

# How we can make ports more sustainable—and why it matters

September 18 2019, by Isabela Brown

---



It can take several days for a large ship to unload its cargo. If the port doesn't provide a clean power supply, pollution from the ships can be harmful to nearby communities. Credit: [Pixabay](#)

Take a look at the objects around you. The laptop or phone you are using

to read this article, the clothes you are wearing, the glass of juice you may be drinking ... almost all of these items likely arrived at your door in part by ship. Whether it be the transport of the raw materials that create products or the product itself, shipping accounts for 90 percent of the world's trade. The journey these ships take is marked by countless stops at ports around the world.

You may think of ports as a thing of the past, but the success of today's global economy means we rely on ships, and therefore ports, more than ever to get goods from point A to point B. This growing reliance on international goods has helped make transportation the fastest growing cause of greenhouse gas emissions. Ship emissions are projected to increase between 50 and 250 percent by 2050. Because ports are critical points of connection where cargo is passed between ships, railroads and trucks, improving their [sustainability](#) will trickle down to every element of the global supply chain. Likewise, by assessing port sustainability, we can identify which parts of the chain need fixing.

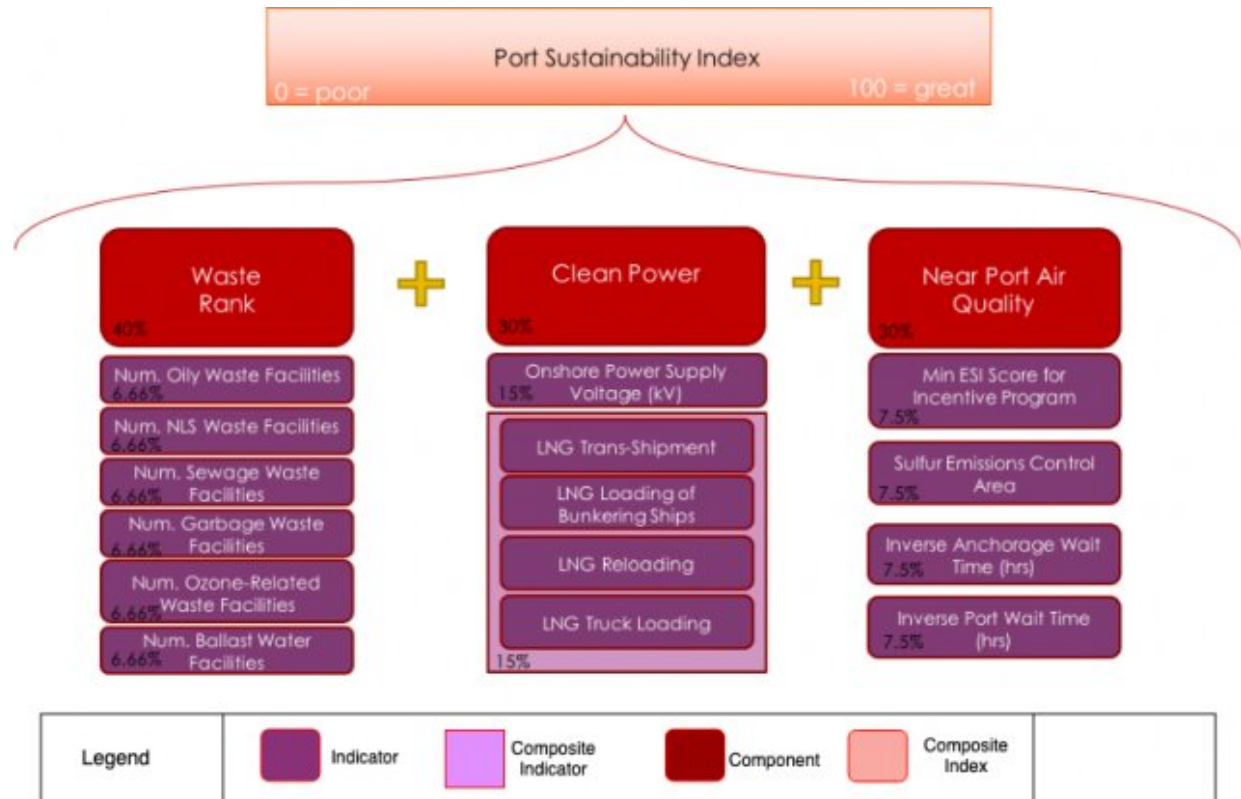
But in order to do that, we must first identify what a sustainable port looks like. In a world where the sustainability label can be placed on everything from clothing brands to agriculture to [energy sources](#), defining and agreeing upon sustainable practices can be tricky. This is where data and statistics play a necessary role. In order to come to a consensus on large-scale sustainability objectives, like the UN Sustainable Development Goals, scientists often create an index by gathering statistics relevant to their area of interest and picking out pieces of data that may indicate sustainable performance. For my final project in the Environmental Sustainability Indicators: Construction and Use class, which I took last spring, I drafted an index showing one way to quantify the sustainability of ports.

Ships contribute a significant amount of waste to the ocean. The shipping industry is responsible for 20 percent of all marine litter, while

some 34 percent of ship garbage ends up being discharged at sea. In addition to garbage, ships discharge sewage, oily waste and chemicals, which can harm ecosystems. They release ballast water, which can spread invasive species. When port waste reception services are inadequate or missing, ship crews are more likely to dump waste overboard to reduce weight, thereby harming marine ecosystems.

The amount and variety of waste facilities that a given port offers is a good first indicator of sustainability. By analyzing this type of "indicator" data on port waste facilities, we can begin to define what port sustainability looks like. Instead of just saying "ports should handle waste better," we can say "ports should offer waste facilities for garbage, sewage, oily waste, chemicals, and ballast water," and then rank ports accordingly. Now we have a goal and a metric for determining how far along we are to achieving that goal.

When we have multiple indicators that collectively represent sustainability, we can see how well ports do with regards to each sustainability goal. Then we can statistically combine these results into a composite index to rank their sustainability holistically, as I did in my project. This way, we can use data to accurately compare ports for many different, but concrete, sustainability targets.



An index to measure the sustainability of shipping ports, proposed by Isabela Brown, a student in the M.S. Sustainability Science program. Credit: Isabela Brown

For example, there are multiple ways that ports can offer cleaner energy alternatives to reduce the carbon footprint and emissions of ships. Due to their large capacity, ships are ultimately the most fuel efficient method of transporting cargo. But there's no getting around the fact that they still burn massive amounts of fuel. International regulations have long allowed ships to use just about whatever fuel they'd like. Not surprisingly, most choose to run on the cheapest fuel available, which is also the dirtiest. They commonly use heavy, high-sulfur residual oil, sometimes called bunker fuel, left over after gasoline, diesel and other lighter fuels are extracted during the refining process. This dirty fuel is

loaded with particulates, and their associated pollutants such as NO<sub>x</sub> and PM<sub>2.5</sub>, that can lead to respiratory and heart disease and produce acid rain.

The good news is that in 2020, an historic international regulation will go into effect that will mandate the use of low-sulfur, cleaner fuels. Yet, so far these cleaner fuels have only been mandated in Emission Control Areas that have been set up over the last 20 years around North America, the Caribbean, the North Sea and the Baltic Sea. Even in these regulated areas, when ships idle in port over long periods of time, the concentrations of their emissions can harm human and ecosystem health. Although ships turn off their main engines, which they use to move through the water, when they idle they still need power for heating, cooling, ventilation, cranes, and other functions. Ships often spend between one to three days at anchor and the pollution that they emit during this time can be incredibly harmful to near-port communities. And a typical cruise ship is much worse than other marine vessels. Because it is essentially a hotel fueled by dirty oil, one combusts about 20 tons of fuel while portside, which can produce the same amount of emissions as 35,000 trucks idling for 10 hours. This dockside activity has been shown to cause approximately 400,000 premature deaths from lung cancer and heart disease and about 14 million childhood asthma cases each year.

By offering clean power alternatives, ports can be environmental stewards and protect their near port communities. One such alternative is onshore power supply (OPS), which allows ships to effectively "plug in" to a land-based electrical grid while at port docks. By doing so, ships can use electrical energy, which can be sourced from renewable or clean sources, for dock-side needs. Recent studies have shown that, for certain types of ships that frequently visit ports, OPS would reduce NO<sub>x</sub> and PM<sub>2.5</sub> emissions between 62-90 percent per port visit. Therefore the amount of OPS a port offers is a good indicator of its environmental

stewardship and sustainability.

Ports can also drastically decrease ship fuel usage by becoming more efficient. One prominent and recent development is the use of the "Virtual Arrival" automated software, which allows ports to convey congestion information to the ships planning on docking there. Within this process, both the port and the ship agree that the ship may operate at a slow speed and arrive later than its predetermined ETA to lower congestion. Ships need exponentially more fuel to go fast than they do to go slow. Because of this, by simply slowing down, ships can cut the amount of total fuel they would normally use over a journey, saving themselves money and reducing their carbon footprint. Likewise, ports that improve their efficiency this way are also less likely to have ships idling near port for long periods of time, using up power and harming the near-port air quality and ecosystems. Efficiency programs like Virtual Arrival have been shown to drastically reduce overseas emissions, sometimes by up to half.

Improvements in port waste facilities, their clean energy offerings, and their efficiency are critical steps towards sustainability. Because of this, the statistics that show port progress in these areas need to be considered when developing a composite port sustainability ranking. Analysis like this is necessary in order to wrangle data into a story that is meaningful for those affected by port sustainability, and therefore instigate change. Such rankings would be important tools for near-port communities, which are often socioeconomically and politically marginalized, to better understand the impacts of ports on local air quality. Businesses could use these rankings to consider the carbon footprint of their products. Regulators could use the data to better assess the impacts of their regulations on port communities.

Still, no public port sustainability rankings exist. And while ports are likely to monitor other important indicators, like energy and water

consumption, noise, and sediment and soil quality, none of this information is available to the public.

The story of [port](#) sustainability is a common one. We cannot accurately define, defend, and evaluate sustainability goals without utilizing data to help us along the way. And we cannot progress toward these goals without making that data public. But we also must put in the work to bring out the story in the data, to find the pieces that are relevant to the community members, associated businesses, and other stakeholders who can help instigate change. With this balance between the data, story, metrics, and stakeholders in mind, the path toward sustainability for ports and for other areas becomes a lot clearer.

*This story is republished courtesy of Earth Institute, Columbia University*  
<http://blogs.ei.columbia.edu>.

Provided by Earth Institute, Columbia University

Citation: How we can make ports more sustainable—and why it matters (2019, September 18)  
retrieved 23 May 2024 from <https://phys.org/news/2019-09-ports-sustainableand.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--