Port of San Diego Climate Mitigation and Adaption Plan

Extended Abstract # 9

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INTRODUCTION

While nations and states develop programs to address climate change, many local jurisdictions are addressing climate change on a smaller scale by developing climate action plans (CAPs) that present measures to reduce greenhouse gas (GHG) emissions from sources over which they have direct control. In Fall 2010, the Port of San Diego began development of a Climate Mitigation and Adaptation Plan (CMAP) to identify, assess, and develop strategies to help reduce GHG emissions and address local vulnerabilities to climate change. The CMAP will also be a tool for streamlining climate change evaluation under the California Environmental Quality Act (CEQA) for future planning. The CMAP can be used for environmental review of future projects if it includes elements for a GHG Emission Reduction Plan specified in current CEQA Guidelines.[1]

There is currently no template for a CMAP for a port. There are many aspects that are unique to ports compared to cities or counties. For example, the Port does not have authority over many of the sources that are responsible for its GHG emissions in the same way that a city or county might have control over similar sources. For example, a city may be able to authorize improvements in public transit, whereas a port may not have the same authority. Moreover, unlike GHG emissions, there are no specific state or federal guidelines for adaptation planning. In general, both the National Environmental Policy Act (NEPA) and CEQA require a project proponent to evaluate potential impacts of locating development in areas potentially vulnerable to climate change effects. Example climate change effects posing potential threats to development include long-term inundation due to sea level rise (SLR), drought, water shortage, storm intensification, flooding, and temperature increases. The adaptation portion of the CMAP evaluates and prioritizes key vulnerabilities within Port tidelands that require further analysis and adaptation strategies in order to retain operational, recreational and natural resources functions.

CMAP Development Process

The process for the development of the CMAP is divided into four stages. Stage 1 encompasses the technical analyses for GHG mitigation and climate change adaptation. Stages 2 and 3 are the development of the Draft and Final CMAP reports, respectively, with public review. Stage 4 involves taking the CMAP into the CEQA review process. This paper addresses the process under Stage 1 of the development of the CMAP.

Greenhouse Gas Mitigation

The steps followed to address GHG mitigation were informed by the required elements for a GHG Emission Reduction Plan (or CAP or CMAP) under current CEQA Guidelines:

1. Baseline and Future Emission Inventories – The first step in the process is to develop the existing and future GHG emission inventories. To begin with, the categorical and geographical boundaries of the inventory must be defined. The next step is to define both the baseline and future years for the inventory. A baseline must be established in order to set a goal for emissions reductions. The future year inventory will inform how to establish the emission reduction goal and the magnitude of the emission reductions required. The next step is the calculation of the GHG inventory itself.

2. Review and Rank Mitigation Measures – Once baseline and future inventories are developed, mitigation measures are evaluated for a number of relevant criteria including timeframe, emissions reduction potential, cost, cost effectiveness, technical feasibility, implementability, measured results, co-benefits, potential funding opportunities, and authority to implement the measure. The evaluation of the mitigation measures will then inform how measures are ranked and eventually adopted into the CMAP.

3. Set Goals – Once the inventory is established and mitigation measures are ranked, the Port can develop emission reduction goals based on statewide targets, feasible mitigation measures, and internal Port goals.

4. Specify Mitigation Measures to Achieve Goals – After an emissions reduction goal is set, specific mitigation measures are selected to achieve the goal.

5. Tracking Methods – Progress towards achieving the emission reduction goal must be measureable. Thus for each selected mitigation measure, metrics for measuring the progress of each measure are developed.

Climate Change Adaptation

The steps followed to address climate change adaptation were informed by guidance provided in NEPA, CEQA, the California Adaptation Strategy (December 2009)[2], and on-going collaboration with the ICLEI-Local Governments for Sustainability Sea Level Rise Adaptation Strategy[3], the CA SLR Interim Guidance[4] as well as other available documentation. SLR is the primary climate change impact of concern for the Port, based on its jurisdiction location, operational activity, and authority.

1. Existing Conditions – The first step in understanding potential climate change impacts to Port resources is to gather baseline data for areas within the Port tidelands jurisdiction. Data gathered includes shoreline elevation information, bathymetry and Light Detection and Ranging (LIDAR) data, Port land use designations, infrastructure mapping, and natural resource mapping. These data are incorporated into geographic information systems (GIS) layers and spatially arranged to coincide with the Port Master Plan[5] Precise Planning District unit mapping. Once all baseline data are gathered, the next step is to create a model to project the potential effects of climate change, in particular SLR, and identify those areas most vulnerable to these impacts.

2. Vulnerability Assessment – Once baseline conditions are established, an SLR projection model is created to reflect projected increases in sea level estimated to be 0.5 meters (m) by 2050 and 1.5 m by 2100[6]. In addition to these projections, local mean sea level and estimated elevations for the 1% high water storm event are incorporated into the model in order to provide local accuracy. Areas potentially subjected to long-term inundation under each SLR scenario are calculated within each Port Planning District.

3. Prioritization of Actions – After key vulnerabilities have been identified under each SLR scenario, a risk analysis is completed to help identify priority areas and resources that will require additional analysis. A risk metric is developed which ranks the likelihood and consequences of climate change impacts, each on a scale of 1 to 5. The risk factor is then determined based on this metric and is ranked from low to very high. Risk rankings in the high and very high range under the 2050 scenario are identified as priority areas needing near-term adaptation strategies.

4. Implementation Strategies – The final step in the adaptation strategy portion of the CMAP is to help the Port identify strategies for implementing adaptation measures.

Results and Discussion

Greenhouse Gas Mitigation

1. Baseline and Future Emission Inventories – The GHG inventory for the Port includes three sectors: 1) Port Operations, 2) Maritime Tenants, and 3) Non-Maritime Tenants. The emission categories within each sector are energy use (electricity and natural gas), on-road transportation, off-road transportation and equipment, water use, and waste. Geographic boundaries for energy and water use and waste generation are based on usage or generation within the jurisdiction. We include on-road vehicle emissions for all trips originating or terminating within Port tidelands, including vehicle miles traveled outside of the jurisdiction. Geographic boundaries for off-road vehicle and equipment emissions are consistent with the Port's 2006 Maritime Air Emissions Inventory; emissions within County and State Waters are captured except for cargo handling equipment and cruise terminal transportation, which incorporate only emissions within the Port.[7] A baseline year of 2006 was selected, primarily because a significant contribution to the Port's GHG inventory is from the Maritime sector and a 2006 GHG inventory had already been prepared.[7] While it does not match with the California Global Warming Solutions Act (AB 32) baseline of 1990, having an existing inventory saves a considerable amount of effort in preparing the overall inventory. Many other jurisdictions that have completed or are working on a GHG inventory are finding a baseline year more recent than 1990 is more practical to calculate.

A future year of 2020 was selected for consistency with AB 32. For the future inventory, we make a number of assumptions on activity growth for each category or sector. For Port Operations, we assume that activity is constant. For the Maritime Sector, we assume that cargo-related activities increase 3% by year and that cruise-related activities increase 10% by year, consistent with the Port's Maritime Business Plan.[8] For other tenants, we assume no changes in activity data (i.e., square footage or production) since, unlike a city, the Port is constrained in land and cannot expand. Also, California GHG emission projections for the industrial sector do

not change significantly between 2008 and 2020.[9] Known projects to be implemented by 2020 and California regulations are included.

2. Review and Rank Mitigation Measures – Mitigation measures were compiled based on existing CAPs and emission reduction strategies for Ports. Each measure was evaluated based on the listed criteria above and presented in a matrix for discussion with the Port and its stakeholders. Mitigation measures were then ranked based on the evaluation matrix.

3, 4, & 5. Set Goals, Specify Mitigation Measures to Achieve Goals, and Tracking Methods – These steps have not yet been reached.

Climate Change Adaptation

1. Existing Conditions – Baseline data were collected and compiled into a GIS database which included data layers containing: the Port tidelands boundary, 33 Port-specific land use types, aerial photography, storm water infrastructure, natural resources by habitat type, spot monument elevations (control points) located throughout the Port, LIDAR data, and San Diego Bay bathymetry. Elevation data, aerial photography, and control points were used to create a Triangulated Irregular Network (TIN) which was then converted to a 30-foot raster Digital Elevation Model (DEM). Port planning districts were defined using data driven pages in ArcGIS 10.

2. Vulnerability Assessment – An SLR projection model based on an assumed increase of 0.5 m by 2050 and 1.5 m by 2100 and incorporating local mean sea level elevations plus the 1% high water storm event was calculated. Initial inundation areas were determined by extracting Port tidelands exhibiting elevations within the SLR 2050 and 2100 elevation estimates. The elevation contours, control points and aerial photos were used to refine inundation areas by removing areas protected from inundation by barriers such as sea walls and levees. Inundation areas were then calculated by designated land use, habitat value or other assigned attribute. Projections of potential impacts to resources within the Port tidelands were then calculated and mapped within each Port planning district. Areas exhibiting inundation under the 2050 scenario were highlighted as priority areas needing further risk analysis.

3. Prioritization of Actions – A risk metric is currently under development. Examples of risk categories include Port operations, public safety, environmental, and public access. The proposed metric with examples of applications to Port planning district areas will be presented to the Climate and Energy Work Group. Once consensus is reached on metric inputs, the risk analysis will be completed for all designated risk categories in each Port planning district.

4. Implementation Strategies – This step has not yet been reached.

SUMMARY

For GHG mitigation, baseline (2006) and future (2020) GHG inventories were developed for the Port that incorporate emissions from energy use, on-road transportation, off-road transportation and equipment, water use, and waste generation. These inventories were used to evaluate

mitigation measures and to establish GHG reduction goals. Once established, the goals will inform which mitigation measures are selected and their implementation strategies will be documented in the CMAP report. For climate change adaptation, baseline data and SLR projections have been developed for the Port and areas vulnerable to inundation have been identified. Once the risk analysis has been completed, the Port will begin to prioritize actions and develop adaptation strategy guidance to be used for planning development now and in the future. The process developed for the Port of San Diego can serve as a model for other ports developing their own strategies to reduce GHG emissions and adapt to climate change.

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REFERENCES

1. Tiering and Streamlining the Analysis of Greenhouse Gas Emissions. *California Code of Regulations*, Section 15183.5, Title 14, Division 6, Chapter 3. §15183.5.

2. State of California. *2009 California Climate Adaptation Strategy; a Report to the Governor of the State of California in Response to Executive Order S-13-2008*. Sacramento: CA Natural Resources Agency, 2009. Print.

3. ICLEI Local Governments for Sustainability - USA. *Sea Level Rise Adaptation Strategy for San Diego Bay, Regional Vulnerability Assessment - DRAFT*. San Diego: The San Diego Foundation, 2011. Print.

4. State of California, Sea Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT), *Sea Level Rise Interim Guidance Document.* October 2010. Print.

5. Unified Port of San Diego. *Port Master Plan, San Diego Unified Port District*. San Diego: Port of San Diego Land Use Planning Department, 2010. Print.

6. CO-CAT 1-197.

7. Starcrest Consulting Group, LLC. *The Port of San Diego 2006 Emissions Inventory*; 2008.

8. TEC Inc. San Diego Unified Port District Maritime Business Plan Update. 2008.

9. California Air Resources Board. California GHG Emissions – Forecast (2008-2020), 2010. http://www.arb.ca.gov/cc/inventory/data/tables/2020_ghg_emissions_forecast_2010-10-28.pdf (accessed July 2011)

KEYWORDS

Greenhouse gas, climate change, climate action plan, CMAP, adaptation, CEQA, port