FINAL REPORT

Port Infrastructure Needs Assessment

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Association of Canadian Port Authorities

Prepared by:

cpcs

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Limitations
CPCS makes efforts to validate data obtained from third parties, but CPCS cannot warrant the accuracy of these data.

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Acronyms / Abbreviations

Acronym	Definition
AUD	Australian dollars
BRIC	Building Resilient Infrastructure and Communities
CBSA	Canada Border Services Agency
CEF	Connecting Europe Facility
CIB	Canada Infrastructure Bank
CMA	Canada Marine Act
CPA	Canada Port Authority
CSS	Centralized Scheduling System
EU	European Union
EUR	Euro currency
GHG	Greenhouse Gas
GTE	Government Trading Entities
GSCP	Green Shipping Corridor Program
HMTF	Harbor Maintenance Trust Fund
INFRA	Infrastructure for Rebuilding America
IRA	Inflation Reduction Act
NTCF	National Trade Corridors Fund
OMERS	Ontario Municipal Employees Retirement System
PIDP	Port Infrastructure Development Program
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
TARA	Transportation Asset Risk Assessment
TEN-T	Trans-European Transport Network
TEUs	Twenty-foot Equivalent Units
TIGER	Transportation Investment Generating Economic Recovery
USACE	United States Army Corps of Engineers
US	United States
USD	United States dollars
VIT	Virginia International Terminals
VPA	Virginia Port Authority
WAPA	Western Australia Port Authorities

Executive Summary

Objectives and study methodology

Transport Canada's Port Modernization Review estimated that ports and marine shipping handled nearly $113 billion (19%) of Canada's exports and $138 billion (23%) of Canada's imports.[1] The 17 Canada Port Authorities (CPAs) handle 60% of this traffic, amounting to over 340 million tonnes of cargo annually.[2] Therefore, CPAs serve as an integral part of Canada's trade and economic activity.

The objective of this study is to assess the port infrastructure needs of the 17 CPAs (until 2040) and how other jurisdictions approach sustainable infrastructure investment, particularly in the ports sector.

CPCS and ACPA developed a survey to collect data from all 17 CPAs on their infrastructure investment needs. CPCS also engaged CPAs and other supply chain stakeholders in one-on-one follow-up discussions on port infrastructure investment and the challenges faced by CPAs.

Key messages from CPAs and other supply chain stakeholders

Two clear messages emerged from discussions with CPAs and stakeholders which motivate the need for port infrastructure investment to address the challenges faced by CPAs and to ensure Canada improves its supply chain competitiveness.

1. **Canadian ports face strong competition and risk losing trade to US ports which also serve major trade gateways to the North American market.** US ports benefit from a less cumbersome project approvals process, which enables them to be more responsive to business opportunities. US ports also benefit from more coordinated infrastructure investment at a national scale.

2. **Canada competes for investment capital globally and must demonstrate an appealing business case for attracting capital.** Companies, including railways and terminal operators, are key partners for CPAs in developing infrastructure. Companies with a global presence have the option to invest in other jurisdictions should they present a better return on investment.

The US has awarded more funding to port infrastructure investment (60% more per unit of traffic) in comparison to Canada. It is important to note that this analysis does not account for differences between Canada and US in terms of the need for port infrastructure (e.g. condition of existing assets) or other differences in the funding environment that might exist. We have made this comparison based on summarizing the grant funding awarded to ports (2022-2023) and normalizing by total port traffic to obtain a ratio of funding dollars per unit of traffic (tonnes), refer to Section 3.2.3 for more detail.

In addition, the US has a greater range of funding programs available (e.g., PIDP, TIGER, RAISE, INFRA and MEGA) when compared to Canada.

[1] Transport Canada, What we heard report: Ports modernization review, (2022) Link

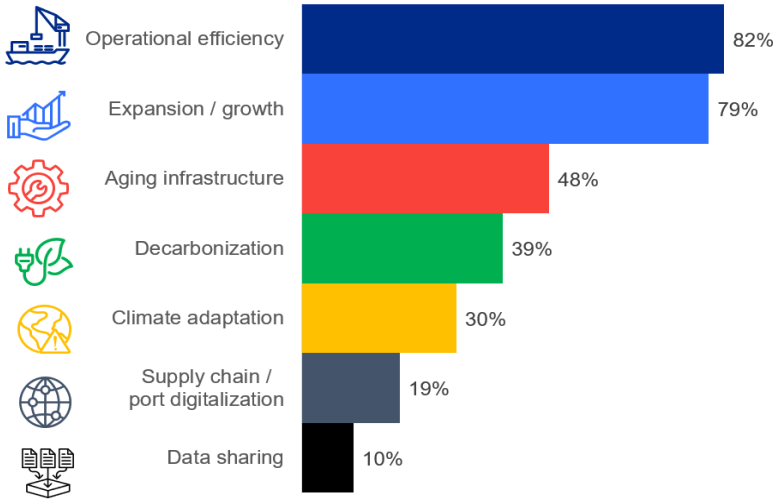
[2] Transport Canada, "Transportation in Canada – Overview Report" (2023) Link

Port infrastructure investment needs highlighted through the survey

$10 Billion	CPAs reported nearly $10 billion in capital investment for identified projects between 2024 and 2040.
$5 Billion	Over the next five years (2024 to 2028), CPAs plan to spend around $5 billion in capital infrastructure investment. The total infrastructure funding gap in this period is $1.24 billion.
61% of capital dollars are unsecured	Funding gaps are significant, 61% of identified capital spending through 2040 lacks funding, however many identified projects are still in early stages of development.
66% of unsecured capital is medium or high risk	Projects rated by CPAs as "High" or "Medium" urgency account for 66% of all unsecured capital dollars, highlighting the substantial funding required for projects with elevated risk, if they do not advance in a timely manner.
73% of near-term investment focused on new projects	New infrastructure investment is vital for future growth, with 73% of near-term capital investment (2024 to 2028) focused on new projects, particularly in landside and waterside infrastructure.
27% of near-term investment focused on rehabilitation	Aging infrastructure poses a challenge, with 27% of capital investment needs (2024 to 2028) directed toward rehabilitating critical assets like piers, docks, and breakwaters that are decades old and at risk of failure.
Most investment geared toward efficiency and growth	The largest investment themes are operational efficiency and expansion or growth, with 82% of dollars targeting operational efficiency and 79% focusing on expansion or growth (projects can have multiple themes). See Figure ES-1.

The key themes driving port infrastructure investment are summarized in Figure ES-1. Note that projects can often address multiple investment themes; this is why the total percentage in Figure ES-1 exceeds 100%.

Figure ES-1: Percentage of CPA investment ($) by project investment theme

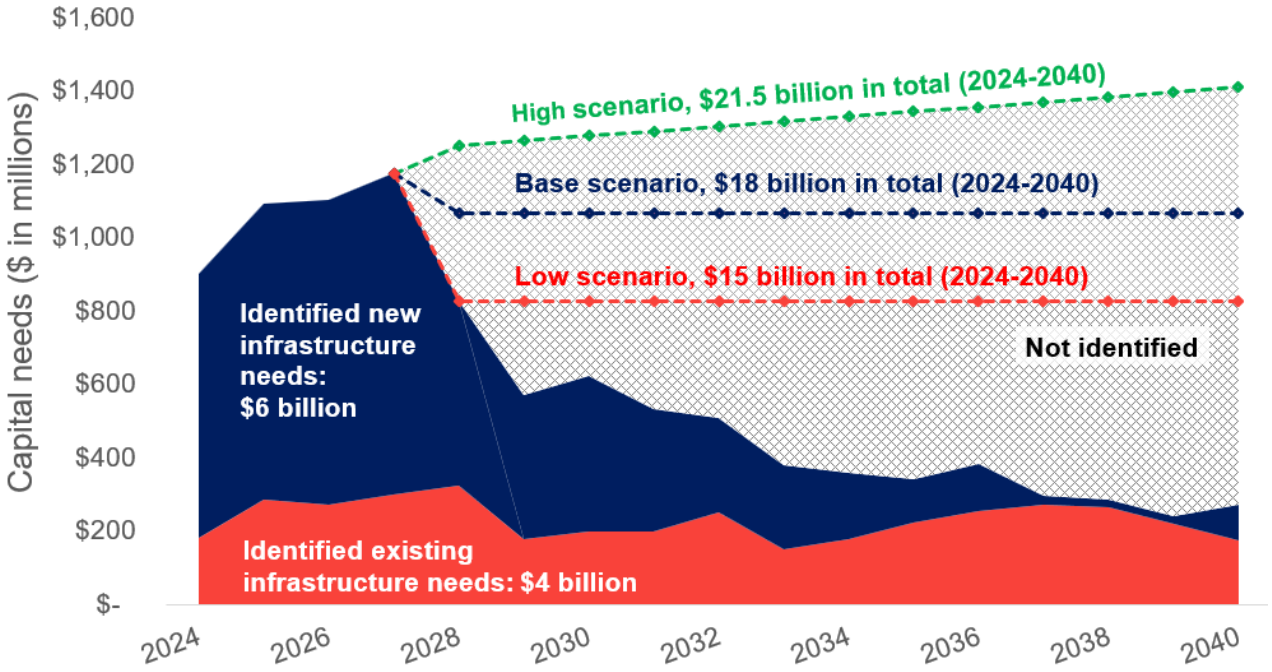


Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024).

Short-term planning cycles (five years for most CPAs) limit our ability to project long-term infrastructure needs, with many CPAs uncertain about their capital requirements beyond 2028. Therefore, the capital needs identified until 2040 (shaded dark blue area in Figure ES-2) are likely understated. To provide a more realistic sense of potential capital needs until 2040 we have developed the following illustrative scenarios.

CPA capital investment scenarios	Total potential capital investment 2024-2040
Base: Decrease to $1.1 billion (annual average 2024-2027).	$18 billion
Low: Decrease to $0.8 billion annually (2028 level).	$15 billion
High: Increase of 6.5%[3] in 2028 and 1.0% annually[4] from 2029 to 2040, to $1.4 billion.	$21.5 billion

Figure ES-2: Projection of capital investment needs for CPAs (2024 - 2040)



Investment needs identified via survey (2024 – 2040)		
Existing infrastructure[5]	New infrastructure	Total
$4 billion	$6 billion	$10 billion

Source: CPCS

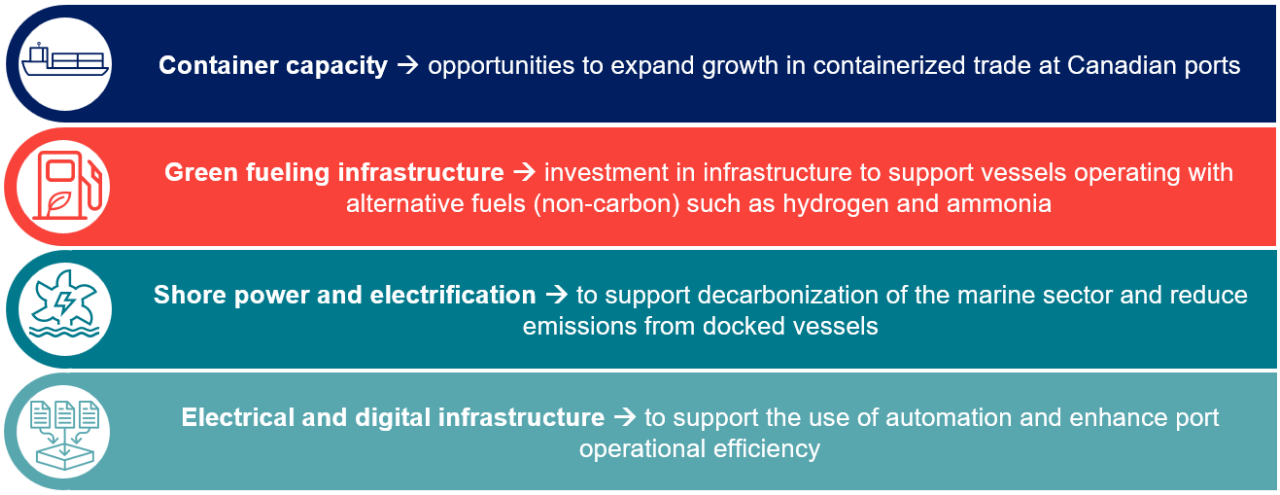
[3] Matching the year-over-year increase planned from 2025 to 2026

[4] Aligns with the planned increase in year-over-year increase in capital investment from 2026 to 2027

[5] If a port authority did not report existing infrastructure investment needs in a particular year, a rolling historical average of the previous five years was used to project their needed investment.

Investment themes over the long term

CPAs have identified the following four key future investment themes:



Insights from port infrastructure investment models in other jurisdictions

A review of port infrastructure investment models, in the US, Europe and Australia, yielded the following insights relevant to improving port infrastructure funding in Canada:

- **The financial structure of CPAs limits their financing options. Notably, CPAs cannot raise equity capital.** In the Netherlands and Australia, some port authorities have multiple owners (e.g., state and federal governments have equity stake(s) in the port authority).
- **Port authorities in other jurisdictions have access to port-specific grant funding and infrastructure investment is coordinated nationally**:
    - The US Port Infrastructure Development Program (PIDP) targets port infrastructure, whereas Canada's National Trade Corridor Fund (NTCF) program does not solely fund port infrastructure.
    - The Trans-European Transport Network (TEN-T) program coordinates investment at the European level, while the NTCF is more general and less coordinated (i.e., limited detail or planning at a national scale for investment in major trade gateways and/or corridors).

Funding challenges faced by CPAs

CPAs and other supply chain stakeholders shared several key challenges to funding port infrastructure and consequently, Canada's ability to compete globally:

- **Long timelines for permits and approvals** can limit the effectiveness of capital investment (due to cost escalation) and potentially lead to lost business opportunities. There is a need for government to reduce red tape in conjunction with making capital contributions to projects. Many CPAs indicated that 7-10 years to advance projects from pre-feasibility to construction is far too long and due to the overly cumbersome regulatory, permitting and government approval processes.

- **Limited outlook and stability of the federal funding pipeline.** The NTCF has only announced its funding allocation and "themes" one-year in advance. This limits CPAs in their ability to position (prioritize) project planning efforts to leverage the funding available. Long-term stability of funding would enable CPAs to better plan and use funding to increase the overall competitiveness of Canadian supply chains.

- **Competition for grants.** Programs like the NTCF place all CPAs—small, medium, and large—in the same competitive funding environment, even though their needs and funding requests can vary significantly.

- **Cash flow constraints for matching programs.** CPAs (notably smaller ports) can find it challenging to meet the 50% minimum threshold for matching grants such as NTCF.

Changes to the port infrastructure investment model in Canada could offer CPAs greater flexibility in obtaining funding to advance capital projects. The following merit further exploration and discussion:

- **Constraints on borrowing limits.** CPAs shared that increased flexibility would enhance their ability to deliver capital projects. Some smaller CPAs are also constrained because their borrowing limits, tied to their current revenue levels, prevent them from funding revenue-generating projects.

- **Equity ownership from local or provincial government as well as private companies with economic interests at CPAs** could provide another means for CPAs to obtain funding and financing that is currently unavailable.

Looking ahead, the US plans to continue making significant investments with the announcement of $3 billion in federal investment to come from the IRA to improve the country's port infrastructure.[6] Whereas Canada has yet to make any new funding commitments, such as renewing the NTCF, which has already awarded 90% ($4.1 billion) of its funding ($4.6 billion).

[6] MarineLink, "US Awards Nearly $3 Billion for Clean Port Projects" (2024) Link

1 Introduction

Key chapter takeaways

- The 17 Canada Port Authorities (CPAs) play a critical role in facilitating Canada's global trade, handling a significant share of exports and imports.
- When analyzing the determinates of port competitiveness, this study focuses on 1) quality and extent of multimodal connections, 2) available facilities and equipment, and the physical capacity to handle demand.
- The study aims to identify infrastructure gaps and trends influencing investment needs, providing data-driven insights for advocacy efforts.
- Operational efficiency and expansion/growth are the two largest themes behind capital investment - of all projects, 82% of investment dollars are targeted towards the theme of improving operational efficiency component, whereas 79% are related to expansion/growth (one project can have multiple themes).
- CPAs must balance being financially self-sufficient while addressing substantial infrastructure investment needs, particularly without federal borrowing support.
- Funding mechanisms like the National Trade Corridors Fund (NTCF) have been pivotal but are limited, creating challenges for long-term planning.
- CPAs face uncertainties in projecting long-term capital needs, as most focus on short-term (five-year) planning cycles.

1.1 Project scope: objectives and key questions

In this study, CPCS surveyed the infrastructure needs of CPAs to provide the Association of Canadian Port Authorities (ACPA) and interested stakeholders with data-driven insights to support efforts in communication and advocacy related to the importance of investing in port infrastructure. In addition, CPCS conducted a jurisdictional review to better understand how other jurisdictions approach sustainable infrastructure investment, particularly in the ports sector. Our study methodology is summarized in Appendix A.

The data gathered in this study will inform areas where ACPA can align the interests of its members with the strategic interests and plans of the federal government, particularly as related to major trade gateways and corridors.

This study will support ACPA's objectives by addressing the following key questions:

1. What are the infrastructure needs of CPAs over the next 15 years (until 2040)? and beyond?
    i. What is the type of infrastructure needed? (e.g., different types of physical and digital infrastructure)
    ii. What is the type of investment needed? (e.g., maintenance, rehabilitation, lifecycle replacement of existing infrastructure or new infrastructure)
2. What best practices exist in other leading international jurisdictions in regard to sustainable investing models for port infrastructure?

CPCS has aggregated Canada-wide statistics on the infrastructure needs of CPAs, with no specific attribution to any CPA. We focus on communicating key themes (e.g., challenges, opportunities, factors driving investment), which recurred during our discussions with CPAs and other stakeholders, rather than local issues.

1.2 Role of CPAs in Canada's transportation and logistics system

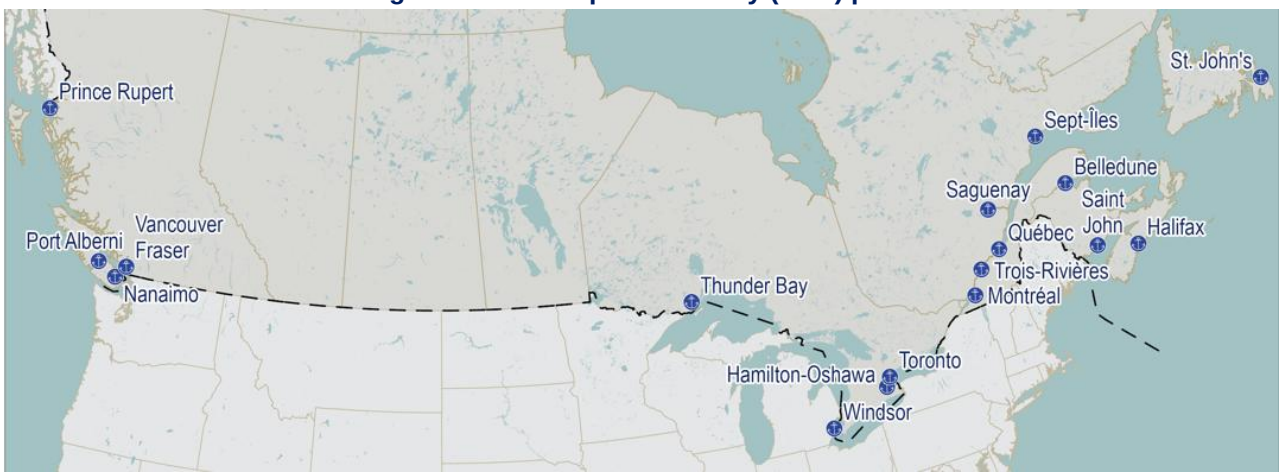
1.2.1 Rationale for Canada investing in port infrastructure

Canada's 17 Canada Port Authority (CPA) ports, which vary greatly in scale and operations, are clustered on the West Coast, Great Lakes (in Ontario), St. Lawrence River (in Québec) and the East Coast (Figure 1).

CPAs are an essential component of marine transportation and Canada's broader transportation and logistics (T&L) system. Transport Canada's Port Modernization Review estimated that ports and marine shipping were responsible for nearly $113 billion (19%) of Canada's exports and facilitated $138 billion (23%) of Canada's imports, CPAs handled 60% of this traffic[7] which amounts to over 340 million tonnes of cargo annually.[8]

In addition, marine shipping is one of the greenest forms of freight transportation. Marine shipping accounts for just 0.6% of Canada's greenhouse gas (GHG) emissions[9] and can play a key role in advancing federal priorities to achieve net zero by 2050.

Figure 1: Canada port authority (CPA) ports



Source: CPCS. Port of Hamilton and Port of Oshawa are both managed by the Hamilton-Oshawa Port Authority (HOPA).

Through their diverse facilities and locations, CPAs allow Canadian shippers to compete on global and continental markets. Port competitiveness can be defined as the ability of ports to retain and attract cargo traffic by meeting the expectations of supply chain participants (including shippers and carriers) with respect to cost, transit time, reliability and risk/information.

There are multiple determinants of port competitiveness, and they depend on the specific supply chains they are serving. The determinants most often cited include:

[7] Transport Canada, What we heard report: Ports modernization review, (2022) Link
[8] Transport Canada, "Transportation in Canada – Overview Report" (2023) Link
[9] Globe and Mail, "Canada risks falling behind in infrastructure investment and supply chain strength" (2024) Link

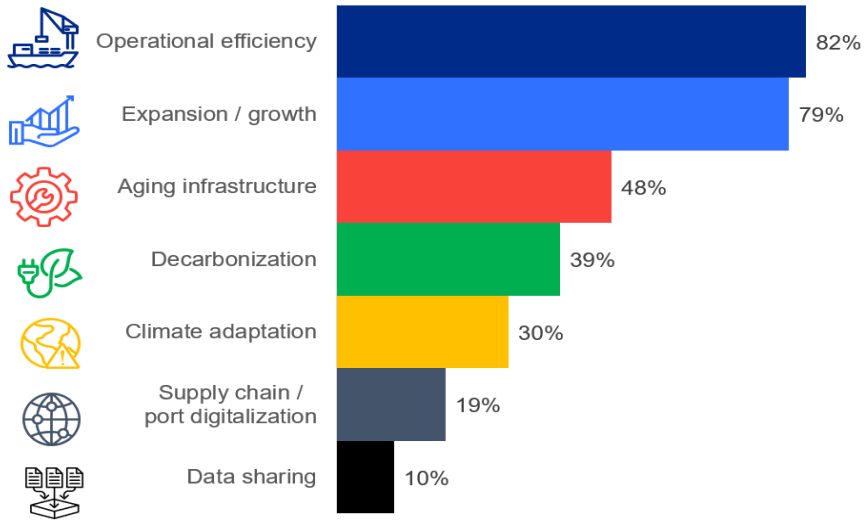
1) Proximity to natural resources and consumer/industrial demand centres, as well as to intercontinental and regional shipping routes,
2) **Quality and extent of multimodal connections,**
3) **Available facilities and equipment, and the physical capacity to handle demand,**
4) Transportations costs, and
5) Market prices for commodities.

This study explores **Bullets #2 and #3** through surveying the infrastructure needs of CPAs, notably as they face a variety of factors motivating the need for investment.

1.2.2 What are the key factors and trends impacting investment needs?

Several factors and trends are likely to influence the magnitude of port infrastructure investment needs over the next 15 years, and beyond. Infrastructure needs can vary greatly across regions and by CPA. However, there are several overarching themes to consider. A selection of these investment themes is presented below. Projects can often address multiple investment themes; this is why the total percentage in Figure 2 exceeds 100%.

Figure 2: Percentage of CPA investment ($) by project investment theme



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024).

Operational efficiency, expansion and growth for port competitiveness

CPAs and other stakeholders have discussed current and future infrastructure needs to meet growing demand. For instance, stakeholders emphasized investments in dry ports and intermodal facilities as a solution to pull cargo away from the berths, thereby reducing dwell times and facilitating prompt cargo clearance from the port. There will also be investment needed for supporting infrastructure, such as Canada Border Security Agency (CBSA) facilities.

CPAs also expressed the need to have a long-term strategic vision for Canada's trade corridors. Having a clear long-term strategy would encourage CPAs and other supply chain stakeholders to collaborate to address rising demand, enhance supply chain resilience and sustain global competitiveness.

Another factor that CPAs expressed when making investment decisions is the flexibility to have a more streamlined approval process for partnerships with the private sector. By speeding up the

government approval process CPAs believe that the setting for private investment in ports and marine infrastructure will be more attractive.

Aging infrastructure

CPAs are facing challenges managing aging infrastructure, which can be unreliable, have high maintenance costs and be more vulnerable to the impacts of climate change.

Decarbonization

Decarbonization of the transportation sector will also impact infrastructure needs at CPAs. Marine shipping is one of the most environmentally friendly and economically efficient modes for transporting goods. In addition, the marine sector is trialing alternative low carbon fuels, such as Canada Steamship Lines (CSL) completing the world's longest-running trials of B100 biodiesel with vessels operating in the Great Lakes.[10]

There are opportunities for ports to offer bunkering services with low carbon fuels and outfit berths with shore power to reduce GHG emissions. Both initiatives will impact the infrastructure needs of CPAs.

Furthermore, CPAs could require investment to support emerging opportunities for Canadian energy exports, such as hydrogen in the form of ammonia.[11]

Climate adaptation

CPAs have expressed a need to ensure climate resiliency. For example, rising sea levels and storm surge events along Canada's coasts will likely increase flooding, leading to significant damage to infrastructure, ecosystems, and shoreline erosion. Extreme high water-level events are likely to become larger in magnitude and occur more frequently.[12]

Supply chain / port digitalization and improved data sharing

Supply chain digitalization and emerging use cases of artificial intelligence are giving rise to new opportunities which port authorities could capitalize on for optimizing supply chain performance, such as better coordination of vessel, rail and truck traffic.

Infrastructure expansions can provide large step gains in capacity, however, these projects often come at a high cost with lengthy timelines for permits, approvals and construction. Land and water constraints can impact the scope of viable projects or limit options to higher cost solutions. These factors are motivating investment in digital infrastructure which can unlock capacity by optimizing the use of existing infrastructure assets (e.g., berths, intermodal yards, road and rail access points, etc.)

1.2.3 Overview of Canada's port infrastructure investment model

Under the *Canada Marine Act* (CMA), CPAs are agents of the Crown for the purpose of operating ports. However, CPA operations are generally limited to the management of lands and infrastructure dedicated to port activities, and not in handling or storage activities *per se*. CPAs are thus usually considered *landlord* port authorities, as opposed to *tool* or a *public service* port authorities.[13] CPAs are thus responsible for maintaining and developing landside and water

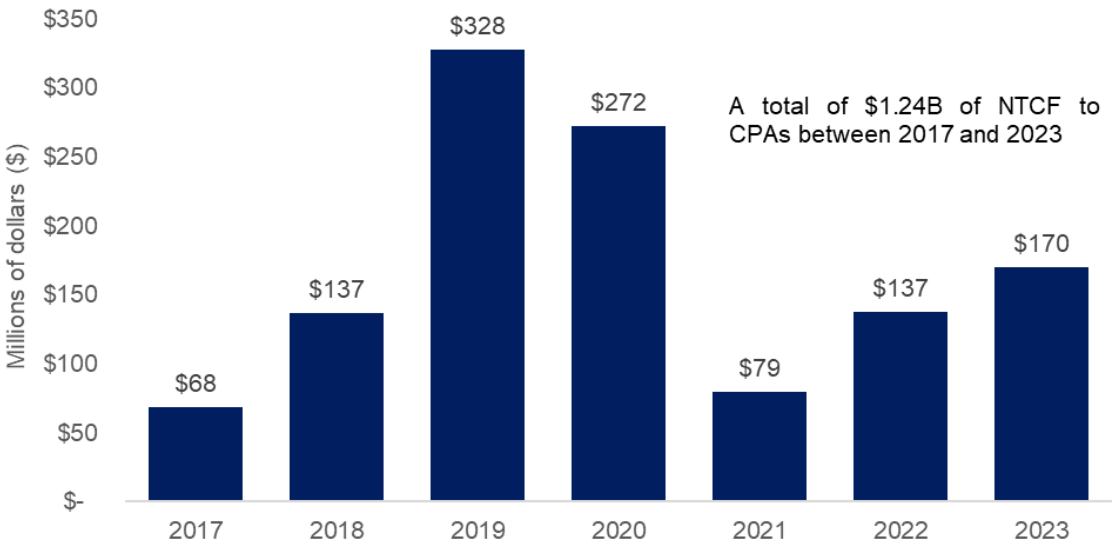
[10] CSL, "CSL Successfully Completes World's Largest B100 Biofuel Tests" (2021) Link
[11] Ammonia Energy Association, "Canada: ammonia exports from British Columbia & Nova Scotia" (2022) Link
[12] Government of Canada, "Canada's Changing Climate Report" (2020) Link
[13] Further reading on general port governance models can be accessed on the Port Reform Toolkit, Link

infrastructure. The terminals owned by CPAs are leased to operators who handle and store goods with their own equipment and facilities.

CPAs must be financially self-sufficient. In addition to revenues generated by leasing their assets to port operators, CPAs notably charge harbour, berthage and wharfage dues to users (carriers and cargo owners). The level of these fees must allow CPAs to be self-sufficient and ideally allow them to invest in capital projects. Other than a loan made by the Canada Infrastructure Bank (CIB), CPAs cannot finance investments by borrowing money as agents of the Crown,[14] but they can receive governmental appropriations for capital costs of infrastructure projects, the improvement of environmental sustainability or safety, as well as for emergencies.

In recent years, CPAs have for example financed capital projects through Transport Canada's National Trade Corridors Fund (NTCF). From 2017 to 2023, the NTCF has provided $3.7 billion in funding, allocating $1.24 billion (33% of the total) to CPAs. The annual breakdown of NTCF funding allocations is in Figure 3. Projects funded by the NTCF have included the construction or expansion of facilities, land development, as well as internal road and railway infrastructure. Otherwise, Transport Canada also administers the Green Shipping Corridor Program (GSCP), which funds projects that contribute to the establishment of green shipping lanes between two or more ports, and the decarbonization of the marine sector. The distribution of GSCP funding for ports to electrify port equipment, supply shore power to vessels and the deployment of green vessel technologies will reach approximately $150 million between 2024 and 2028.[15]

Figure 3: Annual NTCF funding provided to CPAs, 2017 to 2023 (millions $)



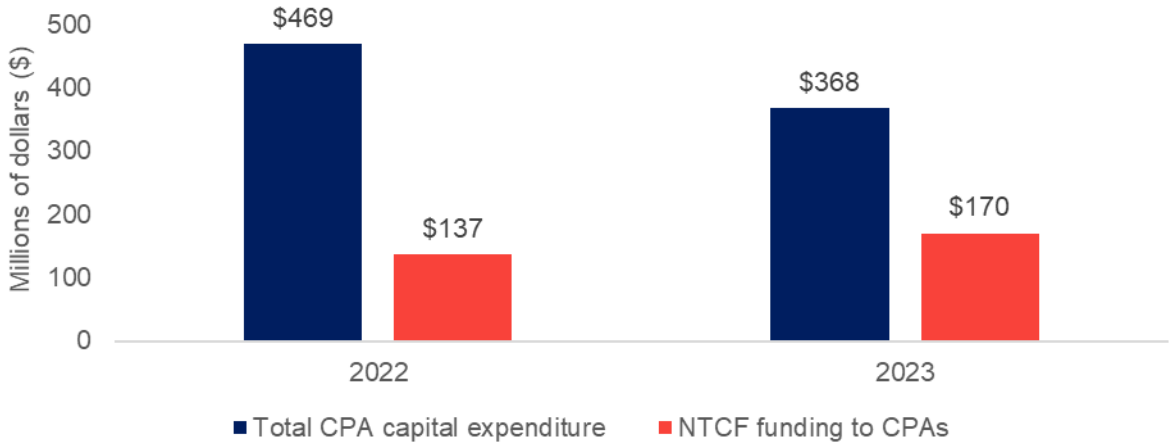
Source: "NTCF in Marine Project Data" spreadsheet provided to CPCS by ACPA on October 3rd, 2024. Data is originally sourced from Transport Canada

As part of this assignment, CPAs shared their annual capital expenditures for 2022 and 2023. Figure 4 compares the aggregate capital expenditures of CPAs against the NTCF funding distributed to CPAs in 2022 and 2023. The NTCF plays a critical role in providing funding capital projects at CPAs, over this small two-year sample there is about $1 of NTCF funding for every $2.75 of CPA capital expenditure. Although NTCF funding is greatly beneficial to CPAs, the

[14] A CPA can nevertheless borrow money on its own credit. CMA, 31 (1). The borrowing limits of CPAs are set out in their respective letters patent.
[15] Transport Canada, Green Shipping Corridor Program. Link

program is expiring in March 2028 and $4.1 billion of the $4.6 billion fund (90%) is already awarded. Going forward, there is a need for new capital funding to support the continued maintenance and expansion of infrastructure at CPAs.

Figure 4: Annual CPA capital expenditure compared to NTCF funding to CPAs ($ in millions)



Source: "NTCF in Marine Project Data" spreadsheet provided to CPCS by ACPA on October 3rd, 2024 (originally from Transport Canada) and CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024) and CPA financial statements (where available).

2 Results: identification of port infrastructure needs

Key chapter takeaways

- Nearly $10 billion in capital investment was identified by CPAs for known projects looking forward until 2040. Around $5 billion is planned over the next five years (2024-2028).
- Short-term planning cycles (five years for most CPAs) limit the confidence in projecting long-term infrastructure needs, with many ports uncertain about their capital requirements beyond 2028. Therefore, the capital needs identified until 2040 are likely understated.
- Projections demonstrate that CPAs may require between $15 to $21.5 billion in total capital investment needs (2024 to 2040).
- Funding gaps are substantial, with 61% of capital dollars not yet secured. However, many of the projects identified are still in early stages (e.g., under consideration or pre-feasibility).
- Projects rated by CPAs as “High” or “Medium” urgency account for 66% of all unsecured capital dollars, highlighting the substantial funding required for projects with elevated risk, if they do not advance in a timely manner.
- New infrastructure investment is vital for future growth, with 73% of near-term capital investment (2024-2028) focused on new projects, particularly in landside and waterside infrastructure.
- Aging infrastructure poses a significant challenge, with 27% of capital investment needs (2024-2028) directed toward rehabilitating critical assets like piers, docks, and breakwaters that are decades old and at risk of failure.
- Competition from US ports intensify the urgency for CPAs to invest in infrastructure, as US ports benefit from larger funding programs, posing a risk to the competitiveness of CPAs if investments are delayed.

2.1 How are capital needs identified?

The scope of our survey focused on identifying the capital investment needs of CPAs to 2040 and beyond. All information in Section 2 comes from the survey, unless otherwise noted. The following definitions are provided to distinguish between “maintenance” and “capital” spending.

- **Maintenance spending** keeps assets in good working condition. Examples of maintenance are functional checks, inspections, repairing and replacing minor components of an asset.
- **Capital spending** creates assets that are expected to generate value over more than a year. Examples of capital assets are buildings, computer equipment, computer software, land improvements, equipment and fixtures, machinery, vehicles and vessels.

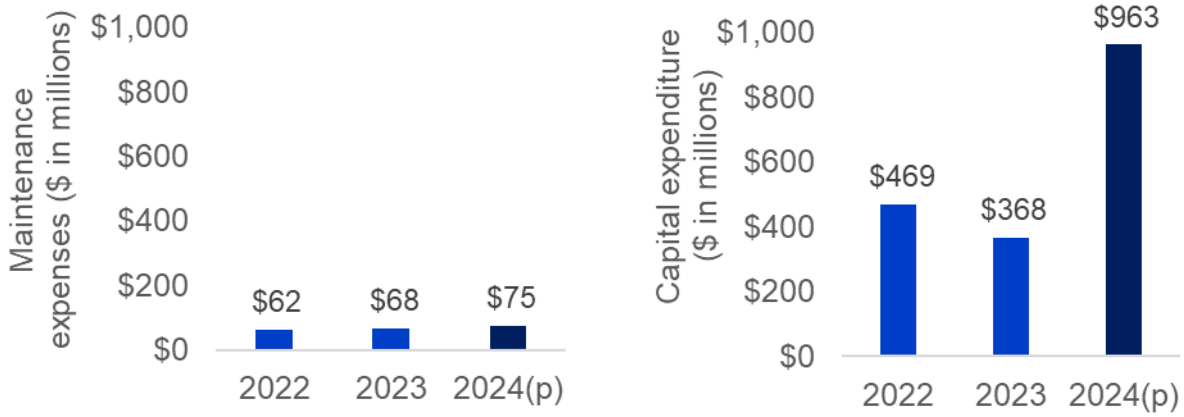
From our review of published financial statements, general maintenance expenses for CPAs are an average of 16% of their total operational expenses.[16] Notwithstanding accounting practices, this percentage will vary based on the degree to which a port operates its own equipment versus a pure landlord port (e.g., Port of Windsor).

The total spend on general maintenance for CPAs was $68.2 million in 2023. This amount has been steadily increasing in recent years (see Figure 5, left chart), both as a function of cost escalation (e.g., inflation) but also due to aging assets, which are requiring increased expenditures to maintain in a state of good repair.

Most commonly, CPAs derive their maintenance budgets as fixed dollar budgets based on expected costs of maintaining existing infrastructure. These costs are typically derived from inspection and historical upkeep costs. For large repairs, estimates may be sought. However, in some cases, the maintenance budget may incorporate a blend of percentage of asset value and fixed budget.

Over a longer timeframe, general maintenance is nevertheless insufficient for keeping the port operating effectively, as is evident by the significant investment needs in major capital projects (e.g., asset rehabilitation), which represent significantly larger expenses. These capital expenditures can have greater year-to-year variability (see Figure 5, right chart), driven both by rehabilitation needs of existing assets, as well as opportunities for investing in new infrastructure. Capital expenditure of CPAs in 2024 is projected to be near $963 million, which is more than double the yearly expenditure in the two years prior (2022 and 2023). Port infrastructure needs and plans, beyond general maintenance, are described in the following sections.

Figure 5: General maintenance expenses for CPAs (left) and capital expenditure (right), 2022 – 2023 actuals, and 2024 (p - projected)



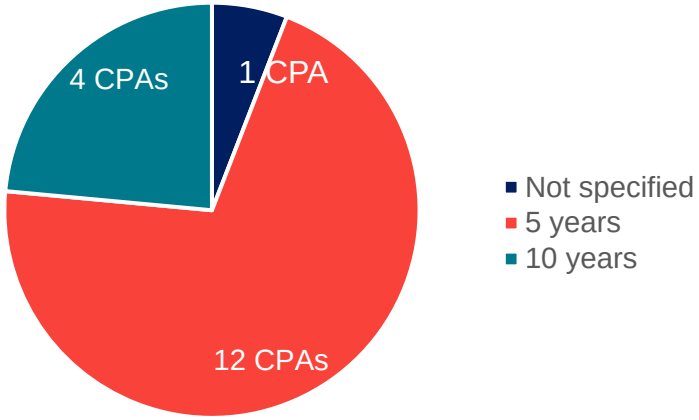
Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024) and CPA financial statements (where available). (p) indicates the projected expense for 2024, based on annual budgets.

[16] Operational expenses exclude interest and amortization. CPCS reviewed financial statements from 2022.

2.2 What is the capital planning horizon of CPAs?

The majority of CPAs (12 CPAs) develop their capital plans with a five-year horizon (Figure 6). Some of CPAs have a longer-term (10-year) strategic outlook on projects which are likely to impact their capital plans in the coming years. In general, larger CPAs tend to have an ability to plan their capital outlays further ahead with more confidence, whereas smaller CPAs are more sensitive and have increased uncertainty year to year on how they prioritize their allocation of capital. Overall, CPAs communicated an opportunity for greater support for developing asset management programs, which would provide them an ability to have a longer-term outlook on their capital needs.

Figure 6: Capital planning horizon of CPAs (years)



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

2.3 Investment needs

As shown in Figure 6, 12 of the 17 CPAs create capital plans over a five-year planning horizon. This means that between 2024 and 2028, all CPAs can report capital investment needs with a relatively high degree of certainty.

As of 2024, capital plans for most CPAs have not yet identified or costed new business opportunities and infrastructure projects that could emerge between 2029 and 2040. Many CPAs have indicated that they remain flexible to future infrastructure investment beyond 2028, depending on factors including funding opportunities, demand, unanticipated weather events, and the state of existing infrastructure. Additionally, projects completed in the near term will determine infrastructure needs beyond 2028.

Three notable projects contributing to around one-third of new infrastructure investment across all CPAs

Several of the larger CPAs have significant investments in new infrastructure projects, which form a large share of the identified in "blue" (Figure 8). We estimate that around one-third of the nearly $6 billion investment in "new infrastructure" needs identified until 2040 is attributable to the following three projects.[17]

1. **Montreal – Contrecoeur container terminal.** The Port of Montreal is investing $715 million in this container terminal expansion project[18], alongside additional investment

[17] Contrecoeur project investment shared by the Port of Montreal ($715 million), plus CANXPORT investment shared by the Port of Prince Rupert ($340 million), plus total of new infrastructure investment identified by the Port of Vancouver ($725 million) divided by the total of new infrastructure investment for all CPAs until 2040 combined ($5,962 million)

[18] CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

from the NTCF and the Government of Quebec. The Contrecoeur project is set to add 1.15 million TEUs in capacity[19] and is scheduled for completion by 2030.[20]

2. **Prince Rupert – CANXPORT logistics hub.** This project to construct an export logistics facility on Canada's west coast will add capacity for 4 Mt of bulk commodities and 400,000 TEUs of containerized trade.[21] The Port of Prince Rupert has $340 million allocated, alongside additional funding from the NTCF, Province of British Columbia, CN Rail and the CIB. The target completion date for construction is 2026.[22]

3. **Vancouver – Roberts Bank Terminal 2 (RBT2).** In 2023, the federal government granted environmental approval for RBT2 to proceed. This project for a new container terminal on Canada's west coast will add 2.4 million TEUs of capacity and cost an estimated $3.5 billion.[23] The project is scheduled for completion in two phases by the mid-2030s. It is not yet clear what portion of the total investment will fall under the responsibility of the Port of Vancouver, versus other funders. However, the Port of Vancouver did share a need for nearly $725 million in new infrastructure investment looking towards 2040, of which the RBT2 project is likely a significant component.[24]

Despite these three major infrastructure projects, there remains around two-thirds of new infrastructure investment attributable to a variety of other projects across CPAs, thus motivating the point that capital needs for new infrastructure projects is more widespread and will likely persist even after Contrecoeur, CANXPORT and RBT2 are complete.

Focusing on 2024-2028, collectively CPAs expect to invest between $829 million and $1,176 million annually on capital projects between 2024 and 2028, with 73% of for new infrastructure. Estimating existing infrastructure investment beyond 2028 is more predictable for CPAs due to the ongoing need for capital investment for infrastructure rehabilitation. The average annual investment required by CPAs to rehabilitate existing infrastructure is about $230 million, with yearly needs ranging from $150 million in 2033 to $320 million in 2028.

Figure 7: Status of funding for all reported CPA capital investment until 2040, in billions ($)

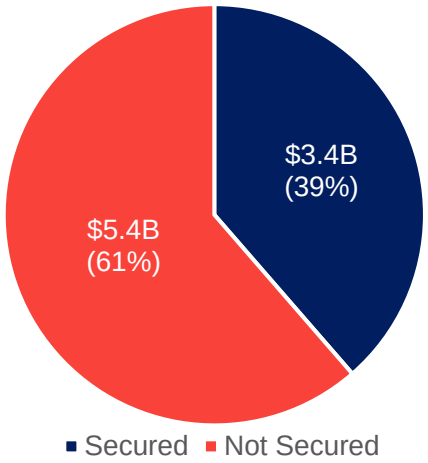


Figure 7 shows that $5.4 billion for capital investment is not yet secured by the relevant authorities. The survey considers funding unsecured if it is not allocated in a port authority's internal budget or provided by external sources, such as private partners or government grants.

The amount of unsecured project funds may change as port authorities progress through their next iteration of capital planning and

[19] Port of Montreal, "Contrecoeur terminal expansion project" (2024) Link
[20] CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)
[21] CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)
[22] CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)
[23] Vancouver Sun, "Port of Vancouver's Roberts Bank Terminal 2" (2023) Link
[24] CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

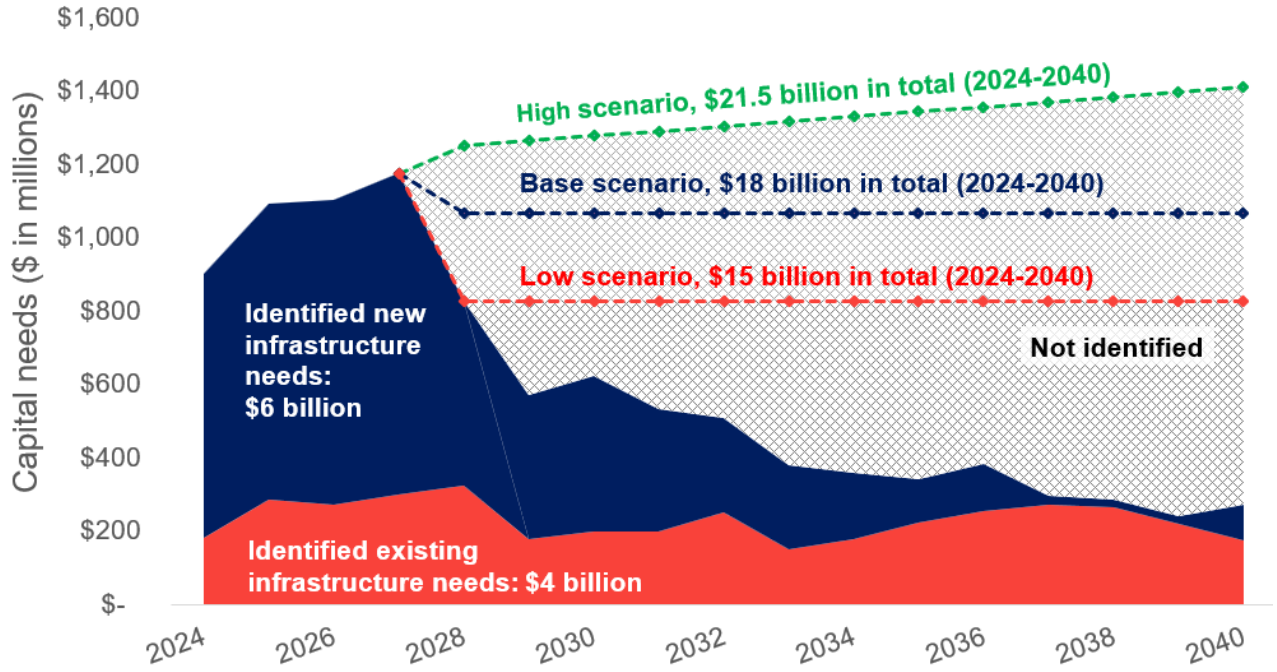
earmark funds to specific projects, nevertheless, there is still a significant gap of funding the capital project needs identified by CPAs.

2.3.1 Projections for investment needs until 2040

To address the data gap in identifying investment needs from 2028 and beyond, we offer the following illustrative scenarios as projections of port infrastructure needs until 2040:

CPA capital investment scenarios	Total potential capital investment 2024-2040
Base: Decrease to $1.1 billion (annual average 2024-2027).	$18 billion
Low: Decrease to $0.8 billion annually (2028 level).	$15 billion
High: Increase of 6.5%[25] in 2028 and 1.0% annually[26] from 2029 to 2040, to $1.4 billion.	$21.5 billion

Figure 8: Projection of capital investment needs for CPAs (2024 - 2040)



Known investment needs, identified via survey response data (2024 – 2040)		
Existing infrastructure[27]	New infrastructure	Total
$4 billion	$6 billion	$10 billion

Source: CPCS

[25] Matching the year-over-year increase planned from 2025 to 2026

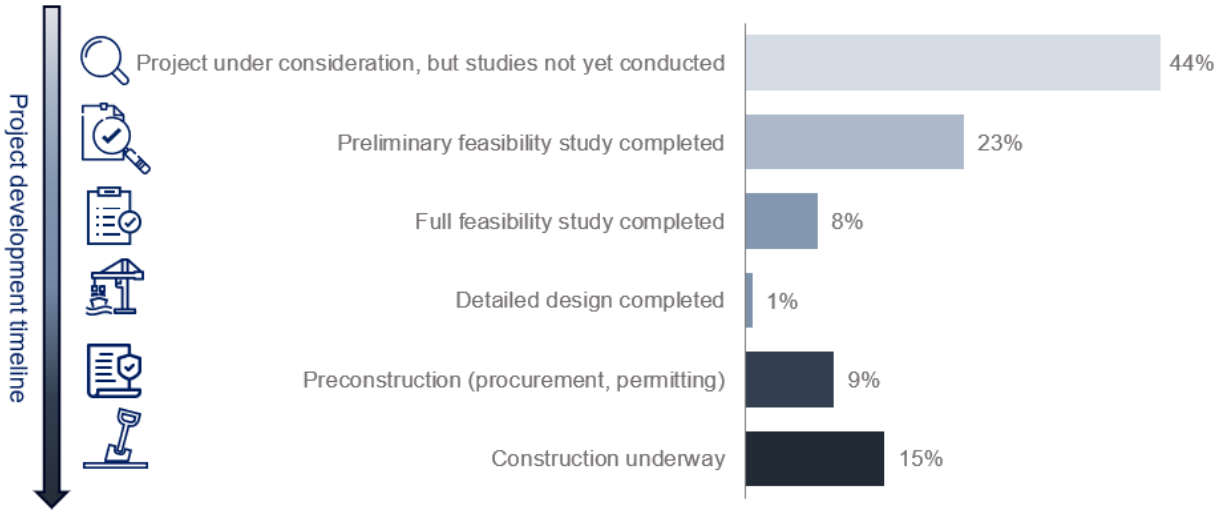
[26] Aligns with the planned increase in year-over-year increase in capital investment from 2026 to 2027

[27] If a port authority did not report existing infrastructure investment needs in a particular year, a rolling historical average of the previous five years was used to identify their needed investment until 2040.

2.3.2 Status and urgency of identified investment needs

About three-quarters (75%) of capital port projects are in the consideration, feasibility, and detailed design stages (Figure 9). The remaining quarter (25%) are in preconstruction or construction. Many CPAs indicated that the 7-to-10-year timeframe to advance projects in Canada from pre-feasibility to construction is far too lengthy due to the overly cumbersome regulatory, permitting and government approval processes.

Figure 9: Allocation of funding by development stage (% by capital dollars)



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

The survey identifies $5.4 billion (or 61%) of capital projects as having unsecured funding (Figure 7). This situation presents a significant concern for CPAs and the competitiveness of Canada's supply chain, given that nearly two-thirds of all identified CPA capital spending to 2040 lacks funding. The survey determined the percentage of funding for each project, allowing for categorization into three funding groups (Figure 10).

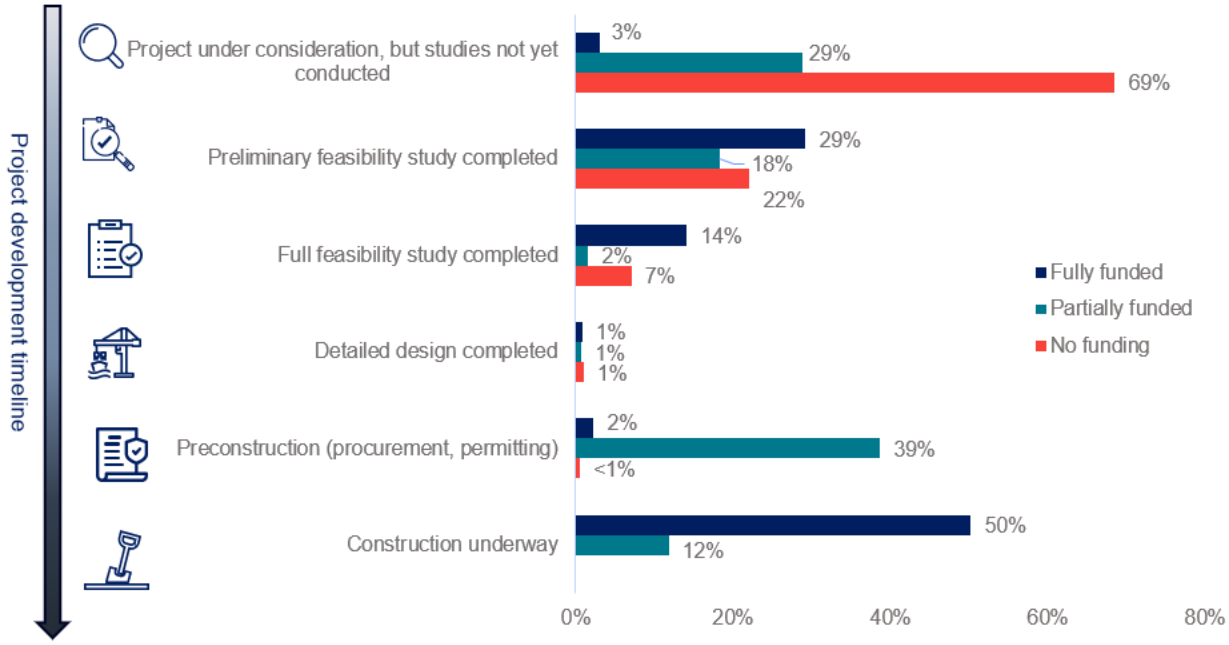
Figure 10: Funding status definitions

Funding status	Definition
No funding	The project has no funding from partners, government grants, or other external sources. Additionally, the CPA has not allocated any of its capital planning budget to the project. (0% funded)
Partially funded	The project has received some funding from partners, government grants, or other external sources and/or the CPA has only allocated a funds for its capital planning budget to a portion of the project.
Fully funded	Through either its own capital budget, external sources, or a combination the project has been fully funded. (100% funded)

Figure 11 outlines how funding aligns with the project development stages, weighted by total capital cost, and divides the percentages based on funding status. For instance, fully funded projects, represented by blue bars, add up to 100% across all stages in the project development timeline.

Cross tabulating funding status with the project development timeline highlights that the largest share of unfunded projects is in the early development stages, with 69% of capital spending tied to projects in the pre-feasibility stage. No projects in the construction phase lack funding, and less than 1% of unfunded projects are in procurement.

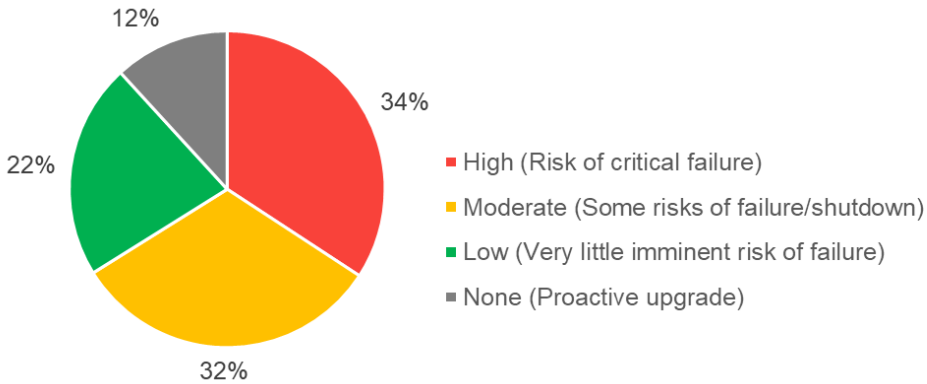
Figure 11: Status of projects categorized by funding status (% by capital dollars)



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

The survey also identified project urgency. CPAs were asked to categorize projects into four groups. Figure 12 displays the urgency of all CPA capital investment that has unsecured funding. Infrastructure investment with a high or medium urgency risk makes up 66% ($3.6 billion) of all unsecured capital dollars. This highlights the significant portion of funding allocated to projects with elevated risk levels should they not proceed in a timely manner.

Figure 12: Urgency of projects, weighted by unsecured funding value (% by capital dollars)

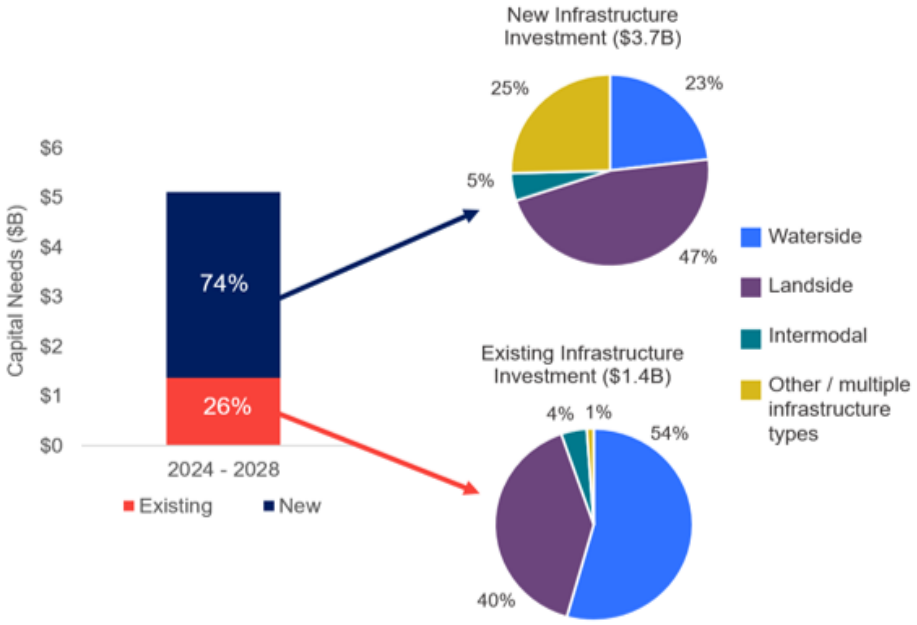


Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

2.3.3 Near-term capital investment needs, 2024 to 2028

Over the next five years, the CPAs expect to spend $3.7 billion on new infrastructure and $1.3 billion to rehabilitate existing infrastructure. Additionally, 47% of the new near-term (2024 to 2028) capital investment needs are landside projects, which tend to focus on export-oriented opportunities, like building new container terminals. The investment in existing infrastructure is almost entirely in waterside and landside investment. Near-term capital needs for existing infrastructure are for aging piers, wharfs, docks, breakwaters, building maintenance and storage facility upgrades.

Figure 13: Split of new and existing infrastructure capital needs (2024 to 2028)



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

Figure 14 summarizes the capital investment needs for both new and existing infrastructure between 2024 and 2028 by infrastructure type.

Figure 14: Capital investment by infrastructure type (2024 to 2028)

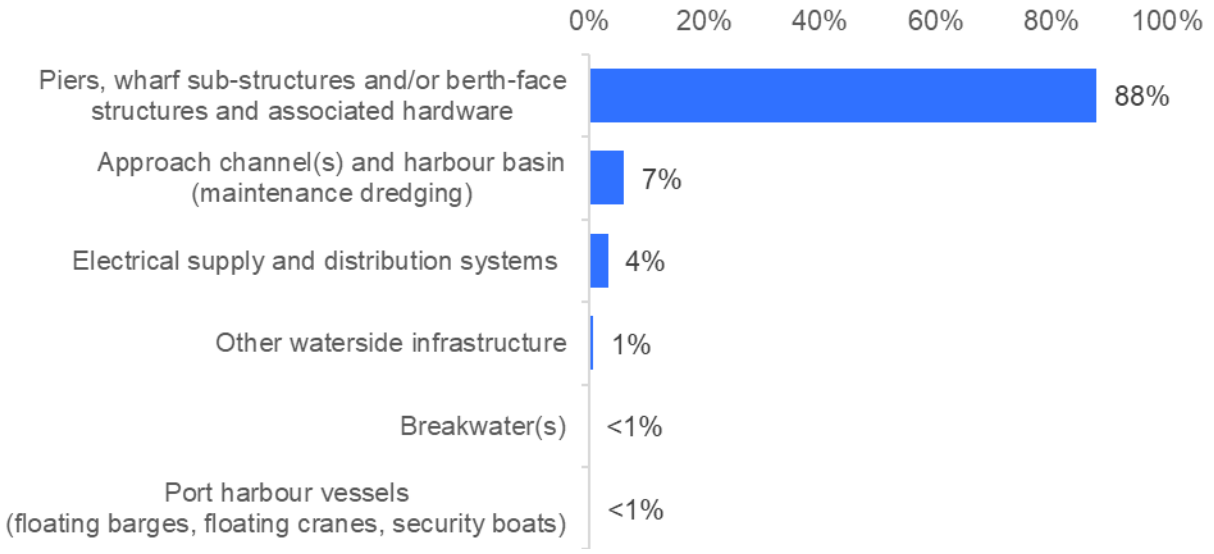
	Capital investment ($ in millions)		
Infrastructure type	Existing	New	Total
Waterside	743	865	1,608
Landside	550	1,747	2,297
Intermodal	57	173	230
Other / multiple infrastructure types	15	951	966
Total	**1,365**	**3,736**	**5,101**

Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

2.3.4 Waterside infrastructure investments

Across CPAs, most capital investments for waterside infrastructure focus on piers, wharfs and berths (Figure 15). Several ports have waterside infrastructure that is 75 to 100 years old and faces a high risk of failure. The rehabilitation of these aging structures often comes with significant costs, as projects aim to repurpose or restore the functionality of existing berths to accommodate larger vessels. Additionally, there is investment in new infrastructure, including new terminals and berths to meet future demand.

Figure 15: Types of waterside projects (% by capital dollars)



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

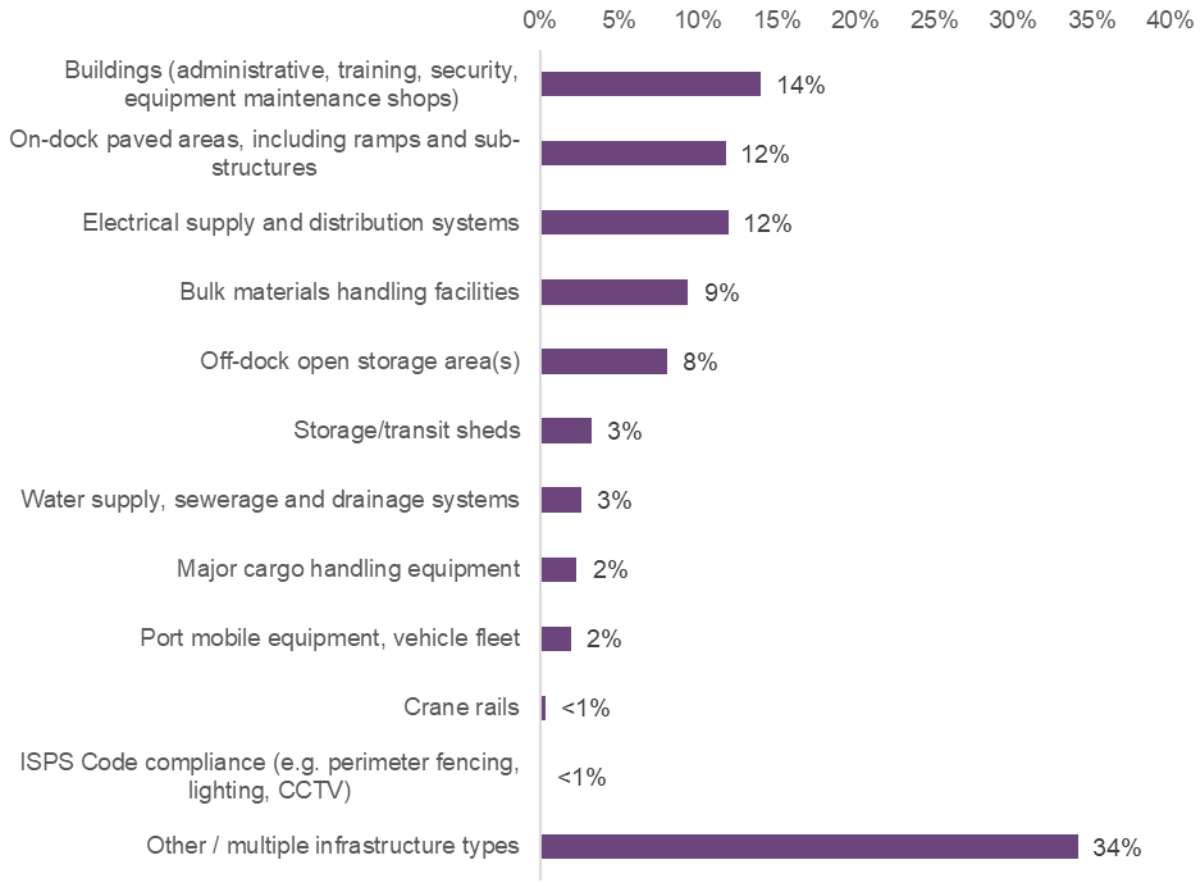
Several CPAs have highlighted their future requirements for capital dredging. Climate change has contributed to increasing demand for dredging, as siltation from rainfall runoff and shoreline erosion necessitate more frequent dredging efforts. Furthermore, the need for expansion has grown, requiring deeper harbours and channels to accommodate larger vessels and the increasing volume of maritime traffic. Notably, unlike in the United States where the US Army Corps of Engineers (USACE) handles all dredging activities, there is no equivalent federal support for dredging efforts in Canada, presenting an additional challenge for CPAs. The USACE performs dredging activities, which are funded by the Harbor Maintenance Tax (HMT), a fee on importers and domestic shippers to support the maintenance and improvement of US ports.[28]

2.3.5 Landside infrastructure

The outlook for landside infrastructure capital investment by CPAs to 2040 reflects a significant need for both new construction and the rehabilitation of aging infrastructure to sustain operations, grow capacity and improve the climate resilience. Buildings, on-dock paved areas, electrical supply, and bulk material handling facilities account for approximately 50% of landside investments (Figure 16). The landside capital investment of 34% categorized as "other," primarily consists of projects that span multiple types of landside infrastructure.

[28] Artemus, Harbor Maintenance Fee, 2024 Guide. Link

Figure 16: Types of landside projects (% by capital dollars)



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

Utility upgrades are another essential landside investment needed for expansion projects, including electricity supply for shore power, terminal cranes, and other equipment. Additionally, addressing climate change impacts, such as flooding and sea level rise, necessitates investments in raising docks and grading paved areas to improve drainage. Some CPAs have dock structures in poor condition, which could be rehabilitated and with an improved condition serve as an opportunity for CPAs to generate additional revenue.

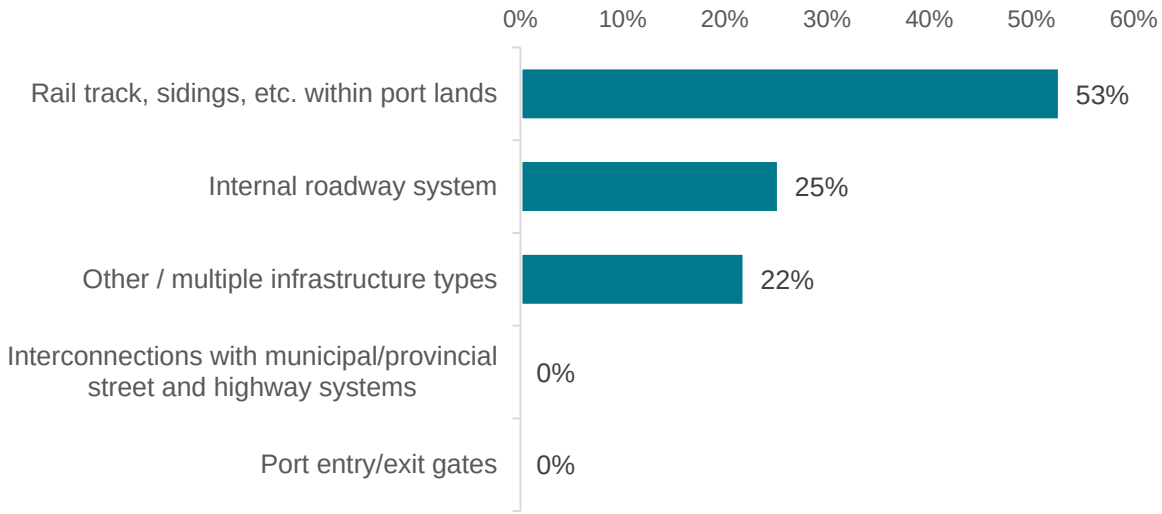
2.3.6 Intermodal infrastructure

CPAs are actively investing in intermodal infrastructure to enhance traffic fluidity and alleviate congestion. Figure 17 shows that 53% of intermodal investments focus on rail and include increasing rail sidings, expanding track within port lands, and improving resiliency by twinning rail bridges, and/or other bottleneck points. Several CPAs are expanding rail infrastructure on port lands to facilitate a shift from truck to rail. These investments will reduce congestion and minimize damage to roads. Additionally, trucks have a GHG emissions intensity about six times higher than Class 1 rail (per tonne-kilometer), providing significant environmental benefits.[29]

[29] CPCS estimate based on Delphi and Pollution Probe (2020). For comparison, used 2013 levels were used, which were the only comparable years available. However, rail emissions have fallen over this time. References: The Delphi Group and Pollution Probe (2020) Modal Optimization as a Contributor to Reducing GHG Emissions in Canada. (Link), and Railway Association of Canada (2021) Locomotive Emissions Monitoring Report 2021. (Link)

Other intermodal projects include investments in internal roadway systems at CPAs as well as other investments, primarily consisting of projects that include both road and rail investment. No capital is expected to be invested in interconnections with public roads or port entry / exit gates.

Figure 17: Types of intermodal projects (% by capital dollars)



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

2.3.7 Digital infrastructure

Several CPAs acknowledged the importance of investing in digital infrastructure, notably:

1) **Information systems**, such as network upgrades, to ensure security of the port and protect against emerging threats (e.g., cyberattacks), and

2) **Improving data collection and sharing in the supply chain**, thus unlocking capacity and enabling greater fluidity of cargo moving through the port's jurisdiction (e.g., improved alignment of rail and vessel traffic to minimize delays at the port).

Digital infrastructure optimizing supply chain performance at the Port of Vancouver

One example of a digital infrastructure solution, related to improving data collection and sharing in the supply chain is the Centralized Scheduling System (CSS) implemented by the Vancouver-Fraser Port Authority (VFPA) to sequence the traffic of commercial ships, tugs and barges in and out of the port. The CSS uses scheduled windows for vessel traffic to transit under the Second Narrows Rail Bridge, prioritizing piloted vessels and tug and barge combinations. VFPA will also leverage data feeds from Class I railways to better plan for bridge lifts and management of rail traffic to/from the North Shore.

However, there are a multitude of supply chain optimization projects being envisaged by other port authorities as they look to improve their operations to increase capacity and resiliency. Port authorities are looking to leverage digital infrastructure solutions, including artificial intelligence, to make improvements for unlocking capacity and/or increasing resiliency of supply chains.

2.3.8 Investment needs by region

Based on the survey results, Figure 18 summarizes CPA's reported investment needs by region. About half of all capital investment needs were reported by CPAs in the St. Lawrence region. However, CPAs in the St. Lawrence tended to respond to the survey with a longer time horizon compared to other regions.[30]

Figure 18: Capital investment needs by region

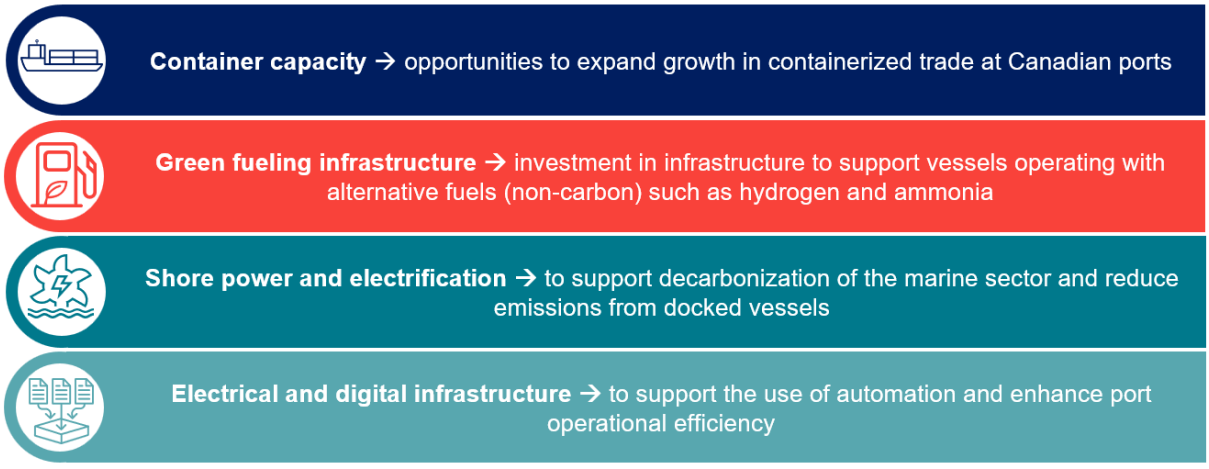
	Atlantic	Pacific	St. Lawrence	Great Lakes	Total
Identified capital investment (2024 to 2040) ($ in billions)	1.8	2.0	5.0	1.0	**10**
Identified capital investment (2024 to 2028) ($ in billions)	0.4	1.3	3.0	0.5	**5**
Percentage of identified capital spending lacking funding	79%	72%	35%	18%	**61%**
Percentage of identified high / medium risk unsecured capital	67%	81%	65%	31%	**66%**

Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

2.4 Themes of investment over the long-term

Long-term investment needs are defined as capital projects at CPAs that are projected to commence development after 2040. CPAs noted that identifying specific investment needs beyond 2040 was challenging. As mentioned in Figure 6, most port authorities focus on immediate infrastructure needs that are identified in 5- or 10-year capital plans. If a CPA identified a project in the long-term (e.g., beyond 2040), it is in the conceptual stage, yet to be approved, fully defined and/or costed.

Although accurate timelines or cost estimates are unavailable for long-term capital investment needs, CPAs identified the following project themes. These investment themes are also relevant to the broad investment themes at CPAs between 2029 and 2040, where planning horizons a capital plans are undetermined at the majority of CPAs.



Source: CPCS analysis of data collected from CPAs in the Port Infrastructure Needs Assessment Survey (2024)

[30] Several St. Lawrence ports develop their capital plans on a 10-year basis rather than every 5 years.

2.5 What are the implications of climate change on port investment?

Climate change is likely to yield increased maintenance costs for CPAs and necessitate rehabilitation to shore up existing infrastructure against environmental loads and stressors. It could also increase the cost of building new infrastructure that is more robust to future environmental conditions and extreme weather events.

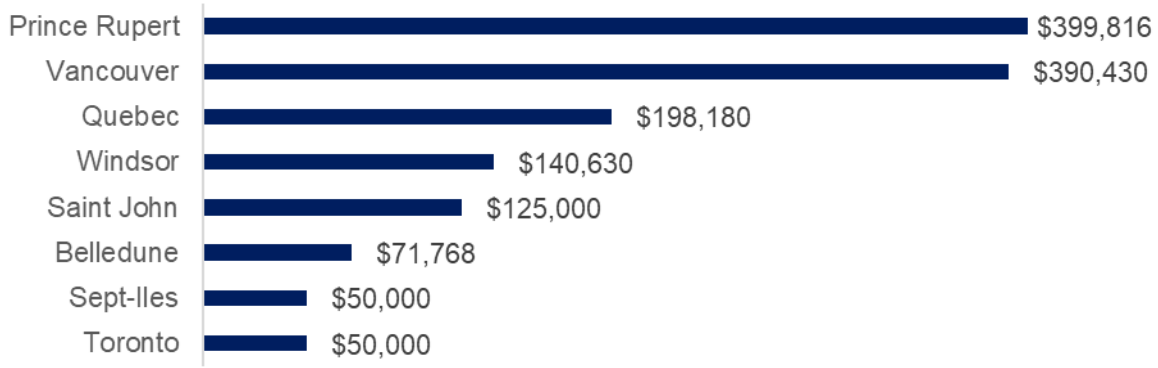
CPAs have shared the following with respect to the implications of climate change on their capital planning and investment needs:

1) Sea (or lake) level rise and flooding (due to storm surge or intense rainfall) are the two most pressing climate concerns.
2) CPAs are taking action to mitigate the impacts of climate change (e.g., improving drainage, elevating waterside infrastructure).
3) CPAs are responsible for dredging and shoreline rehabilitation. Climate change is yielding an increased cost for both activities and the benefits extend beyond the jurisdictional region of CPAs.

Several CPAs completed climate vulnerability assessments with federal funding from Transportation Asset Risk Assessment (TARA). Between April 2018 and October 2020, the TARA program provided $2.6 million to improve the understanding of climate change-related risks and vulnerabilities to federal transportation infrastructure.

Nearly 55% of TARA funding ($1.4 million) went to CPAs (Figure 19), refer to Appendix B for a complete list of all funding received by CPAs from the TARA program. However, succeeding the TARA program, CPAs have shared that there is a clear opportunity for follow-up government funding to support development of climate adaptation plans (e.g., engineering and design changes) to advance projects towards construction.

Figure 19: Summary of TARA program funding allocated to CPAs ($)



Source: Transport Canada, “Projects funded by the Transportation Asset Risk Assessment Program” (2021) Link

2.6 What role do CPAs have in decarbonization of the transportation sector?

Port authorities have a central role in coordinating the direction and investment decisions between public and private sector stakeholders, with regards to technologies to decarbonize the transportation sector.

Port authorities can make infrastructure investments such that fleets (e.g., vessels, trains and trucks), which interface with the port can adopt lower or zero emission technologies. This includes

working with stakeholders to decide on what alternative fuels are available and/or prioritized (e.g., liquified natural gas, ammonia, methanol, hydrogen, etc. for bunkering vessels).

Port authorities also have a role in making capital investments to ensure both power supply and charging infrastructure is available to support electrified fleets (e.g., CPAs investing in electric vehicle charging stations alongside drayage trucking companies purchasing battery electric trucks).

As well, port authorities can demonstrate leadership by transitioning their own assets to more energy efficient, and zero emission technologies (e.g., rubber tire gantries, cranes, shunting trucks).

Comparison of the magnitude of decarbonization funding available to CPAs

In Canada, the federally administered Green Shipping Corridor Program (GSCP) provides funding for projects that contribute to the establishment of green shipping corridors and the decarbonization of the marine sector.

The GSCP's Clean Ports Stream will provide $127 million in contribution funding from 2024 to 2028 for onshore equipment and infrastructure at ports and terminals, for example, commercially available shore power, electrification of port equipment, vessel charging and clean fuel infrastructure.[31]

This federal funding is welcomed by CPAs, however, by comparison the magnitude of funding in the US for ports and marine sector decarbonization is significantly larger. As a point of reference, the Port of Long Beach has received over $635 million in government grant funding for decarbonization,[32] five times more than the entire GSCP funding available to ports across Canada (including CPA and non-CPA ports). This funding support is enabling the Port of Long Beach to implement significant decarbonization projects, including a fleet of over 380 zero emission drayage trucks (battery electric and hydrogen), and installation of 100+ public EV charging stations. The Port of Long Beach currently has 22% of its cargo handling equipment as zero emission vehicles / equipment and is targeting 100% zero emissions by 2030.[33]

The Port of Long Beach is also working to advance offshore wind projects with a target of producing 20 GW to supply the future power demands of the port.[34]

For reference, the Port of Long Beach handles approximately 83 MT of cargo, including 6 million TEUs of containerized cargo.[35] In comparison, CPAs collectively handle 343 MT of cargo, with just over 7 million TEUs.[36]

The US has also announced a $147 million investment from the IFA to the Maryland Port Administration (Port of Baltimore) to fund zero-emission port equipment, charging infrastructure, and power improvements.[37] This single investment is more than the entire budget for the GSCP – Clean Ports Stream. The Port of Baltimore handles around 34 MT[38], an order of magnitude (1/10th) of the total cargo handled by CPAs.

Overall, increased federal funding will enable CPAs to do more, in alignment with federal priorities, such as decarbonizing the transportation sector and contributing to net-zero 2050.

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[31] Transport Canada, "The Green Shipping Corridor Program" (2024) Link

[32] Mario Cordero – CEO at the Port of Long Beach, "Keynote Presentation at ACPA Ports Canada Conference" (2024)

[33] Mario Cordero – CEO at the Port of Long Beach, "Keynote Presentation at ACPA Ports Canada Conference" (2024)

[34] Mario Cordero – CEO at the Port of Long Beach, "Keynote Presentation at ACPA Ports Canada Conference" (2024)

[35] US ACE, "Waterborne tonnage for principal U.S. ports and all 50 states and U.S. territories; Waterborne tonnages for domestic, foreign, imports, exports and intra-state waterborne traffic" (2022) Link and "Waterborne container traffic" (2022) Link

[36] Transport Canada, "Transport in Canada Statistical Addendum" (2022)

[37] The White House, "President Joe Biden Announces $3 Billion to Strengthen Port Infrastructure, Create Good-Paying and Union Jobs, Bring Cleaner Air to Communities" (2024) Link

[38] US DOT, "Cargo throughput at American ports dashboard" (2022). Link

3 Review of alternative port infrastructure investment models

Key chapter takeaways

- Several port infrastructure investment models exist in other jurisdictions. The investment model of a particular port authority can depend on expected returns and the ultimate beneficiaries of the return on investment.
- Some port authorities are owned by their respective state and federal governments, such as in the Netherlands and Australia, (i.e., equity stake(s) in the port authority). The financial structure of CPAs limits their financing options. Notably, CPAs cannot raise equity capital.
- Port authorities in other jurisdictions have access to port specific discretionary grant funding programs and infrastructure investment is systematically coordinated with planning at a national scale:
    - The Port Infrastructure Development Program (PIDP) in the US is targeted specifically at port infrastructure, whereas Canada's NTCF program does not solely fund port infrastructure.
    - The Trans-European Transport Network (TEN-T) program in Europe is a more coordinated European level of program investment, in comparison to the NTCF which is more general and less coordinated (i.e., limited detail or planning at a national scale for investment in major trade gateways and/or corridors).
- The US has awarded more funding to port infrastructure investment (60% more per unit of traffic) and has a greater range of funding programs available when compared to Canada (2022-2023). Furthermore, the US has announced $3 billion of federal investment to come from the IRA, whereas Canada has not yet announced any renewal of NTCF funding with 90% of funds already awarded.

This chapter reviews alternative models and practices for sustainable infrastructure investment and funding. It employs the following definitions:

- **Funding:** refers to who pays for the investment (e.g., taxpayer or private sector)
- **Financing:** is the mechanism for how the cash for the investment is obtained (e.g., cash from revenue, debt via bond issuance or raising cash by offering equity ownership)

3.1 Identification and rationale for selecting jurisdictions

We selected Australia, the Netherlands, and the southern United States (US) east coast (Virginia Port Authority, and Georgia Ports Authority) in consultation with ACPA for reasons of practicality and applicability:

- **Practicality:** In addition to having information available in English, the US and Australia have transparent funding and financing mechanisms which allow us to adequately document practices. Although English is not the official language of the Netherlands, significant information is available in English.
- **Applicability** is also important because infrastructure funding from government can be very different from one jurisdiction to another. Funding practices in the jurisdictions selected must be applicable (or at least potentially applicable) in Canada for them to be relevant. Australia, the US and the Netherlands have systems of government and institutional arrangements that are more similar to Canada than for example China or Singapore.

Additional rationale for selecting these jurisdictions include the following:

1. **US East Coast (southern)** – US ports compete with Canadian ports as both serve North American trade gateways and supply chains. American ports, particularly in the southeast are benefiting from infrastructure investment spurred by shippers re-configuring their supply chains from the West Coast to East Coast ports, following congestion issues that emerged during the COVID-19 pandemic[39, 40] and the widening of the Panama Canal. In addition, ports in the southeastern US are expected to benefit from the nearshoring of EV manufacturing.[41] For the purpose of this report, the examples of the Virginia Port Authority and Georgia Ports Authority were selected due to the large investments made at their facilities in recent years.

2. **Australia** – Canada and Australia are federal states with ports under federal jurisdiction. Both countries rely on ports for supporting export-oriented supply chains and resource-based economies.

3. **The Netherlands** – Some of the world's largest and most highly ranked ports in terms of performance are in the Netherlands (e.g., the Port of Rotterdam).[42] The Netherlands ranks high on the World Bank's Logistics Performance Index[43] and is a leading innovator in the ports sector, applying technology to increase the efficiency of supply chains.[44]

3.2 United States (east coast)

3.2.1 Virginia Port Authority

The Virginia Port Authority (VPA), branded Port of Virginia, is a corporate body and a political subdivision (equivalent to county, city or town) of the Commonwealth of Virginia in charge of developing ports of the Commonwealth. It is considered a public agency exercising public and essential governmental functions. VPA's Board of Commissioners is composed of the State Treasurer and the Chief Executive Officer of the Virginia Economic Development Partnership, as well as 11 individuals appointed by the Commonwealth governor.

The VPA owns and operates port terminals in Norfolk, Portsmouth and Newport News, as well as an inland port in Front Royal. It also leases for operation two terminals in Portsmouth and

[39] WSJ, "California Long Ruled U.S. Shipping. Importers Are Drifting East." (2022) Link
[40] In 2022, the Port of Savannah saw record-breaking cargo volumes, posting an 7% year-over-year increase, as it captured container traffic from backlogged ports on the West Coast. The Port of Savannah has hired additional workers, added equipment and increased its container yard capacity by about 25%. Source: CityNews, "Savannah port breaks cargo records amid import surge" (2022) Link
[41] S&P Journal of Commerce, "Southeast, Gulf ports expect container uplift from electric vehicle plants" (2023) Link
[42] World Bank Group, "The Container Port Performance Index" (2022) Link
[43] Invest in Holland, "Europe's Leading Logistics Location" (2023) Link
[44] Portbase, "The Port Community System" (2023) Link

Richmond. Port facilities are operated by Virginia International Terminals (VIT) under an operating agreement. VIT is a limited liability company with VPA as its sole member. Although VIT is a separate organization, the VPA is financially accountable.

VPA's biennium budget is submitted to Virginia's Department of Planning and Budget and the Governor. It is then submitted to the General Assembly which enacts appropriations for operations and capital expenditures and provides summary expenditure limitations.

VPA's operations are financed through net revenues emanating from VIT terminal operations, while capital improvements are mainly financed by long-term debt (notably through bonds), capital grants, leasing arrangements, revenues collected by the Commonwealth, and cash flow from operations.

Major initiatives undertaken by the VPA in recent years are part of the port's Capital Gateway Investment program. This includes a $350 million USD dredging project which should be completed in 2024, as well as a $650 million USD modernization of the Norfolk International Terminal. The dredging project was subject to a 50/50 cost-share agreement with the US (federal) Government. The US Government share was funded through the Bipartisan Infrastructure Law which committed $2.25 billion USD to the Port Infrastructure Development Program (PIDP) of the Maritime Administration (MARAD).

The PIDP is a discretionary grant program awarding funds on a competitive basis for port projects which improve safety, efficiency, or reliability of goods movement. Otherwise, the VPA can also apply to obtain funds through the *Inflation Reduction Act* (IRA), the Harbour Maintenance Trust Fund (HMTF) and the Transportation Investment Generating Economic Recovery (TIGER) program. The IRA provides $3 billion USD to the Environmental Protection Agency's Clean Ports Program, while the HMTF allocates funds collected through the Harbor Maintenance Tax. The TIGER program also provides discretionary grants on a competitive basis for capital investments in surface transportation projects. As such, it is mainly used by ports to finance multimodal and port connectivity projects. Otherwise, the VPA can also apply to any grant offered by municipalities or counties.

Among the major differences between the VPA and Canadian port authorities is that through the VIT, the VPA is also a port operator, and not only a landlord. This allows the VPA to finance capital investments with stevedoring revenues. In 2023, 98% of VPA's operating revenues were generated by VIT, and the rest came from federal and state grants. While CPAs have the right under the Canada Marine Act (CMA) to engage in handling of goods, they usually do not.

In addition, CPAs cannot obtain ongoing government funding for dredging while the VPA has access to the HMTF. USACE funds 95% of all dredging operations in the US.[45] However, as the HMTF is a general fund, the benefits are not necessarily equally redistributed (i.e., the benefits of dredging projects funded by the HMTF are not necessarily tied to ports who are paying the most tax).

3.2.2 Georgia Ports Authority

The Georgia Ports Authority (GPA) is a public corporation and an instrumentality of the State of Georgia. GPA's board members are appointed by Georgia's governor for a term of four years.

Facilities owned by the GPA currently include the Port of Savannah, the Port of Brunswick, Port Bainbridge (bulk river terminal), and the Appalachian Regional Port (dry port). The GPA also

[45] Central Dredging Association, "New funding to address "significant backlog" in US dredging" (2021) Link

expects that its new inland terminal (Blue Ridge Connector) will be operational in 2026.[46] The port of Savannah is composed of the Garden City container terminal and the multipurpose Ocean Terminal. Garden City is operated by Gateway Terminals, a joint venture of three stevedoring companies, while Ocean Terminal is operated by the GPA. In Brunswick, Colonel's Island Terminal is operated by the GPA in collaboration with automobile processors, the Mayor's Point terminal is operated by GPA, and the East River terminal is operated by Logistec USA.

During the past decade, the GPA benefited from massive investments in the Savannah Harbor Expansion Project which consisted in deepening the Savannah federal shipping channel from 42 feet to 47 feet. Total costs for this project were about $1 billion USD, of which nearly 75% was funded by the US Government. It is estimated that each dollar invested in this project will generate $7.70 USD in total economic output.[47] Federal funding was provided by the USACE, and the remaining amounts came from the GPA and the Georgia Department of Transportation.

To meet expected future demand, the GPA plans to undertake numerous infrastructure initiatives and handling equipment purchases. In its Annual Comprehensive Financial Report for 2022 and 2023, the GPA indicates total investments for these projects which are to be completed between 2023 and 2025 should reach over $2 billion USD. Two-thirds of this amount will be financed through bonds issued by the GPA. The remaining amounts will be financed through federal and internal GPA funds. Federal funds received by the GPA to finance infrastructure projects in the past notably came from the FASTLANE, Port Infrastructure Development Program (PIPD) and Infrastructure for Rebuilding America (INFRA) programs.

3.2.3 Comparison of Canada and US port infrastructure investment

Port authorities in the US can pursue funding from several grant programs administered by the federal government. This includes programs with substantial budgets such as INFRA grants, TIGER grants, Rebuilding American Infrastructure with Sustainability and Equity (RAISE), National Infrastructure Project Assistance (MEGA) program. Furthermore, the US has port-specific grant funding programs, notably the PIPD, which is administered by the Maritime Administration (MARAD) under the US Department of Transportation.

In contrast, Canada's NTCF ($4.6 billion) is the main infrastructure funding program leveraged by port authorities seeking federal funding, and the scope of this program covers a wide range of infrastructure (e.g., airports, ports, railways, transportation facilities, and access roads). In 2022, Transport Canada also launched the Green Shipping Corridors Program (GSCP) – Clean Ports Stream to specifically fund infrastructure investments at ports and terminals that contribute to the establishment of green shipping corridors and decarbonizing the marine sector. However, the total funding available ($127 million) is relatively small in comparison to the NTCF program.

Given the size of the US market in comparison to Canada it is necessary to use a normalized statistic to compare the magnitude of port infrastructure investment from federal programs. Figure 20 shows grant funding awarded to ports in Canada and the US, normalized by total port traffic to obtain a ratio of funding dollars per unit of traffic (tonnes).

Overall, the US has awarded more funds to port infrastructure investment (almost 60% more per unit of traffic) and has a greater range of funding programs available when compared to Canada (2022-2023). The US federal funding to port infrastructure projects averaged $0.70 CAD per tonne, whereas Canada's federal investment in CPAs from the NTCF averaged $0.44 CAD per

[46] Blue Ridge Connector on track for 2026 completion. Link.
[47] Savannah Harbor Expansion, GA, Link

tonne. It is important to note that this analysis does not account for differences between Canada and US in terms of the need for port infrastructure (e.g. condition of existing assets) or other differences in the funding environment that might exist. Looking ahead the US plans to continue making significant investments. The US has announced $3 billion of federal investment to come from the IRA to improve the country's port infrastructure.[48] Whereas Canada has yet to make any new federal funding commitments to renew the NTCF program, which has already awarded 90% ($4.1 billion) of the program's total budget ($4.6 billion).

Figure 20: US and Canadian federal government funding awared to ports in 2022 and 2023 (all figures expressed in Canadian dollars, converted at market exchange rates)[49]

Grant	Description	Federal grants awarded to ports	
		2022	**2023**
INFRA	Grants for multimodal projects of national or regional significance to improve the safety, efficiency, and reliability of the movement of freight and people.	$353 million	$44 million
MEGA	Grants for large projects that are difficult to fund by other means and likely to generate national or regional economic, mobility, or safety benefits.	$103 million	none
RAISE	Grant program to fund projects that enhance safety, accessibility, sustainability, and equity in transportation, prioritizing climate resilience and benefits to underserved communities	$51 million	$124 million
PIDP	Supports projects that improve the safety, efficiency, and reliability of port facilities	$877 million	$973 million
Reduction of Truck Emissions at Port Facilities	Provides funding to reduce truck idling and emissions at ports, including through the advancement of port electrification.	$67 million	$156 million
Port Security Grant Program	Funding to help protect port infrastructure from terrorism, enhance maritime domain awareness, improve port-wide maritime security risk management, and maintain maritime security mitigation protocols that support port recovery and resiliency capabilities.	$139 million	$139 million
BRIC	This program supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.	$15 million	$1 million
Total (CAD)		**$1,605 million**	**$1,437 million**
Total metric tonnes traffic at all US maritime ports[50]		**2,137 million**	**2,144 million**
$CAD per tonne invested by federal government		**0.75**	**0.67**
NTCF[51]	Program designed to improve the efficiency and resilience of critical trade infrastructure, including ports, airports, railways, and highways.	$137 million	$170 million
Total (CAD)		**$137 million**	**$170 million**
Total metric tonnes traffic at CPAs		**340 million**	**351 million**
$CAD per tonne invested by federal government		**0.40**	**0.48**

[48] MarineLink, "US Awards Nearly $3 Billion for Clean Port Projects" (2024) Link

[49] Grant information is sourced from CPCS analysis of announced federal grant awards in the United States that pertain to projects where the successful proponent is a maritime port. United States port tonnage data is from the US DOT and includes domestic and foreign waterborne trade, excluding duplication.

[50] There is no United States traffic data available for 2023 from US DOT. The presented value is a projection of 2023 traffic based on the rate of increase from 2021 to 2022.

[51] NTCF funding information from "NTCF in Marine Project Data" spreadsheet provided to CPCS by ACPA on October 3rd, 2024. Data is originally sourced from Transport Canada. CPA tonnage traffic data is from Transport Canada.

3.3 Australia

Governance of the Australian port system is very diversified. Traditionally, state and territory governments regulated ports and established land use planning and control, while the Australian (Commonwealth) government is responsible for environmental assessment of port development.[52] However, between 2011 and 2016, many large container ports in Australia were "privatized" on a lease basis for periods ranging from 50 to 99 years.[53] Although ports remain under the ownership of state and territory governments, some observers consider that these ports have been essentially privatized.[54] Through these lease agreements, the private sector becomes the effective landlord of the port, and operations are concessioned to stevedoring companies, exactly as any public landlord port authority would do.

The reform of the port sector in Australia began in the 1990s with the creation of government-owned port corporations, many of which have not been privatized. Depending on the jurisdiction, these port authorities may be designated as state-owned corporations (New South Wales), government-owned Corporations (Queensland) or Government Trading Entities (GTEs) (Western Australia).

Port GTEs of Western Australia include the Port Authority of Fremantle, the Kimberly Port Authority, the Mid West Port Authority, the Southern Ports Authority and the Pilbara Port Authority. Following an amalgamation process which occurred in 2014,[55] these port authorities oversee nine distinct port locations across the state. In the case of Fremantle, it handles practically all containers transiting ports in Western Australia and is the fourth highest volume container port in Australia.

As GTEs, port authorities may have to pay dividends to their shareholders. In the 2024-25 budget for example, the Port of Fremantle should pay about $35 million AUD to the Government of Western Australia, from a net profit after tax of $47 million AUD. The port authority will however retain dividend payments to contribute to future infrastructure development at the port. In its 2024-25 budget, the Government of Western Australia announced that it will invest over $800 million AUD to enhance port infrastructure in the state. About 30% of this amount will be financed by port authorities through borrowing, 47% through internal funds, and 22% through capital appropriations. This amount compares to an estimated asset investment program of $524.4 million AUD for the 2023-24 budget, and $846.2 million AUD planned for 2025-26.

Western Australia Port Authorities (WAPAs) are similar to CPAs in that they are autonomous landlord organizations operating at arms length for their owner (government). However, WAPAs are expected to contribute to the state's consolidated account through dividends. This mechanism of transfer payment from port authorities to government is similar to the gross revenue charge paid by CPAs. In addition, the Minister of Transport may set financial targets for WAPAs, which WAPAs then have to implement a plan to achieve.

[52] Department of Infrastructure, Transport, Regional Development Communications and the Arts. Link

[53] Brisbane, Botany Port Kembla, Newcastle and Darwin were leased for 98-99 years, while Melbourne was leased for 50 years. Melbourne was leased for $9.7 billion AUD in 2016 to a group of investors which notably includes the Ontario Municipal Employees' Retirement System. The Caisse de Dépôt et Placement du Québec is one of the investors which leased the Port of Brisbane for $2.1 billion AUD in 2011.

[54] Taylor, G., 2022, Link

[55] Except Fremantle which was not affected by amalgamation.

Comparison of how borrowing limits are set

The borrowing limit for WAPAs is set by the Minister each financial year. It may apply to either (1) the maximum outstanding balance allowed at any point during the year or (2) the total liabilities that can be incurred within the year.

In Victoria, like Western Australia, borrowing limits are defined on a case-by-case basis and must be aligned by the Department of Treasury and Finance.

NSW borrowing limits are regulated by the NSW Treasury, though up-to-date borrowing limits are not disclosed publicly.

Queensland Ports are government owned, and the specific borrowing limits are not readily available.

In comparison to Canada, the process for how borrowing limits are set in Australia (particularly for WAPAs) is a more structured and well-defined process. CPAs have shared that the process for determining borrowing limits should have less government influence. CPAs have experienced inconsistency among different government departments on how they recognize incremental revenue from planned new infrastructure projects (e.g., terminal expansions) contributing to their request to increase borrowing limits.

Some Australian ports also have pension funds as private investors, thus providing another means for port authorities to raise capital. Canadian pension funds, such as the Ontario Municipal Employees Retirement System (OMERS) have invested in Australian ports as the potential to generate strong returns and consistent cash flows and match well with funds long-term obligations to pay pensions to their members.[56] In Canada, there is private investment in the ports sector (e.g., terminal operations) however private investment is not permitted in CPAs.

3.4 The Netherlands

According to a report prepared for the European Parliament about a decade ago,[57] there is no specific legislation pertaining to port infrastructure financing in the Netherlands. But state funding in the European Union (EU) is closely scrutinized by the European Commission, because it is generally considered that state aid should not distort competition in the internal market, with certain derogations[58] pertaining to social provisions, disadvantaged regions, common European interests, culture, heritage conservation, etc. Figure 21 categorizes port investments according to three types:

Figure 21: European Union port infrastructure investment categories

Category	Name	Funder	Examples
A)	Basic port infrastructure	Public sector (state)	Dykes, breakwaters, canals, locks navigation aids, etc.
B)	Terminal infrastructure	Port authority or public-private-partnership	Dock basins, quay walls, jetties, etc.
C)	Port terminal equipment, superstructure	Private sector	Crane ways, buildings, cranes, rolling equipment, terminal roads/railways, etc.

Source: European Parliament Link

[56] Benefits Canada, “Why big pension funds love Australian ports” (2017) Link

[57] Buck Consultants International, 2011, *State Aid to EU Seaports,* report prepared for the Directorate-General for Internal Policies

[58] An exemption from or relaxation of a rule of law

In the Netherlands, these categories are linked to who should fund for the investment. Basic infrastructure (Category A) which serves and protects the public should for example be funded by the state, while terminal equipment and superstructure (Category C) is user specific and should be funded by the private sector. In either case, this does not mean that private/public contributions are prohibited.

Public-private partnership financing agreements can be considered for Category A infrastructure while state funding is possible for Category C projects if user fees allow cost recovery. Finally, port internal infrastructure (Category B) is usually funded by port authorities and paid back through port fees.

Since the mid-2000s, ports in the Netherlands function as government-owned companies in charge of managing and developing ports.

Comparison of equity ownership models

Dutch port authorities may have multiple shareholders from different levels of government (e.g., municipal, state and federal). For example, 71% of shares in the Port of Rotterdam are held by the municipality of the same name, while the remaining shares are held by the Dutch state. In Amsterdam, however, all the shares of the port are held by the municipality. Finally, the shares of Zeeland Ports are held a holding organization composed of the Province of Zeeland and three municipalities.

Dutch ports can sell shares to obtain funding, in exchange for shareholders receiving dividend payments. In contrast, CPAs cannot have equity owners; they are fully owned by the federal government without any equity stake.

The construction of the Maasvlakte II terminal between 2008 and 2013 in Rotterdam, at an estimated cost of 2.9 billion EUR, illustrates funding arrangements for port investments in the Netherlands. The state and the port authority financed general infrastructure, about one-third of the total investment, at a 60/40 split. The port authority funded land reclamation work (about 2 billion EUR). The state however purchased 500 million EUR in shares in the Port of Rotterdam in exchange for receiving dividends.

In addition to Dutch state funding, ports of the Netherlands (as well as other ports of the EU) can also access EU grants through the Trans-European Transport Network (TEN-T) program. The Connecting Europe Facility (CEF) is the most important funding instrument, whereas the European Regional Development Fund is another option available.[59] In the case of the CEF, it granted 860.5 million EUR to port authorities between 2014 and 2017.[60] During this period, the Netherlands received 60.2 million EUR for two projects.

Through the TEN-T program, Dutch ports are eligible to obtain EU grants if they demonstrate their projects contribute to reaching the program's objectives. At the European scale, needs are assessed through the TEN-T corridor program which establishes investment priorities, however individual ports can also determine their own priorities. If the port's priorities are aligned with TEN-T priorities, they can obtain funding from the EU through the CEF. The TEN-T program is overseen by coordinators appointed by the European Commission.[61]

[59] The Netherlands are not eligible to the Cohesion funds of the European Union because it has a gross national income (GNI) per capita above 90% EU-27 average

[60] De Langen, P., *et al.*, 2018, *The infrastructure investment needs and financing challenge of European ports,* European Seaports Association.

[61] European Commission, Trans-European Transport Network (TEN-T) objectives (2024). Link

The major distinction between the CPA investment model and that of port authorities in the Netherlands is that state aid is very strictly monitored by the European Commission. Port authorities can access government funding if it is demonstrated that this does not distort market competition at the European scale; one way to demonstrate this is to allow governments to obtain a return on their investments through dividends on their shares in port authorities.

3.5 Key insights

Port infrastructure investment models vary and depend on expected returns and the ultimate beneficiaries of the return on investment. However, there are several models which are being used by port authorities in other jurisdictions that differ from the model of CPAs.

Some port authorities are owned by their respective state and federal governments, such as in the Netherlands and Australia, (i.e., equity stake(s) in the port authority). In contrast, the financial structure of CPAs limits their financing options. Notably, CPAs cannot raise equity capital.

Given the recognized wider societal and economic benefits of basic port infrastructure, jurisdictions will implement funding programs such as the TEN-T program via CEF in Europe or the Bipartisan Infrastructure Law in the US. This funding is generally allocated to ports through a competitive process, according to trade development, connectivity, and environmental priorities/policies. However, the PIDP in the US is targeted specifically at port infrastructure and the TEN-T program in Europe is a more coordinated European level of program investment, in comparison to the NTCF which is more general and less coordinated. A more detailed comparison of the PIDP, TEN-T, and NTCF programs is included in Appendix C.

Finally, the level of government funding is usually a function of each port's internal financial resources and its ability to raise private equity for specific elements of infrastructure development.

4 Conclusions: investment challenges faced by CPAs

Key chapter takeaways

- Canadian ports face strong competition and risk losing trade to US ports, which also serve major trade gateways to the North American market. In addition, Canada competes for investment capital at a global scale and must demonstrate an attractive business case for attracting private sector capital.
- Long timelines for permits and approvals can limit the effectiveness of capital investment (due to cost escalation) and potentially lead to lost business opportunities. There is a need for government to reduce "red tape" in conjunction with making capital contributions to projects.
- CPAs would be able to better plan and utilize funding opportunities to increase the overall competitiveness of Canadian supply chains if there was greater long-term visibility, stability, and coordination of how federal funding is allocated.
- Increased flexibility on borrowing limits would enhance CPA's ability to deliver capital projects (including the ability to seek private lenders).
- Equity ownership could offer an alternative means for CPAs to obtain funding. In other jurisdictions, such as in the Netherlands and Australia, some port authorities are owned by their respective state and federal governments.

This study and the resulting inventory of CPA infrastructure investment needs provide an initial picture of the extent of port infrastructure needs and plans in Canada. In addition, CPAs and other stakeholders have highlighted several challenges and potential areas of improving the funding environment and port infrastructure investment model in Canada. These are summarized below:

- **Long timelines for permits and approvals** can limit the effectiveness of capital investment (due to cost escalation) and potentially lead to lost business opportunities. There is a need for government to reduce "red tape" in conjunction with making capital contributions to projects.
- **Limited outlook and stability of the federal funding pipeline.** The NTCF only announces its funding allocation and "themes" one-year in advance. This limits CPAs in their ability to position (prioritize) project planning efforts to leverage the funding available. Furthermore, long-term stability on the pipeline of funding would enable CPAs to better plan and utilize funding opportunities to increase the overall competitiveness of Canadian supply chains.
- **Competition for grants.** All ports (small, mid-sized and large CPAs) are placed in the same competitive environment for funding from programs like NTCF. However, their needs and magnitude of funding asks can greatly differ.

- **Cash flow constraints for matching programs.** CPAs (notably smaller ports) have shared their challenges in being able to meet the 50% minimum threshold for matching grant applications such as NTCF.

- **Constraints on borrowing limits.** CPAs have shared that increased flexibility would enhance their ability to deliver capital projects. Some smaller CPAs are also in a bind as they cannot fund projects via increased borrowing that would in turn support them with increased revenue as their borrowing limits are controlled by their current level of revenue. Stakeholders have also raised that there are inconsistencies across different departments of the federal government on how expansionary project investments and resulting future revenue factor into increased borrowing limits for CPAs.[62]

- **Equity ownership in CPAs is not currently an option, unlike in Netherlands and Australia.** If the regulatory environment allowed external investors to own equity, CPAs would have another means to obtain funding that is currently unavailable. However, there are risks to implementing equity ownership. For instance, if equity ownership were allowed, an investor might be able to influence a CPA's investment decisions in a direction beneficial to the investor's business or interests, which may not be the most beneficial decision for other stakeholders or Canadian supply chains at a national scale.[63]

The NTCF program has been effective in accelerating capital expansion projects at CPAs. For CPAs, most NTCF investments have focused on supply chain digitalization, relieving congestion, and increasing the fluidity of Canada's supply chains.[64] However, the structure of the NTCF can lead CPAs to prioritize expansion projects to secure funding, often at the expense of needed maintenance and rehabilitation of aging infrastructure. This is particularly relevant for smaller CPAs, which face more constraints due to their smaller capital budgets. Neglecting investment in aging infrastructure creates significant risks not only for the CPAs but for the entire supply chain.

Port authorities in other jurisdictions have access to port specific discretionary grant funding programs and infrastructure investment is systematically coordinated with planning at a national scale. Notably, the PIDP in the US is targeted specifically at port infrastructure, whereas Canada's NTCF program does not solely fund port infrastructure. In addition, the Trans-European Transport Network (TEN-T) program in Europe is a more coordinated European level of program investment, in comparison to the NTCF which is more general and less coordinated (i.e., limited detail or planning at a national scale for investment in major trade gateways and/or corridors).

In summary, two clear messages emerged from discussions with CPAs and stakeholders, which motivate the need for port infrastructure investment and addressing the challenges faced by CPAs to ensure Canada improves its supply chain competitiveness.

[62] CPCS stakeholder meeting for ACPA's Port Infrastructure Needs Assessment (2024)
[63] CPCS stakeholder meeting for ACPA's Port Infrastructure Needs Assessment (2024)
[64] NTCF backgrounder, (2020) Link

1. **Canadian ports face strong competition and risk losing trade to US ports which also serve major trade gateways to the North American market.** US ports benefit from a less cumbersome project approvals process, which enables them to be more responsive to business opportunities. US ports also benefit from more coordinated infrastructure investment at a national scale.

2. **Canada competes for investment capital globally and must demonstrate an appealing business case for attracting capital.** Companies, including railways and terminal operators, are key partners for CPAs in developing infrastructure. Companies with a global presence have the option to invest in other jurisdictions should they present a better return on investment.

Notably, the US has awarded more funding to port infrastructure investment (60% more per unit of traffic) and has a greater range of funding programs available when compared to Canada (2022-2023). It is important to note that this analysis does not account for differences between Canada and US in terms of the need for port infrastructure (e.g. condition of existing assets) or other differences in the funding environment that might exist.

Looking ahead, the US plans to continue making significant investments with the announcement of $3 billion in federal investment to come from the IRA to improve the country's port infrastructure.[65] Whereas Canada has yet to make any new federal funding commitments to renew the NTCF program, which has already awarded 90% ($4.1 billion) of the program's total budget ($4.6 billion).

[65] MarineLink, "US Awards Nearly $3 Billion for Clean Port Projects" (2024) Link

Appendix A Study methodology

Methodology

CPCS collected data on existing and future infrastructure needs through a survey of all 17 CPAs. The survey asked CPAs to provide historical 2022 and 2023 infrastructure expenditure data as we as forward-looking projections from 2024 to 2040.

This survey assessed port infrastructure needs according to a broad range of criteria, including by asset type (e.g., waterside, landside), criticality, rehabilitation of existing infrastructure or new project investments, motivation for the investment need (e.g., climate adaptation, aging infrastructure, capacity improvements, etc.), project and funding status. The survey was initially open for one month, but to ensure a 100% response rate, it ended up being open for two months.

In addition, we held one-on-one follow-up meetings with all CPAs to discuss any needed clarifications from their survey responses and to facilitate an open discussion on their infrastructure needs.

CPCS also engaged with a selection of other stakeholders to collect their views on the infrastructure needs of CPAs, and key factors or trends which are driving investment needs. We prioritized speaking with stakeholders who have a broad perspective on Canada's port infrastructure, and experience in other jurisdictions to explore and contrast the Canadian context.

Limitations

There are several limitations regarding the scope and presentation of data collected in this study:

Data availability. CPCS is only serving as a conduit to relay information shared by CPAs in their survey response and in follow-up meetings with CPAs and other stakeholders. Therefore, CPCS is only able to present the data and feedback that were shared with us.

Confidence in presenting capital needs over the long-term. The majority of CPAs follow a five-year capital planning cycle. Their investment needs until 2028 can be presented with a high level of confidence, however there is greater uncertainty in projecting capital needs from 2029 to 2040, and beyond. Capital projects over the longer-term have yet to be fully defined or have cost estimates developed. Therefore, we are limited to presenting infrastructure needs and capital investment in the following manner:

- **Until 2028.** We present and discuss aggregated data and statistics with a high degree of certainty for the next five years (near-term investments identified in capital plans).
- **2029 to 2040**. We present and discuss aggregated data and statistics on capital outlays shared by CPAs while noting the limitation that not all CPAs have yet to define capital outlays to 2040. CPCS has included illustrative scenarios as projections of port infrastructure needs until 2040. The scope of new infrastructure projects may depend on what happens in the next five years of CPAs planning cycle. Most CPAs are focused on defining the projects which they will do in the next five years. However, larger CPAs have shared a longer-term outlook.
- **Beyond 2040.** We describe the types of capital projects which CPAs are planning in the long-term, however our ability to share any indicative cost of these projects is limited.

Scope of infrastructure assessment. Our scope focuses on the infrastructure needs under the responsibility of CPAs. The broader scope of port infrastructure includes assets owned, operated, and maintained by private terminal operators within the jurisdiction of CPAs. However, it is outside the scope of this study to assess the infrastructure needs and/or magnitude of capital investment needed by private sector stakeholders.

Jurisdictional scan. It was out of scope for CPCS to engage with port authorities or other stakeholders in these jurisdictions. Therefore, the information gathered, and our analysis is based on what is available publicly.

Overview of the survey tool

The following are screenshots of the Excel-based survey that was administered to CPAs to obtain data that was aggregated and analyzed for producing many of the figures shared in this report. This survey was prepared both in English and French. The French language version was shared with CPAs based in Québec.

The questions and classifications of asset types (e.g., waterside, landside and intermodal) and their sub-categories (e.g., port harbour vessels, breakwaters, piers, wharfs sub-structures), status of project development (e.g., pre-feasibility, construction underway) and risk/criticality rating of the project were largely carried over from a previous CPA infrastructure needs assessment conducted by CPCS on behalf of ACPA in 2011. The survey was constructed with a pre-determined dropdown list of options for asset type, project status, and risk/criticality rating to ensure a level of standardization in the responses received, and enable aggregation of each CPAs response into Canada-wide statistics.

Survey instructions

PORT INFRASTRUCTURE NEEDS ASSESSMENT SURVEY

INSTRUCTIONS

This survey is limited to one response per CPA

	Cells with yellow fill are entry fields for respondents to complete
$ -	Dollar value should be provided
%	Percentage value should be provided
▼	Black triangle indicates there is a drop down menu for respondents to select their response from the list of options

The *"General Info"* sheet contains questions related to maintenance and capital expenditures (see definitions below)

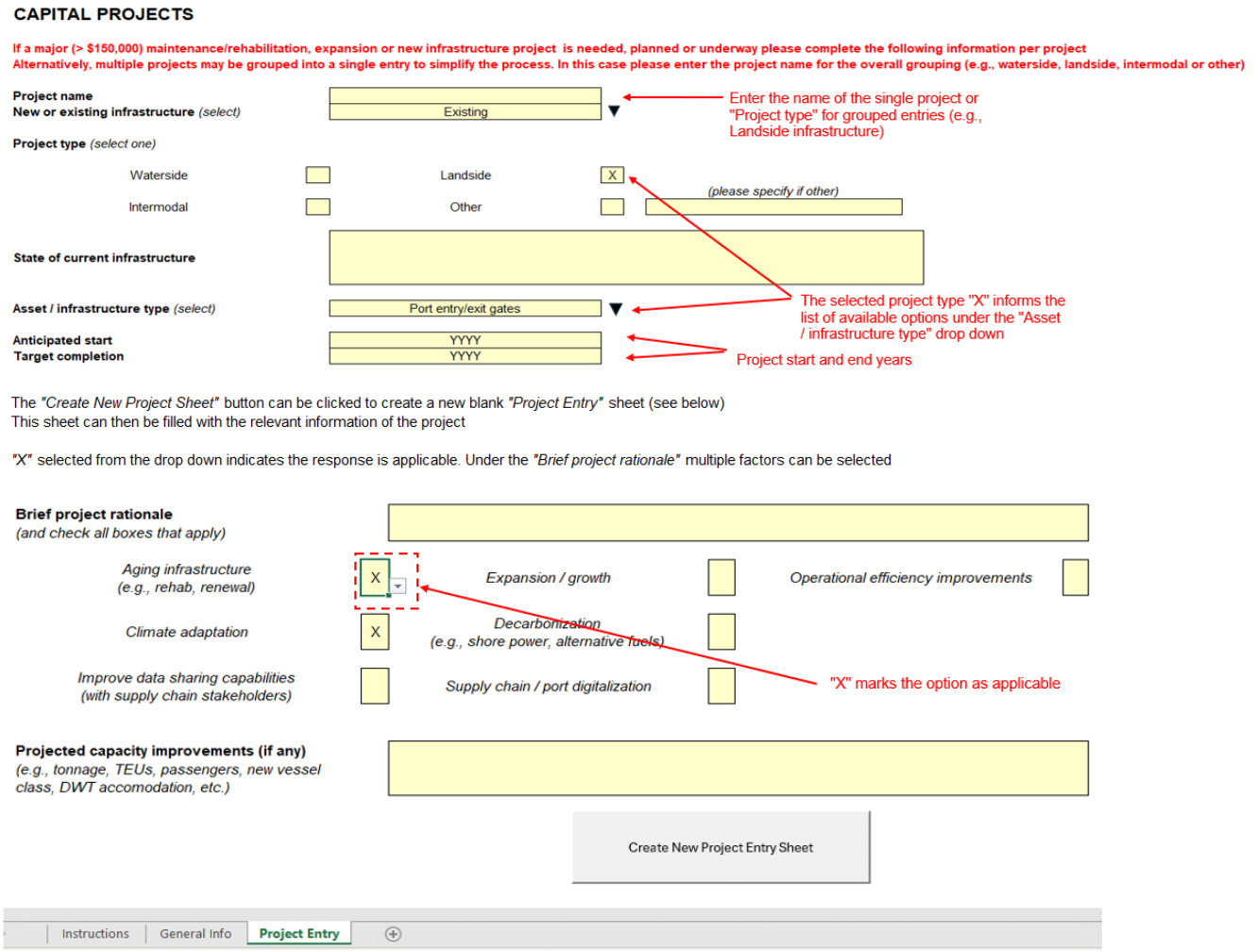
Maintenance: refers to the process of keeping something (e.g., an asset) in good working condition. Maintenance expenses are recorded in the Income Statement.
Examples of maintenance activities are functional checks, inspections, repairing and replacing minor components of an asset

Capital: A capital asset is property that is expected to generate value over a long period of time (e.g., expected useful life greater than one year). Capital assets are recorded in the Balance Sheet.
Examples of capital assets are buildings, computer equipment, computer software, land, land improvements, equipment and fixtures, machinery, vehicles and vessels

The *"Project Entry"* sheet contains questions related to a specific capital project
Please complete one *"Project Entry"* sheet per project should the project be valued at $150,000 or greater (see **Screenshot 1**)
Alternatively, multiple projects may be grouped into a single entry to simplify the process. In this case please enter the project name for the overall grouping (e.g., waterside, landside, intermodal or other)

Note that the selection under *"Project type"* will create a list of available options to select under the drop down list for the Asset / infrastructure type (see below)

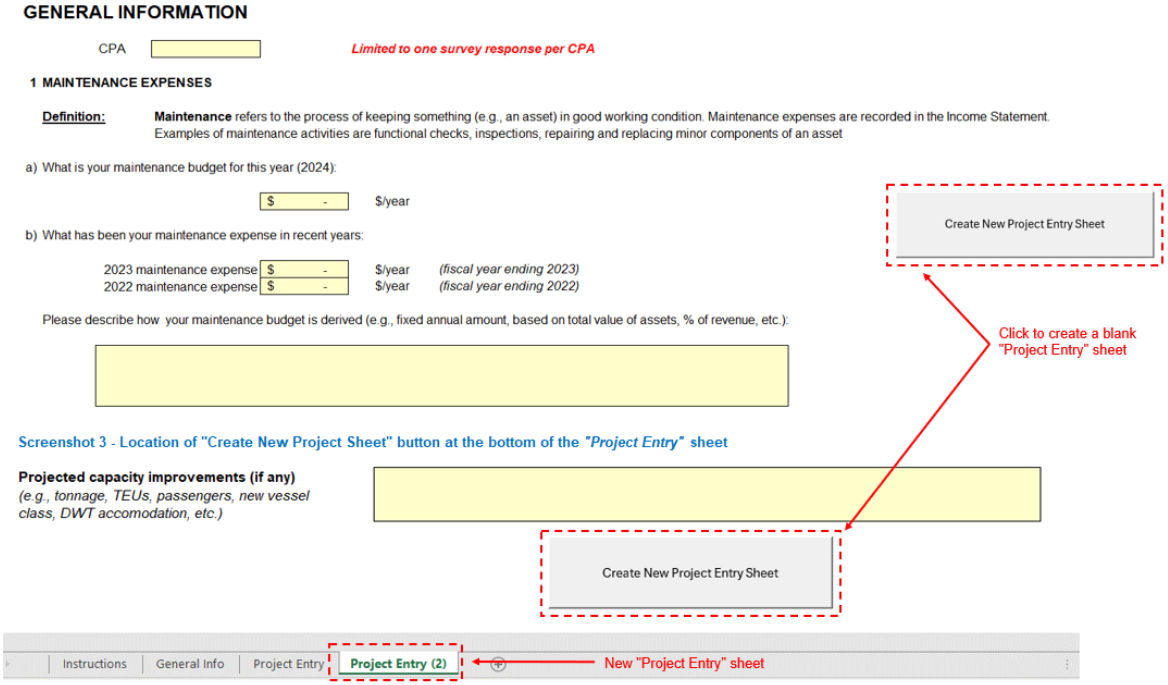
Screenshot 1 - Capital Project Entry - Single Project



The *"Create New Project Sheet"* button can be clicked to create a new blank *"Project Entry"* sheet (see below)
This sheet can then be filled with the relevant information of the project

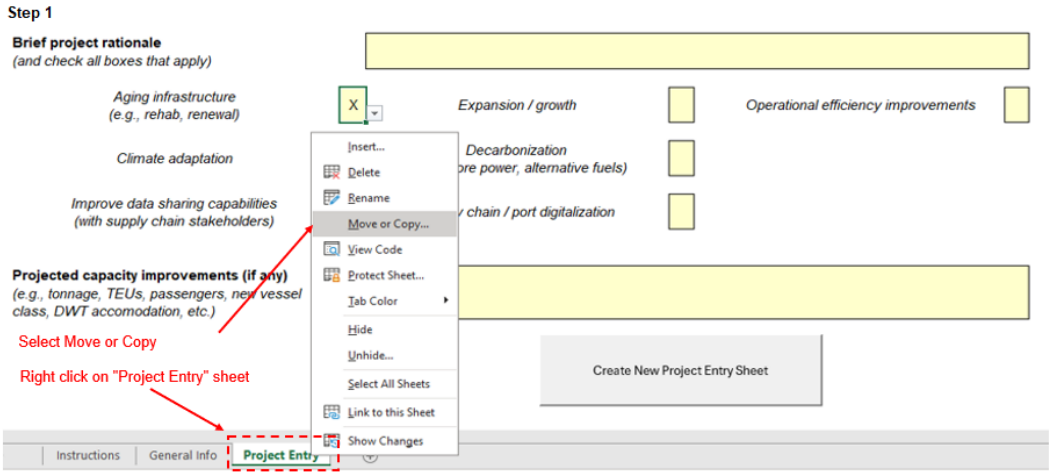
"X" selected from the drop down indicates the response is applicable. Under the *"Brief project rationale"* multiple factors can be selected

Screenshot 2 - Location of *"Create New Project Sheet"* button at the top left of the *"General Info"* sheet



Screenshot 3 - Location of "Create New Project Sheet" button at the bottom of the *"Project Entry"* sheet

Screenshot 4 - Creating and Renaming a new *"Project Entry"* sheet



Survey questions

GENERAL INFORMATION

CPA [ ]

Limited to one survey response per CPA

1 MAINTENANCE EXPENSES

Definition: **Maintenance** refers to the process of keeping something (e.g., an asset) in good working condition. Maintenance expenses are recorded in the Income Statement. Examples of maintenance activities are functional checks, inspections, repairing and replacing minor components of an asset

a) What is your maintenance budget for this year (2024):

$ - $/year

Create New Project Entry Sheet

b) What has been your maintenance expense in recent years:

2023 maintenance expense $ - $/year *(fiscal year ending 2023)*
2022 maintenance expense $ - $/year *(fiscal year ending 2022)*

Please describe how your maintenance budget is derived (e.g., fixed annual amount, based on total value of assets, % of revenue, etc.):

2 CAPITAL PLANNING

Definition: A **capital asset** is property that is expected to generate value over a long period of time (e.g., expected useful life greater than one year). Capital assets are recorded in the Balance Sheet. Examples of capital assets are buildings, computer equipment, computer software, land, land improvements, equipment and fixtures, machinery, vehicles and vessels

a) What is your planned capital expenditure for this year (2024):

$ - $/year

b) What has been your capital expenditure in recent years:

2023 capital expenditure: $ - $/year *(fiscal year ending 2023)*
2022 capital expenditure: $ - $/year *(fiscal year ending 2022)*

c) What time horizon do you use for developing your long-term Capital Plan (e.g., 5 years, 10 years, 15 years)?

Capital planning horizon [ ] years

d) How was your long-term capital plan developed?

e) What has changed over the past 10 years in regards to your long-term capital planning process?

f) Can you provide the following disaggregated figures on your capital plan.

Please note that recording the total capital amount ($) is more important than precisely determining in what year(s) the expenditure will occur (e.g., $100,000 in 2033 versus 2034)

Rehab / replacement of existing infrastructure $ in millions	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Waterside	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landside	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intermodal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

New infrastructure $ in millions	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Waterside	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landside	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intermodal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

KEY PORT INFRASTRUCTURE ASSET GROUPINGS

Waterside infrastructure
Approach channel(s) and harbour basin (maintenance dredging)
Wharf sub-structures and/or berth-face structures and associated hardware
Breakwater(s)
Port harbour vessels (floating barges, floating cranes, security boats)
Electrical supply and distribution systems (including lighting systems, reefer installations and power supply for cranes)
Other waterside infrastructure

Landside infrastructure
On-dock paved areas, including ramps and sub-structures
Storage/transit sheds
Off-dock open storage area(s)
Crane rails
Buildings (administrative, training, security, equipment maintenance shops)
Electrical supply and distribution systems (including lighting systems, reefer installations and power supply for cranes)
Water supply, sewerage and drainage systems
Major cargo handling equipment, where this is the responsibility of the port authority
Bulk materials handling facilities, where this is the responsibility of the port authority
ISPS Code compliance (e.g. perimeter fencing, lighting, cctv)
Port mobile equipment, vehicle fleet (autos, trucks, vans, etc.)
Other landside infrastructure

Intermodal infrastructure
Internal roadway system
Interconnections with municipal/provincial street and highway systems
Rail track, sidings, etc. within port lands, where this is the responsibility of the port authority
Port entry/exit gates
Other intermodal infrastructure

Other
Any other port infrastructure

CAPITAL PROJECTS

If a major (> $150,000) maintenance/rehabilitation, expansion or new infrastructure project is needed, planned or underway please complete the following information per project
Alternatively, multiple projects may be grouped into a single entry to simplify the process. In this case please enter the project name for the overall grouping (e.g., waterside, landside, intermodal or other)

Project name
New or existing infrastructure *(select)* Existing ▼

Project type *(select one)*

Waterside	☐	Landside	☐	
Intermodal	☐	Other	☐	*(please specify if other)*

State of current infrastructure

Asset / infrastructure type *(select)* ▼

Anticipated start *(YYYY)*
Target completion *(YYYY)*

Urgency *(select)* ▼ Comments to explain the rating of project urgency can be provided in the "brief project rationale" box below

Project status *(select)* ▼

Estimated total cost $ -

% of funding secured %

Source(s) of funding

Brief project rationale
(and check all boxes that apply)

Aging infrastructure (e.g., rehab, renewal)	☐	*Expansion / growth*	☐	*Operational efficiency improvements*	☐
Climate adaptation	☐	*Decarbonization (e.g., shore power, alternative fuels)*	☐		
Improve data sharing capabilities (with supply chain stakeholders)	☐	*Supply chain / port digitalization*	☐		

Projected capacity improvements (if any)
(e.g., tonnage, TEUs, passengers, new vessel class, DWT accomodation, etc.)

Create New Project Entry Sheet

Appendix B List of funds received by CPAs from the TARA Program

Figure B-1: Summary of funding received by CPAs from the TARA program

Recipient	Project description	Funding ($)
Funding Contributions		
Belledune Port Authority	The Belledune Port Authority will identify, analyse and evaluate the Port's climate change related risks. The project aims to determine any shortfall in the ability of infrastructure to absorb the negative effects of climate conditions.	$71,768
Saint John Port Authority	The Saint John Port Authority will evaluate climate change and extreme weather vulnerabilities and risks on key Port of Saint John infrastructure and facilities, and navigational channels. The purpose of the project will be to confirm to what extent infrastructure will be impacted by climate change.	$125,000
Windsor Port Authority	The Windsor Port Authority will provide a detailed analysis of the risks associated with climate change and will provide information necessary to plan and mitigate for the impact of climate change on its assets.	$140,630
Prince Rupert Port Authority	The Prince Rupert Port Authority will investigate ways to maximize resiliency of ports to climate change, develop a deeper understanding of how climate change will impact the Prince Rupert Port Authority, and develop a transferrable method for business partners and stakeholders to plan and execute resilience measures to advance climate change risk assessment research.	$399,816
Vancouver-Fraser Port Authority	The Vancouver Fraser Port Authority will perform coastal flood hazard and risk assessment for the Port's assets along the Fraser River.	$254,430
Grants		
Administration portuaire de Sept-Îles	The Administration Portuaire de Sept-Îles will develop over a period of six-month a three-dimensional modelling of the marine currents in the Bay of Sept-Îles.	$50,000
Administration portuaire de Québec	The Administration Portuaire de Québec will, over a two-year period, add the federal asset of the Port of Quebec to an existing study to seek to better understand short- and long-term erosion trends and quantify the movement of coastal sediments.	$49,880
	The Administration Portuaire de Québec will receive funding for a project to determine the impacts of climate change and increase the resilience of the port's infrastructure.	$50,000
	The Administration Portuaire de Québec will assess the criticality of port infrastructure in relation to anticipated climate change. To do so, an asset prioritization methodology will be developed to define and rank priorities.	$48,300
	The Administration Portuaire de Québec received funding for the acquisition of a current meter to monitor water level variation and to measure the current over a long-term period.	$50,000
Toronto Port Authority	The Toronto Port Authority will undertake a vulnerability assessment of the port's infrastructure. The study will improve understanding of climate change impacts on their assets and	$50,000

Recipient	Project description	Funding ($)
	operations, while also guiding future plans for infrastructure investments and improvements.	
Vancouver-Fraser Port Authority	The Vancouver Fraser Port Authority will develop adaptation guidelines for the port's infrastructure that is at risk of flooding due to potential rising sea levels and increase flood water levels.	$50,000
	The Vancouver Fraser Port Authority will collect GPS-based imagery of shoreline areas through the use of a Remotely Piloted Aerial System, or drone. The data will be used to assess the condition of the shoreline and identify areas requiring upgrades in light of increased erosion.	$22,000
	The Vancouver Fraser Port Authority will create 3D images of the port's area using specialized software and aerial photographs. This mapping will identify roadways or rail lines that may be vulnerable to flooding or sea level rise.	$15,000
	The Vancouver Fraser Port Authority will develop specific infrastructure risk assessment criteria and methodology for assessment of risks related to climate change. The project will quantify risks related to Vancouver Fraser Port Authority assets.	$49,000

Source: Transport Canada, “Projects funded by the Transportation Asset Risk Assessment Program” (2021) Link

Appendix C Comparison of NTCF, TEN-T and PIDP funding programs

Figure C-1: Comparison of TEN-T, PIDP and NTCF programs[66]

Feature	EU TEN-T	US PIDP	Canadian NTCF
Objective	Planning and developing a coherent, efficient, multimodal, and high-quality transport infrastructure across the EU	Improve the safety, efficiency, and reliability of port infrastructure.	Enhance the efficiency and resilience of Canada's trade corridors.
Scope	Railways, inland waterways, short sea shipping routes, roads, ports, airports, terminals. (same source as objective)	Coastal seaports, inland river ports, Great Lakes ports.	Airports, ports, railways, transportation facilities, access roads
Budget	Approximately €30 billion ($44.9 billion CAD) for 2021-2027.	$2.25 billion ($3.1 billion CAD) over five years (2022-2026).	$0.8 billion CAD remaining between 2024 - 2028
Environmental Focus	Emphasis on reducing emissions, promoting sustainable transport modes.	Includes projects for environmental and emissions mitigation.	Projects must consider climate change impacts and sustainability
Governance	Coordinated by the European Commission with national and regional authorities to ensure a cohesive and integrated approach	Administered by the United States Maritime Administration (MARAD) and geared specifically to port infrastructure	Administered solely by Transport Canada
Eligibility	EU Member States, regional and local authorities, infrastructure managers.	State and local governments, public agencies, Indigenous group, private entities.	All levels of government, Indigenous groups, private organizations, Crown Corporations, CPAs, Airport authorities, and academia.

[66] Sources for the table by program:

- TEN-T – EC, "Objectives of the Trans-European Transport Network" (2024) Link; TEN-T governance (2024) Link.
- PIDP – US DOT, "Port Infrastructure Development Program (2024) Link; PIDP Grants (2024) Link.
- NTCF – TC, "National Trade Corridor Fund Backgrounder" (2020) Link.

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