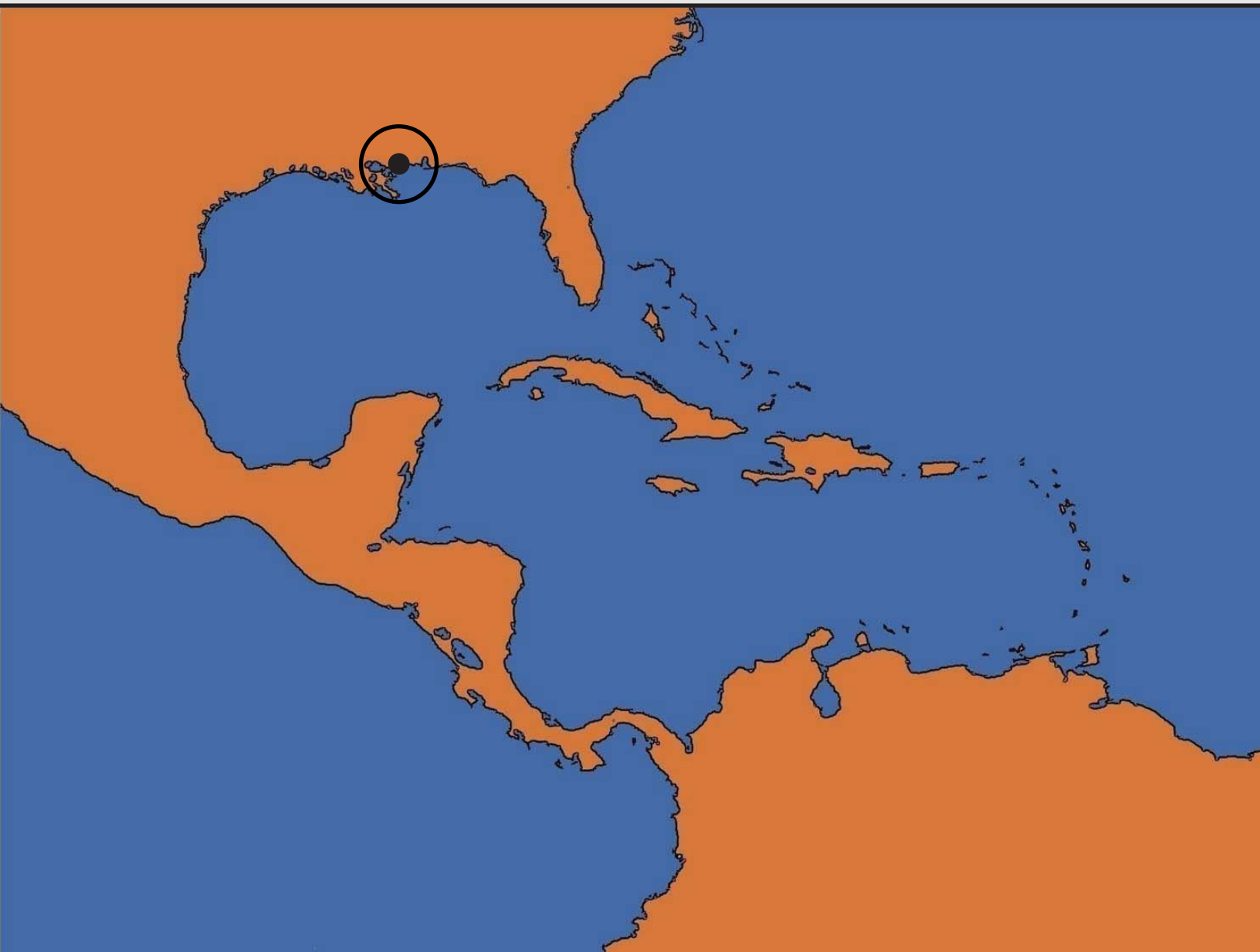
Sustainable Restoration of the Port of Gulfport



SUSTAINABLE RESTORATION OF THE PORT OF GULFPORT

FINAL REPORT
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Mississippi Center for Justice
Mr. Reilly Morse, Esq.

Columbia University
School of International and Public Affairs-The Earth Institute
Master of Public Administration in Environmental Science and Policy
Workshop in Applied Earth Systems Management

Faculty Advisor
Ms. Gail Suchman, Esq.

Workshop Team
Fariya Ali
Peachie Aquino
Jennifer Barbour
Preston Cox
Jin Jin Huang
Joseph Gosselar
Charis Lypiridis
Roberto Leal
Nathan Rudder
Clayton Winter
Anastasia Wright
Hilary Young

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EXECUTIVE SUMMARY

Hurricane Katrina devastated the Port of Gulfport and its surrounding communities. Yet, in the wake of its destruction, an opportunity arose—the chance to restore and expand the Port and rebuild its neighboring communities in an environmentally, economically, and socially sustainable manner. To this end, the U.S. Department of Housing and Urban Development awarded the Port $570 million in Community Block Development Grant (CBDG) funds, with 70 percent allocated toward the construction of new housing in the communities adjacent to the Port, including North Gulfport, and the remaining designated to restoration of the Port.

The purpose of this report is to provide the diverse stakeholders of this restoration and expansion plan with guidelines and best practices that will assist them in achieving mutually acceptable sustainability goals. In order to offer the most current and practical information, our team researched seventeen ports, selected for their range in geographical location, scale, and unique characteristics. From these a set of tangible guidelines were distilled that target environmental, economic, and social issues related to energy and air, water, land, climate change adaptation, and community and business development. Five case studies were then selected from these seventeen ports to provide practical examples of how these sustainability guidelines can and have been implemented at a world-class scale (Port of Rotterdam) and within the United States (Port of Houston, Port of Savannah, Port of Charleston, and Port of Portland).

In addition, this report isolates one significant feature of the Port's expansion plans—the 10-mile Port connector road—and recommends ways in which the guidelines can be used to mitigate its environmental and social impacts on the community of North Gulfport. Finally, a carbon footprint analysis is presented, which suggests one way in which the Port of Gulfport can use an environmental shipping advantage to compete for new business post completion of the widening of the Panama Canal in 2014.

From 2008 to 2010, the Port Authorities of Houston, Georgia, and South Carolina secured approximately $17.1 million, $3.1 million, and $2.7 million, respectively, in government funds under the Diesel Emissions Reduction Program (DERA). They used these resources to reduce diesel emissions by retrofitting and replacing equipment and vehicles and switching to cleaner burning fuels. During the same period, the DERA provided more than $99 million in direct funding to U.S. ports for these types of initiatives. To assist the Port of Gulfport in taking advantage of these types of opportunities, this report also provides information on currently available funding opportunities and a description of how this funding has been used successfully by U.S. ports in their efforts to "green" their practices.

As the Port of Gulfport moves forward with its restoration and expansion plans, it is crucial that all stakeholders acknowledge that this critical period will define not only the Port's future, but that of its surrounding communities. Armed with this awareness and the guidance contained in this report, the Port of Gulfport will be well positioned to pursue the next steps necessary to achieve its goals of truly becoming a sustainable "Port of the Future."

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LIST OF ACRONYMS

CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CO2	Carbon Dioxide
CY	Cubic Yards
CZMA	Coastal Zone Management Act
DERA	Diesel Emissions Reduction Program
EFH	Essential Fish Habitat
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environmental Protection Agency
ERTMS	European Railway Traffic Management System
ESI	Environmental Ship Index
FEU	Forty Foot Equivalent Unit
GCCF	Gulf Coast Claims Facility
GETF	Global Environment and Technology Foundation
GHG	Greenhouse Gas
HIA	Health Impact Assessment
HPA	Houston Port Authority
IAPH	International Association of Ports and Harbors
IMO	International Maritime Organization
ISO	International Organization for Standardization
MARPOL	International Agreement for the Prevention of Maritime Pollution of Ships
MCJ	Mississippi Center for Justice
MDA	Mississippi Development Authority
MSPA	Mississippi State Port Authority
NAVD	North American Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen Oxides
NRDC	Natural Resources Defense Council
NVOCC	Non Vessel Operating Common Carrier
ODMDS	Ocean Dredged Material Disposal Site
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PM	Particulate Matter
RCI	Rotterdam Climate Initiative
RoRo	Roll-on/Roll-off
RTGC	Rubber-Tired Gantry Crane
SLR	Sea Level Rise
SOx	Sulfur Oxides
SSS	Short Sea Shipping
TEU	Twenty Foot Equivalent Unit
TMDL	Total Maximum Daily Load
TBT	Tributyltin
ULSD	Ultra Low Sulfur Diesel
VOC	Volatile Organic Compounds
WPCI	World Ports Climate Initiative

INTRODUCTION

Port of Gulfport, Mississippi

In 2005, Hurricane Katrina destroyed the Port of Gulfport and its surrounding communities. Since then, restoration and expansion of the Port has been a top priority of the State of Mississippi. To facilitate restoration, the Port was awarded $570 million in Community Block Development Grant (CBDG) money through the U.S. Department of Housing and Urban Development. The bulk of these funds (70%) are allocated toward rebuilding housing in communities adjacent to the port, including North Gulfport, with the remaining is designated for the Port's reconstruction.

Currently, the Port of Gulfport is operating on 204 acres and averaging more than 2 million tons of cargo (200,000 TEUs) and 235 vessels annually, which is 80% of its pre-Hurricane Katrina capacity (Mississippi State Port Authority). The Port handles bulk, break-bulk and container cargo and is recognized as the second largest importer of green fruit in the United States and the third busiest container port in the Gulf of Mexico (Mississippi State Port Authority). The Port is considered vital to the State economy because many of the products grown or manufactured in Mississippi, such as feed stock and wood products, are exported through it. Furthermore, manufacturing companies located throughout the State depend upon the goods imported through Gulfport.

Port of Gulfport in Operation

Image Source: Sun Herald

Gulfport Oceanarium, pre-Katrina

Image Source: Wikimedia Commons

Like most marine ports, the Port of Gulfport aims to capitalize on the rapid growth in the volume of goods shipped by sea due to increases in international trade spurred by globalization. It also intends to compete with neighboring Southern ports for the increased cargo resulting from the widening of the Panama Canal. To this end, the Port has developed a port expansion plan to compliment the Port's restoration. The expanded "Port of the Future" will include the following elements: increased cargo-handling capacity of 5 times existing levels; a port connector road that enhances cross-country distribution by providing links with major rail and highway networks; and revitalization of the community of North Gulfport (Joint Public Notice).

The Port of Gulfport Expansion Project as currently proposed involves the filling of up to 400 acres of open water bottom in Mississippi Sound and the construction of approximately 4,000 linear feet of breakwater (Joint Public Notice). Construction will include wharfs, bulkheads, terminal facilities, container storage areas, intermodal container transfer facilities, build up of other infrastructure, and channel dredging. This expansion will include the 84-acre fill area that was originally authorized under Department of the Army permit MS96-02828-U (Joint Public Notice). Sixty acres of the 84-acre fill area has already been completed and the remaining authorized 24 acres is currently under construction (Joint Public Notice).

Gulfport Oceanarium, post-Katrina

Image Source: National Geographic

The restoration and expansion of the Port represents an opportunity for Gulfport to set itself up as a model for sustainable recovery and growth in both the State and the Gulf region. The State of Mississippi is also seeking to position itself as a leader in sustainability and was ranked as one of the top 5 states in the nation for biomass energy potential (Pentland 2008). Given the importance of the Port to the State's economy, it would behoove the Mississippi Development Authority (MDA) to work together with the Mississippi State Port Authority (MSPA) to coordinate and support a comprehensive sustainability strategy. For instance, the State is spearheading a Clean Cities Program that advocates adoption of alternative fuel vehicles through coalitions and funding assistance to communities. This is a prime example of where the Port could partner with the City of Gulfport to foster the use of alternative fuels both in the Port and the community in order to reduce the burden of air pollution from transportation. There are thus numerous ways for the Port to expand its infrastructure in a manner that is at once environmentally, economically, and socially sustainable.

The Mississippi Center for Justice (MCJ) is a nonprofit public interest law firm committed to advancing racial and economic justice. This project was conducted on their behalf to ensure that the Port of Gulfport and inland area of North Gulfport is restored in a way that ensures long-term sustainability and community benefits. North Gulfport is a low-income, predominately African-American community adjacent to the Port. The poverty rate in this area is almost triple the average poverty rate of the greater Gulfport area (Gulfport, MS Poverty Rate Data).

PROJECT OBJECTIVE

Photo by William Colgin

The goal of this project is to deliver a comprehensive report that informs the Port of Gulfport and its surrounding communities on the essential elements of port sustainability and how these elements may be incorporated into their own restoration, expansion, and community revitalization plans. This report will communicate these elements in the form of a set of sustainability guidelines for ports in general and case studies demonstrating the practical applications of these guidelines.

A further objective of this report is to become part of the official record so that it may be used as a future guide by stakeholders as they develop the Port and surrounding communities. In addition, it is intended as an advocacy document that can be used by communities as they struggle for economic and social equity and as a negotiation tool that the Mississippi Center for Justice can use to ensure that developers incorporate a holistic vision of sustainability.

METHODOLOGY

The team researched 17 ports around the world

Our research methodology consisted of three phases:

Phase 1

The first phase consisted of primary research, which involved the examination of the sustainability strategies implemented and practiced at 17 ports around the world. These ports were selected for their diversity in scale, geographical location, and unique characteristics in order to get a complete picture of how sustainability is addressed around the world (see Appendix 2). One of our key findings is that despite many differences, all ports face the same fundamental environmental and social issues. This phase of our research included an extensive literature search, expert interviews, and a visit to the Port of New York and New Jersey in Brooklyn.

During this phase, our team also consulted a broad range of expert analyses related to port sustainability. The Natural Resources Defense Council (NRDC), Carbon War Room, and World Ports Climate Initiative proved particularly valuable sources of information as they reflect the diverse opinions of various stakeholders: environmental advocates, entrepreneurs, business leaders, policy experts, researchers, as well as individual ports. Additionally, we investigated legal regulations, recent court cases, and available funding opportunities that could impact the Port of Gulfport's restoration and expansion efforts.

Phase 2

The second phase of our research involved the identification of sustainability guidelines informed by the previous phase and the selection and more in-depth examination of five case studies that would be included in our report. The sustainability guidelines were divided into five broad categories encompassing the most significant challenges that ports face. These are:

1. ***Energy & Air***
2. ***Water***
3. ***Land***
4. ***Climate Change Adaptation***
5. ***Community & Business***

The case studies were selected to provide practical examples of how many of these guidelines are currently applied at representative ports. The ports were chosen based on the following criteria. The Port of Rotterdam was selected because it is a world-class leader in sustainability and is the largest port in Europe. As such it provides a model of what is possible given the right vision and tools. Also, due to its size and the scope of its environmental program, Rotterdam includes the application of all of our guidelines in one port. The remaining four ports were selected from the United States because the Port of Gulfport requires guidelines and examples that are consistent with American regulations and shipping practices. Of these, the Port of Portland was selected because it is similar in scale to the Port of Gulfport and environmentally progressive; thus, it provides an example of how environmental strategies can be incorporated on a smaller scale. The remaining ports include the Port of Savannah, Port of Charleston, and Port of Houston. These Southern ports were included for three main reasons: to determine how the competition is addressing environmental sustainability; assess opportunities for inter-port coordination of sustainable strategies (e.g. collaboration with surrounding ports to implement short-sea shipping, etc.); and the Mississippi Center for Justice specifically requested their inclusion.

Off-shore wind turbines

Image Source: National Geographic

Phase 3

The final phase of the project involved using the sustainability guidelines identified in Phase 2 to assess various options for lessening the environmental and social burden created by the Port of Gulfport's plans to build a port connector road through the community of North Gulfport. The connector road aims to connect the Port with the national highway and rail system hence increasing the Port's cargo-handling capacity as well as the volume of cargo moving through Mississippi. It is a particularly important issue because while the connector road will increase the pollution and congestion in the surrounding low-income neighborhood of North Gulfport, it will also provide potential economic benefits.

Finally, an emissions analysis was conducted to determine whether the Port of Gulfport possesses an environmental advantage that it can use to compete for new business. Typically, trade between China and the U.S. involves shipping cargo by sea to ports situated along the West Coast and then using trucks and rail to transfer it to its final land destination. Once the Panama Canal widening is complete in 2014, the Port of Gulfport may possess an environmental advantage in terms of the carbon footprint a China-Panama-Gulfport route would incur compared to the typical China-Western U.S. route.

ENVIRONMENTAL PROBLEMS

Environmental, Economic & Social Problems

Marine ports provide a vital source of economic activity, but often at heavy environmental, health, and social costs. In the United States, marine ports are weakly regulated compared to other sources of pollution. As a result, many of them generate large quantities of pollutants, which they release directly to the air, water, and land. Ports also generate a significant amount of noise and light pollution, which inflicts further damage on local marine ecosystems and disturbs neighboring communities. North Gulfport, which lies directly north of the Port of Gulfport, resembles most communities that border ports; it is mainly composed of a low-income population. This creates an added injustice, whereby the community that reaps the least economic benefits from the Port's operations also shoulders a disproportionate share of its environmental burdens. In order to alleviate these environmental problems and reduce the economic and social inequities associated with them, it is helpful to describe the various sources of Port-generated pollution and the impacts they have on the environment.

Energy & Air

Air pollution generated at marine ports rivals that of power plants and refineries (Bailey vii). The majority of this pollution is generated by equipment that runs almost exclusively on diesel fuel. Marine vessels, in particular, burn the dirtiest grade of diesel ("bunker" fuel) available. Trains, heavy trucks, onsite service and employee vehicles, and cargo-handling equipment also contribute substantially to air pollution at marine ports. When diesel fuel is combusted it emits a toxic stream of particles, vapors, and gases. These pollutants include particulate matter, greenhouse gases, NOx, SOx, VOCs as well as approximately 450 additional compounds, 40 of which are considered toxic air substances (Bailey 2). The health impacts of these air contaminants are numerous. Diesel exhaust exposure is linked to increased cancer risk, aggravation of respiratory illnesses such as asthma, allergies, pneumonia, heart disease and chronic obstructive lung disease, as well as irritation of the nose, sinuses, throat, and eyes (Bailey 3). At the climate scale, greenhouse gases such as carbon dioxide (CO2) contribute to global warming (discussed below).

Water

Water contamination is a serious problem at marine ports. The major contributing sources are waste from ships, stormwater runoff, oil spills, dredging activities, and ballast water. The impact on water quality and marine life from these contamination sources can be severe. Effects include bacterial and viral contamination of fish and shellfish, oxygen depletion, and bioaccumulation of toxins in fish and other aquatic organisms.

Ship waste consists of waste dumped either directly or indirectly (e.g. leaching) into the water. Oily bilge water is a prime example. Bilge water is water that collects at the bottom of the hull of a ship. Periodically, it must be emptied to ensure ship stability and to prevent the accumulation of hazardous vapors. Onboard, this water becomes contaminated by leaking oil from machinery, sewage, and diverse forms of waste from other onboard uses. Antifouling additives, which are used in ship paint to deter the growth of barnacles and other marine organism on ship surfaces, contain tributyltin (TBT). TBT leaches into the water where it can be absorbed by and bioaccumulate in marine organisms. Among its deleterious effects, it can cause endocrine disruption leading to alterations in the sexual characteristics of marine life (Bailey 10). TBT has also been linked to skin irritations, headaches, fatigue, dizziness, stomachaches, colds, and influenza among shipyard workers (Bailey 10).

Rain and other forms of precipitation produce stormwater, which collects automotive fluids, sediments, nutrients, pesticides, metals, and other contaminants as it flows over paved surfaces. Stormwater runoff creates environmental problems in the form of water quality degradation, eutrophication, flooding, habitat loss, and reduced aquatic diversity. Eutrophication, one of the most serious problems facing estuaries in the United States today, yields devastating effects on estuaries, killing large numbers of fish and shellfish as oxygen levels become dangerously depleted due to overgrown algal blooms.

Large-scale oils spills, such as that caused by the 2010 Deepwater Horizon explosion in the Gulf of Mexico, cause immediate and long-lasting devastating effects on marine ecosystems and human health. Some examples include massive wildlife die-offs and lasting organ damage and digestive, reproductive, and central nervous system disruptions in humans (Bailey 12). Often overlooked, chronic sources of pollution such as port runoff, bilge water discharge, and the unloading and loading of oil tankers can also be substantial, contributing approximately three times as much oil pollution as oil tanker spills (Bailey 11).

The economic and social impact of oil contamination can also be significant and exacerbate existing disparities. Following the Deepwater Horizon disaster, the Gulf Coast Claims Facility (GCCF) was created to facilitate the transfer of funds from British Petroleum (BP) to those individuals who faced losses in livelihood as a result of the oil spill. Recently, however, concern is mounting that the GCCF is restricting compensation to claimants in order to reduce BP's liability. Rudy Toler, a Gulfport resident and fourth generation fisherman, says that his claim, which included 62 pages of documentation, was denied by the GCCF, along with 100,000 other people's claims (Jamil).

Dredging is performed to remove sediment that accumulates in shipping channels from erosion and silt deposition. It is performed to create new channels and deepen existing ones. Dredging poses many environmental risks, such as the release of buried contaminants like polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), mercury and other heavy metals, and pesticides. Approximately 5 to 10 percent of dredged sediment contains these toxic chemicals (Bailey 12). Additional problems associated with dredging include increases in water turbidity, habitat destruction, and disruption or death of endangered species.

Large ships extract or discharge water in order to maintain their balance. Approximately 3 to 5 billion tons of this "ballast" water is displaced annually, including an estimated 80 million tons in U.S. waters (Bailey 14). This practice combined with loose regulations is responsible for introducing invasive species into foreign habitats around the globe. Invasive species, like "red tide" algae, create environmental problems because they disrupt the balance of the ecosystems in their new habitats (e.g. prey upon native species or compete for resources).

Land

Ports operate 24 hours a day and thus generate significant noise and light pollution. Noise pollution is caused by the multitude of ships, trucks, and machines that continuously run their engines and use signaling devices like horns. This type of pollution can cause hearing loss, high blood pressure, sleep deprivation, aggressive behavior, as well as disturb marine mammal behavior patterns (Bailey 15). Artificial lighting similarly induces negative environmental effects including alterations in biological rhythms, stress, and degradation of habitat quality (Bailey 16).

Ports generate large quantities of recyclable or recoverable waste materials from their operations. These materials include paper, plastics, cans, construction waste, scrap wood and metals, and food wastes. This creates pressure on local disposal facilities, increases port waste transportation costs, and diminishes the aesthetic value of the port itself and surrounding community.

Melting Glacier in Greenland

Image Source: National Geographic

Climate Change

Since the industrial revolution, atmospheric CO2 concentrations have increased from approximately 280 parts per million (ppm) to around 384 ppm today. Under business-as-usual conditions, current models put atmospheric CO2 levels at double (550 ppm) and triple (700–900 ppm) that of preindustrial levels by 2050 and 2100, respectively (Aldy 4). At an atmospheric CO2 concentration of 550 ppm, the average global temperature is expected to increase above that of preindustrial temperatures in the range of 2.0−4.5°C (Aldy 4). More concerning is the possibility that global warming could greatly surpass these levels; projection models do not adequately account for climate feedback mechanisms such as heat-induced releases of substantial quantities of methane stored under the oceans and in the permafrost (Harvey 1995). The most serious consequences of global warming include an increase in severity of extreme weather events, like hurricanes, and rising sea levels. Gulfport is particularly vulnerable to both because of its location and low elevation. Currently, plans are underway to elevate the Port of Gulfport by 25 feet to protect against these types of events (Joint Public Notice), however further measures may be required to provide adequate protection.

CARB will allocate 10 percent of direct annual cap and trade auction revenues toward efforts to reduce GHG emissions, mitigate climate change impacts, or promote green collar employment in disadvantaged communities.

CALIFORNIA AIR RESOURCE BOARD (CARB)

Community & Business

North Gulfport is a low-income minority community that has an unemployment rate that is approximately triple that of the average unemployment rate of the City of Gulfport as a whole. Commonly, ports contribute directly to this type of disparity because they are single-use (or double-use at best) facilities that do not provide a variety of jobs and opportunities for the local community. Situated just north of the Port, North Gulfport also bears the brunt of the adverse effects of the Port's pollution. Communities living close to large sources of emissions, noise, and light experience higher rates of illness and a lower quality of life than those that do not (Bailey 16).

Increasingly, communities are successfully organizing to combat these inequities. One such example is the recent decision concerning the Association of Irritated Residents, et al v. California Air Resources Board. In 2006, the California Air Resources Board (CARB) was assigned the task of implementing the California Global Warming Solutions Act of 2006 (otherwise known as Assembly Bill 32 or AB 32). To this end, they approved a Climate Change Scoping Plan in December 2008, which outlined a strategy for the state to reduce its GHG emissions to 1990 levels by 2020. In March 2011, the San Francisco Superior Court found that CARB had violated the California Environmental Quality Act (CEQA) when it failed to thoroughly evaluate possible alternatives to the programs it detailed in its Climate Change Scoping Plan of December 2008 (Client Alert 1). Included among the petitioners' grievances are the CARB's "[exclusion] of whole sectors of the economy from GHG emissions controls" and its "[failure] to adequately evaluate the total cost and total benefits to the environment, economy, and public health before adopting the Scoping Plan" (Superior Court 2011). In response, CARB has agreed to take further actions, including the allocation of 10 percent of direct annual cap and trade auction revenues to the Air Pollution Control fund to facilitate the Legislature's efforts to reduce GHG emissions, mitigate climate change impacts, or promote green collar employment in disadvantaged communities (Client Alert 3).

Thus, it is in the best interests of ports like the Port of Gulfport to be proactive in engaging their surrounding communities as they pursue their development plans.

ENERGY + AIR

These guidelines aim to address port-associated environmental, economic, and social problems related to the categories of energy and air, water, land, climate change adaptation, and community and business. These guidelines are not intended to provide an exhaustive list, rather a collection of the most relevant initiatives that the Port of Gulfport should consider as they pursue their goal of becoming a sustainable port. Information about funding opportunities that exist to aid in the implementation of these guidelines can be found in Appendix 1 of this report.

GUIDELINE 1

Electrification of vehicles and equipment in order to reduce diesel/ bunker fuel emissions

Actions

- Switch to electrified reefer racks (electric refrigeration sheds) instead of diesel-powered refrigeration of cargo stored at the port
- Switch to electric RTGs (rubber tired gantry) cranes
- Switch to electric ship-to-shore cranes
- Use Electric Vehicles for transport within the port and via rail
  - Drayage trucks
  - Port Authority's vehicle fleet
  - Forklifts
  - Tractors
  - Locomotives
- Implement grid-based Shore Power for docked ships (cold ironing). This entails using plug-in electricity from the port to the ship
  - To ensure the use of shore-based power, ban generators from these locations where shore power is used
  - Utilize Wind Power to feed in renewable electricity in to the shore power line
  - (See example below)

GUIDELINE 2

Utilize renewable energy options where feasible in order to reduce diesel emissions

Actions

- Install solar panels on rooftops and exposed surfaces
- Use "sun-pipes" (in addition to windows) to naturally light work spaces without using electricity, thus reducing emissions associated with electricity generation and reducing energy costs (Goh 2010)
- Explore opportunities for wind power through offshore-wind turbines (see Rotterdam Case Study on p. 27)

Shoreside electrical power at Port of Los Angeles

Image Source: portoflosangeles.org

GUIDELINE 3

Improve engine efficiency through the use of better fuels as well as retrofitting and replacing old engines in order to reduce diesel emissions

Actions

- Switch to Ultra Low Sulfur Diesel Fuel (ULSD) fuel for all water vessels, yard cranes, trucks, tractors and other port equipment
- Encourage the use of better fuels including biofuels and emulsified diesel (water added)
- Leverage the research study conducted by the Port of Savannah on the effectives on certain fuel additives to further reduce emissions (Ross 2010)
- Use diesel multi-stage filters for drayage trucks to reduce particulate matter emissions
- Retrofit RTGs using fuel saving devices to regulate revolutions per minute according to load demand (Goh 2010)
- Retrofit trucks with fuel saving technology such as single-wide tires or aerodynamic kits
    - Utilize EPA's Diesel Emissions Reduction Program (DERA) funding for these projects (see Appendix 1 for details)
- Upgrade to higher tier engines as mandated by EPA standards
    - Update and improve engines and equipment ahead of EPA mandates
    - Switch to Tier 3 engines for off-road engines on the port
    - Engage in projects to test and use the new Tier 4 engines in pilot programs
- Use advanced power trains for port locomotive engines

GUIDELINE 4

Implement programs and operating procedures to decrease idling time and traffic congestion in order to minimize diesel emissions

Actions

- Work with employees to explore and organize ways for collective transport within port
- Encourage carpool and vanpool commuting options for employees to and from work
- Create a Clean Truck Program with engine and emissions standards for all trucks entering the port. Trucks that don't meet the standards are prohibited. The port should phase this in gradually and assist in the implementation of the program with incentives
- Create a traffic assessment task force to investigate ways to reduce traffic and congestion near the port and in the city's urban area with explicit and quantifiable goals. Participation should include the Port Authority, any employee organizations, and local government traffic and transportation officials. Existing methods include:
  - Rush-hour avoidance
  - Collective transport
  - Predictions of travel time
  - Nighttime driving
  - Public transportation by water
  - Improving accident recovery to reduce congestion
  - Encourage working from home
  - Make telemarketing structurally possible
  - Explore possibilities for greening existing transportation, including
  - Cleaner methods of transport
  - Environmentally friendly alternatives
  - Reducing travel time (Rotterdam's Traffic Management Company)
- Increase port dues for vessels which do not meet increasingly stringent emissions standards for their engines
  - Use these fees to subsidize the procurement of cleaner engines

GUIDELINE 5

Make improvements to port infrastructure to reduce energy use and minimize associated emissions

Actions

- Optimize terminal layout to reduce the amount of energy wasted while the cargo is sitting in port (US EPA 2008)
- Build all new buildings to LEED certified standards
  - Utilize rainwater catchment for the use of cleaning vehicles and equipment. This can reduce the energy needed to pump water for washing vehicles (Goh 2010)
  - Use greenspace to cool workspaces and reduce air conditioner use. Greenspaces cool buildings by absorbing light energy that would otherwise heat the interior of the building. This reduces the need for artificial cooling systems (Goh 2010)
  - Install motion sensors to reduce energy demand in unused rooms (Goh 2010)

GUIDELINE 6

Utilize Intermodal Transportation options to reduce truck transportation in favor of rail, inland shipping or short sea shipping wherever possible

Actions

- Incentivize alternative modes of transport for cargo
- Mandate a modal ratio for companies' transportation of cargo
- Work with other ports in the region to promote Short Sea Shipping
  - (See example below)

GUIDELINE 7

Establish proactive initiatives with the private sector through joint ventures and public-private partnerships to increase efficiencies that reduce emissions

Actions

- Partner with the local government, transportation associations and terminal operators to explore more sophisticated traffic management systems for all segments of the supply chain
- Establish a Rail Information System to increase communication between players
- Charge fees on non-compliant vessels and vehicles. Use this revenue to fund programs that foster innovation in reducing port emissions and improve air quality
- Establish a Chain Management Project which seeks to reduce inefficiencies to increase punctuality of trains in both directions

GUIDELINE 8

Monitor and evaluate progress of programs and initiatives to ensure that emissions reductions are being achieved

Actions

- Run a truck-survey to quantify and then measure reductions in emissions (Charleston 2010)
  - Partner with environmental groups to do this (e.g. EDF, EPA) and/or Health Organizations (Dept of Health, American Lung Association) and/or counterparties (Chamber of Commerce, trucking companies/associations/ employee unions)
- Conduct emissions testing for off-the-road equipment and vehicles
- Use Rotterdam's Environmental Ship Index (ESI) created in a pilot project through the World Ports Climate Conference for the World Port Climate Initiative in order to calculate NOx, SOx and particulate matter emissions
- Use Rotterdam's framework for calculating the port's carbon footprint and determine the port authority's emissions
- Create a sustainability index for the port's activities based on the three Ps: People, Planet and Profit
  - First phase includes the calculation and reduction of their CO2 footprint, sustainable purchasing activities, sustainable construction/building, and the sustainable allocation of Port Authority land

Benefits

Taking actions to reduce emissions through electrification, use of alternative power sources, upgrading engines and infrastructure, use of intermodal transportation and programs to reduce traffic congestion all help reduce diesel/ bunker fuel emissions. The reduction of emissions is important because it minimizes air pollution and the associated health affects for those who live in the immediate vicinity of the port. Reducing the amount of carbon dioxide and particle matter in the air will also help contribute towards the global goal of decreasing greenhouse gas emissions in an effort to slow down global warming. In many of the actions described above, increased efficiency or completely switching away from the use of diesel fuel also means cost savings and therefore provides a financial benefit as well.

Examples

Clean Truck Program at the Port of Charleston

The Port of Charleston as well as Rotterdam and Los Angeles have created and implemented a Clean Truck Program that limits the access of non-compliant emissions vehicles from entering the port. This reduces the local impacts from air pollution and thus helps mitigate some of the environmental justice disparities in the adjacent communities. To support the Clean Truck Program, the Port of Charleston provides incentives such as:

- Low-interest loans or leases for new trucks
- Retrofits in lieu of replacing entire trucks
- Contribution of Port funding to leverage private investment
- Matching private funding
- Implementing idle-reduction technology such as auxiliary power units for over-the-road trucks
- Setting up a scrapping initiative

Short Sea Shipping

Short sea shipping is the transport of cargo by water (either sea or river) over relatively short distances. This method of transport can save a substantial amount of fuel compared to road (truck) or rail transport. Not all ports are in ideal locations to set up short sea highways, but the Gulf Coast may be an appropriate place to implement this kind of transport. There are several ports located along the coast and transport between these ports by coastal waterways would be a very efficient mode of transit.

An examination by Kruse et al (2007) demonstrated that waterway transport increases fuel efficiency and decreases emissions from transport. It should be noted that much of their data pertains to inland waterway towing transport rather than intercoastal waterway transport. Inland towing waterway transport can move one ton at 576 miles per gallon compared to 413 miles per gallon for rail and 155 miles per gallon for road transport in a truck (Kruse 42). In addition, in this report the researchers also calculated the number of miles that each method of transport can move one ton of cargo while producing just one ton of greenhouse gas. For trucks, this number is 13,964 miles. For rail it is 37,207 miles. For inland waterway towing it is 51,892 miles.

Shore-Based Power (Cold Ironing)

Hoteling is the practice whereby a ship runs its diesel engines or a generator to produce electrical power for ship equipment while docked at port; this activity is made more damaging because ships use extremely low grade “bunker” fuel (Khersonsky 838). Emissions from docked ships can be a significant source of pollution. In the Port of Houston, for instance, nearly one third of nitrogen oxide emissions come from ships docked at the port (Sembler 1). Cold ironing is a method of powering ships at port directly from the shore-side electrical power grid; this practice reduces the emissions from engines or generators being used in port to power electrical equipment on the vessel. The term cold ironing is derived from the iron engines of a docked vessel being turned off (as opposed to idling in port) and thus being cold (Sembler 1).

Among the ports that exemplify the highest standards in shore power is the Port of Gothenburg, which has been cold ironing since 2000 (Khersonsky 838). The power for these operations is wind-generated and the transition from ship power to shore power and vice versa can be accomplished in ten minutes (Khersonsky 840). It is estimated that cold ironing at the Port of Gothenburg saves 80 tons of nitrogen oxides, 60 tons of sulfur oxides and 2 tons of particulate matter annually (Khersonsky 838). To put these numbers in perspective, an average passenger car, according to the EPA, emits 38.2 pounds of nitrogen oxides annually. This means that the 80-ton savings from the Gothenburg port is roughly equivalent to the nitrogen oxide pollution annually produced by more than 4,000 average-sized passenger vehicles.

GUIDELINE 1

Promote disaster and spill preparedness through regular multi-agency drills and plan revisions

Actions	• Draft and distribute standardized spill response plans to port personnel and relevant actors in port activities • Review spill response plans annually to keep up with port expansion and diversification of cargo • Coordinate annual multi-agency spill response drills, to test for the feasibility and effectiveness of response plans
Benefits	In addition to the rare, but disastrous effects of oil spills, there is a risk of collisions, or accidents in the handling of hazardous cargo. Ports must be prepared to deal with these accidents effectively and efficiently in order to protect the marine environment and to ensure that business operations in the port resume as soon as possible.
Examples	The Port of Singapore has been conducting regular exercises for many years to prepare for these types of emergencies. As part of the International Chemical and Oil Pollution Conference and Exhibition, participants took part in a simulation exercise called ChemSpill 2009, to test and demonstrate Singapore's chemical spill response readiness. Led by the Maritime Port Authority of Singapore, about 100 personnel from 21 agencies participated in a mock response to a collision between an oil tanker and a chemical tanker. These simulations have been carried out in Singapore since 1998 (Maritime Chemical Pollution 2009). Since 2000, the Port of Singapore has been conducting the annual Joint Oil Spill Exercise, a set of drill exercises to ensure an efficient response to oil spills. It involves updating the Oil Spill Contingency Plan annually, and takes the form of a multi-agency tabletop exercise which involves both government agencies and industry partners (Maritime In Good Company 21).

Ships discharging waste at sea

Image Source: afcan.com

GUIDELINE 2

Promote geospatial mapping of illicit discharge

Actions	• Implement geospatial mapping capacity at ports
Benefits	Mapping illicit discharge facilitates source identification, which contributes to efficient and focused corrective action and preventative measures. These actions will: • Improve water quality • Reduce levels of harmful bacteria/substances in port waters • Protect marine life and valuable coastal resources • Improve water safety and aesthetics of mixed-use ports (e.g. ports with recreational and shipping functions)
Examples	**Illicit Discharge Investigation Program at the Port of Houston** The Port of Houston Authority holds an MS4 (Municipal Separate Storm Sewer Systems) permit to improve the quality of stormwater runoff and waters surrounding the port. As part of this permit, the port has implemented its illicit discharge investigation program, which includes a geospatial mapping component. The Port uses this tool to identify sources of discharge and pursue corrective action.

GUIDELINE 3

Develop a comprehensive stormwater management program

Actions

- Prepare a stormwater pollution prevention plan for all terminals
- Provide guidance to all port tenants on development of model stormwater program, oversight and inspections of individual terminals to confirm implementation of program, and education and training of terminal staff
- Carefully document and analyze potential water pollution problems, water quality monitoring, and best management practices for the prevention, control, and treatment of stormwater runoff
- Implement sediment management measures such as wheel washing, rumble grids, and Stormceptor technology
- Incorporate permeable surfaces into urban design plans such as wetlands or swales
- Promote compliance with LEED building design codes for collection or stormwater/irrigation

Benefits

As per current environmental regulations, the Port of Gulfport maintains a stormwater management plan. However, they could benefit from reviewing their existing plan against the latest best practices from other ports. By improving the quality of stormwater runoff, water quality improves in surrounding port waters, with positive effects on marine life and coastal resources, as well as mixed use port activities such as swimming. The removal of sediment improves the clarity of water, with aesthetic benefits for the surrounding community.

Examples

Storm Water Pollution Prevention Plan at the Port of Houston
As part of the Port of Houston's MS4 permit, they are required to develop a Storm Water Pollution Prevention Plan that addresses the following components (minimum control measures): public education and outreach, public participation, pollution prevention and good housekeeping, illicit discharge detection and elimination, construction site runoff control, post-construction runoff control (EPA Office of Water 2).

Stormceptor technology at the Port of Houston
Stormceptor technology at the Port of Houston has resulted in the prevention of pollutants entering the water system surrounding the port. This technology, as well as the Storm Water Skimmer, removes sediments, heavy metals, and floating oils and solids from stormwater leaving the Central Maintenance Facility. This technology is also installed at the Port of Los Angeles.

Sediment management measures at Sydney Ports
Sydney Ports has implemented a number of sediment control measures to protect the surrounding waterways from sediment-laden runoff. This includes wheel washing (of port vehicles) and the use of rumble grids (an elevated grid system that passively removes sediment from port vehicle wheels) and environmentally sensitive urban design features that have permeable surfaces to catch and treat contaminated runoff (wetlands, swales).

GUIDELINE 4

Reduce water consumption through reuse and efficiency measures

Actions	• Install water efficient fixtures, fittings, and appliances • Implement greywater and blackwater treatment technologies onsite • Facilitate public meetings, education, and outreach regarding water conservation
Benefits	By reducing water consumption in port operations, ports can reduce their costs and conserve water. Retrofitting fixtures, fittings, and appliances, which is often subsidized, leads to water savings realized on a foreseeable timescale. Onsite treatment technology also provides opportunities for reuse and reduces costs and water consumption. Educating port tenants and the public on water consumption and quality issues creates a dialogue on water use and abuse in and around the port.
Examples	**Onsite treatment technology at the Port of Portland** The Port of Portland's LEED Platinum certification for its central facility indicates that the Port is taking a number of measures to handle its water consumption and treatment responsibly. One measure includes the installation of a Living Machine, which handles internal waste and wastewater and reuses it post-treatment. This internal system reduces the amount of water drawn from other sources and efficiently promotes reuse and reduction in the Port's operations. **Public outreach at the Port of Los Angeles** The Port of Los Angeles has created a Water Resources Action Plan and hosts monthly public Plan Advisory Committee meetings. These meetings allow the public to participate in the planning process and offer comments on progress. Since Los Angeles is a mixed-use port located close to recreational beaches, this type of dialogue between the Port and community is critical in maintaining relations and in publicizing water quality issues that are of interest to the public (including high levels of bacteria in the waters off Cabrillo Beach). These meetings provide an accountability mechanism for the Port, which helps to ensure that they are pursuing their water quality improvement goals.

Maintenance dredging at Port Oriel, Ireland

Image Source: wikimedia Commons

GUIDELINE 5

Minimize the impact of dredging activities

Actions	• Prior to dredging, collect and analyze core samples of sediments to ensure that harmful contaminants will not be released by dredging activities • Use turbidity curtains to minimize sedimentation pollution • Employ sediment suspension system • Reuse dredged material to reconstruct barrier islands or restore wetlands
Benefits	The use of turbidity curtains during dredging helps mitigate sedimentation pollution, which degrades water quality. Sediment suspension systems prevent silts from settling along harbor bottoms.
Examples	The Port of Houston uses turbidity curtains during dredging to minimize sedimentation pollution in Galveston Bay (James 94). It also uses sedimentation basins and passive treatment facilities during construction to reduce sedimentation during construction (James 94). The Port also uses dredged material to restore islands and salt marshes as part of the Houston Port Authority's (HPA) beneficial use and environmental mitigation responsibilities. The Port of Charleston has installed a sediment suspension system that keeps silts from settling along the bottom of the harbor.

GUIDELINE 1

Promote the proper management and recycling of hazardous waste

Actions	• Hazardous waste recycling • Proper hazardous waste handling • Sludge collection
Benefits	Port operations also generate significant amounts of hazardous waste materials, which could potentially damage the environment and human health. Common hazardous materials generated by ports and ships include gasoline, oil, and paints. If properly treated and handled, this could result in: • A reduction in the amount of hazardous waste materials that must be treated and disposed of • A reduction in air, water, and soil pollution associated with the extraction, refining, and processing of raw materials • Energy savings from extraction, transportation, and processing of raw materials to produce new products
Examples	**Hazardous waste recycling in the Port of Seattle** Employees identified their use of paint thinners as a major hazardous waste problem. In order to address this, the Port obtained approval to distil thinners themselves; they now recycle 90% of their paint thinners (Resource Venture 2008). The port also treats other hazardous materials such as batteries, antifreeze, and gasoline. Since 2001, they have collected and recycled around 81,000 gallons of oil and gasoline (Resource Venture 2008). **Proper hazardous waste handling at Port of Seattle** Several port marinas, including Bell Harbor, Harbor Island, and Shillshore Bay have instituted proper storage, containment, handling, and labeling of hazardous waste. Material spill and response plans, safety information for hazardous products, and documentation of appropriate off-site handling of hazardous materials related to the marinas' operation are elements included in this program. As a result, the three marinas have been awarded an EnviroStar Rating. (EnviroStar is a regional program that seeks to provide incentives and recognition to businesses for reducing hazardous waste).

GUIDELINE 2

Promote waste minimization and management through at-source segregation, collection, recycling, and disposal

Actions

- Recycling
- Scrap metal segregation
- Garbage collection from ships
- Collection of floating wastes
- Waste-to-energy initiatives

Benefits

If port facilities properly segregated waste, they could facilitate and simplify the recycling process. This would lead to important environmental and socio-economic benefits including:

- Increased diversion of waste from disposal facilities such as landfills
- Reduction in the amount of raw materials needed in the production of new products
- Cost savings from transportation and waste disposal
- Aesthetic environmental improvement

Examples

Scrap metal segregation at Port of Houston

The huge volume of scrap metal generated at the Port of Houston threatens water quality when it comes in contact with storm water. To address this problem, the Port of Houston sorts scrap metals using a mobile magnet. A magnet is placed on the rear of a work truck to pick up scrap metal in the facility. After the metal is collected, it is covered to prevent its contact with storm water. This action significantly reduces storm water impacts, damage to tires, and promotes an efficient waste collection system (Port of Houston Authority 2010).

Dunnage recycling program at Port of Houston

One of the largest waste products generated at the Port of Houston is dunnage materials composed of mahogany or teak. Recognizing the potential value of these materials, the Port of Houston Authority has implemented an innovative dunnage recycling program with the Texas Criminal Industry (TCI), which uses it to make furniture, chain link fencing, and razor wire, which are then sold back to the Port of Houston and to other tax-supported entities (Port of Houston Authority 2004). In 2009, 252 tons (21%) of dunnage was recycled (Port of Houston Authority 2010). The port also saves about $125,000 to $135,000 annually from this initiative (Port of Houston 2004).

Recycling activities at Port of Seattle

Since the early 1990s, the Port of Seattle has been recycling valuable materials from glass, cans, plastic bottles, paper products, scrap metals, wood, gasoline and tires. Marine facilities in the port area have also initiated organic recycling of food waste, plant material, soil, and untreated wood from other Marine properties. Since 2007, the Marine facilities and the Port's corporate headquarters have composted approximately 60 tons of organic waste. This program has reduced the amount of waste generated at the port by nearly 17% (Resource Venture 2008).

Image Source: National Geographic

GUIDELINE 3

Assess and monitor local marine and terrestrial ecosystems

Actions	• Conduct biological baseline study and wildlife survey • Create conservation and wildlife hazard assessment plan that includes a framework for ongoing monitoring of ecosystem and wildlife health • Hire a full time biologist to conduct ongoing wildlife and ecosystem monitoring
Benefits	Conducting an initial biological baseline study and wildlife survey allows the port to set a benchmark for future ecosystem monitoring. This benchmark will serve as a measurement tool that will allow the port to ascertain future ecosystem health. Once current ecosystem health is determined, a conservation and wildlife hazard assessment plan should be developed to create a framework for ongoing monitoring. Measurements from ongoing monitoring will allow the port to understand whether or not the port operations are adversely affecting the local ecosystem and the magnitude of these adverse effects. As the port begins to develop and implement ecosystem restoration efforts, the benchmarks established by the biological baseline study and wildlife survey will help the port measure the success of their efforts.
Examples	• Port of Los Angeles Biological Baseline Study • Port of Seattle Comprehensive Wildlife Surveys and Real Time Bird Tracking • Port of Portland Wildlife Hazard Assessment, Mitigation Management Program

GUIDELINE 4

Preserve and protect existing open space and establish wildlife sanctuaries

Actions

- Identify key habitats and species in greater Gulfport area for conservation opportunities.
- Engage with local environmental groups and wildlife organizations for financial and technical resources and ongoing support. Potential groups in Gulfport may include:
  - Mississippi Coastal Improvements Program
  - Mississippi Department of Marine Resources
  - Coastal Impact Assistance Program
  - Governors Gulf of Mexico Alliance
  - CEQ Louisiana-Mississippi Gulf Coast Ecosystem Restoration Working Group
  - National Oceanic and Atmospheric Administration's (NOAA) Coastal and Estuarine Land Conservation Program
  - EPA National Estuary Program
  - EPA Gulf of Mexico Program
  - Gulf Ecological Management Sites (GEMS) Program
- Reach out to local schools and universities to identify how newly protected land can be used for educational purposes.

Benefits

These actions establish sanctuaries and habitats for wildlife, which promotes healthy ecosystems. This, in turn, provides ecosystem services to the local community. In addition to ecosystem services, preserving open space and establishing wildlife sanctuaries offers active and passive recreational opportunities for citizens. By engaging with local environmental groups, the port will be able to take advantage of the technical and financial resources provided by these groups. Reaching out to local schools and universities will create an opportunity for the port to engage with the local community and provide educational opportunities for the population.

Examples

Port of Los Angeles

- California Least Tern Site Management on Port 400.
- Restored Cabrillo saltwater marsh and allow Cabrillo Aquarium to use the marshes for educational purposes.

Port of Savanna

- Efforts to protect the Loggerhead Sea Turtle.

Port of Charleston

- Protection of Morris Island
- Donated 3 acres to Clemson University Restoration Institute

GUIDELINE 5

Restore, enhance and establish key marine and terrestrial ecosystems

Actions	• Establish an artificial reef using derelict vessels, concrete blocks, etc. • Test dredge material for potential beneficial reuse • Reuse qualifying dredged material to create barrier islands • Establish clutch plants for existing oyster reefs • Restore wetlands to predevelopment levels • Establish vegetated barrier around connector road to mitigate effects of noise and air pollution from vehicle traffic on local residents
Benefits	Restoring, enhancing, and establishing key marine and terrestrial ecosystems creates a habitat for marine life and promotes biodiversity. Reusing qualified dredged material to create habitats diverts dredged waste from landfills. Nearly all of the U.S. ports studied in this report reuse dredged materials for restoration efforts. Using this material to create barrier islands further protects coastal areas from impending storm events as well as provides space for wildlife and passive recreational opportunities for citizens. Because oysters are filter feeders, they act as natural filtration systems for the surrounding water, sieving out water pollution and improving water clarity. As a result, establishing clutch plants for existing oyster reefs promotes the health of the marine environment and improves overall water quality. The environmental benefits of wetlands are numerous. Wetlands provide flood control, replenish groundwater, stabilize the shoreline, purify water, encourage biodiversity, provide active and passive recreational opportunities, and can absorb CO2. Additionally, the Clean Water Act mandates that development inflicts no net loss to wetlands.
Examples	**Port of Los Angeles** • Constructed artificial reef outside port's breakwater • Reconstructed oyster beds • Restored Batiquitos lagoon, Bolsa Chica wetlands, and Cabrillo saltwater marshes **Port of Houston** • Redeveloped Redfish Island, which encourages oyster growth **Port of Charleston** • Restored 22 acres of tidal marshes **Port of Seattle** • Cleaned up and restored Lower Duwamish Waterway **Port of Portland** • Restored about 65 acres of wetlands as part of their mitigation management program

4 CLIMATE CHANGE ADAPTATION

GUIDELINE 1

Prepare port and community for potential impacts of climate change

Actions	• Develop a Climate Change Adaptation Plan (CCAP) • Establish a Climate Change Adaptation Local Partnership (CCA–LP) • Join international networks related to port climate change adaptation
Benefits	A comprehensive CCAP will provide a strategic framework that will assist the Port in its efforts to prepare for the potential impacts of climate change. By incorporating climate change adaptation goals in the Port's development strategy, the port will be able to assess the risks associated with its current infrastructure, operating activities, and port-community relationship and devise strategies to overcome them. Hurricane Katrina underscored the need for a coordinated community effort toward a sustainable future for the Mississippi post-disaster economy. Initiating a Climate Change Adaptation Local Partnership (CC-ALP) could advance sustainability objectives by incorporating various environmental networks that have specific focus areas such as water management, renewable energy, or environmental justice. This would provide an interdisciplinary framework of action for institutional authorities and community groups. As an added benefit, such an agreement would serve to strengthen Port relationships with stakeholders. Climate change adaptation issues have become more mainstream in recent years. As a result, networks devoted to port climate change adaptation have been created. These networks provide an efficient means for the exchange of knowledge. They may also incentivize ports to improve their environmental performance. Additionally, in many cases these networks can improve transparency and communication between ports and the communities they represent. By joining these networks, the Port of Gulfport would have access to up-to-date information related to port activities around the world, including those best practices that are currently being employed with respect to climate change adaptation

Port of Seattle at Sundown

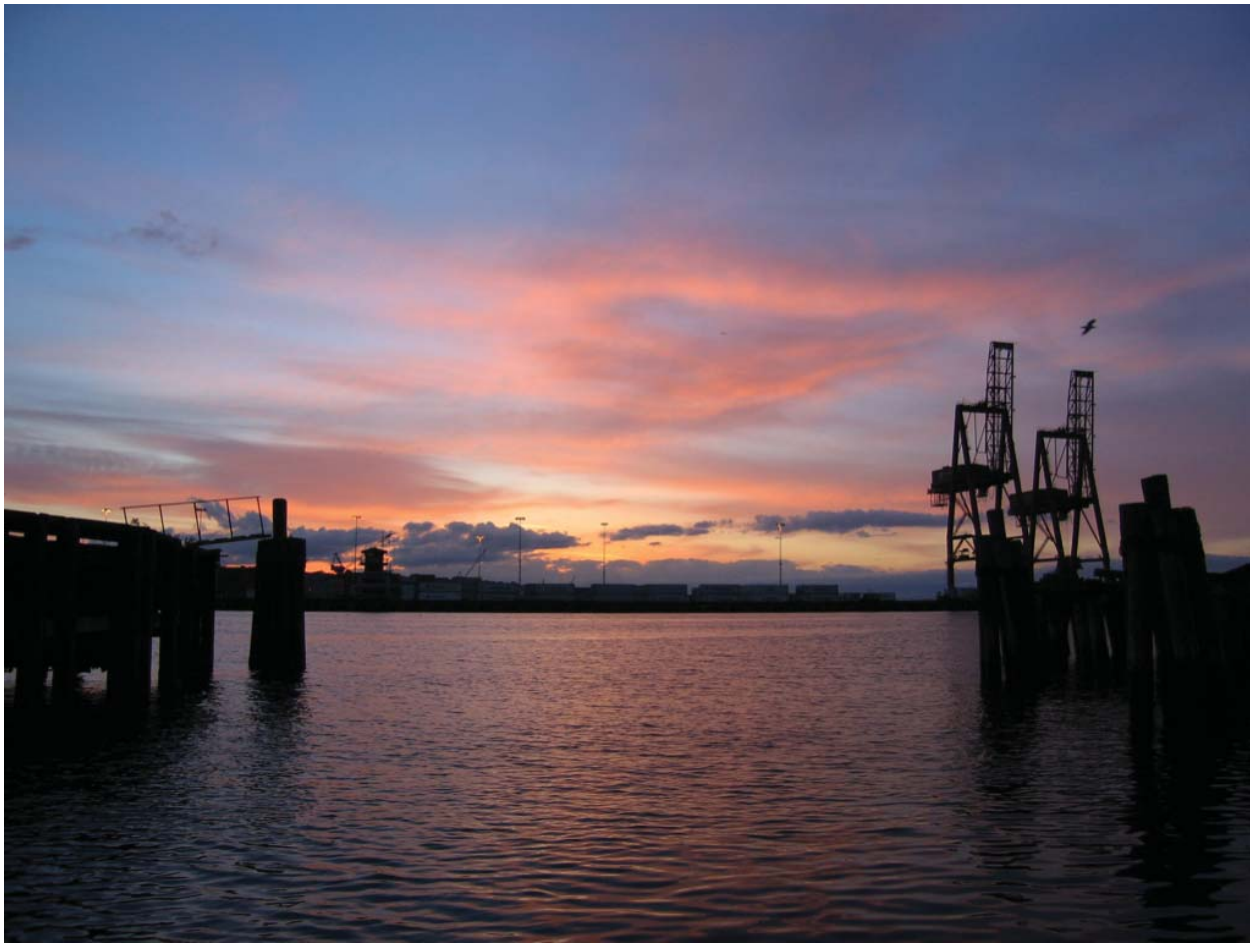


Image Source: Wikimedia Commons

Examples	The Port of Seattle, developed its Climate Change Program (similar to CCAP) to meet the goals of the broader Seattle Climate Partnership. The goal of this program is to reduce greenhouse gas emissions to 7% below 1990 levels by 2012. This program could provide a useful model for the Port of Gulfport. The World Ports Climate Initiative is a network of fifty-five ports that was initiated by the International Association of Ports and Harbors (IAPH) as a response to the emerging issued of climate change. Among the chief goals of the World Ports Climate Initiative are: • Promotion of information sharing • Establishment of a framework for CO2 footprint inventory and management • Establishment of Environmental Ship Indexing and increased support for this measurement ICLEI - Local Governments for Sustainability is an example of a community-level association of over 1220 local government members from 70 different countries that are committed to sustainable development. Gulfport could benefit from joining this type of organization could provide guidelines for environmental strategies related to the role of the port in community development.

5 COMMUNITY + BUSINESS

GUIDELINE 1

Promote community involvement in port management with a particular focus on the intersection of environmental, economic, and social issues

Actions	• Create a Community Benefits Agreement (CBA) between community stakeholders and Port Authority that includes assurances that development projects will provide the community with local jobs, affordable housing, and environmental improvements that lead to health improvements. The CBA should:
	  • Include stakeholders representing residential community, public health, environment science, technology, and urban planning to ensure that impacted persons and environmental experts have a formal role in port management (Importing Harm 7)
	  • Establish a Community Advisory Committee to allow for broader public input (Importing Harm 7)
	  • Specify that any planned port expansions or major projects should be preceded by a Health Impact Assessment (HIA), Environmental Impact Assessment (EIA), and/or an Environmental Impact Statement (EIS) (Imparting Harm 7)
	  • Require that ports mitigate all significant impacts identified by EIAs and HIAs before proceeding with a project instead of relying upon "Overriding Considerations" to approve a project (Imparting Harm 7)
	  • Develop and implement an Environmental Management System (EMS) with a third party independent auditor to monitor project developments and conditions

Benefits	CBAs provide benefits to both the community and the Port because they not only help avoid lengthy and costly litigation, but also create a partnership where each member's interests are balanced against the others. Environmental Management Systems are an important component because in order to encourage educated decisions, shippers, ports, and other stakeholders in the community need access to open and transparent environmental performance ratings. (Carbon War Room)

The Gaengeviertel in Hamburg, Germany

Image Source: travelpod.com

Examples

The Lowcountry Alliance for Model Communities (LAMC) in North Charleston has begun a Model Block project in low-income communities. The goals of the project are to increase healthy and energy efficient homes; preserve affordability; retain local families living within LAMC neighborhoods; and increase long-term community control of neighborhood resources (LAMC Community 1). The South Carolina State Ports Authority Community Management Plan allocated $1 million to replace or renovate homes and construct efficient homes in vacant lots (LAMC Community 1).

The city of Hamburg is currently working with community stakeholders to design a new concept for redevelopment of the Gaengeviertel—a 19th century working class district of historical importance (Boeing). This initiative evolved in response to an act of protest organized by 200 artists and activists concerned after the neglected area was sold to an investor who had redevelopment plans that did not factor in community input.

Port of Rotterdam Maasvlakte 2 Air Quality Agreement (Sustainable Maasvlakte Accord with Friends of the Earth Netherlands). See Port of Rotterdam case study.

GUIDELINE 2

Promote port education and community outreach by providing educational port tours focusing on the economic and sustainable aspects of the port

Actions	• Provide tours of port facilities
	• Create a Community Center or Port Visitor Center that features:
	  • Exhibits that focus on port history
	  • Exhibits focusing on sustainable activities at the port
	• Establish Port workshops for community youth that include:
	  • On-site activities
	  • In-school workshops for students including a professional development course for teachers

Benefits	Sharing information about the Port and how it is contributing to the community through sustainable practices will help foster mutual understanding. The Port is a major economic contributor to the region thus providing information about how it works will help engage the local community in a constructive way by offering opportunities for engagement. The more knowledge people possess about the Port, the better they can contribute to the dialogue on how to best improve it for the benefit of all.
Examples	The Port of Long Beach educates community members about the Port via their Port tour program (Port of Long Beach Tours). The Port also has a "Let's Talk Port" traveling community series involving informal community talks. In addition to providing Port updates, the talks also provide an opportunity for the community to share their thoughts on Port-related topics including air quality, port redevelopment, economic outlook, and security improvements. To assist with local education, the Port also has scholarships in place and provides teachers with a curriculum guide about the Port (Port of Long Beach Education).

GUIDELINE 3

Reduce port noise levels

Actions	• Operate a 24-hour noise complaint hotline for the surrounding community with standardized follow up procedures • Promote noise reduction measures for vehicles/vessels (e.g. insulation, alternative reversing alarms, idling regulations) • Implement a strategic noise map requirement for any new development in the port's mixed-use areas • Incorporate construction and mechanical equipment noise guidelines as per local, state, and international building codes as well as environmental protection guidelines • Have regulated hours for heavy good delivery (e.g. only during the day to reduce traffic noise at night)
Benefits	Excessive and unreasonable noise levels in a city can have harmful health effects on its inhabitants. Noise also has a negative impact on the welfare and prosperity of a community. Adopting noise regulations is beneficial for the health and comfort of a community and their residents.
Examples	• Sydney Port accepts noise complaints, monitors its progress and, provides data on location and cause of noise pollution • Sydney Port bans the parking and idling of trailers on port roads in order to protect the nearby communities • The European Commission Noise Emission Directive requires the Port of Hamburg to provide a strategic noise map for any developments occurring in the mixed-use area. This identifies any noise conflicts that may occur with the residents near the port and requires a mitigation action plan be created if a conflict arises • To minimize traffic noise, Sydney Ports has developed a traffic management plan, which is updated regularly. One feature mandates that heavy goods only be delivered during the day

GUIDELINE 4

Promote job training and skills development in the local community

Actions	• Partner with local universities, colleges, and high schools to use the port to educate and train students in a technical profession and provide internships and other green job development programs • Establish a scholarship program
Benefits	The benefits of such programs are achieved at an individual and community level. Offering opportunities in the form of educational funding, job training, and internships to underprivileged local youth provides them with the skills necessary to contribute not only to the Port's operations, but also to the economic growth and sustainability of their communities. In addition, as trainees enter the job market, the economy of the area will be stimulated as poverty decreases and median family income increases (Green Collar Jobs).
Examples	The Charleston Promise Neighborhood is an example of a community initiative in Charleston and North Charleston that provides "academic, family, and community support solutions" to help improve the lives of students and their families in the area (LAMC Community 2). There is also a scholarship program in place that offers $1000 scholarships for education and a $500 afterschool scholarship to local students in Charleston (LAMC Community 2). As of February 2011, the Port of Long Beach will award approximately $5 million to schools through a community grants program. The purpose of these grants is to fund air quality projects (e.g. installation of air filtration systems) at participating schools (Port Recognized Air Quality Program).

CASE STUDIES

Five case studies were chosen to illustrate the practical implementation of the guidelines above. The Port of Rotterdam was selected because it is a world-class leader in sustainability and provides a one-stop-shop for nearly all guidelines in one port. Additionally, it demonstrates how transparency and multi-stakeholder partnerships can provide an effective means to achieve sustainability objectives. The Port of Gulfport is an American port subject to American regulations and shipping practices, however. Thus, the remaining four case studies were selected from within the United States.

The Port of Portland was chosen because it is similar in scale to the Port of Gulfport and one of the most environmentally progressive ports in the United States. As such, it provides an example of how sustainability strategies can be incorporated on a smaller scale. The final three case studies include the Southern ports of Houston, Savannah, and Charleston. These ports were selected because they share geographical and cultural characteristics with the Port of Gulfport and also represent its most direct competitors. They also provide examples of the successful leveraging of government programs to finance some of their sustainability goals. Under the Diesel Emissions Reduction Program (DERA), the Port Authorities of Houston, Georgia, and South Carolina obtained approximately $17.1 million, $3.1 million, and $2.7 million, respectively, which they used to reduce diesel emissions by retrofitting and replacing equipment and vehicles and switching to cleaner burning fuels (US EPA Grants). From 2008 to 2010, the DERA provided more than $99 million in direct funding to U.S. ports (US EPA Grants) for these types of initiatives. Please see the Appendix 1 of this report for more detailed information about these initiatives and current funding opportunities.

From 2008 to 2010, the DERA provided more than $99 million in direct funding to U.S. ports

PORT OF ROTTERDAM

Image Source: portofrotterdam.com

World-Class Leader in Sustainability Practices

The Port of Rotterdam is the largest port in Europe covering an area of 24,710 acres. Plans are currently underway to enlarge the existing port, Maasvlatke, by building a 2000-hectare extension, Maasvlatke 2, on adjacent land. In 2009, Rotterdam handled 387 million metric tons (427 million U.S. tons) of cargo from 33,532 vessels. This cargo consisted of crude oil (24.9%), other liquid bulk (26.3%), dry bulk (17.2%), containers (17.2%), and break-bulk (5.7%). The Port of Rotterdam is considered Europe's energy hub because of its heavy economic reliance on the fossil fuel industry (Port of Rotterdam Statistics 2010).

At approximately 120 times the size and 210 times the handling capacity, Rotterdam benefits from economies of scale and industry partnerships that Gulfport does not. Nevertheless, it is an important case to include because it provides a world-class model of what can be achieved through innovation, initiative, and dialogue with government, industry, local community, and other stakeholders. As Mississippi positions itself to become a leading clean energy state, particularly in biofuels, the Port of Rotterdam could offer the Port of Gulfport a valuable roadmap toward energy sustainability.

CASE STUDIES

Energy & Air

Given the importance of energy to the Port of Rotterdam, it is not surprising that it seeks to develop the port as the "most efficient energy and industrial cluster in the world" (Balanced Growth 5). What follows is a snapshot of some of the major initiatives that the Port has pursued.

Measurement of CO_2 Footprint

In 2008, the Port of Rotterdam calculated its carbon footprint for its 2007 business operations based on three parameters (mobility, building, and energy). The Port Authority intends to use this methodology to achieve carbon neutrality by 2012 and to this end followed up by measuring its 2008 emissions. The Port plans to reduce their carbon emissions by at least 35% and compensate for the rest. To achieve this goal, they have implemented several initiatives. In 2008, they reduced their fleet's fuel consumption by 81,000 liters. They also retrofitted their corporate vessel to be the cleanest of its kind and installed lighting and heating systems that are 100% sustainable. In addition, approximately 70% of the Port Authority's corporate passenger vehicle fleet has a green energy label of A, B or C or run on biofuels and 88% of the Port Authority's corporate commercial vehicles meet the standards for a "clean fleet" as set by the Rotterdam Municipal Executive (Port of Rotterdam Annual 2009).

Rotterdam Climate Initiative

The Rotterdam Climate Initiative (RCI) is a joint initiative between the Municipality of Rotterdam, the DCMR Environmental Protection Agency Rijnmond, and Deltalinqs, the port's business sector employers association. The collective goal of the three organizations is to reduce carbon emissions to 50% of 1990 levels by 2025. To achieve this, the Port along with its two partners, is aggressively mobilizing investment toward carbon capture and storage (CCS) infrastructure and technology innovation (Port of Rotterdam Summary 2008).

CO_2 Capture and Storage

Rotterdam recognizes that CCS is crucial to meeting its RCI target by 2025. Fortunately, the Port is in a unique position to take advantage of this technology. Not only do they have the economies of scale to make CCS effective, but they also have the industry connections to reduce storage costs by transporting the CO2 to depleted oil fields in the North Sea, either by tanker or by pipeline. In 2008, the port set up a pilot program at Maasvlakte that has been capturing CO2 on a small scale and using it for horticulture. That same year, a business case was presented (and approved for advancement into a business plan) to allow for 5 million metric tons of carbon capture and storage annually to begin in 2015. This initiative will serve as a pilot that will be used to scale up annual CCS capability to 20 million metric tons by 2025 (Port of Rotterdam Energy 2010).

Maasvlakte 2 Air Quality Agreement

This agreement, also known as the Sustainable Maasvlakte Accord with Friends of the Earth Netherlands, was signed in 2009. The explicit goal of the agreement is for Maasvlakte and Maasvlakte 2 to reduce total emissions by 10%, including fine dust, NOx, SO2 and CO2. As the construction of the port expansion continues, companies sited at both Maasvlakte 1 and 2 will be contractually required to limit their proportion of road transport. Also, trucks will be required to use only the cleanest engines in their transportation to and from these terminals starting in 2014. Specifically, only Euro V engines or higher will be allowed to travel to these two terminals upon completion of Maasvlakte 2 in 2013 and only Euro VI engines will be allowed starting in 2016. In addition, increased inner port dues for vessels which do not meet the increasingly stringent standard for vessel engines will be applied. At the same time, subsidy schemes will support the procurement of cleaner engines for inland vessels (Port of Rotterdam Annual 2009).

Traffic Reduction

Created in July 2008, the Traffic Management Company seeks to improve the flow of traffic and to specifically reduce local rush-hour traffic on the A15, the main transport corridor for the Port, by 20%. Co-founded with and signed by the CEO of the Port of Rotterdam, the Dutch Minister of Transport, Public Works and Water Management, and the Alderman of the City of Rotterdam for Traffic Policy (July 18 Press Release), the Traffic Management Company also has an advisory board made up of members representing the Deltalinqs, the adjacent municipality of Spijkenisse, the Chamber of Commerce, the TLN (the Dutch organization for road transporters) and the EVO, (the Dutch shippers' organization) (Port of Rotterdam Summary 2008).

Container Transferium (Balanced Growth 4)

In 2008, the Port implemented a "container transferium" in order to divert vehicles away from the A15. Container flows are combined so that barges can transport goods from terminals at Maasvlakte to the transferium in the immediate Rotterdam hinterland (thus bypassing the A15). A total of 200,000 containers can be diverted from the A15 in this manner. Though the A15 is not the responsibility of the Port, and the Port does not transport any of the goods itself, traffic congestion on the A15 limits the efficient flow of goods. In addition, limiting congestion also limits the emissions and fine dust produced by traffic (Port of Rotterdam Summary 2008).

Shore-Based Power

In 2007, the Port of Rotterdam began a two-year pilot project that introduced shore-based power to Maashaven, its largest inner harbor with approximately 150 public berths. By 2008, 132 shore-based power connections had been installed (Port of Rotterdam Summary 2008). Two years later, in light of the success at Maashaven, the Port decided to expand its shore-based power program to all (nearly 400) public berths (Port of Rotterdam Annual 2009). In Jan 2010, the first of these new facilities was installed at Noordereiland. To ensure adoption, the Port has stipulated that all shore-based power must be operational by 2012 and that generators be banned from locations where shore-based power is available ((Port of Rotterdam Annual 2009).

Wind Turbines

Rotterdam receives heavy and consistent wind off the North Sea and is using this renewable resource to generate wind power. Currently, wind power capacity is 150 MW, but the Port expects to add another 108 MW through the construction of Maasvlakte 2 (Port of Rotterdam Energy 2010). The ultimate goal is to double current wind power output, which should be sufficient to power an estimated 250,000 households (Port of Rotterdam Annual 2009).

Intermodal Transport

Rail, inland shipping and shortsea shipping generally use less energy and produce fewer emissions than trucks (Port of Rotterdam Annual 2009).

Inland Navigation

For the Port of Rotterdam, inland shipping is almost always cheaper than road transportation (assuming the destination is located near the water). Barges can reach nearly every major industrial area within 1,000 km by water. They can also reach distances greater than 1,000 km, like Austria, Czech Republic, Slovakia, Hungary, France, Croatia and Poland, via the Danube. Inland navigation currently accounts for around 30% of container transport and 37% of total transport at the Port of Rotterdam, but the goal is to limit road transport to 35% of the modal ratio with at least 65% allocated to rail (20%) and inland shipping (45%) by 2033 for Maasvlakte 2. Though the economic crisis has caused a load reduction in inland shipping and thus, due to economies of scale, a reduced economic advantage, this problem is expected to resolve itself as increased throughput increases its cost-effectiveness (Port of Rotterdam Annual 2009).

A key development in inland shipping is the recent joint venture between the Port Authority, Van Uden (terminal operator), and Heineken to construct an inland terminal at Alphen aan de Rijn in 2009. This terminal will allow Heineken to shift a large majority of its transportation to inland shipping. Another initiative undertaken by the Port is the Fresh Corridor Project. This project, which encourages carriers of fresh products to ship their refrigerated cargo to the Venlo region via inland shipping was so successful that additional opportunities are being sought to shift cargo toward inland shipping for hinterland transportation. From 2009 to 2011, the Port will also be contributing funds to the Expertise and Innovation Centre for Inland Shipping (EICB) to help support new innovations to improve local air quality and address climate concerns. Starting in 2012, funding will come instead from a fee on vessels whose engines do not meet the ever-increasing emissions standards of the Maasvlakte 2 Air Quality Agreement (Port of Rotterdam Annual 2009).

Rail

Rail, or “dry” shipping, is used to reach places that barges cannot. Approximately 80% of the Netherlands rail destinations are cross-border, but shorter distances are also feasible. Relying heavily on the Betuweroute—the freight-only railroad to the German hinterland—Rotterdam has added the title of “Rail Port” to its list of ambitious goals. Rotterdam expects rail transport to quadruple between 2008 and 2033 from the addition of Maasvlakte 2 along with the standard growth expected throughout the rest of the port and the intensification of freight along the Betuweroute. The goal is to shift the modal split in container transport away from road and towards the other three alternatives. Specifically, they want rail transport at Maasvlakte to increase from the 16% rail transport seen in 2008, to 20% by 2033. Some of this growth is expected to occur via increased infrastructure for rail to and from Maasvlakte and Waalhaven, but the majority is expected to occur through innovation and more efficient operations throughout the rail chain. For example, in 2009, the first electric locomotives reached Maasvlakte; prior to this, the locomotives had to be switched using the European Railway Traffic Management System (ERTMS). Intensive cooperation has been a crucial facet of these improvements. The use of the electric locomotives listed above illustrates a milestone reached only through years of extensive cooperation with the major market players: carriers, suppliers, government, and infrastructure providers (Port of Rotterdam Annual 2009).

Shortsea Shipping

At Rotterdam, shortsea shipping is useful to reach the UK, Scandinavia, Russia and Southern European ports. It works on a “door-to-door” basis, often for factories, and thus overlaps with the road transportation sector (Port of Rotterdam Annual 2009).

Water

The Port of Rotterdam has devised a number of strategies for dealing with waste. These include the development of a Harbour Master’s Reporting Centre for national reporting and questions regarding the Shipping Waste Treaty, as well as a Shipping Waste Decree for inland shipping and an Enforcement Strategy for Shipping Waste that was created in conjunction with the Transport, Public Works and Water Management Inspectorate (Port of Rotterdam Annual 2009).

Land

The construction of Maasvlakte 2 will add 2,000 hectares of newly created land. The Port of Rotterdam assigns environmental preconditions to all of its developments. These include the clustering and multiple use of space to create a sustainable and space-intensive port as well as provisions to track soil pollution and recreate habitats for displaced land during development (Port of Rotterdam Annual 2009).

Community & Business

In addition to its many programs aimed at reducing local air pollution, the Port of Rotterdam also aims to build constructive relationships with the community. This is best exemplified by the aforementioned Sustainable Maasvlakte Accord with Friends of the Earth Netherlands. By signing this Accord, the Port pledged that harmful emissions associated with the construction of Maasvlakte 2 would be reduced to levels 10% lower than that anticipated in the environmental impact statements by 2020.

To engage the community, the Port also hosts World Port Days, where hundreds of thousands of people visit the port to learn more about it and get acquainted with its activities. Additionally, the new port, Maasvlakte 2, will include the Futureland Information Centre, which will be open to visitors and citizens; similar to World Port Days, the Centre will educate the public about the progress being made at the harbor as well future plans and the impact these will have on the community (Port of Rotterdam Annual 2009).

PORT OF HOUSTON

Image Source: Wikimedia Commons

First U.S. ISO 14001 Compliant Port

The Port of Houston consists of a 25-mile-long complex of public and private facilities, including the Port of Houston Authority and more than 150 private industrial companies along the Houston Ship Channel. In 2009, the Port moved 220 million tons of cargo from more than 7,700 vessels. In 2005, the Port Authority completed a plan to deepen its channel from 40 to 45 feet and widen it from 400 to 530 feet (using local voter-approved bonds and federal funds). This expansion will enhance the safety of port operations, and will accommodate larger and more varied vessels as north-south trade grows. Notably, the Port of Houston was the first U.S. port to receive ISO 14001 compliance, which it achieved in 2002 (Port of Houston – Publication). ISO 14001 is a voluntary international EMS standard created by the International Organization for Standardization (ISO) that serves as a framework to assist organizations in developing their own EMS.

The Port of Houston moves roughly 110 times the cargo moved at Gulfport, both before Hurricane Katrina and after (as measured in millions of tons). It also has more diversified cargo and covers a much larger area. The Port of Houston was selected as case study because it is situated in the Gulf and as such is a direct competitor of the Port of Gulfport.

Energy & Air

The Houston-Galveston-Brazoria (HGB) area is classified as an ozone nonattainment area by the EPA, which means that it is out of compliance with the Clean Air Act (Port of Houston Authority Clean Air Strategy Plan 2). Within the port, there is a high volume of diesel-fed traffic, which produces high concentrations of emissions that are damaging to worker health, public health, as well as the ecosystems in the region. Truck idling accounts for a large portion of these emissions.

Clean Air Strategy Plan

The Port of Houston has developed a Clean Air Strategy Plan (CASP) to reduce real and sustThe Port of Houston has developed a Clean Air Strategy Plan (CASP) to reduce real and sustainable maritime and port-related emissions. The plan promotes voluntary emissions reductions for the HGB area. The scope of the plan includes the Port of Houston and the approximately 150 private industrial firms located along the Houston Ship Channel, extending 9 nautical miles off the coast. It includes all Port-owned property (cargo handling equipment, trucks, and locomotives) and Port Terminal Railroad Association property. The Plan includes a CASP Steering Committee made up of the principal businesses and services and major Port tenants as well as Stakeholder Committees and specialty sub-committees (ocean-going vessels, cargo handling equipment, locomotives, etc.). The Plan includes several components: Goods Movement Air Emissions Inventory; Clean Fleet Policy Program; pre-check gate; tenant engagement and education; van pool; preferential purchasing policy; exploration of shore power capabilities; and participation in America's Marine Highways Program. (Port of Houston Authority Clean Air Strategy Plan)

The Goods Movement Air Emissions Inventory tracks the level of NOx, VOC, CO, SOx, CO2 and particulate matter at the Port. The inventory was developed in 2000 and has been updated ever since. Outside contractors are hired to measure the emissions (Port of Houston Authority Clean Air Strategy Plan 8).

In order to implement its Clean Fleet Policy Program, the Port is currently evaluating a grants and low-interest loans program to accelerate the replacement of its heavy-duty diesel-fueled trucks. They have also created a timeline for upgrading their cargo-handling equipment to tiered engines according to EPA schedules within 5 years of implementation of the program (Port of Houston Authority Clean Air Strategy Plan 12). To reduce on-site truck idling, which accounts for approximately 78% of total emissions, a pre-check gate located at Barbours Cut Terminal has been installed. Tenant engagement and education concerning the importance of addressing air quality issues has also been initiated as part of quarterly tenant meetings. Complimenting this, a van pool program has been implemented to reduce employee commute trips and associated emissions. The van pool program alone has eliminated 493 tons of CO2, 0.47 tons of NOx, 0.49 tons VOCs, saved 43,779 gallons of fuel and eliminated 902,642 vehicle miles (James 88).

Other aspects of the Plan include institution of a preferential purchasing policy that favors contractors who include emission reduction plans as part of their bids as well as participation in the America's Marine Highways Program (use of tug-and-barge over trucks) (Port of Houston Authority Clean Air Strategy Plan 11).

An aggressive dust control program has also been developed at the Port of Houston, which consists of the application of a suppression product (emulsified asphalt SS-1), as well as the monitoring of vehicle speeding and housekeeping practices at the facility. This has resulted in the port's lowest readings of particulate matter in recent years, despite a growing steel industry presence at the port (James 87). From 2005-2008, the Port of Houston also reduced VOCs from central maintenance by 32.6% and from the Barbours Cut Terminal by 12.9% (James 86). In 2008, the Port set a new goal to further reduce VOC emissions by another 15% by 2012.

Transport

In 2000, the Port of Houston became the first U.S. port to conduct air emissions testing on off-road equipment (Port of Houston Authority Delivers First). By 2013, they will install the first advanced power trains for port locomotive engines from GE in three tugboats and three trains at the Port of Houston (Port of Houston - Publication). These engines will meet tier 4 standards, reduce NOx emissions by 90% (or 23.4 tons per year), reduce particulate matter by 1.1 tons per year, and reduce fuel consumption (11,250 gallons) and greenhouse gases by 10% per year. In addition, the port has used a $150,000 grant from the EPA to purchase a hybrid diesel-electric yard tractor, which will reduce fuel consumption by 60% and NOx emissions by 43% (James 80).

Water Quality & Consumption

The Port of Houston has developed quantitative goals for water conservation, including a goal to conserve 5% of potable water at the Turning Basin terminal. From 2005 to 2008, water use at the Barbours Cut Terminal decreased 77.3%, but increased 3.8% at the Turning Basin Terminal.

Stormwater Management

From March 2006 through September 2007, the Port used a Coastal Coordination Council grant from the General Land Office to evaluate a storm water best management practice using phytoremediation and biofiltering. The project used mulch socks and wetland plants to retard storm water flow, allowing solids to settle, reducing the amount of pollutants. As part of the Port's Municipal Separate Storm Sewer Systems (MS4) Permit to improve the quality of storm-water runoff, the Port of Houston has taken the following steps toward improvement (Port of Houston Authority General Information MS4s 5):

- Litter education for Port personnel and tenants that promotes housekeeping, recycling to reduce waste, street sweeping, and installing proper collection measures.
- Spill prevention and control through spill-proof storing standards for chemicals, oily materials, and waste, which must be provided with secondary containment for additional protection.
- Identification/elimination of illicit discharges through inspection and enforcement.
- Improved materials management at Port facilities to prevent pollutants from entering systems, including the installation of the Stormceptor and a Storm Water Skimmer to remove sediments, heavy metals, and floating oils and solids from storm water leaving the Central Maintenance Facility. In addition, Mobile Magnet technology is used to pick up scrap metal from the yard (Port of Houston Authority General Information MS4s 6).
- Eliminating non-storm water discharges including vehicle wash water, or water from cooling tower operations.

Ship Discharge

Disposing of ballast water can contaminate waterways, releasing toxic substances into port waters with detrimental effects on water quality and marine ecosystems. Also, ballast discharges can introduce invasive species.

As part of the MS4 permit, the Port of Houston continues to implement its illicit discharge investigation program. Through geospatial mapping of illicit discharge, the discharge source is identified and corrective action is implemented (Office of the Controller Annual Report 9). As is consistent with United States and international maritime law, the discharging of waste/oil from bilges or tanks is prohibited. The abandonment of any drums, boxes, containers of cargo on Port authority will result in the removal by the Port, the cost of which will be borne by the user plus an additional 20% (Port of Houston Authority Tariff No. 15).

Dredging

In order to lessen its impact, the Port of Houston uses turbidity curtains during dredging to mitigate sedimentation pollution in Galveston Bay. The Port also uses sedimentation basins and passive treatment facilities during construction to minimize sedimentation during construction (James, 94). Finally, the dredged material is used for islands and salt marshes as part the Houston Port Authority's (HPA) beneficial use and environmental mitigation responsibilities.

Port Waste Management

The Port produces a large amount of industrial waste, as well as used packing and shipping materials. Additionally, Port activities contaminate storm water that flows into the surrounding waters. Pollutants including oil, hazardous wastes, scrap metal, and other discarded materials should be disposed of properly to avoid this.

The Port-wide recycling program saw 85% (of a total of 195,484 pounds) of industrial waste recycled in 2008 (James 89), and 90% in 2010 (Office of the Controller Annual Report 10). Paper-recycling is conducted in the administrative facilities. Plastic and aluminum recycling services were added to the Executive Office Building in 2009 with plans to expand it in 2010 (Office of the Controller Annual Report 10). The Port also collected and recycled 100% of 476 passenger tires, 628 truck tires and 252 oversize tires (James 89). It also implemented an innovative dunnage recycling program (wood used for packing during shipping). Dunnage is sent to a third party in the State that uses it to make furniture (Port of Houston Authority General Information MS4s 6). In 2009, 252 tons or 21% of dunnage was recycled (Office of the Controller Annual Report 10).

Restoration

Recent port expansion, which widened and deepened the ship channel, significantly altered the existing landscape and the wildlife inhabiting the region. Galveston Bay remains a mixed-use area, so preserving the ecology of the region is crucial from an ecological, economic, and aesthetic perspective.

The Port of Houston aims to have a "long-term net positive environmental effect on Galveston Bay" (POHA Overview). As part of this broader goal, the port agreed to a strategy that considers dredge material a resource, and that commits to environmentally acceptable methods of dredge disposal. The port used dredged material to reestablish Redfish Island, which had been a boating destination until it subsided. This redevelopment, which began in 2003, rebuilt the island as a boating destination, a bird habitat and rookery, and also designed the island in such a way

that would encourage oyster growth and the establishment of an oyster reef (POHA Overview). The port mitigated impacts on wetlands by creating 70 acres of new wetland habitat, enhancing 12 acres of existing wetland and 71 acres of coastal prairie at the Memorial Tract, and is currently in a five-year phase of monitoring plant survival and invasive species control (James, 95).

Outreach & Participation

For the past four years, the Port of Houston Authority has sponsored the Baytown Nature Center as a Trash Bash site. In 2010, 350 volunteers from the community participated in the trash pickup initiative at the Center. They gathered 600 bags of trash and collected 85 tires (Port of Houston Authority, Environmental Awareness). The port also provided a $25,000 sponsorship to the Upper Texas Coast Water-Borne Education Center, which helps "local youths gain a basic overview of marine- and coastal-related topics" (Port of Houston Authority, Community Relations).

Small Business Development

The Port of Houston runs a Small Business Development Program (SBDP) to provide "additional opportunities for local small businesses to participate in contracting and procurement at the Port of Houston Authority" (Port of Houston Authority, Small Business Development). The program targets small businesses, including minority- and women-owned businesses, and creates opportunities for their involvement in the port's activities. The annual goal of the SBDP is 35% of the dollar amount of all SBDP-eligible contracts and procurement, and applies to all contracts over $25,000 except "contracts for sole-source items, federally funded contracts, contracts with other governmental entities and those contracts that are otherwise prohibited by applicable law" (Port of Houston Authority, Small Business Development).

Noise

The Port of Houston Authority is continuing its sound mitigation effort, which addresses impacts on communities north of the Bayport Ship Channel. The port installed acoustically rated windows and doors in two test phase homes, with positive results. Efforts will continue beyond this phase, including partnerships with fuel-bunkering companies to test equipment and provide recommendations for concrete reductions (James 94).

Competitiveness

As of 2008, the Port of Houston ranked first in the U.S. in terms of foreign tonnage; first in imports for 18 consecutive years; second in the U.S. in total tonnage for 18 consecutive years; and ranks as the seventh largest U.S. container port (Port of Houston Trade Statistics). The Port of Houston Authority also received the 2007 President's "E Star" Award for export service in recognition of its continuing support of export growth in the U.S. business community for at least 5 years.

EMS

The Port of Houston Authority Central Maintenance Facility and Barbours Cut facilities have been members of the National Environmental Performance Track since 2003, a partnership that recognizes top environmental performance among participating U.S. facilities of all types. This organization encourages benchmarking and leadership in environmental performance, which may contribute to a competitive advantage among ports (Port of Houston Authority, Environmental Awareness).

PORT OF SAVANNAH

Image Source: Britannica.com

2008 Port Environmental Management System Assistance Project Participant

The Port of Savannah consists of two terminals covering an area of 3.5 square miles (2240 acres). In 2010, Savannah handled 2.8 million TEUs from 2,186 vessel calls. The top ten exports for the Port of Savannah during the past five years have been wood pulp, paper, food, clay, retail goods, chemicals, machinery and electronics, resins and rubber, automotive goods, and fabrics. Together, these exports comprise 83% of the total TEUs exported. The top ten imports for the Port of Savannah during the past five years have been furniture, retail goods, machinery and electronics, hardware and houseware, food, automotive goods, apparel, toys, minerals, and woven fabrics. In all, these imports comprise 82% of the total TEUs imported (Georgia Ports Authority By The Numbers).

In 2008, the Georgia Port Authority (GPA) was one of five North American Ports chosen to participate in the 18-month Port Environmental Management System (EMS) Assistance Project established by the American Association of Port Authorities (AAPA) and the Global Environmental & Technology Foundation.This program assists ports in developing environmental management systems so that they can more effectively analyze, control, and enhance the environmental consequences of their activities (Georgia Ports Authority Participates 2008). Applications and additional information about this program can be found at the AAPA website: http://www.aapa-ports.org.

CASE STUDIES

The Port of Savannah is approximately 11 times the size and handles more than 14 times the cargo as the Port of Gulfport. However, the two Ports are comparable in terms of the types of cargo imported and exported and will be closer in size once expansion of the Port of Gulfport is complete. (Georgia ports Authority Green Initiative)

Electrified Ship to Shore Cranes and Refrigerated Storage Racks

The Port of Savannah and the Georgia Port Authority have undertaken a number of programs to reduce energy demand and emissions from diesel engines. In September 2010, the GPA began participating in an energy retrofit program funded through the American Recovery and Reinvestment Act. The Port of Savannah is also working to reduce its diesel fuel consumption. The GPA estimates that through various methods of fuel use reduction, it is saving 4.5 million gallons of fuel every year. Methods for fuel savings include the use of electrified cranes (saving 1.5 million gallons annually) (Georgia Ports Authority Awarded 2010), electrified refrigerated containers (saving 600,000 gallons of fuel annually) (Georgia Ports Authority Terminal 2010), and rising fuel grade standards. These kinds of initiatives have the dual benefits in that they reduce air pollution, including particulate matter, and help reduce noise pollution since diesel engines are much louder than electrified engines.

Fuel Additives to Enhance Fuel Efficiency

Additives to fuel have reduced total fuel use by 5% and decreased emissions as well (Georgia Ports Authority Study 2010).

Higher Efficiency Engines

With grant assistance from the federal EPA, the Georgia Port Authority has begun a repowering project to replace the tier I diesel engines powering their rubber tired gantry cranes with tier III engines. The newer engines have higher emission standards and will reduce emissions by 22,000 metric tons during the lifetime of the cranes. Fuel savings are expected to approach approximately 130,000 gallons annually (Georgia Ports Authority Awarded 2010).

Recycling of Scrap Metal

The Port of Savannah is engaged in a large-scale recycling effort. Materials that are recycled at the port mostly take the form of scrap metal from old equipment. The GPA recycled over 1200 metric tons of used metallic waste in 2008. This weight encompasses 32% of the waste produced at the Port of Savannah in 2008 (Georgia Ports Authority Recycled 2008).

Loggerhead Sea Turtle

The GPA has also involved itself in issues of local conservation. By sponsoring the Caretta Research Project it has helped protect the nests of loggerhead turtles (*Caretta caretta*). Loggerheads are an endangered sea turtle whose life cycles include a nesting period on the eastern coast of the United States (Georgia Ports Authority Protects 2009).

PORT OF CHARLESTON

Image Source: port-of-charleston.com

2009 EPA Environmental Justice Achievement Award Winner

The Port of Charleston is South Carolina's primary seaport and boasts one of the deepest channels in the southeast. In 2007, the Port handled 27.2 million tons of cargo and received approximately 8,400 vessels (Community 25). The Port of Charleston plays a pivotal role as the main engine of economic growth in the city. Important commodities that pass through the port include agricultural products, consumer goods, machinery, metals, vehicles, chemicals, and clay products. The Port of Charleston serves more than 150 countries with its top markets being North Europe and Asia (Community 25).

The Port of Charleston is strategically located near the heart of the fastest growing consumption zone in the Southeast, the 1-85 corridor from Raleigh, North Carolina, to Atlanta, Georgia, which creates a distinct economic advantage for the city. In addition, there has also been an increase in demand for water routes to the East Coast via Panama and the Suez Canal where the Port of Charleston is perfectly positioned. In response to these new trends, the Port has been expanding its capacity for handling the huge demands of incoming freights by updating its operations, constructing new container yards, and upgrading terminals and facilities. The Port has also been known to provide quick and efficient operations where "crane operators work ships at an average of 41 moves per hour per crane and trucker turn times average 20 minutes from gate in to gate out" (Why We're Known). Because of this, the Port has earned its title as the Pros of Productivity (Why We're Known) and is one of the few ports in the US to receive the Presidential "E" and "E-Star" awards for excellence in exporting (Community 25).

CASE STUDIES

The Port of Charleston handles nearly 14 times the cargo that the Port of Gulfport does, yet the two ports are comparable in that they share the same geographical features and provide a substantial economic contribution to their individual localities. With the new trends and opportunities that exist in the Southeast, Gulfport could attain the same competitiveness as Charleston by adopting sustainable practices in port management and at the same time improving the efficiency of its operations. This could be achieved by adopting some of the green practices and approaches conducted by the Port of Charleston.

Ultra-Low Sulfur Diesel

The Port has adopted ultra-low sulfur diesel (USLD) fuel for its equipment, which has decreased air emissions levels by an estimated 10 percent (Setting Standard 1).

Diesel Emissions Reduction Projects

The South Carolina State Ports Authority (SCSPA), Charleston Motor Carriers Association, South Carolinas Trucking Association, Charleston Metro Chamber of Commerce, DHEC and the American Lung Association have partnered in a 1.7 million joint project that seeks to improve trucks in the private sector truck fleet. The fund is allocated toward the retrofitting of over-the-road trucks to increase fuel efficiency and reduce air emissions. In addition, an EPA grant of $3.56 million has been secured by the SCSPA to reduce diesel emissions by retrofitting a local drayage fleet with diesel oxidation catalysts and repowering the on-terminal container handlers. About 1,966 tons of NOx, 86.86 tons of PM, 40.75 tons of HC and 218.73 tons of CO emission reductions are expected from these 2 projects (Setting Standard 1).

Sediment Suspension System

In order to control the environmental impacts of dredging, the Port has installed a sediment suspension system that keeps silts from settling along the bottom of the harbor (Enhancing 1).

Port-wide Recycling

The Port of Charleston has established a recycling program that treats scrap materials like metals, tires, paper, lead-acid batteries and used oil (Going Above 2).

Tidal Marsh

To offset the direct environmental impacts on aquatic resources and wetlands, the Port is contributing $3 million to restore 22 acres of tidal marsh along the southern tip of Drum Island in lower Charleston Harbor. While the state requires a ratio of 1:1 for the replacement of filled marsh, this project will restore more than double the acreage that will be affected by develop¬ment of the new terminal (Going Above 1).

Community Development Programs

The Port won the EPA Environmental Justice Achievement Award in 2009 for their efforts to foster environmental protection and economic revitalization in distressed neighborhoods in the city of North Charleston (Mitigation Agreement Commission and Lowcountry Alliance for Model Communities). The Port created a $4.08 million community plan to fund community, neighborhood, and economic development projects such as a Model Block neighborhood, a plan to increase healthy and efficient homes, and plans for long-term community control (LAMC revitalization 1).

PORT OF PORTLAND

Image Source: portofportland.com

Seeking LEED Platinum Certification For Its Headquarters

The Port of Portland encompasses an area of 1049 acres and consists of four terminals, one of which is for containers. In 2010, it handled 181,100 TEUs of cargo from 575 vessel calls. The Port is the largest wheat export port in the U.S. and third largest in the world. It is also the largest mineral bulk port, third largest auto import port in the country (with one full terminal dedicated to Ro-Ro vessels), and 17th largest container traffic port in the U.S. It is located at a convergence of deep water shipping, upriver barging, two water-grade rail lines, and two interstate highways (Port of Portland- Marine).

The Port is comparable in both size and cargo-handling capacity to the Port of Gulfport. It is also considered to be one of the greenest ports in the U.S. and as such serves as a valuable sustainability model for Gulfport.

CASE STUDIES

T-6 Gate Automation
An optical card reader at marine Terminal 6 automates cargo-carrying truck processing to reduce idling emissions and fossil fuel consumption (Port of Portland - Marine).

Fuel
Since 2005, all container-handling equipment at marine Terminal 6 has been powered by ultra-low sulfur diesel and many tenants at Terminals 4 and 5 followed suit. Since 2007, ultra-low sulfur diesel has been the standard for all Port construction projects (Port of Portland - Marine).

Replace older equipment
Equipment at the Port is in the process of being replaced with new, cleaner-burning machinery. When replacement is not possible, the Port is retrofitting equipment to emit fewer pollutants (Port of Portland - Marine).

Hybrid vehicle fleet
When vehicles in the Port fleet reach end of service life, the port replaces them with hybrid vehicles (Port of Portland - Marine).

Air Emissions Inventory
The Port estimates emissions of 17 pollutants (5 criteria, 12 hazardous air pollutants) and carbon dioxide using baseline data from 2000 (Port of Portland - Environmental Programs).

Comprehensive storm water management plan
The Port of Portland uses a comprehensive storm water management plan that emphasizes responsible monitoring and maintenance activities tailored to different operating areas. It also uses best practices to control pollution and tries to mimic natural systems by using native vegetation and pervious surfaces so that groundwater can recharge instead of running into the sewer system. The Port also uses porous asphalt to reduce erosion from storm water (Port of Portland - Environmental Programs).

Water conservation
The Port has installed landscaping that requires less frequent watering, water delivery lines that use non-potable water for irrigation purposes, and irrigation control systems at two of its industrial parks that use real-time weather data to determine if watering is needed on a given day. This last effort has reduced water usage for irrigation by 30 percent. The Port uses drip systems versus spray irrigation, which has reduced water use by up to 57 percent at one its sites (Port of Portland - Environmental Programs).

Invasive species

The Port helped buy five portable hot pressure wash units for recreational boaters to prevent the introduction of invasive species like the zebra and Quagga mussels (Port of Portland - Green Side).

Preservation of streak horned lark

The Port helped create a five-acre site at St. Johns Landfill for streaked horned larks (Port of Portland - Green Side).

Wildlife Undercrossing

In 2004, the Port built a wildlife undercrossing at the Rivergate Industrial Park in north Portland. This tunnel helps turtles and other wildlife safely cross beneath a busy highway (Port of Portland - Green Side).

Natural Resources Assessment and Management Program

The Port has implemented a comprehensive, ecosystem-based program for managing natural resources within port property. It includes a resource inventory for natural resource mapping and modeling and ecological maps of all port property (Port of Portland - Environmental Programs).

Restoration

As part of the Port-wide mitigation management plan, the Port filled approximately 65 acres of wetland in the southwest quadrant of Portland International Airport in 1993. The majority of the required wetland mitigation took place at the Jewett Lake site. However, the permit also included upland and riparian mitigation planting at Buffalo Street –approximately 15.6 acres and Elrod Road –approximately 10 acres (Port of Portland - Green Side).

Infrastructure

In 2010, the Port completed construction of its new headquarters. The new facilities include a green roof and a geothermal heating and cooling system. It uses 60% less energy and 75% less water than comparable office space. The Port is seeking LEED Platinum certification for this building (Port of Portland - Environmental Programs).

APPLICATION

Applying Sustainability Guidelines to Port of Gulfport Connector Road

One of the most vital and controversial aspects of the Port of Gulfport's expansion plans is the creation of a 10-mile Port connector road. The purpose of this road is to provide a link from the Port to the rail and national highway systems to increase the outflow and inflow of goods. This connection is crucial as it will enhance cross-country distribution and facilitate the planned increased cargo-handling capacity of the Port.

However, it also increases the environmental burden placed on North Gulfport—one of the most economically disadvantaged areas within the city of Gulfport—because it cuts straight through it. To help address the air and noise pollution from increased truck and rail traffic along the connector road, our sustainability guidelines can be applied as follows:

Energy & Air

The Port should require the use of cleaner fuels (such as ULSD) in all vehicles using the connector road and eventually phase in a requirement for the use of electric engines only (see Clean Truck Program in Sustainability Guidelines section). The Port should also create a traffic management plan to time the movements of deliveries in order to avoid peak hours and prevent trucks from idling due to congestion.

Land

The Port should construct a vegetated buffer zone on either side of the road to help absorb emissions and provide an additional safety barrier between the community and the road.

Community

The Port should partner with the local community to create a committee composed of representatives from the Port, local government, community groups, and local residents to evaluate the development plans of the connector road and to seek mutually beneficial strategies to mitigate its environmental impact on the community.

"Ships account for over 1 billion tons of CO2e annually, or around 3% of global anthropogenic emissions, in addition to being a major emitter of other pollutants such as SOx, NOx, Particulate Matter and Soot"

CARBON WAR ROOM

The Environmental Advantage of Gulfport

According to the 2009 International Maritime Organization report, shipping produces around three percent of global manmade GHG emissions which, as a result of growth in world trade, may grow by up to 150 to 250 percent of current levels by the year 2050 in the absence of emissions reduction policies. The challenge of reducing carbon emissions is, therefore, a critical issue for the shipping industry (World Maritime Day 2009). The widening of the Panama Canal and subsequent increase in ship traffic represents an opportunity for Gulfport to capture a larger volume of trade. In particular, Gulfport has an opportunity to expand its trade with Asia. Depending on the final destination, cargo incoming from Asian ports will have a smaller CO2 footprint if it is shipped through Gulfport as compared to the usual route of cargo from Asia using ground transport across the continental United States.

We can see this difference in the total carbon footprint of transportation by running a comparative analysis of the movement of goods through several ports. For the purposes of this analysis we used the Port of Shanghai as the port of loading (initiation point), and the Ports of Los Angeles, Seattle-Tacoma and Gulfport as the unloading ports for comparison. The 3 final destinations of the goods used for this analysis are: Biloxi, Birmingham and Nashville.

- Unit: This study is done for a TEU (twenty foot equivalent unit)
- Weight: The weight used in the study per container is 10 tons per TEU.
- The emissions from vessels, trucks and rail are based on Hanjin shipping line services (HANJIN SHIPPING).

Transport Modes

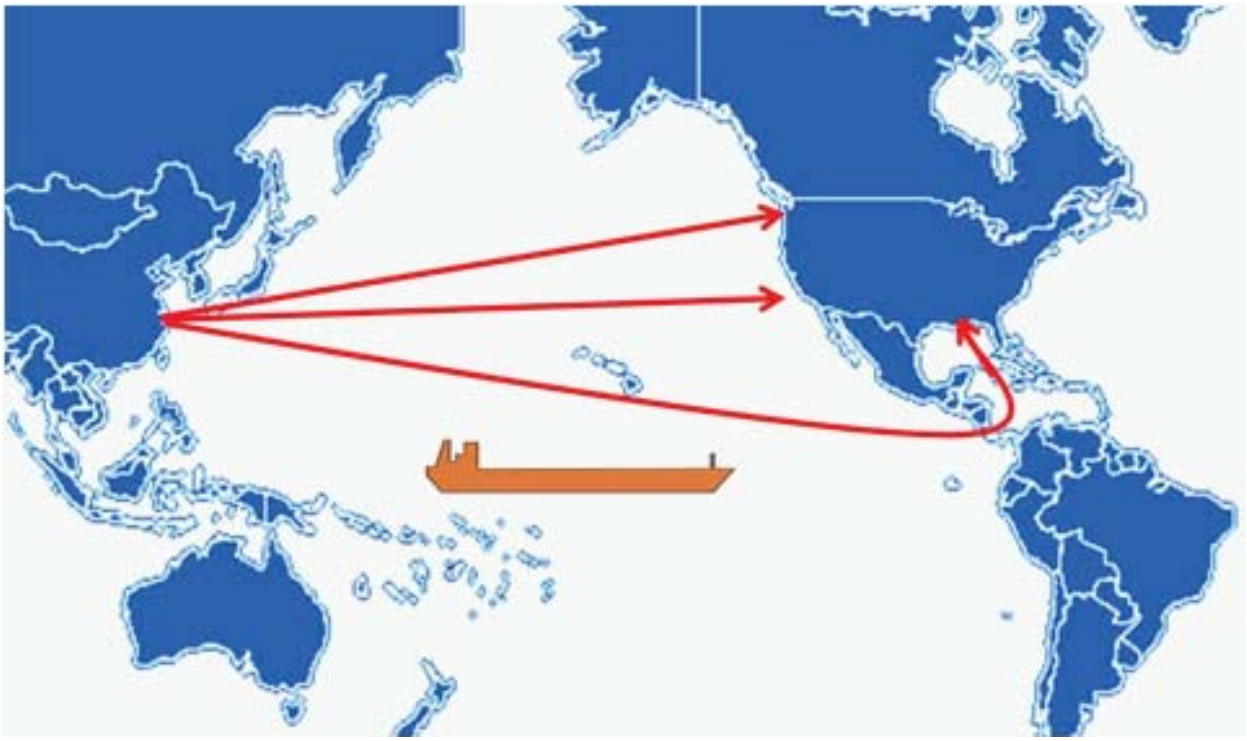
Below is a table showing the modes of transport utilized from the Port of Shanghai to the final destinations of Biloxi, Birmingham and Nashville.

- POL: Port of Loading
- POD: Port of destination

POL	POD	Destination	1st leg	2nd leg	3rd leg	4th leg
Shanghai	LAX	Biloxi	Ocean	Truck	Rail	Truck
Shanghai	Seattle	Biloxi	Ocean	Truck	Rail	Truck
Shanghai	Gulfport	Biloxi	Ocean	Truck		
Shanghai	LAX	Birmingham	Ocean	Truck	Rail	Truck
Shanghai	Seattle	Birmingham	Ocean	Truck	Rail	Truck
Shanghai	Gulfport	Birmingham	Ocean	Truck	Rail	Truck
Shanghai	LAX	Nashville	Ocean	Truck	Rail	Truck
Shanghai	Seattle	Nashville	Ocean	Truck	Rail	Truck
Shanghai	Gulfport	Nashville	Ocean	Truck	Rail	Truck

Ocean movement and emissions (1st Leg)

The ocean routes and emissions are based on actual services from Hanjin. Gulfport is currently not a port of call for Hanjin but for this exercise, the same type of ship that calls on other Eastern ports and the Gulf of Mexico was used.



POL	POD	Hanjin Ocean Service	Destination	Distance Ocean (nautical miles)	Distance Ocean km	CO2 emission per km (Ocean) t	Total CO2 Emissions Ocean in kg
Shanghai	LAX	PSX	Biloxi	5695	10535.75	0.0894	941.90
Shanghai	Seattle	PSX	Biloxi	5041	9325.85	0.0894	833.73
Shanghai	Gulfport	AWH	Biloxi	9960	`	0.0764	1407.75
Shanghai	LAX	PSX	Birmingham	5695	10535.75	0.0894	941.90
Shanghai	Seattle	PSX	Birmingham	5041	9325.85	0.0894	833.73
Shanghai	Gulfport	AWH	Birmingham	9960	18426	0.0764	1407.75
Shanghai	LAX	PSX	Nashville	5695	10535.75	0.0894	941.90
Shanghai	Seattle	PSX	Nashville	5041	9325.85	0.0894	833.73
Shanghai	Gulfport	AWH	Nashville	9960	18426	0.0764	1407.75

Truck and Rail movements' 2nd ,3rd and 4th leg

POL	POD	Destination	Distance Truck (POD) km	Distance Rail km	Distance Truck (railhead/port to final destination) km	CO2 kg emission per km (rail)	CO2 kg emission per km (truck)	Total CO2 Emissions Rail (kg)	Total CO2 Emissions Truck (kg)
Shanghai	LAX	Biloxi	25	3219	45.12	0.1901	0.8313	611.9	58.3
Shanghai	Seattle	Biloxi	25	4328	45.12	0.1901	0.8313	822.8	58.3
Shanghai	Gulfport	Biloxi	0	0	20	0.19	0.8313	0.0	16.6
Shanghai	LAX	Birmingham	25	3320	10	0.1901	0.8313	631.1	29.1
Shanghai	Seattle	Birmingham	25	4136	10	0.1901	0.8313	786.3	29.1
Shanghai	Gulfport	Birmingham	0	488	10	0.19	0.8313	92.7	8.3
Shanghai	LAX	Nashville	25	3264	10	0.1901	0.8313	620.5	29.1
Shanghai	Seattle	Nashville	25	3885	10	0.1901	0.8313	738.5	29.1
Shanghai	Gulfport	Nashville	0	791	10	0.19	0.8313	150.3	8.3

Total Emissions

The table below shows the total sum of all the emissions from the movement of goods through the 1st, 2nd, 3rd and 4th legs, as well as a percentage difference comparing the different routes in terms of emissions of CO2 in kg.

POL	POD	Destination	Total Emissions Ocean (kg) CO2	Total Emissions Rail (kg) CO2	Total Emissions Truck kg CO2	Total Emissions kg CO2	Comparison to Gulfport (less clean)
Shanghai	LAX	Biloxi	941.90	611.93	58.29	1612.12	13%
Shanghai	Seattle	Biloxi	833.73	822.75	58.29	1714.77	20%
Shanghai	Gulfport	Biloxi	1407.75	0.00	16.63	1424.37	
Shanghai	LAX	Birmingham	941.90	631.13	29.10	1602.12	6%
Shanghai	Seattle	Birmingham	833.73	786.25	29.10	1649.08	9%
Shanghai	Gulfport	Birmingham	1407.75	92.72	8.31	1508.78	
Shanghai	LAX	Nashville	941.90	620.49	29.10	1591.48	2%
Shanghai	Seattle	Nashville	833.73	738.54	29.10	1601.36	2%
Shanghai	Gulfport	Nashville	1407.75	150.29	8.31	1566.35	

Environmental Advantage

From this analysis, we can see that bringing cargo via Gulfport to Biloxi can be up to 20% cleaner (in terms of CO2 emissions); up to 9% cleaner to Birmingham; and up to 2% cleaner to Nashville. Gulfport thus provides an environmental advantage for customers that wish to transport their products in a more sustainable manner as part of their brand image. For products originating in Asia and headed to the adjacent sates of Mississippi, Alabama, Tennessee, Georgia and other locations close to the Port, the most environmentally friendly route is via the Panama Canal to Gulfport. The Mississippi Port Authority has already expressed their intention to bid for a new tenant at the expanded port and Gulfport's environmental advantage as described above, is an additional value proposition the Port can offer to potential tenants.

CONCLUSION

The Port of Gulfport and the surrounding community are at a critical juncture. This is the moment to seize the opportunity to lay the groundwork for a truly sustainable future by incorporating the elements of this report into a strategic redevelopment plan that everyone in the community can benefit from. To achieve this, the Port will need to pursue a restoration and growth strategy that is economically, socially, and environmentally in sync.

This report aims to assist the Port of Gulfport in this endeavor by providing guidelines and best practices that it can apply to the various components of its restoration expansion plans. While not an exhaustive list of all possible sustainability guidelines, this report has distilled a collection of the most relevant best practices that the Port of Gulfport can use to position itself as a model of sustainable recovery. This can then foster an ongoing dialogue on ways the Port can incorporate sustainable growth practices as part of its redevelopment and expansion.

A practical application of the guidelines is provided in the report through an analysis of the 10-mile Port connector road and offers recommendations for how to mitigate its impacts on the community of North Gulfport. Additionally, the carbon footprint analysis proposes a new way for the Port of Gulfport to take advantage of the Panama Canal expansion by using its environmental shipping advantage to compete for new business.

In addition to the funds from the Community Block Development Grant, there are other government sources that the Port of Gulfport can seek to help finance equipment upgrades and other environmentally-friendly improvements that are critical to sustainable redevelopment. From 2008 to 2010, the Diesel Emissions Reduction Program provided almost $1billion in direct funding to U.S. ports for these types of initiatives and the case studies and Appendix 1 offer additional information on how the Port Authorities of Houston, Georgia, and South Carolina benefited from the program.

Hurricane Katrina, though devastating, has provided the Port of Gulfport with an opportunity to restore itself and expand in a sustainable manner that will revitalize the local economy for the Port and its surrounding communities. With the restoration near completion and the expansion planning under way, the moment to apply these guidelines is now.

Sample of Currently Available Funding Opportunities

Diesel Emissions Reduction Act

This act expired in 2010, however, in January 2011, President Obama reauthorized the DERA for an additional five years (until 2016) by signing the Diesel Emissions Reduction Act (H.R. 5809) into law.

- Source: http://www.epa.gov/cleandiesel/grantfund.htm

Grant/ Fund Option	Purpose	Amount	Expiration	Point of Contact
National Clean Diesel Funding Assistance Program	Competitive grants for EPA or CARB certified diesel emissions reduction technologies	DERA received $200 million annually from 2007 - 2011	TBD	TBD
National Clean Diesel Emerging Technologies Program	Competitive grants to innovative application of diesel emissions reduction technology	DERA received $200 million annually from 2007 - 2011	TBD	TBD
SmartWay Clean Diesel Finance Program	Competitive grants for national revolving loans to reduce fleet diesel emissions	DERA received $200 million annually from 2007 - 2011	TBD	TBD
State Clean Diesel Grant Program	Funding for States' own loans for clean diesel projects	DERA received $200 million annually from 2007 - 2011	Ongoing	TBD
Qualified Plug-In Electric Drive Motor Vehicle Tax Credit	Purchase of new qualified plug-in electric vehicles	$2,500 - $7,500 10% of cost to for qualified conversions (max $4,000) 10% of cost of qualified low-speed electric vehicles, electric motorcycles, and three-wheeled electric vehicles (max $2,500)	12/31/11	IRS Phone: (800) 829-1040
Fuel Cell Motor Vehicle Tax Credit	Purchase of qualified light-duty, medium-duty and heavy-duty fuel cell vehicles	$4,000	12/31/ 2014	IRS Phone: (800) 829-1040
Air Pollution Control Program	Assists State, local and tribal agencies in developing programs to improve air quality. Examples include alternative fuels, vehicle maintenance and transportation management	Up to 60% of project costs	Ongoing	EPA Phone: (202) 272-0167
Improved Energy Technology Loans	Projects to reduce air pollution and greenhouse gases Emphasis on advanced technologies and alternative fuels	Up to 100% of the amount of the loan	Ongoing	DOE Phone: (800) 342-5363 Fax: (202) 586-4403
State Energy Program (SEP) Funding	Help States develop and implement renewable energy and energy efficiency programs	Varies by competitive solicitation\ States match 20% funding	Ongoing	DOE Phone: (800) 342-5363 Fax: (202) 586-4403

Qualified Plug-In Electric Drive Motor Vehicle Tax Credit
http://www.afdc.energy.gov/afdc/laws/law/US/409

Fuel Cell Motor Vehicle Tax Credit
http://www.afdc.energy.gov/afdc/laws/law/US/350

Air Pollution Control Program
http://www.afdc.energy.gov/afdc/laws/law/US/274

Improved Energy Technology Loans
http://www.afdc.energy.gov/afdc/laws/law/US/392

State Energy Program (SEP) Funding
http://www.afdc.energy.gov/afdc/laws/law/US/317

DERA Southern Port Funding From 2008-2010				
State	**Sector(s)**	**Recipient**	**Description**	**Amount Awarded**
GA	Ports	Georgia Port Authority	Install diesel oxidation catalysts (DOC) and closed crankcase ventilation (CCV) on 47 marine engines	$164,000
GA	Ports	Georgia Ports Authority	Retrofit entire fleet of cargo handling equipment (133 units) at the Savannah port with DOCs and CCVs	$250,000
GA	Public Fleet	University of Georgia Research Foundation Inc	Electrification of 17 port rubber gantry cranes	$2.72 million
			Total:	$3,134,000
SC	Ports	South Carolina Port Authority	Repower 36 pieces of cargo handling equipment, two tugboats, and one dredge. Install diesel multi-stage filters (DMF) on 40 trucks	$2 million
SC	Utility, Construction	South Carolina State Ports Authority	Engine repower, ULSD, idle reduction technology for about 50 trucks and 40 cranes	$735,001
			Total:	$2,735,001
TX	Ports	Houston Advanced Research Center	This project will retrofit a marine vessel owned by the Marquette Transportation Company (private), which operates between Baton Rouge/New Orleans, LA and Houston, TX. Two Caterpillar 3508 engines will be retrofitted with 3500 Marine Emissions Upgrade Kit, Tier 1. This project will reduce emissions of criteria pollutants, and it is estimated to create or preserve 33 jobs for local skilled trade workers.	$1.6 million

TX	Ports	Port of Houston Authority	Fuel switching to a low-sulfur fuel (less than or equal to 0.2 percent) for 21 ocean going vessels that call on the Port of Houston Press Release	$1.49 million
TX	Ports	Port of Houston Authority	Replace/repower 96 marine engines	$2.86 million
TX	Ports	Port of Houston Authority	Replace/repower 25 marine engines	$611,466
TX	Freight	Houston-Galveston Area Council (HGAC)	Establishes a Bridge Loan (revolving loan) program to help drayage (regional and short haul) owner-operators and related small businesses purchase and operate cleaner more fuel efficient trucks at the Port of Houston and Greater Houston-Galveston area.	$9 million
TX	Ports	Houston Advanced Research Center	This project will retrofit a marine vessel owned by the Marquette Transportation Company (private), which operates between Baton Rouge/New Orleans, LA and Houston, TX. Two Caterpillar 3508 engines will be retrofitted with 3500 Marine Emissions Upgrade Kit, Tier 1. This project will reduce emissions of criteria pollutants, and it is estimated to create or preserve 33 jobs for local skilled trade workers.	$1.6 million
			Total:	$17,161,466

DERA Funding of U.S. Ports From 2008-2010				
State	**Sector(s)**	**Recipient**	**Description**	**Amount Awarded**
CA	Ports	City of Los Angeles Harbor Department, Port of Los Angeles, EcoCrane Project	Repower one diesel rubber tired gantry crane at Port of Los Angeles' Ports America terminal. Eco-Power's Hybrid EcoCrane system, consisting of a nonroad Tier 3 generator	$731,298
CA	Ports	South Coast Air Quality Management District (Port of Long Beach), Advanced Maritime Emission Control System Project	Retrofit auxiliary-engine exhausts of several at-berth ocean going vessels at Ports of Los Angeles and Long Beach with the advanced maritime emission control system	$1.5 million

CA	Agriculture, Construction, Ports	California Air Resources Board (CARB)	Offers an innovative finance program for nonroad small fleet retrofits. This program uses EPA funding as a loan guarantee to leverage loan funds via California's Providing Loan Assistance for California Equipment (PLACE) finance program.	$5 million
CA	Ports	Port of San Francisco	Design and install shore-to-ship electrical connection system for cruise ships berthed at Pier 27, Port of San Francisco	$1 million
CA	Ports	City of Los Angeles Harbor Department	Install a natural gas powered shore-to-ship electrical connection system for berthed ocean-going vessels at Port of Los Angeles Press Release	$1.21 million
CA	Ports	City of Long Beach City Harbor Craft and Cargo-Handling	Repower three harbor vessels and one piece of cargo-handling equipment; retrofit four pieces of cargo-handling equipment at Port of Long Beach	$1.65 million
CA	Ports	Port of Long Beach	Replace, repower, or retrofit 118 pieces of cargo handling equipment	$4.01 million
CA	Ports, Freight	Bay Area Air Quality Management District (BAAQMD)	Install diesel particulate filters (DPF) on 103 delivery trucks	$2 million
CA	Freight, Ports	City of Los Angeles Harbor Department	Retrofit 27 vehicles including harbor vessels, trucks, sweepers, loaders, cranes, forklifts	$1.99 million
DC	Freight, Ports	Community Development Transportation Lending Services Loan Program	Provides incentives to replace older trucks with newer, cleaner trucks equipped with verified emission control and applicable idle reduction technologies. Program focuses on fleet owners who operate in poor air quality areas, including ports and rail yards.	$2.6 million
DC	Construction, Port	Metro Washington Council of Governments	Retrofit seven municipal nonroad construction units and repower two passenger vessels operating on the Potomac	$560,600
FL	Ports	Miami-Dade County Miami Port Authority	Electrify four gantry cranes; retrofit 19 pieces of cargo handling equipment	$1.51 million
GA	Ports	Georgia Port Authority	Install diesel oxidation catalysts (DOC) and closed crankcase ventilation (CCV) on 47 marine engines	$164,000
GA	Ports	Georgia Ports Authority	Retrofit entire fleet of cargo handling equipment (133 units) at the Savannah port with DOCs and CCVs	$250,000

GA	Public Fleet	University of Georgia Research Foundation Inc	Electrification of 17 port rubber gantry cranes	$2.72 million
IN	Ports	South Shore Clean Cities Inc.	Repower marine vessels with 8 new engines certified to Tier 2 standards Press Release	$630,500
KY	Agriculture, Construction, Ports	Louisville Jefferson County Metro Government	Offers low-interest loans for nonroad diesel equipment retrofits, repowers and replacements. Targets businesses within Jefferson County; equipment can be commercial, construction or industrial.	$2 million
KY	Ports	Kentucky Clean Fuels Coalition	Replace Perkins diesel engines with CARB certified gasoline engines; scrap old 92 engines, retrofit 3 terminal gates	$473,939
KY	Construction, Ports	Louisville/ Jefferson County Metro Government	Retrofit 73 pieces of nonroad construction equipment, four pieces of airport equipment, and three on-road vehicles with Diesel Particulate Filters (DPFs) and Diesel Oxidation Catalysts (DOCs)	$1.16 million
MA	Ports	Northeast States for Coordinated Air Use Management	Repower or retrofit 48 pieces of cargo handling equipment at South Jersey Port Press Release	$1.13 million
MA	Ports	Harbor Development Commission Port of New Bedford Shore-side Power Electrification Project	Install 16 verified shore-side electrification pedestals on two fishing piers in New Bedford Harbor; provide up to 100 rebates to commercial fishermen to assist with retrofitting their vessels with transfer switches to accommodate shore-side power Press Release	$1 million
MA	Ports	Chelsea Collaborative	Repower 79 diesel transportation refrigeration units (TRU) with electric versions	$1.56 million
MA	Ports	Massachusetts Port Authority	Install 6 power stations at the Fish Pier, enabling up to 12 additional fishing vessels to connect to shore power when docked, reducing unnecessary idling by 95%	$400,000
MA	Construction	Northeast States for Coordinated Air Use Management	Repower nine construction tower gantry cranes with Tier 3-certified engines; retrofit one repowered crane. with a diesel particulate filter (DPF)	$1.42 million

MD	Freight, Ports	Mid-Atlantic Regional Air Management Association Lease/Loan Project	Provides incentives to replace drayage trucks operating in the Mid-Atlantic Region by providing a down payment to complement a lease/loan program.	$3.92 million
MD	Ports	Mid-Atlantic Regional Air Management Association (MARAMA)	Repower one tug with new engine certified to current emission standards	$500,000
MD	Ports	MD Environmental Services	Reducing emissions from nonroad equipment used in dredging and waste material handling operations	$361,107
MD	Ports, Freight	Port of Baltimore (Maryland Environmental Services)	Retrofit two tugboats, seven locomotives, 50 short haul trucks, and 83 units of cargo handling equipment	$3.5 million
MD, PA, VA	Construction, Ports, Freight, Public Fleet	Mid-Atlantic Regional Air Management Association	Retrofit 14 and replace six transit buses, repower two harbor craft, retrofit 25 dump trucks, replace six cement trucks, repower one locomotive, replace one truck	$4.32 million
MD, VA	Ports	Chesapeake Bay Foundation	Repower three education vessels, nine watermen work boats, two tug boats	$1.3 million
ME	Ports	Maine Department of Environmental Protection	Repower 17 non-regulated marine engines with Tier 2-certified marine engines	$571,638
ME, NH, VT	Ports	Northeast States for Coordinated Air Use Management	Repower eight marine vessels to EPA Tier 2 certified engines. Vessels include: four ferries, three tugboats and one sight-seeing excursion vessel	$1.65 million
MI	Ports	Great Lakes Commission	Repower four marine engines from Tier 0 to Tier 2; repowering service generator sets on two Great Lakes bulk carriers	$1.21 million
MO	Construction, Freight, Ports, School Bus, Public Fleet	Grace Hill	Retrofit, repower, and/or replace than 575 vehicles will be targeted for retrofits; install idle reduction technologies on some of the vehicles; vehicle/engine types include barge, airport ground support equipment, delivery trucks, school buses, construction	$2 million
NC	Rail and Ports	Meckenburg County	Subgrant construction equipment for retrofits and upgrades	$750,000

NJ, NY	Ports	Port Authority of New York and New Jersey	Replace 636 drayage trucks	$7 million
NJ, NY, PR	Ports	Northeast States for Coordinated Air Use Management	Repower two ferries and three tugboats with Tier 2 engines	$2.8 million
NY	Ports	Nassau County Police Department	Repower ten main and five auxiliary engines with Tier 2-certified engines on five patrol boats	$708,397
NY	Ports	New York City Department of Transportation	Repower four main and two auxiliary engines on one commuter ferry with Tier 2-certified engines	$2 million
NY	Ports	The Port Authority of NY & NJ	Replace 125 pre-2003 model year drayage trucks with 2007-certified trucks	$1.58 million
NY	Ports	Port Authority of New York and New Jersey	Install shore power at the Brooklyn Cruise Terminal	$2.86 million
NY-NJ	Ports	Port Authority of New York & New Jersey	Offer a low-cost financing program in partnership with ACCION New York, Inc. for either the purchase of heavy-duty trucks retrofitted with EPA or CARB verified emission control technologies, or the repowering of used trucks. Program will cover 90 percent financing	$750,000
NY-NJ	Utility	Port Authority of New York & New Jersey	Retrofit 30-40 utility trucks operated by the Port Authority with DPFs, including wrecker trucks, dump trucks, and line body enclosed utility trucks	$280,500
OH	Ports, Utility, Refuse	Ohio Environmental Council	Retrofit municipal vehicles with DOCs, DPFs, CCVs, and APUs	$394,589
OR	Freight, Ports	Cascade Sierra Solutions Lease Program	Creates revolving lease-to-own finance program, focusing on heavy-duty diesel trucks in long-haul, short-haul and drayage applications. Funding can be used to replace older trucks with newer, cleaner trucks, as well as to retrofit existing vehicles with verified emission control and idle reduction technologies.	$2 million
OR	Ports	Oregon Department of Environmental Quality	Repower four pilot launch boats and one towboat with certified engine technology	$482,476

PA	Ports	Pennsylvania Department of Environmental Protection - CONSOL Energy	This project will repower one towboat used in Pittsburgh, PA, and conduct a sea trial to verify engine system performance using Caterpillar's Marine Emissions Upgrade Kit. The current Caterpillar Tier1 engine will be upgraded to a Tier2 engine.	$1.5 million
PA	Ports	Clean Air Council Clean Air Council	Retrofit 30 diesel vehicles with partial flow-through filters (PFFs); retrofit 30 vehicles with diesel oxidation catalysts (DOCs); replace two diesel service vehicles	$350,000
PA	Ports	Port of Pittsburgh Commission	Repower four marine vessels with eight new and efficient Tier II engines and generators Press Release	$1.16 million
PR	Ports	Autoridad de Transporte Maritimo	Repower two main and two auxiliary marine engines on two passenger ferries with Tier 2-certified engines Press Release	$517,220
SC	Ports	South Carolina Port Authority	Repower 36 pieces of cargo handling equipment, two tugboats, and one dredge. Install diesel multi-stage filters (DMF) on 40 trucks	$2 million
SC	Utility, Construction	South Carolina State Ports Authority	Engine repower, ULSD, idle reduction technology for about 50 trucks and 40 cranes	$735,001
TN	Ports	Mississippi River Corridor - Tennessee Inc	This project will achieve significant reductions in particulate matter through the use of ESW Canada's emerging technology XtrmCat DOC Kit having Diesel Oxidation Catalyst and Closed Crankcase Ventilation system on six (6) high horsepower Marine vessels for a total of 13 engine retrofits. This project will positively impact job retention and creation, translating into over 50 total full time jobs.	$2 million
TX	Ports	Houston Advanced Research Center	This project will retrofit a marine vessel owned by the Marquette Transportation Company (private), which operates between Baton Rouge/New Orleans, LA and Houston, TX. Two Caterpillar 3508 engines will be retrofitted with 3500 Marine Emissions Upgrade Kit, Tier 1. This project will reduce emissions of criteria pollutants, and it is estimated to create or preserve 33 jobs for local skilled trade workers.	$1.6 million
TX	Ports	Port of Houston Authority	Fuel switching to a low-sulfur fuel (less than or equal to 0.2 percent) for 21 ocean going vessels that call on the Port of Houston Press Release	$1.49 million

TX	Ports	Port of Corpus Christi Locomotive Switch Engine Repower Project	Repower existing 1,000 horsepower locomotive switch engine with two 700 horsepower GENSET engines Press Release	$1.03 million
TX	Ports	Port of Houston Authority	Replace/repower 96 marine engines	$2.86 million
TX	Ports	Port of Houston Authority	Replace/repower 25 marine engines	$611,466
VA	Ports	Virginia Port Authority Dredging Repower Project	Repower two main engines of one dredge vessel	$775,000
VA	Ports	Virginia Port Authority	Replace 2 locomotives	$647,457
WA	Ports	The Puget Sound Clean Air Agency, Seawater Scrubber Project	Install and demonstrate the durability of Krystallon's particulate matter seawater scrubber on dinner cruise vessel. Scrubber reduces particulate matter by 50 percent from two auxiliary and two main engines. Emission levels expected to meet EPA's Marine Tier 3 status	$1.2 million
WA	Ports	Puget Sound Clean Air	This project will explore the feasibility of reducing particulate matter emissions from two private marine harbor vessels operating in the Puget Sound.	$42,000
WA	Ports	Puget Sound Clean Air Agency	Upgrade one category 2 marine engine using the Caterpillar series 3500 marine engine upgrade kit. Overhaul two Caterpillar 3512 engines	$700,000
WA	Ports	Port of Tacoma	Retrofit two ocean-going vessels; Add certified ship-side technology	$1.49 million
WA	Ports	Puget Sound Clean Air Agency	Replace 10 off-highway trucks ahead of planned retirement with onroad engines; Retrofit 74 pieces of cargo handling equipment with DPF or partial-flow filters and/or closed crankcase ventilation filters	$850,000
			Total:	$99,167,188

B APPENDIX

Summary Statistics of Seventeen Ports Studied					
Port	**Area**	**Annual TEUs**	**Cargo Tonnage handled**	**Port vessel calls**	**Main Imports**
Barcelona	1942 acres	2.6 million (2010)	50 million (2010)	8418	Natural Gas, Gasoline, Soy beans, scrap, cereals
Charles-ton	17900 acres	1.28 million (2010)	6 million (2010)	1539	Vehicles, consumer goods, chemicals
Gothen-burg	N/ A	811843 (2009)	40 million (2009)	N/A	Natural Gas, Gasoline, Cere-als, Chemicals
Hamburg	17915 acres	7.01 million (2009)	110 million (2009)	11889	Ores, Petroleum, Coal, food
Hong Kong	540 acres	23.9 million (2010)	243 million (2010)	456000	Natural Gas, Chemicals, Oil, Fuels, Machinery, foods
Houston	25 mile long	1.7 million (2010)	220 million (2010)	7700	Oil, consumer goods, food
Los Ange-les	7500 acres	7.8 million (2010)	145 million (2010)	2182	Furniture, footware, toys, auto parts
Melbourne	1260 acres	2 million (2010)	90 million (2010)	3100	Furniture, electrical equipment, paper & newsprint, fruit & veg-etables, machinery, clothing
Portland	1040 acres	245450 (2010)	14 million (2010)	N/A	Automobiles, Oil , Cement
Rotterdam	26,080 acres	9.7 million (2009)	430 million (2010)	33,000	Ores and scrap, coal, crude oil, mineral oil
Savannah	2,240 acres	2.8 million (2010)	25 million (2010)	2,200	Furniture, retail consumer, machinery, food
Seattle	853 acres	2.1 million (2010)	22.7 million (2010)	1,200	Machinery, toys, apparel, furni-ture, plastic
Shanghai	N/A	29.1 million (2010)	590 million (2010)	62,000	Bulk grains, oils, feeds, dairy, iron, steel
Singapore	1077 acres	28.4 million (2010)	502.4 million (2010)	140,000	Crude oil, machinery, food, iron, steel
Sydney	N/A	1.9 million (2010)	28.2 million (2010)	1,500	Machinery, chemicals, paper, textiles
Tokyo	6,610 acres	3.7 million (2007)	90.8 million (2007)	31,700	electrical equip, food, furniture, clothing
Yokohama	18,078 acres	2.8 million (2009)	115.5 million (2009)	37,000	chemical industrial, mineral, agricultural

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