

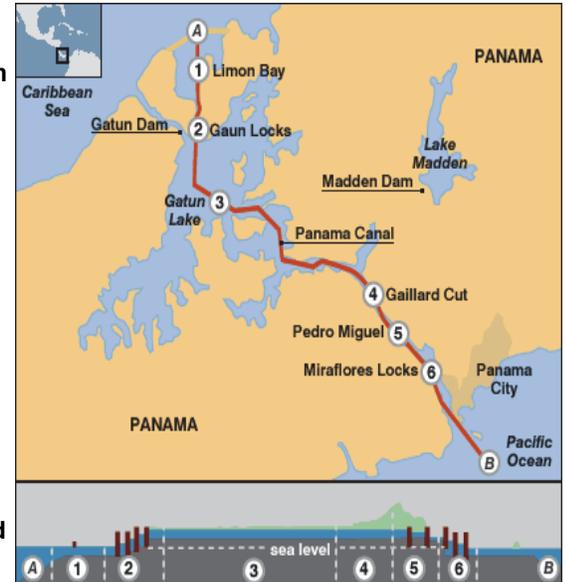
Special Report

Global Infrastructure

Rory Johnston (416) 862-3908
rory.johnston@scotiabank.com

Beyond the Panama Canal Expansion

- Expansion will approximately double the Canal's throughput capacity and more than double the maximum allowable ship size.
- Will largely distribute rather than create new marine traffic; East and Gulf Coast ports will likely see a net gain in traffic while West Coast ports will see a net loss, though the extent of this substitution will depend on a variety of factors including actions taken by West Coast ports to hold market share.
- The most positively affected market segments will be low-unit-value containerized products like paper or bulk commodities such as petroleum, ores, grains, and liquefied natural gas (LNG) where shipping costs represent a larger consideration than transit time.
- Toll rates remain the largest determinant of the expanded Canal's impact; only after tolls are established can full benefits be assessed and shipping routes altered to capture value.



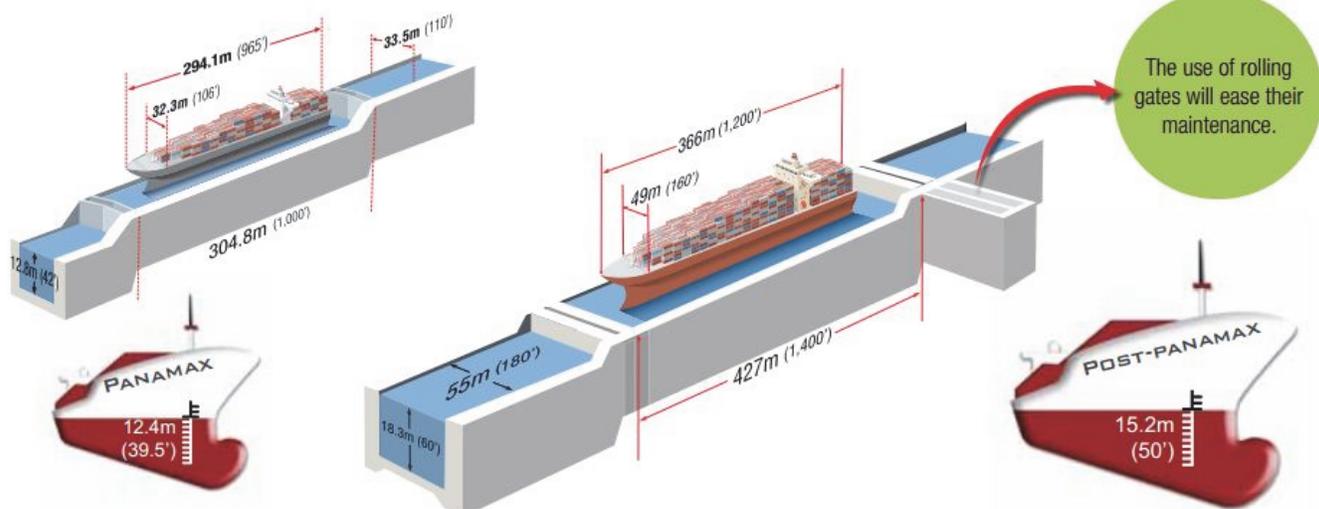
Source: British Broadcasting Corporation.

Background

The Panama Canal has set the standard for decades of ship-building, with ships constructed to be as large as possible without being too large for the Canal — so-called “Panamax” specifications. As technology improved and trade expanded, however, the economics of global transit began to favour larger vessels that quickly outgrew the Canal's constraints, known as “post-Panamax” ships. In 1990, 99% of global shipping capacity could transit the Canal; today, almost half the global fleet exceeds the current Panamax standard. The expansion project is an attempt to regain the Canal's former market share through the accommodation of the post-Panamax fleet, with the new Panamax standard capturing all but the very largest vessels currently in service. More than 12,000 ships carrying over 200 million tons of cargo passed through the 50-mile passageway in 2013 and the Panama Canal Authority (PCA) estimates that demand will increase by about 3% per year after the expansion is complete.

Existing Locks

New Locks



Source: Panama Canal Authority.

Expansion Progress & Technical Specifics

The expansion of the Panama Canal centers on a larger third set of locks that will accommodate ships of 170,000 deadweight tons (DWT) or 12,000 twenty-foot equivalent units (TEU), up from the existing locks' 65,000-85,000 DWT or 4,500-5,500 TEU capacity. (DWT refers to the total weight a ship can carry whereas TEU refers to the volume of a standard shipping container.) The Canal will also be expanded through the construction of new access channels, the dredging of waterways in order to better accommodate the draft depth of larger ships, and the widening of choke-points like the Culebra Cut to allow for two-way traffic. In all, the expansion project will approximately double the throughput capacity of the Canal.

As of February 28, 2015 the expansion was 86% complete and was scheduled to begin service in the first half of 2016. However, construction of the new locks — the most technical portion of the project — lags furthest behind (83%); as with all large-scale infrastructure, it is possible that the final leg of construction will run into unforeseen issues that further push back the opening and further push up the price. The expansion was originally scheduled to be completed in October 2014 at a cost of US\$5.25 billion, but labour, contract, and cost-related disputes have delayed completion and may increase the final price tag by around US\$1.5 billion.

Tolls are the greatest factor affecting the eventual economics of post-expansion Canal transit and the Panama Canal Authority (PCA) has not yet determined what level will be supported by future market conditions. The PCA has already increased tolls from US\$40/TEU in 2006 to US\$82/TEU in 2013, resulting in a near tripling of toll revenue (Figure 1). This doubling of the transit price has consumed a material portion of the expanded Canal's estimated cost advantage, and further increases risk placing the Canal in an uncompetitive position relative to other routes.

Shifting Trade Winds

Grains, petroleum, and containerized cargo make up three-fifths of existing Canal traffic by weight at present. However, tolls vary between commodity sectors and containerized cargo accounted for almost half (US\$911 million) of canal revenue in FY2014 despite representing only one-quarter of the transits (Figure 2). This is a relatively new phenomenon and containerized cargo only became the primary segment of Canal traffic in 2002; before that, bulk cargo was most important.

The current price and time differentials between an all-water route facilitated by the expanded Canal and the "land-bridge" alternative (West Coast port call with rail shipment inland) will alter after the project is completed. Even after the expansion, the land-bridge will still shave days off the journey from Asia to the American interior (about 18 days vs 22 through the Canal), albeit at a higher transport price. The goods that are most likely to benefit from the Canal expansion are low-unit-value containerized products like paper, or bulk commodities like petroleum, ores, grains, and future liquefied natural gas (LNG) shipments where unit shipping costs are a larger concern than transit time. High-value and perishable goods that rely on a just-in-time delivery model will likely continue to favour the land-bridge route.

While more than 100 countries export or import merchandise through the Canal, just ten — the United States, China, Chile, Japan, Colombia, South Korea, Peru, Mexico, Ecuador, and Canada — account for more than 75% of Canal traffic by weight, and just the first three account for over 50% (Figure 3). It is likely that utilization of the expanded Canal will increase proportionally to current usage and more so for countries that export or import the commodities that will be the biggest beneficiaries of the expansion. The most obvious example of this is the large volume of US LNG export capacity that is expected to come on stream in the next few years and the Asian countries that will be the likely importers of that gas.

Figure 1: Canal Revenue By Source

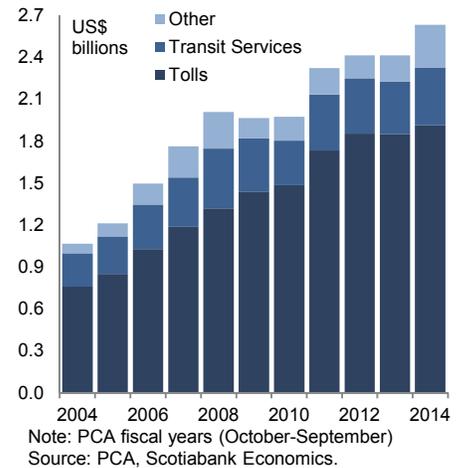


Figure 2: Canal Traffic By Market Segment, FY2014

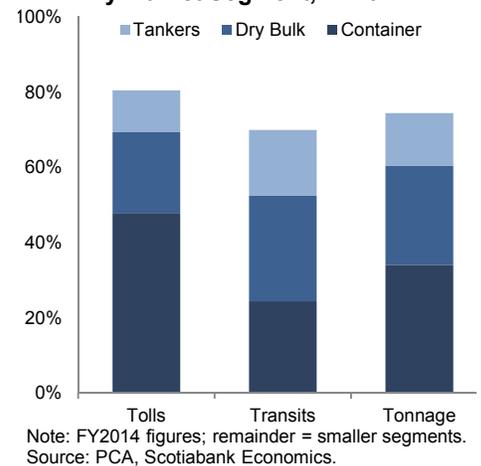
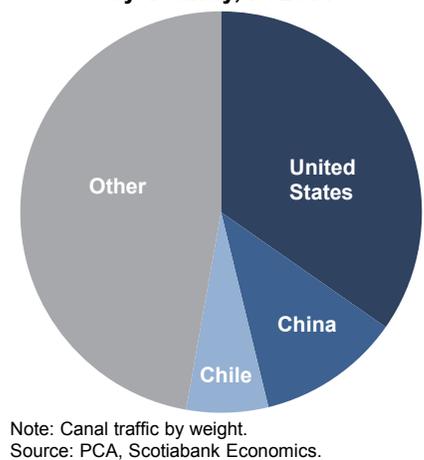


Figure 3: Share of Canal Traffic by Country, FY2014



Energy Through the Canal: LNG in Focus

The Canal has a relatively limited impact on the global energy system at present as its pre-expansion constraints limit traffic to only smaller classes of crude tankers and virtually none of the existing LNG tanker fleet. The expansion will open the Canal up to a far larger swath of the global energy trade: over 80% of the current LNG fleet will be able to pass through the expanded Canal and the maximum crude tanker capacity will increase by upwards of 25%, with larger tankers able to transit the Canal through the use of the trans-Canal pipeline (although doing so increases per-barrel costs). Increasing allowable tanker sizes decreases the unit transport cost, making seaborne transit more competitive with existing pipelines, especially for natural gas.

The expansion will further bolster the ongoing energy revolution in the US. For oil, increased tanker capacity will allow for better economies of scale, facilitating improved logistics for US crude oil (if Washington drops its crude export ban) and refined petroleum exports, which have doubled over the past few years. For natural gas, the current LNG export capacity in the region stands at roughly 2.6 billion cubic feet per day, but that is expected to increase almost 8-fold by 2019 as the US completes its liquefaction facilities and rationalizes its regulatory frameworks. Even if the lion's share of the region's natural gas does not end up in Asia, linking the Atlantic and Pacific basins and easing access to Asian markets (where LNG is traditionally more expensive) will allow exporters to demand a higher price in other markets, shrinking the wide disparities in global landed LNG prices. Higher prices will incentivize further North American natural gas development, which will have positive knock-on effects for Canadian, US, and Mexican GDP growth and trade balances.

Outlook

Expanding the Panama Canal is a massive infrastructural undertaking that will have a dramatic impact on the global shipping industry, but the extent of this impact will be largely influenced by toll levels set by the PCA and how the multiple stakeholders adjust to a post-expansion reality. Plenty of uncertainty remains concerning structural challenges in a post-expansion shipping space, which can be broadly broken down into three categories: substitution, canal execution, and port-side expansion.

There is a possibility that customers will go elsewhere as tolls rise, either to existing canals or speculative routes that may become viable in the future. The Suez Canal currently serves as the primary alternative for goods traveling between the Atlantic Americas and Asia. The Suez Canal's maximum ship size is larger because vessels transit the passage at water-level and never need to enter a system of locks. The Suez is also undergoing its own expansion but even the current Suezmax specifications outstrip the post-expansion Panamax; however, the very largest shipping vessels have traditionally been put into service on the Asia to Europe pendulum route (usually Hong Kong or Singapore to Rotterdam) and do not service the trade lanes between Asia and the Americas. There is also a possibility that competing routes will emerge in the future. The potential for an ice-free North-West passage in the coming decades may provide a viable northern trade route and there are plans for a competing canal that cuts through Nicaragua, though this project is still in its initial stages and its viability is questionable. The extent of the substitution risk from competing waterways and West Coast ports will be determined by the Panama Canal's toll structure, which the PCA can alter in order to regain market share if circumstances require. However, if further delays push up the expansion's final price tag, there may be an incentive to pass along those costs through toll increases.

Risks also exist concerning the management and execution of the Canal itself. The Panama Canal Pilots' Association (PCPA), the group representing the crews of the boats that guide ships through the Canal, recently voiced concern that the Canal is still too narrow — particularly at its most narrow point, the Culebra Cut — to allow for the simultaneous two-way transit of post-Panamax ships. This may result in minor specification tweaking before or immediately after the Canal is completed, but should not materially affect its impact.

Finally, those expecting far greater post-2016 shipping volume have begun investing in ways to capitalize on that opportunity and they risk basing decisions on speculation. Ports across the US East and Gulf Coast are pouring billions of dollars into the infrastructure needed to facilitate the larger ships that will be coming through the Canal. However, larger ships typically make fewer port calls and it is likely that only a few ports will capture the bulk of the larger ship traffic, acting as offloading hubs for the transshipment of goods to other, smaller ports. It is difficult to say with certainty which ports will reap the largest rewards from their respective expansions, but some established ports have pre-existing advantages. Houston will benefit due to its energy advantage, and some ports (e.g. Norfolk, Savannah, Charleston) have the added value of complementary non-port infrastructure that will help with post-port transit to inland markets.

The expansion will have positive effects in many countries, but the primary beneficiary will likely be the United States. China, Chile, Colombia, Mexico, and Ecuador also stand to gain as transport economics for oil, coal, copper, and LNG improve, while Brazil and Argentina are unlikely to see any material benefits during the first years of operation. Improved shipping infrastructure will better lubricate international commerce and allow for a realignment of trade flows — what that looks like exactly, however, has yet to be determined.

INTERNATIONAL ECONOMICS GROUP**Pablo F.G. Bréard, Head**

1 (416) 862-3876

pablo.breard@scotiabank.com**Erika Cain**

1 (416) 866-4205

erika.cain@scotiabank.com**Rory Johnston**

1 (416) 862-3908

rory.johnston@scotiabank.com**Tuuli McCully**

1 (416) 863-2859

tuuli.mccully@scotiabank.com**Estela Molina**

1 (416) 862-3199

estela.molina@scotiabank.com**Neil Shankar**

1 (416) 866-6781

neil.shankar@scotiabank.com**Scotiabank Economics**

Scotia Plaza 40 King Street West, 63rd Floor

Toronto, Ontario Canada M5H 1H1

Tel: (416) 866-6253 Fax: (416) 866-2829

Email: scotia.economics@scotiabank.com

This report has been prepared by Scotia Economics as a resource for the clients of Scotiabank. Opinions, estimates and projections contained herein are our own as of the date hereof and are subject to change without notice. The information and opinions contained herein have been compiled or arrived at from sources believed reliable but no representation or warranty, express or implied, is made as to their accuracy or completeness. Neither Scotiabank nor its affiliates accepts any liability whatsoever for any loss arising from any use of this report or its contents.

TM Trademark of The Bank of Nova Scotia. Used under license, where applicable.