BSR

Extending Supply Chain Sustainability Metrics to Terminal Operations

May 2011

www.bsr.org

About this Report

This report was generously supported by the Rockefeller Brothers Fund as part of an initiative to improve sustainability performance at ports in southern China. The results are based on literature review as well as interviews with companies and other stakeholders. Any errors that remain are those of the authors.

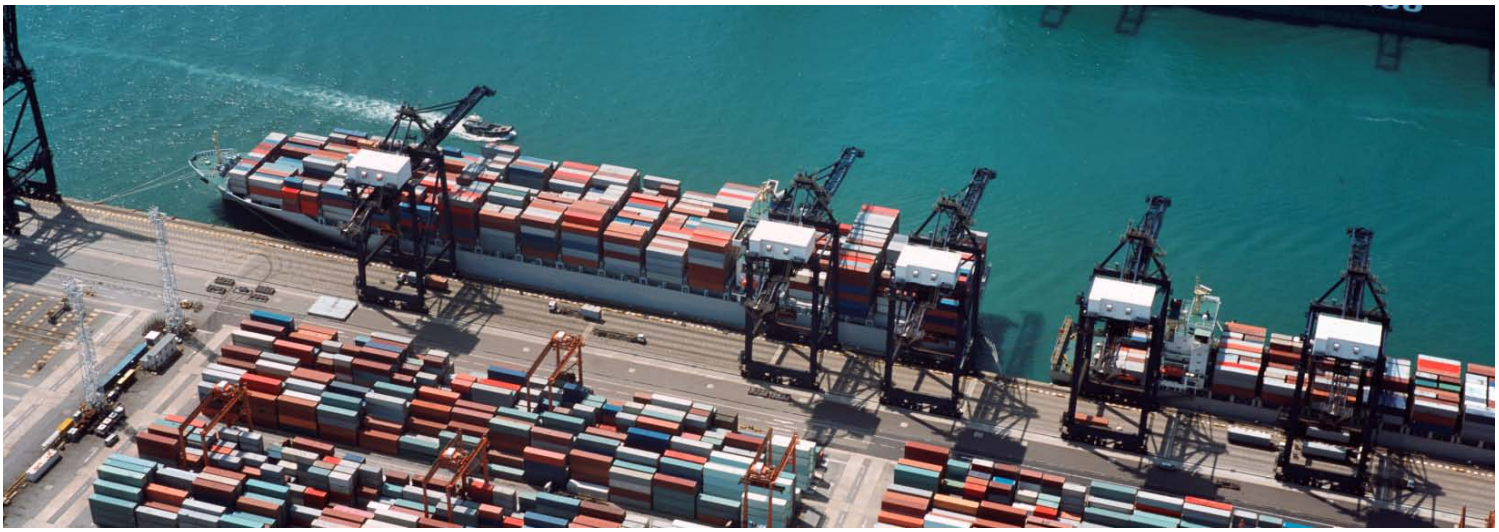
Please direct comments or questions to Raj Sapru at rsapru@bsr.org or Laura Ediger at lediger@bsr.org.

ABOUT BSR
A leader in corporate responsibility since 1992, BSR works with its global network of more than 250 member companies to develop sustainable business strategies and solutions through consulting, research, and cross-sector collaboration. With offices in Asia, Europe, and North America, BSR uses its expertise in the environment, human rights, economic development, and governance and accountability to guide global companies toward creating a just and sustainable world. Visit www.bsr.org for more information.

Contents

Introduction

China's role as a global manufacturing hub causes negative environmental impacts not just through the resource use and pollution associated with industrial processes, but also through the transport and movement of goods by road, rail, and sea.



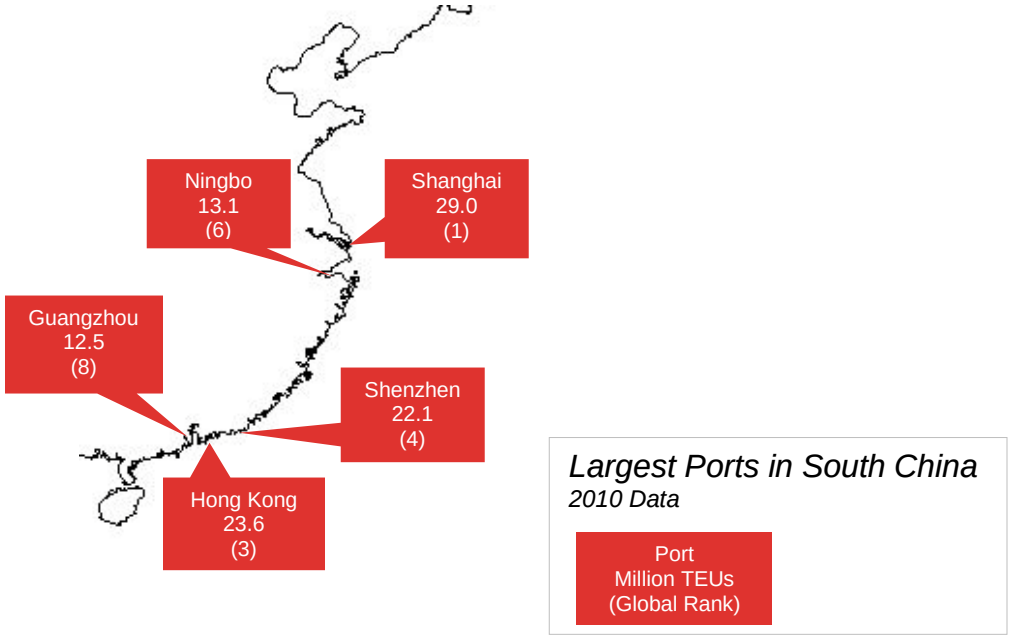
China's ports are a key node of global supply chains—eight of the world's 10 busiest ports are in China, and the country's coastal port throughput grew by 9 percent in 2009, despite a global economic slowdown and decline in international shipping. Even as port expansion and new construction booms in China, the negative environmental and health impacts of port operations are becoming more fully understood. Research by Civic Exchange and other groups has documented the enormous contribution of shipping to local and regional air emissions in southern China, and the damage to public health. By some estimates, annual particulate matter and sulfur emissions from the shipping industry contribute to negative health impacts for millions of people, with concentrations in Europe and South and East Asia. In addition to air pollution emissions from ships, trucks, and on-shore equipment, the environmental impacts of ports include marine and freshwater pollution, electricity and fuel consumption, and degradation of local marine environments. Some of these impacts are managed by local governments and port authorities, but individual terminal operators also play an important role in determining the efficiency and environmental impacts of their own operations. These impacts may results from on-site facilities, cargo handling equipment, drayage (the truck container pickup from or delivery to a seaport terminal), and from ocean going vessels docked at terminals.

Port and terminal operators are receiving increased attention globally from international transportation and logistics companies that want to understand environmental and social impacts throughout their supply chains, in part so that they can offer *green* services and choose more environmentally friendly routes. For ocean carriers to effectively compare and contrast the environmental

performance of different terminals where their ships dock, an internationally applicable, comprehensive, and consistent framework is needed.

Ports and Sustainability in South China

Supply chain sustainability is an essential part of global business operations, and companies are increasingly devoting substantial time and resources to improving social and environmental performance throughout their supply networks. China's position as the primary manufacturing zone for global trade and retail operations enables the attention and influence of international business to be used as a helpful incentive for pursuing more sustainable operations, as a complement to growing civil society awareness and government regulation. From China's factories, goods travel through the coastal ports, which represent a key global supply chain node, channeling goods to consumer markets worldwide. If the transport infrastructure enabling the movement of goods can function in a way that minimizes negative social and environmental impacts, the end results will benefit both consumers and the local communities through which those goods pass. With a clear and consistent means for comparison, carriers and shippers would be able to encourage green practices at ports and terminals, and expand the potential for competitive market forces to foster improved sustainability performance.



China's Role in Global Transport

With China's leading position in manufacturing of goods for export, the country's infrastructure is one of the most heavily used in the world. China's exports rose more than 30 percent in 2010,[1] and the shipping industry has kept up with the rapid pace of export growth. In 2010, Shanghai overtook Singapore as the largest container port in the world in terms of annual container handling, with total container throughput up over 16 percent to 29 million TEUs. Other ports are in the global top 10—six Chinese ports each managed an annual throughput of more than 10 million TEU. Hong Kong's port activity has grown steadily as well,

[1] PRC National Bureau of Statistics, 2011.

at 23.6 million TEU in 2010, up 12.6 percent.[2] China's ports handled around 25 percent of all global container freight in 2010, and may reach one-third of global TEUs by 2015 if current trends continue.[3] The dominant role of terminal operations in China in global shipping activity underscores the importance of integrating China's ports into initiatives that enable improved sustainability performance and international comparison of terminal environmental impacts.

Regional Stakeholders and Regulatory Context

Hong Kong-based NGO Civic Exchange has been working on reducing emissions related to marine transport in southern China for the past several years. In its 2008 report, "Green Harbours," the group reported that levels of sulfur dioxide, nitrogen oxide, and particulates have increased dramatically in Hong Kong in the last two decades, with attendant impacts on public health, especially the incidence of heart and lung disease.[4] In response to these local health risks, Civic Exchange has recently facilitated the successful implementation of the Fair Winds Charter, a voluntary fuel switch program for oceangoing vessels in which 17 companies have agreed to use low-sulfur diesel fuel while at berth in Hong Kong. The port facilities in Hong Kong are unique in that there is no port authority leading regulatory efforts, and so Civic Exchange has focused on the dialogue among stakeholders and the potential for combining strengthened policy measures and voluntary business initiatives.

In addition to liner shipping companies, Civic Exchange includes terminal operators in its outreach, seeing them as important in protecting local air quality. Currently, Civic Exchange suggests that terminal operators complete emissions inventories and look for ways to cut air emissions from the most significant sources. Though, as public awareness of local impacts in South China increases, companies will face additional pressure to reduce emissions. Research currently being conducted by scientists at the Hong Kong University of Science and Technology, the University of Hong Kong, and the Chinese University of Hong Kong will provide more granular information on emissions sources, particularly of local craft and oceangoing vessels, and these results will highlight the relative contributions of different activities. Additionally, ongoing discussion about the prospects for either an emissions control area or low-emission zone in the Pearl River Delta means that carriers and terminal operators may be subject to more stringent emissions controls over the next five to ten years.

Changing Expectations

As ports and terminals worldwide have experienced in the last decade, expectations of environmental performance are changing. Local communities expect ports to contribute to a cleaner, quieter surrounding environment. Regulators have passed more stringent rules on emissions and fuel content. In China, the national government's agenda for establishing a low-carbon economy has also affected ports, requiring some to improve their energy efficiency. The

---

[2] Hong Kong Marine Department, Port of Hong Kong in Figures, 2011 Edition. http://www.mardep.gov.hk/en/publication/pdf/portstat_pamphlet11.pdf

[3] Shipping Intelligence Network, Feb 2 2011. *China's Ports Push to Pole Position*. http://www.clarksons.net/markets/feature_display.asp?section=&news_id=31051&title=China%92s Ports+Push+to+Pole+Position

[4] Civic Exchange, 2008. *Green Harbours: Hong Kong and Shenzhen Reducing Marine and Port-Related Emissions*. http://www.civic-exchange.org/wp/green-harbours-hong-kong-shenzhen.

internationalization of port investment and ownership has also brought an increasingly global perspective to terminal design and operation, including prioritization of efficiency and environmentally friendly infrastructure, equipment, and practices.

Existing Efforts

A range of existing supply chain sustainability initiatives and port-specific frameworks are relevant to the issues discussed above, providing tools to help terminal operators identify and understand their environmental impacts. However, many of these are broad and generally applicable to port authorities or all companies and industries, lacking specific guidance for environmental performance of terminal operations; others focus on a specific region or type of environmental impact, such as carbon emissions.

While some measurement approaches estimate environmental impacts at terminal operations, no single assessment framework covers the full spectrum of material issues while aligning with supply chain data needs.

The following table highlights some of these efforts, ranging from generally accepted sustainability data protocols to sector-specific initiatives targeting parts of the goods movement chain. These existing efforts offer the building blocks for a terminal-specific assessment framework.

	Existing Effort	Approach	Entities Covered	Issue
General CSR/Sustainability	Global Reporting Initiative (GRI)	Universally accepted standard for global sustainability reporting of nonfinancial criteria.	All global companies	General CSR and environment
	ISO 14001	Environmental management standards to help organizations to minimize how their operations negatively affect the environment and to comply with applicable laws, regulations, and other environmentally oriented requirements.	All global companies	Environmental management systems
	ISO 26000	Guidance (that does not include requirements) on socially responsible behavior and possible actions.	All global companies	CSR management systems
	Carbon Disclosure Project (CDP)	Works with shareholders and corporations to disclose greenhouse gas emissions and associated risks in a common database.	All global companies	CO_2
	Greenhouse Gas Protocol	Globally accepted standards for operational and supply chain GHG measurement and accounting.	All global companies	CO_2

	World Ports Climate Initiative (WPCI)	Develops tools and guidance for seaports, including a toolbox for clean air programs and carbon footprint calculation. Projects include: carbon footprinting and modeling tools, onshore power supply, Environmental Ship Index (ESI), cargo-handling equipment, intermodal transport, lease agreement template. Founded by the International Association of Ports and Harbors (IAPH).	Global port authorities	- CO_2 - SO_x - NO_x
	Ecoports Foundation	Collaborative network of European seaports. The "EcoPort" status can be used upon completion of a Self Diagnosis Method checklist of environmental management systems based on ISO 14001. The group also offers a Port Environmental Review System as an established port-sector environmental management standard. Founded by the European Sea Ports Organisation (ESPO).	EU port authorities	- CO_2 - SO_x - NO_x - Environmental management systems (EMS)
Regional Examples	U.S. EPA Clean Ports USA	Incentive-based program designed to reduce emissions from diesel engines and non-road equipment at ports. Part of the Environmental Protection Agency's National Clean Diesel Campaign.	U.S. port authorities	- SO_x - NO_x - Particulate matter (PM)
	San Pedro Bay Ports Clean Air Action Plan (CAP)	Joint air-quality improvement plan for the Port of Los Angeles and Port of Long Beach. Focus areas include: Oceangoing vessels (OGV), clean trucks, technology advancement program, cargo-handling equipment, harbor craft, rail.	U.S. Southern California - Port of Los Angeles - Port of Long Beach	- Port-related air pollution - Related health risks
	Northeast Diesel Collaborative (NEDC) Ports Workgroup	Regional collaboration between industry and government agencies to reduce emissions from marine vessels and port operations.	Northeast U.S. port authorities	- Diesel emissions - Public health - Clean diesel technology

	Green Gateway (Port of Seattle)	Provides marketing recognition for ocean carriers meeting environmental performance standards.	Port of Seattle (U.S. Puget Sound)	- EMS - Transparency - Lubricants - Supply chain collaboration - Vessel design - SO_x - Shore power - NO_x - Hazardous chemicals - Water treatment - Waste
Logistics and Transportation Specific	Clean Cargo Working Group (CCWG)	Collaboration of leading retailers, manufacturers, and transportation providers dedicated to integrating environmentally and socially responsible business principles into transportation management.	Global companies - Shippers - Ocean carriers (OGV) - Third-party logistics providers (3PLs)	- CO_2 - SO_x - NO_x - EMS - Waste, water, chemicals - Transparency
	World Economic Forum (WEF) Logistics and Transportation	Industry partnership aimed at addressing strategic issues in the logistics and transport sector, including research and development of tools and standards.	Global companies - Carriers - 3PLs - Shippers	CO_2
	International Maritime Organization (IMO) MARPOL Annex VI	International marine environmental conventions designed to minimize marine environmental pollution. There were 150 countries party to the MARPOL agreement as of December 31, 2010. **Annex I:** Oil **Annex II:** Noxious Liquid Substances Carried in Bulk **Annex III:** Harmful Substances Carried in Packaged Form **Annex IV:** Sewage **Annex V:** Garbage **Annex VI:** Air Pollution	Global ocean carriers	- SO_x - NO_x - Ozone-depleting compounds - Volatile organic compounds
	WPCI Environmental Ship Index (ESI)	The ESI can be used to identify oceangoing vessels that perform better in reducing air emissions than required by current IMO standards. The index is intended to be used by ports to reward ships through reduced fees, but can also be	EU Port Authorities and Carriers (OGV)	- CO_2 - SO_x - NO_x

		used by shippers and ship owners.		
	Green Ship of the Future	Cooperation in which companies across the Danish maritime industry join forces to develop strategies to reduce CO_2, SO_x, NO_x and particulate emissions from existing and new ships.	Denmark - Carriers (OGV) - Equipment manufacturers - Design and consulting firms	- CO_2 emissions - SO_x emissions - NO_x emissions
	Clean Shipping Project/Index (CSI)	Standardized data collection template and database for ocean carriers.	Sweden/Global - Shippers (EU) - Ocean carriers - 3PLs	- SO_x - NO_x - CO_2 - Chemicals - Waste - Water

Business Needs Across the Logistics and Transportation Value Chain

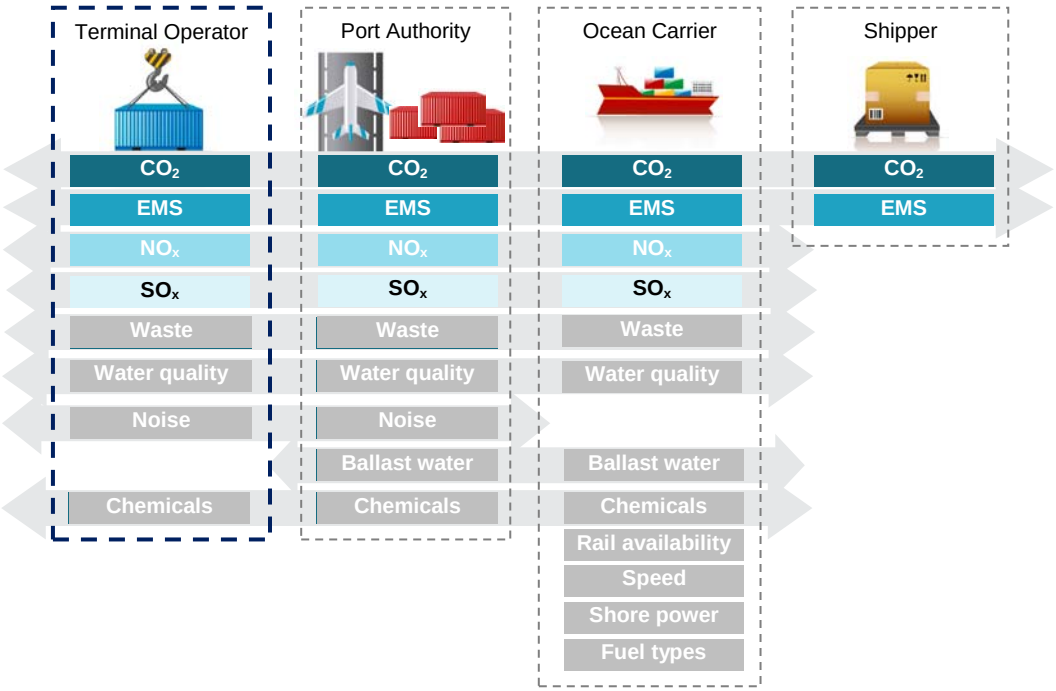
The sustainability issues most material to port operations vary for different entities involved in port activities—these entities range from port authorities that provide comprehensive oversight and usually hold the key relationships with local government bodies and community representatives, to ocean carriers who must respond to customer requests for low-carbon shipping while meeting tightening air emissions requirements of port authorities. The following table summarizes the needs identified by each entity for demonstrating sustainable environmental performance, as well as the associated data required.

	Entity	Needs Identified	Supporting Data
Port Operations	**Terminal operations**	Clear and consistent methods for carbon emissions calculations Effective method to capture granular detail on fuel efficiency and energy usage Compare own operations and benchmark against peers	CO_2 emissions and efficiency SO_x emissions Environmental management systems (EMS) Waste Water quality Chemicals management Noise
	Port authorities	Standardized terminal assessment Holistic view of port ecosystems and impacts on surrounding communities (storm water runoff, spills, water management, container coatings) Keep attracting terminal businesses without burdensome additional costs Incentive approach	EMS SO_x / NO_x / CO_2 Water quality Waste Noise Ballast water

Port Users	**Ocean carriers**	Benchmark owned and third-party terminal operations CO_2 efficiency Responsible procurement of terminal services Transparency of terminal footprint methodologies—increase visibility in south China More frequent output of metrics Performance incentives from port authorities Alignment with other value chain standards—e.g., carbon footprint, increased competitiveness, operational effectiveness, and brand image for customers	SO_x / NO_x / CO_2 EMS Waste Water quality Chemicals Ballast water Fuel types Speed Rail availability Shore power
	Shippers	Carbon data Environmental transparency A view on the most material issues in the supply chain Assurance of robust management systems	CO_2 EMS

Common Data Needs

Entities operating along the logistics and transportation value chain, and centered on port operations, need data to demonstrate performance in a variety of environmental impact areas. While some of the issues and data needs are unique to each entity, others, such as CO_2 and SO_x, are shared across large swaths of the goods movement chain.



Based on the data needs identified, there are several areas of performance that are relevant to multiple entities in the value chain. For example, terminal operators that measure performance in areas such as CO_2, SO_x, NO_x, and environmental management systems (EMS) also have the opportunity to satisfy the data needs of ports they reside in, their carrier customers and partners, and shippers who are increasingly looking across the entire transportation lifecycle for sustainability performance improvements.

A common framework to share data along the value chain will create efficiency between these business partners and allow more focused discussion on performance expectations. Efficient sharing will require that standardized data collection and sharing practices be implemented. Common business-to-business standards have already been implemented in the sector between shippers and carriers (e.g., the Clean Cargo Working Group), and are now emerging between carriers and port authorities (as with port authority initiatives, WPCI, Ecoports). Terminal operators have an opportunity to align with these existing efforts and extend sustainability further into the logistics and transportation value chain.

Implications for Terminal Operators

A framework to assess environmental performance of terminal operations will provide multiple benefits:

- **Performance benchmark against peers:** A standardized approach to assessing and sharing environmental impacts will allow terminal operators to benchmark their own performance against other terminals at the same port, as well as other terminals in a global corporate portfolio. Global terminal operators will be able to analyze their portfolio of terminals and compare them with peers using the same metrics, providing a better understanding of where potential savings lie.

- **Supply chain metrics:** As retailers and manufacturers calculate Scope 3 greenhouse gas emissions for their supply chains, and as ocean carriers transfer sustainability expectations to their own suppliers, terminal operators will need to provide the relevant data. A framework to capture environmental performance will prepare terminal operators for an increase in data requests, which will save time, reduce duplication, and align with high-profile initiatives such as the GHG Protocol and Carbon Disclosure Project.

- **Holistic environmental performance data:** Ultimately, an assessment framework for terminals must provide a performance narrative about the set of environmental impacts that are unique to terminals. While carbon measurements will be needed to appease supply chain partners, the relative contribution of carbon emissions by terminals is usually not as great as local impacts on air pollution and public health. Terminals may also need to track and report on impacts related to management of water, waste, chemicals, and noise. Given this array of issues, terminal operators need a comprehensive assessment framework that allows them to evaluate a portfolio of indicators, with a view to both immediate economic and environmental priorities and long-term planning for more significant investments in port infrastructure and equipment.

Development of an effective and efficient common framework can be aided by learning from earlier supply chain sustainability efforts, including the following considerations:

- **Ease of implementation:** A framework that enables terminal operators to collect and share environmental performance data must balance accuracy and completeness with ease and cost of implementation. Data requirements should be determined after considering the state of the sector and where data is readily available.

- **Providing real business benefits:** A standardized data collection framework should ultimately save time by reducing disparate requests from port authorities, ocean carriers, and other stakeholders. Transparency should help foster stronger relationships with carrier customers, port authorities, and other stakeholders. A successful framework will allow terminal operators to also track their own

performance, assess their status and progress against other terminals, and take advantage of opportunities for improvement.

- **Implementation by a significant portion of the sector:** Significant performance improvement and data-sharing efficiency can only be achieved if a substantial segment of the industry implements the framework within existing B2B relationships. Reaching scale can be enabled by bringing in a variety of interested stakeholders with the motivation and influence to enable widespread adoption.

- **Continuous improvement:** An assessment framework must evolve to continue providing business benefits. It should be revisited periodically to keep pace with increasing accuracy needs and to refine its scope to focus on issues that are most material for terminal operators and other relevant entities in the value chain.

Conclusion and Next Steps

Ports and terminal operations in China form a significant part of supply chains, with impacts on global and local environments and communities. Previous initiatives to address environmental impacts at ports have often been regional in nature, or have focused specifically on a narrow range of issues, such as carbon emissions. There is currently no single assessment framework that covers the full spectrum of material issues while aligning with supply chain data needs.

Entities at different points in the logistics and transportation value chain all need data to demonstrate environmental performance, and port operations are one piece of this chain. A common framework for collecting and sharing will create efficiency between business partners and a clear understanding of performance expectations, as well as an opportunity for terminal operators themselves to benefit from comparable data with which to benchmark their operations.

In the coming months, BSR will work closely with relevant companies and other stakeholders to create, refine, and pilot a draft framework based on the common data needs shared by terminal operators and other entities such as port authorities, carriers, and shippers. The key criteria for success in this process include developing a framework that balances accuracy and completeness with ease and cost of implementation, and that provides business value to terminal operators and their supply chain partners. This framework should have the flexibility to evolve with changing business needs, and will only be successful if widely utilized in the context of B2B relationships. To promote the implementation and use of the framework, BSR will also work with relevant industry initiatives and associations to identify areas of potential overlap and collaboration.