

So, You Want To Decarbonize Your Port?



By

Chris Zuffante

Deputy Port Director, Operations

Massachusetts Port Authority

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ABSTRACT

Decarbonization is debatably the hottest topic in all industries due to the pressure from political activists and global regulations. The recent push to decarbonize has sent shockwaves through ports everywhere. In the current paper, I will explore the costs associated with going green, how ports plan to budget, and if they are able. I will communicate the struggles that my port faces from declaring that we will be carbon neutral by 2031 while giving you a firsthand view of being a member of Massport's Net Zero Team. I'll include our customers' expectations along with what direction they are headed in to achieve net zero operations. The process involves hard work with a variety of people with different roles in planning, budgeting, procurement, and execution. This hard work raises the question: Is carbon neutrality reachable by 2031? The technology for terminal equipment has come a long way, but we do not see a viable solution to replace our diesel-powered yard equipment yet. This paper is intended for ports that are in the initial phase of the carbon-neutral journey and need guidance from a cold-weather port that is currently experiencing the same journey.

ABOUT THE AUTHOR

The author of this essay is a 23-year employee of the Massachusetts Port Authority and writes this paper as a manager of people, property, equipment, and operations. He began his career at Massport as a part-time cashier in the aviation parking facility. Over time, he navigated around Massport and has held 8 different positions through hard work and dedication. Some of the positions he has held within the maritime department are Parks and Open Space Manager, Cruise Terminal Manager, and Maritime Facilities Manager. Currently, he serves as the Deputy Port Director of Operations and is responsible for the operations of all Maritime properties including the Flynn Cruiseport Boston, Conley Container Terminal, Boston Fish Pier, and parks and open spaces. He has direct oversight of the annual capital budget, strategic planning, and port operations.

He is a proud member of the American Association of Port Authorities (AAPA) and a candidate for the Professional Port Managers Program, Alpha Cohort (PPM).

Chris resides in Winthrop Massachusetts with his wife and three adult children.

CHAPTER ONE: NET ZERO BY 2031

In the year 2019, we thought it was another cross-functional department meeting to brainstorm on current issues. What we did not realize was that our CEO, Lisa Weiland, was about to make a very important announcement. She declared that the Massachusetts Port Authority would be net zero by 2031. About a dozen of us sat at the conference room table and our team leader, Stewart Dalzell, explained why we were chosen. Each person in the room was picked to represent our departments in the pursuit of becoming carbon neutral. Although we worked for the same company, we shared different business interests and needs. Some were from the aviation side of the house, community relations, capital programs, environmental, strategic planning, and the maritime department. The direction was given by our CEO that Massachusetts Port Authority would be carbon neutral by 2031 and we were the group that would be responsible for developing a plan that would lead the way.

My initial reaction was shared by others in the room. This is a huge undertaking that would require time, resources, and money within such a brief period. We met weekly to start and lay the framework while maintaining our regular jobs. Countless discussions were had over funding, power availability, community commitments, and stakeholder engagements. We learned about Scope One, Two, and Three emissions and how some emissions are out of our control. After months of meetings, the group was going in circles. It was clear that we needed support from others who had experienced this in the past. We began to research what other ports were doing. New York/New Jersey are the closest ports that we could compare ourselves to. The media has reported that a lot of carbon-neutral work was being done out west in California and

they were way ahead of the curve.¹ The Massachusetts Port Authority is somewhat unique because we own and operate the Logan International Airport, Seaport District real estate, parks departments, Boston Fish Pier, and the Port of Boston. Finding other port authorities with the same responsibilities that were pursuing carbon neutrality was not common. What was the next step in our journey? My direct role would be to focus on the maritime side of the house and engage our customers, both on the cruise and cargo side, as well as engage with our Massport maritime team to open their minds and begin the process of inventorying, planning, and committing to carbon neutrality. However, I knew that we were facing a huge challenge operationally and financially.

According to an emissions profile done by Dewberry Engineers in 2018, we knew that Conley Terminal and the Flynn Cruiseport would be our biggest challenges.²

Figure 2-1: Locus Map

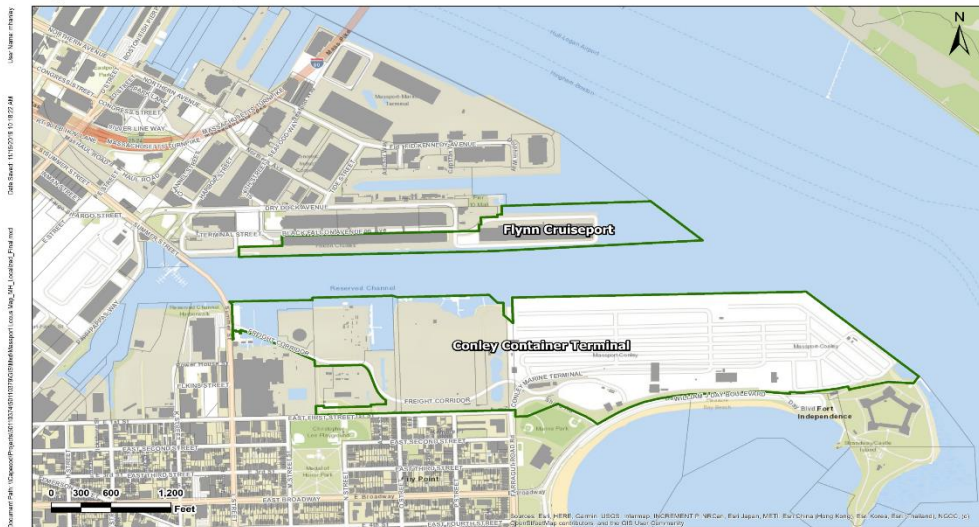


Figure 1. Map of Conley Container Terminal and Flynn Cruiseport located in Boston, MA.

¹ Palmer, Phillip. “Port of Los Angeles and Long Beach Continue to Go Green, Looking toward a Climate-Friendly Future.” *ABC7 Los Angeles*, 25 Jan. 2023, abc7.com/port-of-los-angeles-clean-energy-environment-emissions/12735169/#:~:text=The%20two%20ports%2C%20managing%20almost,might%20help%20save%20the%20planet.

² Dewberry Summary of Emissions for Conley and Flynn Cruiseport, November 20, 2018.

Conley Terminal is New England’s largest container terminal with 100 acres of usable terminal space. The terminal hosts ship-to-shore cranes and various yard equipment that supports container operations such as rubber-tired gantries (RTG), yard tractors, and hundreds of operational vehicles. The terminal’s growth over the past few years has been driven by a multimillion-dollar dredging project and the purchase of three post-Panamax cranes. On the other side of the Reserve Channel, Massport operates New England’s largest cruise terminal and expects to break a passenger record this year with approximately 400,000 passengers. Like Conley, the Cruiseport’s yard equipment is mostly powered by diesel motors.²

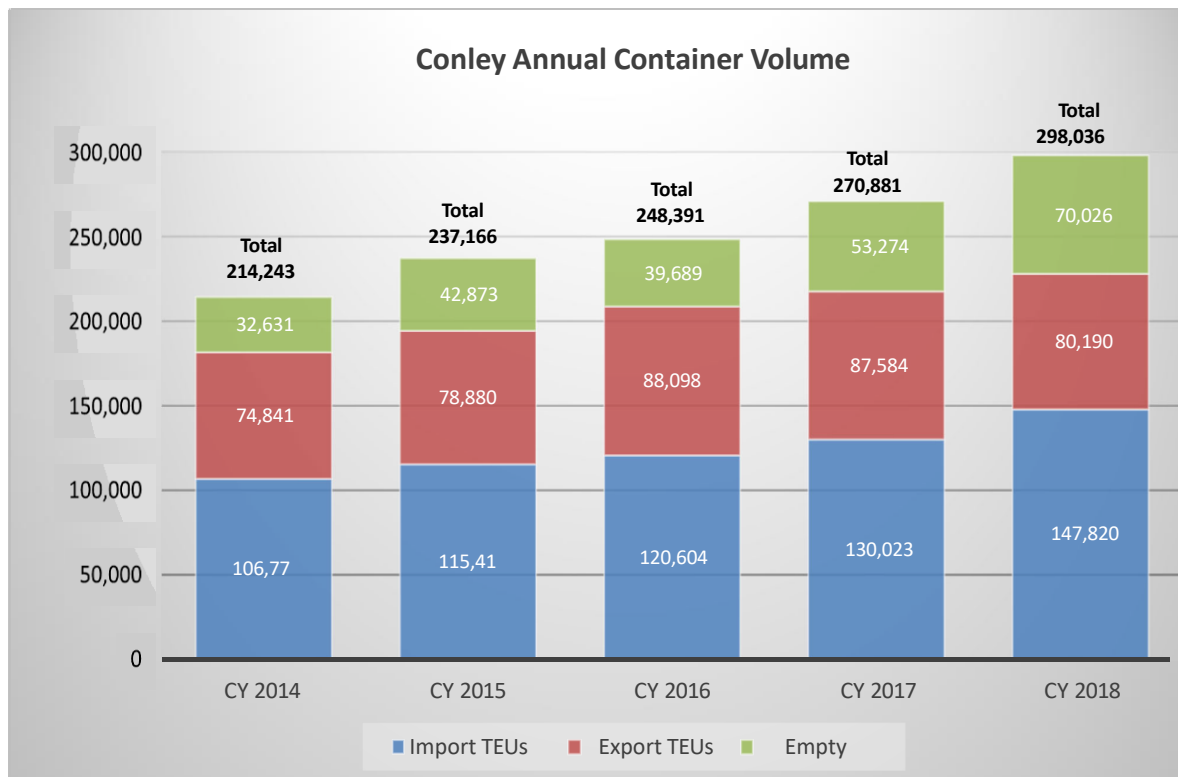


Figure 2. Graph showing the Conley Container Terminal’s annual number of containers from years 2014 to 2018. Blue represents import twenty-foot equivalent units, red represents export twenty-foot equivalent units, and green represents empty containers.²

² Dewberry Summary of Emissions for Conley and Flynn Cruiseport, November 20, 2018.

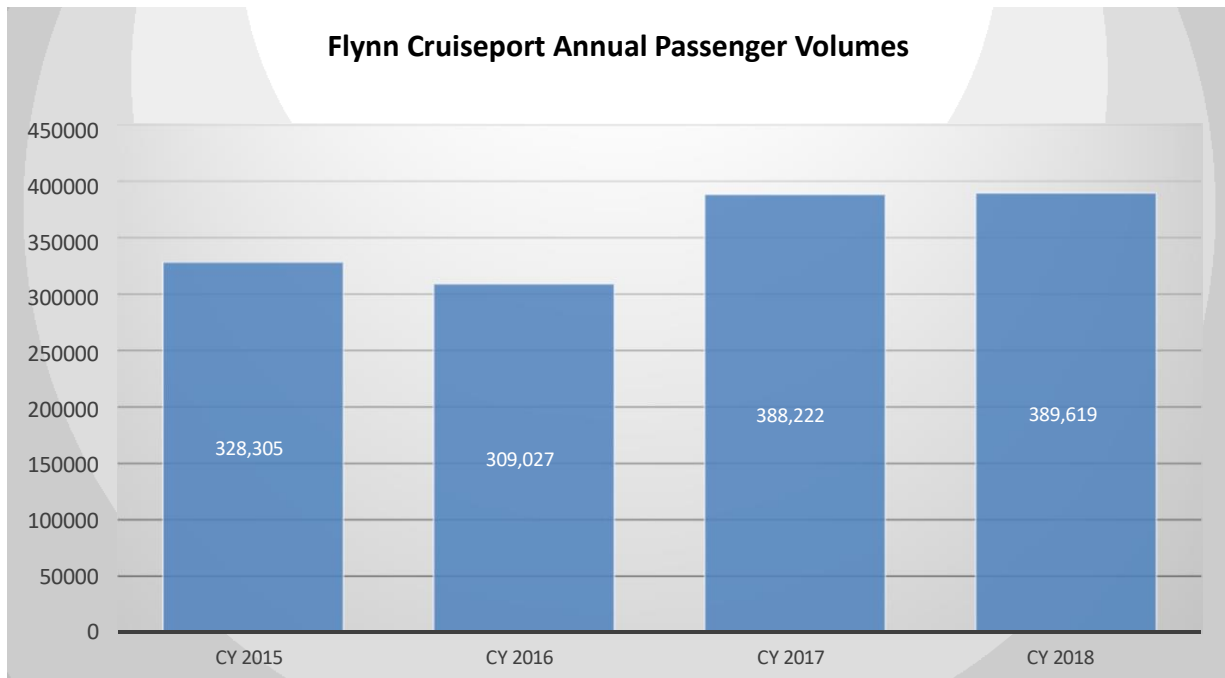


Figure 3. Graph of the Flynn Cruiseport annual number of passengers from 2015 to 2018.²

CHAPTER TWO: LET THE WORK BEGIN

We scrambled to begin the process to achieve net zero emissions. As a group, we decided to tackle smaller projects. To begin, we would target LED light replacements, decrease the use of water at our outdoor recreational parks, and decrease the use of plastic storage containers. However, the serious work of decarbonizing an Authority that managed a vast schedule of aircraft and ship operations was the overall goal. We were not sure how we would manage this great effort alone, especially as everyone on the Net Zero Committee had their regular jobs to focus on too. Weekly meetings were had about brainstorming a plan, but a lot of work was being done behind the scenes to make this come together. Our Net Zero Committee had representatives from each one of our departments. The aviation folks were making plans, the real estate team

² Dewberry Summary of Emissions for Conley and Flynn Cruiseport, November 20, 2018.

was focused on their tenants, the finance team was worried about financing, and I was putting all my attention to the maritime side. We were all doing a lot of work on our end, but how were we going to put it together under one plan? The overarching feedback to senior staff was that we needed support from a Project Management Office (PMO) who had experience in assisting large entities with a carbon-neutral roadmap. We needed a team that could establish a baseline, conduct inventories, advise on alternative fuel sources, prepare cost estimates, engage with the community, and open conversations with the local power companies. The PMO could give us a better understanding of what our total emissions were, so we put out an RFP for a qualified Project Management Office.

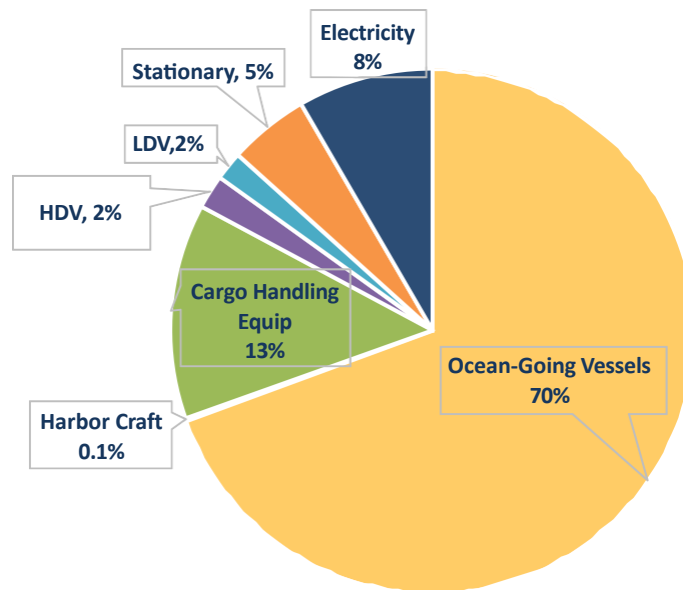


Figure 4. Pie chart depicting the breakdown of the port's emissions, separating emissions into ocean-going vessels, harbor craft, cargo handling equipment, heavy-duty vehicles, light-duty vehicles, stationary, and electricity.²

² Dewberry Summary of Emissions for Conley and Flynn Cruiseport, November 20, 2018.

As the pie chart above shows, most emissions come from ocean-going vessels.² A plan could be constructed to reduce emissions from areas within our control, such as from cargo handling equipment, heavy duty vehicles (HDV), light duty vehicles (LDV), stationary, and electricity sources. A more difficult task is controlling emissions from shipping lines such as ocean-going vessels and harbor craft. To reduce emissions while a ship is in port, Massport is currently performing a shore power study, so ships do not have to run their diesel auxiliary power while tied up in port.

CHAPTER THREE: WHAT THE CUSTOMERS NEED

Scope Three emissions encompass emissions that are not produced by the company themselves and are not the result of activities from assets owned or controlled by them. The largest producer of Scope Three emissions on the maritime side are the emissions that are produced by ships while in port. According to the Dewberry study (2018), ocean-going vessels were responsible for 75% of the port's emissions.² Luckily, the shipping lines have shown great interest in becoming sustainable. One of our biggest cruise line customers, Royal Caribbean Cruise Lines (RCCL), recently published an Energy Use and Air Emissions report (2022) which was shared with me by Captain Thomas Hinderhofer.³ Captain Hinderhofer is the Director of Northeast Port Operations at Cape Liberty Cruise Port and Miami Cruise Terminal for Royal Caribbean and has a great rapport with the operations team at Massport. As a company, Royal Caribbean has committed to being net zero by 2050. Some of the areas that they are focusing on

² Dewberry Summary of Emissions for Conley and Flynn Cruiseport, November 20, 2018.

³ Energy Use and Air Emissions. Environmental, Social, and Governance Report, *Royal Caribbean Group*, 2022. Received via email from Captain Thomas Hinderhofer, Director of Northeast Port Operations at Cape Liberty Cruise Port and Miami Cruise Terminal for Royal Caribbean, July 10, 2023.

are advancements in energy and fuel efficiency, pursuing alternative energy sources, and the development of sustainable technologies.³ Royal Caribbean has been very vocal with our port to design and install a shore power system so the ships do not have to rely on their auxiliary power while at the dock in the Port of Boston.

While at the Seatrade Expo in Ft. Lauderdale this year (2023), I had numerous conversations with cruise line executives. The top item on Chris Allen’s list, Vice President of Global Deployment and Itinerary Planning for Royal Caribbean, was the implementation of shore power in Boston. Chris said that the availability of shore power would be a major factor in the future deployment of cruise ships. Royal Caribbean was at the forefront of green technology and opened the world’s first net zero cruise terminal in Galveston, Texas.⁴



Figure 5. Royal Caribbean Group’s new Galveston Terminal is located in Galveston, Texas.

³ Energy Use and Air Emissions. Environmental, Social, and Governance Report, *Royal Caribbean Group*, 2022. Received via email from Captain Thomas Hinderhofer, Director of Northeast Port Operations at Cape Liberty Cruise Port and Miami Cruise Terminal for Royal Caribbean, July 10, 2023.

⁴ Conversation with Chris Allen, VP of Global Deployment (RCCL) at Seatrade, March 28, 2023.

Royal Caribbean has twenty group ships that are equipped to use shore power with more ships being retrofitted. More importantly, all their new builds will have shore power connections. This will directly drive how terminals all over the world plan for the electrification of their berths.⁴

Another major player in the cruise market is the Carnival Group. Boston has a long relationship with Holland America and Princess Cruises which fall under the Carnival Group umbrella. This past fall (2022) I met with Chris Martin, Director of Port Operations for Holland America, and Stefano Borzone, Senior Vice President of Princess Cruises in Long Beach California. We had some great discussions about the port of Boston and the potential to grow the cruise business there. Mr. Martin explained that the Carnival Group pledged to reduce their carbon footprint by 40% by 2030 and to be a net-zero ship operation by 2050. Like other cruise customers, Holland and Princess have started other initiatives to alleviate their impact on the environment such as managing solid waste and ballast water and using cleaner fuel sources. However, like Royal Caribbean, Holland America wanted to know the intentions of installing shore power at Flynn Cruiseport in Boston.⁵

Again, the port feels the pressure to invest in shore power, as customers advocate for shore power, and, will be a deciding factor for where they deploy their cruise ships. Our marketing department has received that message from all the major cruise customers both from

⁴ Conversation with Chris Allen, VP of Global Deployment (RCCL) at Seatrade, March 28, 2023.

⁵ Conversation with Chris Martin, Dir Port Operations HAL, and Stefano Borzone, Senior VP Princess, February 28, 2023.

the cruise and cargo sides. This makes the design and implementation of shore power a priority for our berths.

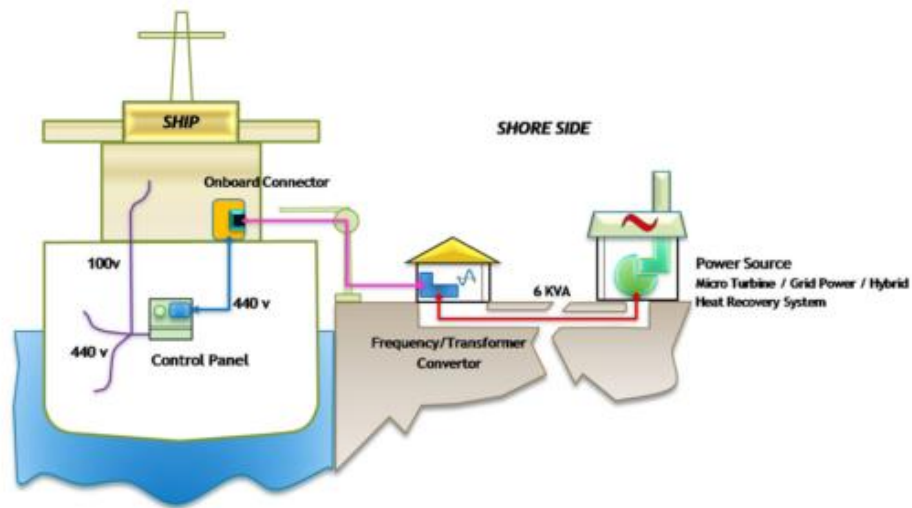


Figure 6. A diagram illustrating shore power usage from a terminal. A ship is connected to a transformer located on the berth for its power supply.

We know that the Brooklyn New York Cruise Terminal has installed a fixed jib shore power system that was manufactured by Watts Marine. That specific terminal is managed by Ports of America which is a terminal and stevedoring company that operates in many ports across the country.

In an email exchange, Steve Loevsky, Vice President of Cruise Operations for Ports America, informed me that the original system had limited range and was only able to service a select ship (2023).⁶ Since its conception, the New York City Economic Development Corporation has planned to upgrade the system at the Brooklyn Cruise Terminal to a mobile cable replacement type. The original system was in a fixed location and could not change

⁶ Email with Steve Loevsky, VP of Ports America East/West Coast, July 10, 2023.

locations for different-style ships. Loevesky went on to say that the New York City Economic Development Corporation commissioned Jacob Engineering to perform a shore power feasibility study at the Manhattan Cruise Terminal as well.⁶ The following suit, Massport is also in the process of awarding a contract to an engineering firm to conduct a feasibility study to electrify the Conley Terminal and Flynn Cruiseport Boston. We will certainly use lessons learned from our counterparts in New York to develop a system that will best be utilized on the current and future fleet of ships that we service. However, the cruise lines will keep it interesting by diversifying their fleet with various alternative fuel options. The Carnival Corporation has already invested in new builds powered by Liquid Natural Gas (LNG).⁷ This puts certain ports in a tough position because the normal level of service that a cruise ship needs while in port has been expanded. The Port of Boston could be at a disadvantage because we only have one current diesel fuel supplier and none that offers alternative fuels.

⁶ Email with Steve Loevesky, VP of Ports America East/West Coast, July 10, 2023.

⁷ Jordan, Allan E. "Interview: The Thinking Behind Carnival's LNG Strategy." *The Maritime Executive*, 30 Nov. 2017, maritime-executive.com/features/interview-the-thinking-behind-carnivals-lng-strategy.



Figure 7. Liquid Natural Gas is being delivered to a cruise ship alongside the berth.

Tom Strang, Senior Vice President of Maritime Affairs for Carnival Corporation, is responsible for studying a group-wide LNG strategy for their brand of future ships. Although LNG is more expensive than diesel fuel, discounts are preferred for bulk LNG. LNG is a proven power source and has been around for years.⁷ Because cruise lines like Carnival are taking advantage of LNG, ports like Boston will need to invest in the infrastructure that could support an LNG ship at our berth.

We will also see battery-powered ships enter the market in the future, such as the Hurtigruten MS ROALD AMUNDSEN that called the Port of Boston in September of 2022. The 530-passenger ship was built in 2019 and was designed to sail the polar waters. The Hurtigruten ship was the second of its class with a hybrid propulsion system. The ship's battery-powered electrical propulsion reduces the ship's fuel similar to a hybrid car and lowers emissions by 20%.

⁷ Jordan, Allan E. "Interview: The Thinking Behind Carnival's LNG Strategy." *The Maritime Executive*, 30 Nov. 2017, [maritime-executive.com/features/interview-the-thinking-behind-carnivals-lng-strategy](https://www.maritime-executive.com/features/interview-the-thinking-behind-carnivals-lng-strategy).

This usual planning that takes place to berth a ship in Boston was a little different because we did not know how to accommodate a hybrid ship such as the ROALD AMUNDSEN.⁸ Our operations team was concerned that the ship would need an exorbitant amount of shore power to recharge its batteries. The cruise lines representatives assured us that they scout potential ports that can support their electrical needs, but also reserve their onboard batteries if an upcoming port cannot support them. This was a relief, but also another reminder that shore power is the future and we need to get to work on it.

Chris Martin from Holland America looks at shore power as the best option for reducing air emissions and carbon footprint around the world. He believes that the electrification of ports is both a short and long-term solution. By the end of this year, Holland America will have retrofitted 100% of its ships to accept shore power. He also prefers ports that they call to invest in net zero dock side stevedore equipment to help offset the carbon footprint that vessels bring while in port.⁵



Figure 8. The Hurtigruten MS ROALD AMUNDSEN cruiseship.

⁸ Nowlan, John, and Nowlan, Sandra. "Hurtigruten Roald Amundsen: The First Hybrid Cruise Ship." *More Time To Travel*, 1 Nov. 2022, www.moretimetotravel.com/hurtigruten-roald-amundsen-the-first-hybrid-cruise-ship/.

⁵ Conversation with Chris Martin, Dir Port Operations HAL, and Stefano Borzone, Senior VP Princess, February 28, 2023.

CHAPTER FOUR: THE STRUGGLES WE FACE

When I initially heard Lisa Weiland announce that Massport would be net zero by 2031, I questioned how we were going to pay for all of the resources required to achieve that goal. As the Deputy Director of Operations, I feel the pressure of advocating for money to replenish operating budgets as well as making sure that our capital needs are met. Massport plans to spend \$2,662,000,000 over the next five years on improving and maintaining our critical transportation assets.⁹ These funds are made available to advance strategic priorities and enhance critical infrastructure to support economic growth. Certain net zero projects are included in this five-year plan such as LED replacements, shore power study, and some equipment purchases.⁹ All are substantial projects but are only a piece of the puzzle when it comes to pursuing our net zero goal. Our port is made up of a robust international airport, a bustling ocean cargo and cruise business, as well as a thriving real estate portfolio. I feel that headway is being made by our financial team in estimating the costs to make Massport net zero, but no solid figures have been released as this is a moving target. Lisa Weiland has dedicated an additional \$500,000,000 to net zero projects and equipment to achieve our goal by 2031.

Another obstacle we face is the available power that is currently onsite at our facilities and whether the local energy company can supply supplemental power. Even if the port can muster up the money to pay for this large initiative, there is a question of whether our local utility company can deliver adequate electricity for us to achieve our goal. The Project Management Office hired by Massport has joined our senior leadership in lobbying our utility company for

⁹ “5 -Year Capital Programs Plan.” *Massport*, 2023, www.massport.com/massport/business/capital-improvements/important-documents/5-year-capital-programs-plan/.

⁹ “5 -Year Capital Programs Plan.” *Massport*, 2023, www.massport.com/massport/business/capital-improvements/important-documents/5-year-capital-programs-plan/.

future considerations of additional power supplied to all our facilities. We are also undergoing a power assessment port-wide to find a baseline of our current electrical needs. We already know that supplying shore power to three cruise berths and two cargo berths would be over and above what we already have. Some feel that a new substation would have to be erected in the general area. The local utility company has had its issues in delivering additional power in other parts of the City of Boston, with residents in East Boston opposing their presence.¹⁰

Opposition was also led by the local and State politicians who felt that the impact would be harmful to the community. The residents of the Eagle Hill section of East Boston are fearful of the environmental impacts of a new substation in their neighborhood and are holding the utility company to a hard line in negotiations. The utility company claims that the project exceeds safety and environmental standards but the public still requests that Governor Healy stop the project.¹⁰

¹⁰ Garcia, Paula. "Open Letter Demands Clean Energy Alternative to Risky Eversource Substation." *The Equation*, 19 Nov. 2021, blog.ucsusa.org/paula-garcia/open-letter-demands-clean-energy-alternative-to-risky-eversource-substation/.

¹⁰ Garcia, Paula. "Open Letter Demands Clean Energy Alternative to Risky Eversource Substation." *The Equation*, 19 Nov. 2021, blog.ucsusa.org/paula-garcia/open-letter-demands-clean-energy-alternative-to-risky-eversource-substation/.



Figure 9. The East Boston Eagle Hill community protested against Eversource, bringing attention to their concerns about the negative environmental impacts caused by the substation.

The last major hurdle that we are facing is the availability of machines with alternate fuels that have been proven to work under harsh climates and conditions in the maritime environment, along with the price of this equipment. Our cargo operation will use unique equipment to load/unload and facilitate the movement of containerized cargo throughout the facility. Some of the specialized equipment includes ship-to-shore cranes, yard tractors, rubber tire gantries, and reach stackers. Other equipment that is used in the container yard includes pick-up trucks, cars, street sweepers, and snow removal equipment. The overall total pieces of equipment are well over 200 at the Conley Container Terminal, so it is no easy task to replace them all at once.

We have been busy researching different types of alternative fuel sources for our operations on the cargo, cruise, and parks side. The PMO has introduced us to numerous vendors who are in the business of promoting their alternate fuel equipment and we have had sales calls

from many companies looking to promote their products. Most of these companies believe that they are the solution to Massport's net zero needs. There has been much debate on which alternative fuel source(s) will be the best fit for our operations given the long hours that we work and the harsh weather conditions of the northeast. Much internal debate is ongoing at Massport to decide on which direction we should proceed. Some feel that electrification is the future, while others feel that we should not rely on one sole fuel source. What happens when there is a power outage, especially as New England weather is unpredictable, and we cannot charge our equipment to keep the port functioning? Others feel that diversifying our fleet to operate on a few different fuel sources is the safest bet. However, the port would be looking at higher costs to develop the necessary infrastructure to support different fuel sources.

Massport tested out an electric commercial street sweeper at our container terminal. The demonstration went well with great reports back from our operators. They were impressed with the efficiency, low noise level, and the zero emissions that ordinary diesel engines produce. However, and most importantly, we found that the run time for the batteries was less than eight hours before they had to be recharged. This would be sufficient if you ran a one-shift operation, but the port runs at all hours of the day, making this problematic. A potential solution for this problem would be to purchase multiple sweepers, but the economics of that solution are intangible. We also demonstrated an electric yard tractor that is used in our cargo operations. The tractor was found to work well during vessel operations, with the workforce granting it favorable reviews because of the zero emissions and ease of operations.

Like the battery-operated sweeper, the yard tractor's battery life is a concern. The picture below shows that 38% of the battery life was used in approximately 5 hours of work. This is not bad per se, but our vessel operations could run for up to 14-16 hours. There is no time to

recharge because labor keeps the tractors moving for the duration of the vessel operation. Buying double the amount of tractors could be a solution, but, like the sweeper, it is not feasible based on the economics. Another downside that we would be facing is the harsh conditions of winter weather given that we live within the northeast area of the country.



Figure 10. The battery gauge inside of the electric yard tractor shows a battery percentage of 62% after 5 hours of operation.

Fleet Maintenance magazine reports that regulating the temperature of EV batteries, traction motors, and related electronics is a prerequisite for reliable operation.¹¹ In this regard, EVs and petrochemical-fueled vehicles are similar. Wintery weather can reduce battery capacity as the chemical reactions inside batteries slow down, increasing the internal resistance. This depletes the charge faster and reduces vehicle range. Keeping a respectable and consistent range is crucial for EV fleets because commercial EVs, by definition, must be productive assets.¹¹ This is a major concern for any company that must operate around the clock. Southern and West Coast ports do not have to factor battery depletion due to freezing weather, making

¹¹ Bonini, Gina. "How Battery Thermal Management Systems Protect EVS in Cold Weather." *Fleet Maintenance*, 23 Mar. 2023, www.fleetmaintenance.com/equipment/battery-and-electrical/article/21296330/how-battery-thermal-management-systems-protect-evs-in-cold-weather.

their efforts much easier. Battery life is a major concern for the management and our workforce when it comes to deciding what fuel source to choose. With a traditional gas or diesel motor, we can simply stop and refuel without too much downtime on the vessel operations.

In a sales meeting with Bill Dailey from Standard Hydrogen, Dailey presented his company's approach to helping ports become net zero (2023).¹² His company believes that hydrogen fuel is the future. One of the many attractive things about hydrogen is that it can be used to produce electricity which is stored in fuel cells for peak time usage, taking the burden away from peak electric times.¹² Our major issue with hydrogen is that it is expensive to produce it offsite and then have it delivered to the terminal. Onsite production of hydrogen would assume a lot of space, which would decrease the room to operate a vessel. This might be a good fit for ports that have spare acreage but would not work well with our setup.

All this work and research to find the right technology has raised some eyebrows. Are we acting too fast? The demonstration and research that we have done thus far indicate that the technology for freezing weather ports is not there yet. The development of batteries cannot sustain the long and hard hours that a shipping operation requires. The sticker price for alternate fuel technologies is out of control. Alternative fuel companies know that many are in a rush to declare their net zero status and are desperate to pay any amount of money. During an interview with an unnamed electric yard truck carrier, I asked them why the sticker price is triple the amount of a normal diesel tractor (2023).¹³ His expression said it all. His smile was a direct notice that we would have to pay to play and that these companies had a hold on us.¹³ The Port

¹² Conversation with Bill Dailey of Standard Hydrogen, June 2023.

¹³ Conversation with unnamed electric yard truck carrier, June 2023.

of Miami's Chief of Engineering, Helga Sommer, was in Boston for the American Association of Port Authorities Smart Ports Conference (2023). Sommer participated on a panel focusing on major infrastructure building projects and equated the sales calls that ports receive from various startup companies as 'the gold rush'.¹⁴ It has been burdensome and time-consuming weeding out the companies that have the 'get rich quick' mentality and finding the ones that have done the research and have equipment ready to demonstrate during a live ship operation. I also fear that we are rushing into purchasing the wrong equipment even before we have the infrastructure in place to support it.

CHAPTER FIVE: CONCLUSION

Although we are in the middle of achieving our net zero goals, I feel like I am in the position to advise on ports that are just starting on the net zero journey. First, I would advise seeking assistance from a reputable Project Manager Office that has a proven history of organizing, planning, and decarbonizing ports. The Net Zero Committee at Massport was immediately overwhelmed with the notion of going green by 2031. We know that we would not be able to achieve this with only our internal staff. Everyone on our committee was hand-picked by our senior staff to lead the charge, but we all had our regular day jobs that needed attention. It was easy for us to execute low-hanging initiatives such as LED conversions and reducing water consumption at our parks that are open to the public, but the main plan needed to be the primary focus of a PMO. We found that progress started to be made when the contract for the PMO was aligned and the rest of us could take a breath because the calvary arrived.

¹⁴ Chester Meyers, Assistant Director of Capital Programs for Massport, and Helga Sommer, Port of Miami's Chief of Engineering, panel at the American Association of Port Authorities Smart Port Conference (2023).

Secondly, I feel that engaging with the customers to identify what their plans are to decarbonize helps align your goals with theirs. Scope Three emissions are out of our control, but some initiatives could push decisions made at Massport. An example of this would be installing shore power at our berths because of the pressure we are receiving from the cruise and cargo lines for electrification. There is potentially a loss of business when their fleets are 100% retrofitted for shore power and we cannot supply the power at our berths. Our container shipping customers are right in line with the cruise industry of decarbonization. Mediterranean Shipping Company (MSC), our largest cargo customer, is pledging to have the first net zero-emission vessel by 2030 and to be green as a company by 2050.¹⁵ This is a profoundly serious commitment by MSC that Massport is not taking lightly. We feel the same pressure from the cruise industry to fall in line with their plans.

As Chester Meyers, Assistant Director of Capital Programs for Massport, stated during the American Association of Port Authorities Smart Port Conference, “We don’t want to lose efficiency by choosing the wrong path forward or buying double the amount of equipment because of battery life, but reaching our goal by 2031 is coming fast” (2023).¹⁴

Retrieving a baseline of where your port is with emissions is extremely important. Massport hired an outside consultant to set an emissions profile that identified the criteria for pollutant emission at our cruise and cargo facilities.² The report compared the current profile to

¹⁵ “Enabling Logistics Decarbonisation.” *MSC*, www.msc.com/en/sustainability/enabling-logistics-decarbonisation. Accessed 7 Aug. 2023.

¹⁴ Chester Meyers, Assistant Director of Capital Programs for Massport, and Helga Sommer, Port of Miami’s Chief of Engineering, panel at the American Association of Port Authorities Smart Port Conference (2023).

² Dewberry Summary of Emissions for Conley and Flynn Cruiseport, November 20, 2018.

the last profile done in 2005 and found the results to be astonishing. The carbon footprint of the overall operations increased by 54%, making a better case for our net zero plan.²

We have spent a lot of time researching and demonstrating equipment mostly fueled by batteries. Although some of the equipment has worked well during the summer months, we have not seen the battery life being something that could stand up to the cold northeast weather. Operations cannot be compromised due to subpar equipment being purchased for the sake of going green. Currently, the only effective way we are finding to increase battery life is by buying more trucks. However, our budgets could not support this type of plan. Massport has heard a lot about the future of hydrogen, but we have not yet found a truck distributor that will let us demonstrate a yard tractor for cargo operations. The sourcing of the right equipment is still ongoing, and we hope that technology catches up with the current demand.

Lastly, it is important to make sure your budget is under control. As I discussed earlier, Massport has set aside \$500 million for the net zero goal and more internal funding is being discussed. Our PMO has been busy seeking federal grants for hydrogen and shore power, but we have not landed on anything specific.

Our department's finance manager, Fritz Sanzone, has informally presented ways to generate money through State and Federal grants that would be used to fund "green" projects (2023).¹⁶ This is a fitting example of our staff getting creative in finding separate ways to solve problems. We have quickly learned that converting the Massachusetts Port Authority to become net zero is a huge undertaking, but with a plan, some professional help, and extensive funding, it can become a reality.

¹⁶ Conversation with Fritz Sanzone, Deputy Director of Finance, Massport, February 2023.

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