categories	Advantage	Disadvantage
Balance Sheet Financing	• Straightforward: due diligence by financing entities is focused on the corporate level rather than on the project itself • Some PMBs may have credit ratings, and hence interest rates are easy to anticipate	• Leverage is usually modest • Financing entities have recourse to the entire organisation's assets • Large-scale projects can have a substantial impact on the overall risk profile of the PMB and constrain future investments
Project Financing	• PMBs can secure grants to finance specific projects • Leverage can be higher than corporate finance • Interest rates can be lower than corporate finance in case of low-risk investments • No recourse for the entire organisation's assets, so no effect on the risk profile of the corporate balance sheet	• Requires a long preparation period, financing entities need to conduct a thorough due diligence • Project contracts (e.g. concession contract, EPC contracts) need to be sufficiently strong to carry the project • The cash flows need to be sufficiently strong to carry the project

Step 6: Design Effective Organisational Models for Investment and Service Delivery

PMBs need to make choices regarding the organisational model for investment and operation. PMBs are advised to consider partnership models for specific investment types and consider establishing specific subsidiaries for focused service delivery. Figure 4-3 provides a decision chart that can help guide deciding on the appropriate organisational model.

Figure 4-3 Decision Chart for Organisational Models



The insights provided in this step-by-step approach can help policymakers and PMBs in securing that the huge investment needs of ports can be realised.

Appendix I Summaries of Detailed Case Studies

In Appendix I, the following case studies are included:

Nr.	Project	Funding Sources
1	Porthos – The Netherlands	National & international grants
2	Gas Access to Europe (Gate) Terminal – The Netherlands	IFI loan & commercial bank loan
3	Sea Lock Ijmuiden – The Netherlands	International grant, IFI loan, and internal financing
4	Circulands – The Netherlands	Internal financing
5	CO_2 Terminal Esjberg – Denmark	International grant & internal financing
6	Shore Power Cruise – Norway	National grant & internal financing
7	NEXIGEN – Spain	International grants & internal financing
8	Green Ports Madeira – Portugal	N/A (not executed yet)
9	Zagreb Deep Sea Container Terminal – Croatia	International grant, IFI loan, and internal financing
10	Burnaby Rail Corridor Improvements – Canada	National grant & internal financing
11	Centerm Expansion and South Shore Access – Canada	National grant & internal financing
12	Cargo Handling Equipment Modernisation Program – United States	National grant & internal financing
13	Port Expansion – Chile	Internal financing
14	New Container Terminal - Namibia	IFI loan & internal financing
15	Green Marine Fuel Market – South Africa	N/a (not executed yet)
16	Deep Water Berths – United Arab Emirates	Internal financing
17	Port Rail Transformation – Australia	Local/regional grant & internal financing

	Porthos Rotterdam	GATE Rotterdam	Sea Lock IJmuiden	Circulands Groningen	CO2 Terminal Esbjerg	Shore Power Cruise Norway	NEXIGEN Barcelona	Green Ports Madeira	Zagreb Container Terminal
Good Practices: Policy Frameworks									
Set Clear Objectives						●	●		
Develop Encouraging Regulation						●	●		
Create Aligned Scaled Regulation									
Secure Effective Compliance									
Safeguard Development Options				●		●	●		
Align Funding and Regulation	●		●			●	●		●
Link Public Funding, Values, Gap	●				●		●		
Account Beyond Transport Node	●	●		●	●		●	●	
Public Funding for Early Stage					●		●		
Work with Open Comp. Process									●
N-Com. Loans for Large Cap. Projects		●	●						●
Take Administrative Burden	●								
Provide Direction Evolving Role PMB	●			●					
Merge Small Ports									
Give Financial Freedom PMBs							●		
Good Practices: Augmenting Investment Capacity PMBs									
Increase Share Lease Income			●						
Tight Control Operating Costs									
Strengthen Funding Capabilities	●								
Commercial Third Parties	●	●		●				●	●
Phased Fit-For-Purpose Design					●		●		
Early Planning and Development				●					

● Indicates that the good practice is derived from or influenced by the case study

	Burnaby Rail Corridor	Centerm Expansion South Shore Access	Cargo Handling Equip NY & NJ	Valparaiso Port Expansion	New Container Terminal Namibia	Green Marine Fuel Market South Africa	RAK Deep Water Berths	Port Rail Transformation
Good Practices: Policy Frameworks								
Set Clear Objectives	●	●	●	●			●	●
Develop Encouraging Regulation	●	●						●
Create Aligned Scaled Regulation								
Secure Effective Compliance								
Safeguard Development Options								
Align Funding and Regulation	●	●	●					●
Link Public Funding, Values, Gap								
Account Beyond Transport Node						●		
Public Funding for Early Stage								
Work with Open Comp. Process								
N-Com. Loans for Large Cap. Projects					●			
Take Administrative Burden								
Provide Direction Evolving Role PMB	●	●						●
Merge Small Ports							●	
Give Financial Freedom PMBs	●	●					●	●
Good Practices: Augmenting Investment Capacity PMBs								
Increase Share Lease Income								
Tight Control Operating Costs								
Strengthen Funding Capabilities								
Commercial Third Parties	●	●		●				
Phased Fit-For-Purpose Design								
Early Planning and Development								

● Indicates that the good practice is derived from or influenced by the case study

Porthos – The Netherlands			
Organisation	Porthos CO_2 Transport and Storage	Type of investment	Pipelines for fuels, steam, CO_2, or heat
Governance model	Public-Private Partnership	Short project description	Underground CO_2-storage facility in the North Sea for CO_2 from industry in the Port of Rotterdam, planning on 2.5 Mt of CO_2 per year.
Business model	Not relevant	Value creation of the investment	**Users:** as this project allows for a method to capture CO_2, users contribute towards becoming net-zero and possibility for reuse. **Society:** carbon emission reductions.

Description of relevant policy framework

At the European level, the Trans-European Energy Network (TEN-E) policy to improve energy infrastructure links across the EU to achieve its energy and climate goals has led to the Connecting Europe Facility (CEF) funding instrument aiming to support energy infrastructure investments in the TEN-E network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

In the Netherlands, at a national level, the Havennota is a policy document that outlines the country's ambition for its ports. The ambition of the Dutch government is to maintain the strong position of Dutch ports in the future economy, which is sustainable, digital, and interconnected. Cooperation, between Dutch ports but also with other stakeholders, is seen as key element to maintain the strong position of Dutch ports. For projects related to sustainable and long-term economic growth in the Netherlands, one can appeal to the National Growth Fund. However, the National Growth Fund is in its phase-out stage. As of 2022, infrastructure-specific projects have become part of the Mobility Fund. Another potential funding source for infrastructure projects might include the Delta Fund. This fund is part of the Delta Programme, with the aim to protect the Netherlands from flooding, a shortage of freshwater, or the effects of extreme weather. Projects within this Delta Programme are often (partially) funded with the Delta Fund.

Description of funding (sources) of the investment

National grants:

- Netherlands Enterprise Agency (RVO) subsidy for part of the preparatory studies
- SDE++ subsidy for the customers to bridge funding gap between ETS costs and total capture, transport, and storage costs

International grants:

- CEF Energy (for projects related of the TEN-E programme of the EU) for part of preparatory studies and the realisation of infrastructure (Porthos is marked by EU as Project of Common Interest)

Description of organisation model for the investment

Porthos CO_2 Transport and Storage is a joint venture of the Port of Rotterdam Authority, Gasunie and EBN. European tenders have been issued for the various construction tasks: onshore pipeline, compressor station, cooling water intake building, platform, wells, and offshore pipeline. TAQA Energy is the operator of the gas fields in the North Sea which will be used as storage for this project. Porthos makes use of Joint Development Agreements (JDAs) with the customers of the storage facility. The current four customers are: Air Liquide, Air Products, ExxonMobil, and Shell, and these companies are responsible for, among others, their capture installations to transport CO_2 to Porthos. These customers received SDE++ subsidies. The Porthos investment is a not-for-profit investment, and partly resulted from the shareholder policy in which leadership in the sustainability is a key element.

Gas Access to Europe (Gate) Terminal – The Netherlands			
Organisation	Gasunie (50%) and Vopak (50%)	Type of investment	• Terminal equipment and 'superstructure' like warehouses • Pipelines for fuels, steam, CO_2, or heat
Governance model	Public-Private Partnership	Short project description	LNG import terminal in the Port of Rotterdam, supplied by countries worldwide and contributing to Europe's natural gas supply.
Business model	Not relevant	Value creation of the investment	**Users:** providing a less polluting fuel for vessel and truck transport, LNG. **Society:** reduction in emissions and diminished noise pollution result from using LNG-powered vessels and trucks, as they operate more quietly compared to those running on diesel and heavy fuel oil.

Description of relevant policy framework

At the European level, the Trans-European Energy Network (TEN-E) policy to improve energy infrastructure links across the EU to achieve its energy and climate goals has led to the Connecting Europe Facility (CEF) funding instrument aiming to support energy infrastructure investments in the TEN-E network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

In the Netherlands, at a national level, the Havennota is a policy that outlines the country's ambition for its ports. The ambition of the Dutch government is to maintain the strong position of Dutch ports in the future economy, which is sustainable, digital, and interconnected. Cooperation, between Dutch ports but also with other stakeholders, is seen as key element to maintain the strong position of Dutch ports. For projects related to sustainable and long-term economic growth in the Netherlands, one can appeal to the National Growth Fund. However, the National Growth Fund is in phase-out stage. As of 2022, infrastructure-specific projects have become part of the Mobility Fund. Another potential funding source for infrastructure projects might include the Delta Fund. This fund is part of the Delta Programme, with the aim to protect the Netherlands from flooding, a shortage of freshwater, or the effects of extreme weather. Projects within this Delta Programme are often (partially) funded with the Delta Fund.

Description of funding (sources) of the investment

IFI loan:

- EIB

Commercial bank loan:

- Bank syndicate including Banco Bilbao Vizcaya Argentaria S.A., Bayerische Landesbank, BNP Paribas, Calyon, DnB NOR Bank ASA, Fortis Bank N.V., ING Bank N.V., Rabobank, Royal Bank of Scotland plc, and Svenska Handelsbanken.

Description of organisation model for the investment

Gate Terminal is a joint venture between Gasunie and Vopak. Gasunie is a Dutch infrastructure and transport company responsible for a pipeline network in the Netherlands and Germany, and is fully owned by the Dutch government. Vopak is an independent tank terminal operator worldwide. The project costs are for 15% financed with own equity, the other 85% is financed by the European Investment Bank loan and the bank syndicate.

Sea Lock IJmuiden – The Netherlands			
Organisation	Dutch Ministry of Infrastructure and Water Management	Type of investment	Maritime access (not included as investment category)
Governance model	Public-Private Partnership	Short project description	Construction of the world largest sea lock, located in Ijmuiden at the entrance of the North Sea Canal, to accommodate larger vessels in the Port of Amsterdam.
Business model	Not relevant	Value creation of the investment	**Users:** allowing for larger vessels and increased traffic flow decreases waiting times. **Society:** the sea lock manages water levels, decreasing flooding risks and lower waiting times reduces pollution.

Description of relevant policy framework (non-exhaustive)

At the European level, the Trans-European Transport Network (TEN-T) policy to improve transport infrastructure links across the EU has led to the Connecting Europe Facility (CEF) funding instrument aiming to support infrastructure investments in the TEN-T network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

In the Netherlands, at a national level, the Havennota is a policy that outlines the country's ambition for its ports. The ambition of the Dutch government is to maintain the strong position of Dutch ports in the future economy, which is sustainable, digital, and interconnected. Cooperation, between Dutch ports but also with other stakeholders, is seen as key element to maintain the strong position of Dutch ports. For projects related to sustainable and long-term economic growth in the Netherlands, one can appeal to the National Growth Fund. However, the National Growth Fund is in phase-out stage. As of 2022, infrastructure-specific projects have become part of the Mobility Fund. Another potential funding source for infrastructure projects might include the Delta Fund. This fund is part of the Delta Programme, with the aim to protect the Netherlands from flooding, a shortage of freshwater, or the effects of extreme weather. Projects within this Delta Programme are often (partially) funded with the Delta Fund.

Description of funding (sources) of the investment

International grant:

- CEF Transport (for projects related of the TEN-T programme of the EU)

IFI loan:

- EIB

Internal financing:

- Ministry of Infrastructure and Water Management
- Province of North Holland
- Port of Amsterdam (with the City of Amsterdam as shareholder)

Description of organisation model for the investment

The project includes a cooperation between the Ministry of Infrastructure and Water Management, the Province of North Holland, the City of Amsterdam, the Municipality of Velsen, and the Port of Amsterdam. The Ministry of Infrastructure and Water Management has awarded the contract for the construction of the new Sea Lock IJmuiden to a private consortium: OpenIJ. This consortium – comprising BAM-PGGM, VolkerWessels, and DIF – is responsible for the design, construction, and financing of the new sea lock, as well as its maintenance for a period of 26 years. Van Oord – Boskalis is responsible for the dredging works.

Circulands – The Netherlands			
Organisation	Groningen Seaports	Type of investment	Land for port industries such as fuel production
Governance model	Public-Private Partnership / Corporatised state-owned port development company (SO-PDC)	Short project description	Circular industrial park in the area of Oosterhorn-Zuid, Delfzijl, part of Groningen Seaports. The industrial park is especially for green chemistry and circular companies.
Business model	Landlord	Value creation of the investment	**Users:** availability of land, synergies with the other companies located on the industrial park. **Society:** reduction of emissions by recycling resources and stimulating circular innovation.

Description of relevant policy framework

At the European level, the Trans-European Energy Network (TEN-E) policy to improve energy infrastructure links across the EU to achieve its energy and climate goals has led to the Connecting Europe Facility (CEF) funding instrument aiming to support energy infrastructure investments in the TEN-E network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

In the Netherlands, at a national level, the Havennota is a policy that outlines the country's ambition for its ports. The ambition of the Dutch government is to maintain the strong position of Dutch ports in the future economy, which is sustainable, digital, and interconnected. Cooperation, between Dutch ports but also with other stakeholders, is seen as key element to maintain the strong position of Dutch ports. For projects related to sustainable and long-term economic growth in the Netherlands, one can appeal to the National Growth Fund. However, the National Growth Fund is in phase-out stage. As of 2022, infrastructure-specific projects have become part of the Mobility Fund. Another potential funding source for infrastructure projects might include the Delta Fund. This fund is part of the Delta Programme, with the aim to protect the Netherlands from flooding, a shortage of freshwater, or the effects of extreme weather. Projects within this Delta Programme are often (partially) funded with the Delta Fund.

Description of funding (sources) of the investment

Internal financing:

- Groningen Seaports funds the first phase of the project itself.

Description of organisation model for the investment

Groningen Seaports is the manager of the circular industrial area, Circulands. Groningen Seaports selects companies based on their added value to the already existing raw material streams in the area. Groningen Seaports is the main investor of the project. The contracted companies themselves are in charge of their plant construction works, including its financing.

CO_2 Terminal Esbjerg – Denmark			
Organisation	Port Esbjerg	Type of investment	Terminal equipment and 'superstructure' like warehouses
Governance model	State-owned PDC	Short project description	The CO_2 terminal allow large users to transport their CO_2 to the intermediate storage in Port Esbjerg prior to shipment and storage in the reservoirs in the North Sea.
Business model	Landlord	Value creation of the investment	**Users:** solution for captured CO_2. **Society:** reduced GHG emissions.

Description of relevant policy framework

At the European level, the Trans-European Transport Network (TEN-T) policy to improve transport infrastructure links across the EU has led to the Connecting Europe Facility (CEF) funding instrument aiming to support infrastructure investments in the TEN-T network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

At the national level, Denmark has a port policy aimed at securing the ports are run by autonomous state/municipally owned organisations and are frontrunners in the transition towards energy hubs. National funding is available for sustainability projects, including the CCUS Fund, a market-based, technology-neutral fund aimed at supporting carbon capture, storage and utilisation. The Danish government also aims for a larger role of Danish pension funds in financing investments of port companies.

Description of funding (sources) of the investment

International grant:

- EIB Loan

Internal financing:

- Port of Esjberg; Port Esbjerg is a self-governing port, owned by the municipality and reinvest all profits to strengthen the port complex.

Description of organisation model for the investment

Port Esbjerg offers the CO_2 storage facility as an 'open access' facility to industrial users. The aim is to attract industrial clusters to transport their CO_2 to the intermediate storage in Port Esbjerg prior to shipment and storage in the reservoirs in the North Sea. Port of Esbjerg operates the facility in close partnership with users, some of which such as TotalEnergies collaborate in project Bifrost. Users have committed to injecting CO_2 by 2030 'under the right circumstances'. Users pay for storage and handling to Port of Esbjerg.

Shore Power Cruise – Norway			
Organisation	Port of Oslo	Type of investment	Onshore Power Supply and electricity infrastructure
Governance model	Corporatised state-owned port development company (SO-PDC)	Short project description	Installation of shore power system for cruise ships in the Port of Oslo.
Business model	Landlord	Value creation of the investment	**Users:** energy purchased by vessels via shore power is exempt from the EU's Emission Trading Scheme, regardless of the sustainability of electricity generation. **Society:** reduction in emissions and noise pollution.

Description of relevant policy framework

At the European level, the Trans-European Transport Network (TEN-T) policy to improve transport infrastructure links across the EU has led to the Connecting Europe Facility (CEF) funding instrument aiming to support infrastructure investments in the TEN-T network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

At the national level, the Maritim21 is Norway's strategy from the Ministry of Trade, Industry, and Fisheries. By 2030, Norway's main ambition is to establish itself as global leader in the maritime industry by taking a role at the forefront of the green transition. Value creation and employment are important criteria for development of the maritime industry. Key strategic priorities include advancing digitalisation, implementing low and zero-emission technologies and solution, and promoting environmentally friendly and safe maritime transport, while partnering up with important stakeholders, such as port authorities.

Description of funding (sources) of the investment

National grant:

- ENOVA

Internal financing:

- Port of Oslo

Description of organisation model for the investment

The organisation of the shore power for cruise mainly includes the Port of Oslo itself, with partially funding of ENOVA, an enterprise owned by the Ministry of Climate and Environment that manages funds from the Climate and Energy Fund. ENOVA funded over 40% of the total costs for the shore power facility at Revierkaia. The Port of Oslo has also received funding from ENOVA for the shore power facilities at Filipstadkaia, this is still under construction. By 2025, all cruise ships in the Port of Oslo will have access to onshore power.

NEXIGEN – Spain			
Organisation	Port of Barcelona	Type of investment	Onshore Power Supply and electricity infrastructure
Governance model	Public sector embedded port authority (PA)	Short project description	Infrastructure investment to electrify the container traffic (BEST terminal), ferries and cruise ship docks in the Port of Barcelona.
Business model	Landlord	Value creation of the investment	**Users:** energy purchased by vessels via shore power is exempt from the EU's Emission Trading Scheme, regardless of the sustainability of electricity generation. **Society:** reduction in emissions and noise pollution.

Description of relevant policy framework

At the European level, the Trans-European Transport Network (TEN-T) policy to improve transport infrastructure links across the EU has led to the Connecting Europe Facility (CEF) funding instrument aiming to support infrastructure investments in the TEN-T network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

At the national level, Spain has a National Strategy for Maritime Security 2024, which aims to safeguard Spain's maritime interests, strengthen its maritime capabilities, and improve the safety of its seas. Collaboration with other states and (international) organisations is also highlighted in the strategy. In Spain, there is also an 'OPS Master Plan for Spanish Ports', part of the National Action Framework to establish infrastructure to support the use of alternative fuels within the transport sector. The OPS Master Plan is partially funded by CEF Transport funds. On regional level, Catalonia has its own strategy: the 2030 Maritime Strategy of Catalonia. The vision for 2030 is described as follows: 'Catalonia fully develops the blue economy potential of its maritime space, thus guaranteeing social and territorial balance, based on resilient, biodiverse and fully functional ecosystems that generate top quality services for society'. One of the goals include the development modern and sustainable maritime tourism. The Catalonian strategy scope excludes transport itself but includes maritime space in a broad sense.

Description of funding (sources) of the investment

International grant:

- CEF Transport (for projects related of the TEN-T programme of the EU)
- NextGenerationEU (Support Programme for Sustainable and Digital Transport, within the framework of the Recovery, Transformation and Resilience Plan)

Internal financing:

- Port of Barcelona

Description of organisation model for the investment

The preliminary studies were co-financed by CEF Transport (grant). The pilot phase of the project is (partially) financed by NextGenerationEU grants. The Port of Barcelona itself invests in the project as well. The Port of Barcelona has issued a tender for the supply of the electricity for the BEST container terminal in the port, one of the terminals which is part of the pilot.

Green Ports Madeira – Portugal			
Organisation	APRAM - Portos da Madeira: • Port of Funchal • Port of Caniçal • Port of Porto Santo	Type of investment	• Onshore power supply and electricity infrastructure • Production of electricity (e.g. solar, wind) and fuels
Governance model	Public sector embedded port authority (PA)	Short project description	The 'Green Ports Madeira' project comprises different investments, which include onshore power supply in the three ports, generating renewable energy in the port itself (solar panels, etc.), and an electric vehicle charging station.
Business model	Port of Funchal: public service port Port of Caniçal: tool port Port of Porto Santo: public service port	Value creation of the investment	**Users:** energy purchased by vessels via shore power is exempt from the EU's Emission Trading Scheme, regardless of the sustainability of electricity generation. **Society:** vessels disabling their generators while berthed will lead to improvements in noise pollution and air quality.

Description of relevant policy framework

At the European level, the Trans-European Transport Network (TEN-T) policy to improve transport infrastructure links across the EU has led to the Connecting Europe Facility (CEF) funding instrument aiming to support infrastructure investments in the TEN-T network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

At the national level, Portugal has a Maritime Spatial Situation Plan (PSOEM), which is a planning tool for the national maritime space. The plan's aim is to encourage alignment among competing uses and activities, to foster a more efficient economic utilisation of the maritime environment while minimising the negative effects of human actions on the marine ecosystem. This plan is in line with the purpose of Portugal's National Ocean Strategy (NOS) to strengthen the ocean's role in Portugal's economy and foster a thriving marine environment that enhances the well-being of Portuguese citizens.

Description of funding (sources) of the investment

The idea is to bundle all the different investments to obtain one single funding instrument. From MTBS' perspective, the combined investments may be suitable for CEF; however, it is still uncertain whether the funding will be secured. In a port like Funchal, with a high demand for shore power, OPS investments may be financially viable by themselves, not requiring support from concessional finance.

Description of organisation model for the investment

APRAM – Portos da Madeira is the port authority and port developer of Madeira. As currently envisioned, APRAM will be the owner of the OPS infrastructure and act as service provider. Electricidade da Madiera is the electricity provider in Madeira, which will be providing electricity for the onshore power supply. The shipping lines will be the primary clients and will pay for using the infrastructure.

Zagreb Deep Sea Container Terminal – Croatia			
Organisation	Port of Rijeka Authority	Type of investment	New sites for terminals
Governance model	Public-Private Partnership / corporatised state-owned port development company (SO-PDC)	Short project description	Construction of the second container terminal in the Port of Rijeka, adding more than 1 M TEU capacity in the Port of Rijeka. The Zagreb Deep Sea Container Terminal is part of the Rijeka Gateway Project, aiming to modernise port facilities.
Business model	Landlord port	Value creation of the investment	**Users:** increase in container capacity due to increased depth and a pier length increase, reducing congestion and turnaround times for vessels. **Society:** economic growth, creation of jobs, lowering environmental footprint as volumes are shifted from road to rail.

Description of relevant policy framework

At the European level, the Trans-European Transport Network (TEN-T) policy to improve transport infrastructure links across the EU has led to the Connecting Europe Facility (CEF) funding instrument aiming to support infrastructure investments in the TEN-T network. In addition, the European Investment Bank provides economic support to projects including green transport corridors.

At the national level, the Croatian Transport Development Strategy 2017-2030 outlines the objectives related to different transport sectors, including objectives specific to maritime transport. Objectives for maritime transport include, among others, the development of the Port of Rijeka and increased competitiveness, improving reliability and the supply chain, while considering economic and sustainable factors. The Transport Development Strategy was developed by the Ministry of the Sea, Transport, and Infrastructure, in line with objectives of the EU, and is co-financed by the EU (European Regional Development Fund).

Description of funding (sources) of the investment

International grant:

- CEF Transport (for projects related of the TEN-T programme of the EU)

IFI loan:

- World Bank loans

Internal financing:

- APM Terminals/ENNA Logic Group Consortium

Description of organisation model for the investment

The Port of Rijeka Authority is the port authority in the port and is responsible for the infrastructure. The APM Terminals/ENNA Logic Consortium is the concessionaire of the terminal for 50 years, a period which started in 2021. The consortium is responsible for the formalisation of the project, including design, construction, and operations of the Zagreb Deep Sea Container Terminal. The consortium is responsible for the financing of the equipment and superstructure.

Burnaby Rail Corridor Improvements – Canada			
Organisation	Vancouver Fraser Port Authority	Type of investment	Landside port infrastructure
Governance model	Corporatised state-owned port development company (SO-PDC)	Short project description	Multiple improvements which allow the Port of Vancouver to increase transportation efficiency and trade capacity for its port terminals. By constructing a new four-lane overpass 'Holdom Overpass' over the existing railway, conflicts between road and rail traffic can be reduced.
Business model	Landlord	Value creation of the investment	**Users:** reduction in rail travel times and improved transportation to the terminals in the Port of Vancouver. **Society:** improved public safety, connectivity, and reductions of emissions.

Description of relevant policy framework

At the national level, Canadian ports fall under the Canada Marine Act (1998) by the Ministry of Transport: transportation regulations to improve efficiency and safety. Since the enactment, it has increased competitiveness, efficiency, and commercial focus of Canadian ports, and led to the establishment of Canadian Port Authorities (CPAs). CPAs are 'federally incorporated, autonomous, non-share corporations that operate at arm's length from the federal government, who is the sole shareholder'. CPAs should be financially self-sufficient; only since 2008, CPAs can apply for government funding.

Description of funding (sources) of the investment

National grant:

- National Trade Corridors Fund

Internal financing:

- Vancouver Fraser Port Authority
- Canadian National Railway Company (CN)

Description of organisation model for the investment

The project leader is the Vancouver Fraser Port Authority, in collaboration with the City of Burnaby, CN, and the Canadian Government. The Vancouver Fraser Port Authority is responsible for the planning, design and construction. After completion of construction, the City of Burnaby will become the owner of the overpass. Aecon-Gateway Group is selected as design and constructor party of the overpass. CN has already executed rail improvements.

Centerm Expansion and South Shore Access – Canada			
Organisation	Vancouver Fraser Port Authority	Type of investment	• Terminal equipment and 'superstructure' like warehouses • Landside port infrastructure
Governance model	Corporatised state-owned port development company (SO-PDC)	Short project description	Expansion of the Centerm container terminal, increasing the container handling capacity by two-thirds, by limitedly increasing the terminal footprint, and improving nearby road and rail infrastructure for the Port of Vancouver.
Business model	Landlord	Value creation of the investment	**Users:** increasing capacity allows for lower waiting times and larger volumes. **Society:** decrease in road traffic as more goods can be transported by vessel and reduction in emissions as a result. Centerm Community Fund created by port authority and DP World to show gratitude to the local community during construction works.

Description of relevant policy framework

At the national level, Canadian ports fall under the Canada Marine Act (1998) by the Ministry of Transport: transportation regulations to improve efficiency and safety. Since the enactment, it has increased competitiveness, efficiency, and commercial focus of Canadian ports, and led to the establishment of Canadian Port Authorities (CPAs). CPAs are 'federally incorporated, autonomous, non-share corporations that operate at arm's length from the federal government, who is the sole shareholder'. CPAs should be financially self-sufficient; only since 2008, CPAs can apply for government funding.

Description of funding (sources) of the investment

National grant:

- National Trade Corridors Fund (for South Shore Access)

Internal financing:

- Vancouver Fraser Port Authority
- DP World (for Centerm Expansion)

Description of organisation model for the investment

The project(s) are delivered by the Vancouver Fraser Port Authority, in cooperation with Centerm container terminal operator DP World. DP World has invested in the expansion. The Centerm expansion itself was completed by Centennial Expansion Partners, a joint venture partnership.

Cargo Handling Equipment Mondernisation Program – United States			
Organisation	Port Authority of New York and New Jersey	Type of investment	Terminal equipment and 'superstructure' like warehouses
Governance model	Public sector embedded port authority (PA)	Short project description	Incentivising terminal operators in modernising their cargo handling equipment.
Business model	Landlord	Value creation of the investment	**Users:** cleaner work environment, cost savings, and improved efficiency with newer equipment. **Society:** reduction in emissions as it incentivises a shift towards newer and more environmentally friendly equipment.

Description of relevant policy framework

The US has passed an infrastructure law to rebuild America's transport infrastructure. This includes a goal to modernize ports and tackle the climate crisis. The infrastructure law provides more than 2 billion from 2022 through 2026. The resulting port action plan includes the maritime administration's (MARAD) port infrastructure development program (PIDP), that aims to strengthen supply chains. Grant funding has been provided to various projects to improve port facilities, with further funding may become available.

Description of funding (sources) of the investment

National grant:

- Congestion Mitigation Air Quality grant (US Department of Transportation)

Internal financing:

- Tenants of New Jersey Marine Terminals

Description of organisation model for the investment

Tenants of New Jersey Marine Terminals with off-road container cargo handling equipment can get 20% of the purchase price reimbursed by the port authority, with a maximum reimbursement of USD 20k per cargo handling equipment unit. Old equipment must be discarded to be eligible for the reimbursement. The Port Authority of New York and New Jersey reimburses the purchase price with the Congestion Mitigation Air Quality grant (total grant value comprises USD 2 M).

Port Expansion – Chile			
Organisation	Port of Valparaíso	Type of investment	New sites for terminals
Governance model	Corporatised state-owned port development company (SO-PDC)	Short project description	Expansion of the Port of Valparaíso in Chile by developing Terminal 2, increasing the port's capacity with 1 M TEU.
Business model	Landlord	Value creation of the investment	**Users:** increased capacity allows for lower waiting times and higher volumes. **Society:** increase in trade, boosting the local economy.

Description of relevant policy framework

The national port logistics development policy for Chile contains a roadmap with guidelines for the development of this industry, aimed at improving efficiency and sustainability. The port companies are state owned and financially self-sustainable, public funding is available for specific projects of national interest that serve public interests.

Description of funding (sources) of the investment

Internal financing:

- Port of Valparaíso (EPV): the state-owned PDC will invest around USD 600 million in the expansion. EPV can fund this partially from internal reserves. For the remaining part EPV uses the national financial system, i.e. receives funding from the Ministry of Finance. Such funding can either be equity or loans. In any case, a condition for such funding is that the expansion investment is economically viable.

Description of organisation model for the investment

The expansion consists of an expansion of the current container terminal, a newly developed terminal which can handle over 3 million tons of breakbulk cargo as well as cruise ships and various cargo types. This multipurpose infrastructure will facilitate the transfer of breakbulk cargo when cruise ships are not in service, with cruise operations given priority. EPV is making the investments in port infrastructure (land, quay). The complete set of activities is concessioned (through competitive bidding) to one operator, given the operational synergies involved. This operator invests in cargo handling equipment and facilities to handle the cruise vessels.

New Container Terminal – Namibia			
Organisation	Namibian Ports Authority (Namport)	Type of investment	New sites for terminals
Governance model	Corporatised state-owned port development company (SO-PDC)	Short project description	Construction of a new container terminal on reclaimed land in the Port of Walvis Bay in Namibia, increasing the port's capacity with more than 750k TEU per year.
Business model	Landlord	Value creation of the investment	**Users:** increased capacity decreases waiting times and allows for larger volumes. **Society:** increased trade and economic activity.

Description of relevant policy framework

In Namibia, the Namibian Ports Authority Act 2 of 1994 is a law which led to the establishment of the Namibian Port Authority. The law outlines the mandate, roles and responsibilities for Namport, which is made responsible for the management and development of the ports by this law. Additionally, in the Namibian Transport Policy the Namibian vision, objectives, and strategies are set out, including for maritime transport. The vision is to establish a maritime transport system that is efficient, safeguarded, economically friendly, and well connected with (inter)national markets.

Description of funding (sources) of the investment

IFI loan:

- African Development Bank loan

Internal financing:

- Namibian Ports Authority

Description of organisation model for the investment

The construction of the new container terminal in the Port of Walvis Bay was initiated by Namport. The African Development Bank has issued a loan for the development of the terminal. The container terminal was built by China Harbour Engineering Company. Terminal Investment Namibia, a subsidiary of Mediterranean Shipping Company (MSC), was awarded the tender to operate the terminal.

Green Marine Fuel Market – South Africa			
Organisation	World Bank	Type of investment	Production of electricity (solar, wind) and fuels
Governance model	N/a	Short project description	Study on creating a green fuel value chain for the supply of zero carbon bunker fuels in the ports of Boegoebaai and Saldanha.
Business model	N/a	Value creation of the investment	**Users:** access to green sustainable fuels, which enables shipping lines to meet requirements set by policymakers. **Society:** decrease in emissions, economic improvements, more competitive market.

Description of relevant policy framework

At the national level, South Africa has developed a Green Hydrogen Commercialisation Strategy, recognising ports as essential drivers for advancing green hydrogen development. South Africa's policy frameworks for establishing a green marine fuel market focus on promoting sustainable energy, reducing carbon emissions, and aligning with international environmental standards. Key elements include support for green hydrogen production, utilising renewable resources to produce low-carbon fuels, and developing port infrastructure to facilitate green fuel storage and distribution. These policies aim to position South Africa as a leader in green marine fuel in alignment with global decarbonisation goals, while also addressing the country's energy challenges through increased renewable energy generation and strategic investment in port facilities.

Description of funding (sources) of the investment

Project is in beginning stage. However potential funding sources could include:

- National grants
- IFI loans: World Bank
- Internal financing: Transnet National Ports Authority

Description of organisation model for the investment

The World Bank, together with MTBS, and other stakeholders has developed a study on creating a green value chain for the supply of zero carbon fuels in the ports of Boegoebaai and Saldanha in South Africa. The study outlines the various steps to be taken and potential feasibility of creatin a green marine fuel market in South Africa. Included in the study are multiple financial options for the financing of such investment, including an example of how the World Bank is supporting the Brazilian government in creating a hydrogen hub.

Deep Water Berths – United Arab Emirates			
Organisation	RAK Ports	Type of investment	Port infrastructure and equipment
Governance model	Corporatised state-owned port development company (SO-PDC)	Short project description	Construction of deep-water berths in the Saqr Port, part of RAK Ports in the United Arab Emirates.
Business model	Integrator port	Value creation of the investment	**Users:** larger vessels, increased capacity and traffic. **Society:** increased trade, stimulating the (local) economy.

Description of relevant policy framework

At the national level, in the United Arab Emirates, the UAE Net Zero by 2050 initiative has been established, aiming to net-zero emissions by 2050 in alignment with the objectives of the Paris Agreement. This ambition is consistent with the Principles of the 50, a UAE framework outlining the nation's strategic vision for development. The Principles of the 50 serve as a comprehensive guide for all entities operating within the UAE, emphasising priorities in economic, political, and social advancement.

Specifically for Ras Al Khaimah, the government aims to boost economic growth by attracting investments, especially foreign direct investment (FDI). The ports are operated by RAK ports, a state-owned company which is financially self-sustaining and pays dividend. There is no policy for state funding for port infrastructure, though funding may be provided in case of a clear funding gap.

Description of funding (sources) of the investment

Internal financing:

- RAK Ports has financed the project itself, from its EBITDA (Earnings before Interests, Tax, Depreciation and Amortisation). RAK Ports is paying substantial dividends to the state. RAK Ports can re-invest the available free cash flow in new projects provided that these have a positive business case.

Description of organisation model for the investment

RAK Ports operates with an integrator business model, i.e. it provides terminal services as well as towage and pilotage in-house. RAK Ports uses the newly developed capacity to serve its industrial customers, exporters quarry products such as limestone and aggregates. The main customers are state-owned mining companies such as Stevin Rock and RAK Rock.

Port Rail Transformation – Australia			
Organisation	Port of Melbourne	Type of investment	Landside port infrastructure
Governance model	Private port development company (PO-PDC)	Short project description	Construction and improvement of railways to increase rail capacity and improve rail operations to shift container volumes from road to rail.
Business model	Landlord	Value creation of the investment	**Users:** decrease in congestion leads to lower waiting times and increased efficiency. **Society:** decrease in congestion, noise and emission as railway transport usage increases and road transport for containers decreases.

Description of relevant policy framework

At the national level, Australia has a rail system with a separation of rail infrastructure management and train operations, with various rail infrastructure owners and >50 'above-rail' operators. Australia's rail infrastructure is made up of different rail networks with different systems. A National Rail Action Plan (NRAP) is focussed on getting rail to operate as a single system. A National Network for Interoperability (NNI) identifies rail corridors where interoperability is a key priority. These include the corridors that link Australia's major ports to major origin/destination regions. Australia's main ports, including Melbourne are included in the NNI. Rail Access Guidelines by the Victoria (the state in which Melbourne is located) State Government outline the requirements for rails, including rail standards in line with the interoperability goals.

Description of funding (sources) of the investment

Local/regional grant:

- Victorian Government

Internal financing:

- Port of Melbourne

Description of organisation model for the investment

Part of the investment is financed by revenues of increased import container charges (for proposal costs). Another part is financed by the Victorian Government. The port is obligated by lease contract to make a modal shift towards rail use. The Victorian Government had to approve the proposed investment submitted by the Port of Melbourne.

Appendix II Summaries Policy Frameworks for Selected Investment Types

Table AII-1 The Policy Framework for Advancing Investments in New Sites for Terminals; Key Aspects of Selected Countries

Selected Countries	Policy Framework for New Sites for Terminals
Croatia	The state-owned port company of Croatia's main port (Rijeka) is organisationally autonomous, but the financial accounts are included in the state budget. In case the state approves investments in new terminal sites, the investments are financed from the state budget. The EU 'cohesion fund' policies, targeted specifically at a group of less wealthy member states, frequently lead to substantial EU (TEN-T) funding.
Brazil	The development of new port sites is often done as private initiative, without public funding (at the state or federal level). In the state-owned ports, port expansion is financed by the state-owned port company, based on future revenues.
Canada	Canada's main ports are run as federal ports termed Canada Port Authorities (CPAs). CPAs are federally incorporated, autonomous, non-share corporations that operate at arm's length from the federal government, who is the sole shareholder. CPAs are able to set their own fees and are financially self-sufficient. CPAs finance their operations from their revenues and borrow from commercial banks for capital projects. They do not receive funding from the government to meet operating costs or deficits. They do not receive federal government loans, or any federal government guarantees of commercial loans. Prior to 2008, CPAs could not apply for federal funding in general federal funding programs, currently, they can apply for funding in the same way as private companies can. There are federal funding programs, especially for landside infrastructure.
US	At the federal level, MARAD's USD 2.25 billion Port Infrastructure Development Program (PIDP) provides grants to improve port infrastructure to meet freight transportation needs. At the state level, states (for instance Louisiana) may and often do provide grants for port expansion projects based on cost-benefit analysis.
South Africa	In South Africa, the state-owned port development company (TNPA) takes the initiative for developing additional terminal capacity, based on a business case approach, without state funding.
Oman	In Oman, the partly state-owned port development companies take the initiative to develop new land for terminals. Initially, the government made huge investments in ports infrastructure, which was given in concession to the PDCs. In a later stage of the development of the ports industry, the role of public funding is reduced and the PDCs invest in expansion in a business case driven approach, potentially with minor public funding.
EU	In most EU countries (except Malta and Greece), state-owned PDCs take the initiative to develop expansion plans. The PDCs generate two revenue streams from new terminals: land lease fees from an operator and port dues from ships. If these revenues are insufficient for a viable business case, the national government can provide grants, in case cost-benefit analysis shows a sufficiently high 'societal return on investments'. The PDCs, if supported by the national government, can and frequently do seek additional EU TEN-T funding.

Table AII-2 The Policy Framework for Advancing Investments in OPS Facilities; Key Aspects of Selected Countries

Selected Countries	Policy Framework for OPS Facilities
The Netherlands	The Dutch Government has developed a specific grant scheme to promote investments in OPS. The scheme (running from 2024 to 2027) can provide a maximum of 35% the total investment costs and is open for submissions of any kind of organisation (terminal operator, PDC, energy company or a JV of these) that wants to provide OPS services. On top of this Dutch subsidy, Dutch Seaports have submitted proposals and received grants for EU funds (Connecting Europe Facility and Horizon innovation projects) for OPS projects.
Croatia	No national specific funding program for OPS, but especially as 'cohesion country' investments in OPS are funded largely through EU grants.
Brazil	No national specific funding program for OPS, no regulation for mandatory use of OPS.
Canada	No national specific funding program for OPS, although the Green Shipping Corridor Program has provided investments that include OPS in several regions, no federal regulation for mandatory use of OPS. CPAs have invested in OPS systems, especially for the cruise segment.
US	No national specific funding program for OPS, no federal regulation for mandatory use of OPS, though various states including California have made OPS mandatory.
South Africa	No national specific funding program for OPS, no regulation for mandatory use of OPS.
Oman	In Oman, there is no specific state program for OPS investments. The partly state-owned port development companies take the initiative to attract OPS service providers. The PDC of Sohar, Oman's largest industrial port is seeking a third party for providing OPS services.

Table AII-3 The Policy Framework for Advancing Investments in Terminal Equipment and 'Superstructure' like Warehouses; Key Aspects of Selected Countries

Selected Countries	Policy Framework for Terminal Equipment and 'Superstructure' like Warehouses
Spain	No financial support for such 'superstructures', in some cases the port authority invests in assets like warehouses and leases these to private operators.
Georgia	No financial support for such 'superstructures'.
Brazil	No financial support for such 'superstructures'.
Canada	No financial support for such 'superstructures'.
US	Some ports provide financial support for greening of port equipment. An example is PANYNJ, that has developed a subsidy program in which terminal operators can renew 'off-road container cargo handling equipment' can get 20% of the purchase price reimbursed by PANYNJ as part of the Congestion Mitigation and Air Quality grant program.
South Africa	No financial support for such 'superstructures'.
Oman	No financial support for such 'superstructures', warehousing companies in freezones adjacent to the port do benefit from fiscal benefits.

Table AII-3 shows that 'superstructures' are generally financed by logistics operators, often third parties. In specific cases, public support is provided for environmentally friendly equipment. Such support is not widespread and may often not be needed as greener (electric) equipment is increasingly cost competitive with diesel-powered equipment (see an AECOM study).

Table AII-4 The Policy Framework for Advancing Investments in Landside Port Infrastructure; Key Aspects of Selected Countries

Selected Countries	Policy Framework for Landside Port Infrastructure
EU	Landside port infrastructure generally is the responsibility of Member States. For both inland waterways and roads, governments generally do not recover infrastructure costs directly through user fees. For rail infrastructure, national state-owned rail infrastructure managers generate revenues from user charges. New infrastructure is financed by the Member States, with substantial funding from the EU through the CEF funding mechanism. In some member states (e.g. Germany) the PMB owns and manages the rail tracks in the port area.
Brazil	Investments in landside port infrastructure are the responsibility of the federal and regional government.
US	Investments in landside road infrastructure are the responsibility of the federal and regional government. The majority of investments in rail infrastructure are undertaken by the private integrated railroad companies. On top of that federal funding programs contribute with grants to investments in railroads, both for the large Class A railway companies and for regional rail companies.
South Africa	Investments in landside road infrastructure are the responsibility of the federal and regional government. The majority of investments in rail freight infrastructure are undertaken by the state-owned integrated railroad company Transnet Rail (a sister company of the centralised PMB TNPA (Transnet National Ports Authority) as well as the terminal operating company Transnet Terminals. Transnet rail invests in the rail infrastructure, focused on six corridors; public funding is very limited. Access by third-party operators to the Transnet rail network is foreseen.

The policy frameworks for investments in land for Port Industrial activities are very similar to the framework for investments in terminal sites. In general, such investments are based on PMB initiative with potential state support through grants.

Most countries do not envisage a large role of PMBs in the production of electricity (e.g. solar, wind) and fuels. Regulatory frameworks generally aim to encourage private sector investments. For electricity, investments are often selected through competitive bidding. Most countries do not have developed specific policy frameworks for investments in pipelines for fuels, steam, CO_2 or heat. Often, established state-owned pipeline operators play a central role in new investments.

Appendix III List of Interviewees

Disclaimer: this report is an independent study and does not reflect or include the personal opinions or views of the interviewees. The list excludes some interviewees due to privacy considerations.

- Agustina Calatayud – Inter-American Development Bank (Lead Transport Specialist)
- Antonis Michail – International Association of Ports and Harbours (IAPH) (Technical Director)
- Arne-Jan Polman – Port of Rotterdam (Coordinator Subsidy Affairs)
- Cliff Stewart – Port of Vancouver (Vice President)
- Dominik Englert – World Bank (Senior Economist)
- Eamonn O'Reilly – Former CEO Port of Dublin & Chairman ESPO
- Enrique Piraino – Port of Valparaíso (Concessions Department)
- Freda Fung – Fung Research (Director)
- Ian Gansler – American Association of Port Authorities (AAPA) (Director of Government Relations)
- Patrick Verhoeven - International Association of Ports and Harbours (IAPH) (Managing Director)
- Rico Salgmann – World Bank (Transport Specialist)
- Tine Kirk – Danske Havne (Director)
- Vojko Kocijan – Port of Rijeka Port Authority (Head of Development and Projects Department)
- Wellington Camacho – Agência Nacional de Transportes Aquaviários, Brazil (ANTAQ) (Advisor)
- Xavier Miret – Port of Barcelona (Head of Corporate Finance Department)

References

APM Terminals and DP World launch Zero Emission Port Alliance at COP28. (n.d.). *DP World*. https://www.dpworld.com/news/releases/apm-terminals-and-dp-world-launch-zero-emission-port-alliance-at-cop28/

Clean Energy Marine Hubs | Clean Energy Ministerial. (n.d.). Clean Energy Ministerial. https://www.cleanenergyministerial.org/initiatives-campaigns/hubs/

Dominioni, G., & Englert, D. (2022). *Carbon Revenues from International Shipping: Enabling an Effective and Equitable Energy Transition.* World Bank Group. https://openknowledge.worldbank.org/handle/10986/37240

ESPO (2024), ESPO Port Investment Study 2024 available at https://www.espo.be/news/espo-port-investments-study-2024-europes-ports-hav

EUROPEAN COURT OF AUDITORS (20160 Maritime transport in the EU: in troubled waters — much ineffective and unsustainable investment https://www.eca.europa.eu/lists/ecadocuments/sr16_23/sr_maritime_en.pdf

Flyvbjerg, B. (2011) Over Budget, Over Time, Over and Over Again: Managing Major Projects. In Peter W. G. Morris, Jeffrey K. Pinto, and Jonas Söderlund, eds., The Oxford Handbook of Project Management, Oxford: Oxford University Press, pp. 321-344, 2013, DOI: 10.1093/oxfordhb/9780199563142.003.0014, Available at SSRN: https://ssrn.com/abstract=2278226

Jansen, M. (2023). Ports and the Sustainable Development Goals: An Ecosystems Approach. In International Business and Sustainable Development Goals (Vol. 17, pp. 263-283). Emerald Publishing Limited.

Sornn-Friese, H., Poulsen, R. T., Nowinska, A. U., & de Langen, P. (2021). What drives ports around the world to adopt air emissions abatement measures? Transportation Research Part D: Transport and Environment, 90, 102644.

World Bank (2007) PORT REFORM TOOLKIT, available at https://ppp.worldbank.org/public-private-partnership/library/port-reform-toolkit-ppiaf-world-bank-2nd-edition

Maritime & Transport Business Solutions

address Wijnhaven 3E
P.O. BOX 601
3011 WG Rotterdam
The Netherlands
telephone +31 (0)10 286 59 40
e-mail info@mtbs.nl
internet www.mtbs.nl

mtbs
maritime & transport
business solutions