

[FINAL VERSION – September 2009: Revised to be consistent with December 2008 Coastal Commission Adopted Findings. Includes Commission staff changes to Poseidon’s August 2009 submittal.](#)

DRAFT August 31, 2022

CARLSBAD SEAWATER DESALINATION PROJECT

ENERGY MINIMIZATION AND GREENHOUSE GAS REDUCTION PLAN

July 30, 2008
[Final Adopted Plan](#)
[September 2009](#)

Staff Note:

Key elements of this Plan include:

- *Poseidon’s indirect GHG emissions will be calculated using California Air Resources Board (CARB) or California Climate Action Registry (CCAR) methodologies.*
- ~~*Poseidon will be credited with emission offsets that may result from reductions in State Water Project imports.*~~
- *The offset projects, except for Renewable Energy Credits (RECs), that Poseidon implements pursuant to this Plan will be purchased through/from CARB, CCAR, or any California Air Pollution Control District (APCD) or Air Quality Management District (AQMD). Poseidon may also request that the Executive Director approve projects that may be available from other entities.*

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CARLSBAD SEAWATER DESALINATION PROJECT

ENERGY MINIMIZATION AND GREENHOUSE GAS REDUCTION PLAN

~~JULY 30, 2008~~

FINAL ADOPTED PLAN
SEPTEMBER 2009

INTRODUCTION

In October 2007, Poseidon Resources (Poseidon) offered as part of its Carlsbad Desalination Project (Project) a commitment to account for and bring to zero the net indirect Greenhouse Gas (GHG) emissions from the Project. Poseidon followed its unprecedented commitment with the development of a Climate Action Plan (CAP), Poseidon's roadmap to achieving its commitment over the 30-year life of the Project. Based on protocols adopted by the California Climate Action Registry (CCAR), the CAP was reviewed by the California Coastal Commission (CCC), the California State Lands Commission (CSLC), the California Air Resources Board (CARB) and, at the request of a Coastal Commissioner, the South Coast Air Quality Management District (SCAQMD).

On November 15, 2007, the CCC approved the Project subject to the condition, among others, that the CCC approve the CAP at a subsequent hearing. Specifically, **Special Condition 10** states ~~that:~~

~~“prior~~Prior to issuance of the permit, the Permittee shall submit to the Commission a Revised Energy Minimization and Greenhouse Gas Reduction Plan (the Plan) that addresses comments submitted by the staffs of the Coastal Commission, State Lands Commission and the California Air Resources Board. The permit shall not be issued until the Commission has approved a Revised Energy Minimization and Greenhouse Gas Reduction Plan after a public hearing.”

Since the Special Condition was adopted, Poseidon has reviewed comments from the November 15 hearing as well as CCC staff's draft findings, and continued to work with the CCC, CSLC and CARB to refine the CAP and ensure a complete understanding of the process it sets forth to meet Poseidon's commitments.

~~On May 2, From November 2007 to August~~ 2008, Poseidon met with representatives of the CCC, CSLC and various agencies in the San Diego region to ~~further discuss details of the Plan and its implementation. The purpose of this document is to present Poseidon's revised Plan in response to the additional comments received, the May 2 meeting, and the draft CCC Template. modify the Plan for Commission consideration. On August 6, 2008, the Commission approved the modified Plan and on December 10, 2008 approved Revised Condition Compliance Findings.~~

1. PROJECT OVERVIEW

The 50 million gallon per day (MGD) Project (Figure 1) is co-located with the Encina generation station, which currently uses seawater for once-through cooling. The Project is developed as a public-private partnership between Poseidon and nine local utilities and municipalities.

In 2006, California legislation introduced the AB 32 Global Warming Solutions Act that aims to reduce the GHG emissions of the state to 1990 levels by year 2020. While it is unlikely that the legislation or its implementing regulations will apply to the Project because the Project only emits significant GHGs indirectly through electricity use,¹ Poseidon applauds the objectives of AB 32 and is committed to helping California maintain its leadership role in addressing the causes of Climate Change. As a result, Poseidon has committed to offset the net indirect GHG emissions associated with the Project's operations. Poseidon's offer has been incorporated into the Project's permit through **Special Condition 10**, adopted by the California Coastal Commission and agreed to by Poseidon. ~~According to Special Condition 10 and CCC staff direction, requires~~ Poseidon ~~is required~~ to submit a plan for Commission review and approval showing how the Project will minimize its electricity use and reduce or mitigate for indirect GHG emissions resulting from net increases in electricity use over existing conditions.

Figure 1 – Carlsbad Seawater Desalination Facility

[Note: Figure provided in original.]

2. ~~CCC~~COASTAL COMMISSION DRAFT EMISSIONS TEMPLATE

The draft ~~CCC Template~~Coastal Commission template establishes “a protocol for how to assess, reduce, and mitigate the GHG emissions of applicants,” and calls for the organization of relevant information into the following three sections:

1. Identification of the amount of indirect ~~GHGs~~GHG emitted due to the Project's electricity use,
2. On-Site and Project related measures planned to reduce emissions, and
3. Off-site mitigation options to offset remaining emissions.

After a brief explanation of Poseidon's overall strategy for eliminating the Project's net indirect GHG emissions, this document then organizes the Plan into the ~~CCC's~~Coastal Commission's three general categories.

¹ AB 32's implementing regulations are currently being drafted and will subsequently be released for public comment. AB 32's regulations, when promulgated, will likely target direct emitters of GHGs, including SDG&E (the source of the Project's electricity), rather than indirect emitters such as the Project. In any case, Poseidon will modify its Plan to conform with these regulations to the extent that they are applicable to the Project.

3. OVERVIEW OF THE PROJECT'S GHG REDUCTION STRATEGY

Since offsetting net indirect GHG emissions is an ongoing process dependent on dynamic information, Poseidon's Plan for the assessment, reduction and mitigation of GHG emissions establishes a protocol for identifying, securing, monitoring and updating measures to eliminate the Project's net carbon footprint. Once the Project is operational and all measures to reduce energy use at the site have been taken, the protocol involves the following steps, completed each year:

1. Determine the energy consumed by the Project for the previous year using substation(s) electric meter(s) readings from San Diego Gas & Electric's (SDG&E) or any other entity from which the Project obtains all or part of its electricity at any time in the future.
2. Determine SDG&E emission factor for delivered electricity from its most recently published CCAR Annual Emissions Report. Reports are issued annually and are accessible on the CCAR's website. Emission factors will be obtained from CARB if and when SDG&E's certified emission factor for delivered electricity is publicly available through CARB's anticipated GHG Inventory program. If at any time in the future the Project obtains all or part of its electricity from an entity other than SDG&E, the appropriate CCAR or CARB emission factor for that entity shall be used. While current emissions reports only report CO₂, future reports are expected to include the five additional GHGs (methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride). To the extent that these additional GHGs are included in future reports, they will be converted to carbon equivalents for the Project and offset under the Plan.
3. Calculate the Project's gross indirect GHG emissions resulting from Project operations by multiplying its electricity use by the emission factor.
4. Calculate the Project's net indirect GHG emissions by subtracting emissions avoided as a result of the Project (Avoided Emissions) and any existing offset projects and/or Renewable Energy Credits (RECs). Each year's amount of net indirect GHG emissions will be determined using CARB or CCAR emissions factors for SDG&E and the State Water Project.
5. If necessary, implement carbon offset projects and purchase carbon offsets or RECs to zero-out the Project's net indirect GHG emissions, ~~subject.~~ Subject to the provisions of Sections III.C, E and F below: (i) Offset projects, except for RECs, implemented pursuant to this Plan will be purchased through/from CARB, CCAR, or a California APCD or AQMD and (ii) Poseidon may propose purchasing other offset projects, subject to Executive Director or Commission approval, in the event that sufficient offsets are not available from CCAR/CARB/California APCD or AQMD at a price that is reasonably equivalent to the price for offsets in the broader domestic market.

Energy efficiency measures and on-site use of renewable resources will be given the highest priority. In addition, through its annual program to offset net carbon emissions for that year, Poseidon will commit the first \$1 million spent on this program to fund the revegetation of areas

in the San Diego region impacted by wildfires that occurred in the fall of 2007, as discussed in detail in Part III below.² Poseidon will implement this element of the Plan using CARB or CCAR Forest Project Protocols or the upcoming CARB/CCAR Urban Forest Project Protocol, depending on the type of project Poseidon selects.

The following are elements of the Plan organized in accordance with the draft CCC template.

PART I. IDENTIFICATION OF THE AMOUNT OF GHG EMITTED

The Project will produce fresh drinking water using reverse osmosis membrane separation. The treatment processes used at the Plant do not generate GHGs. The desalination process does not involve heating and vaporization of the source seawater and thus does not create emissions of water vapor, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), or sulfur hexafluoride (SF₆). Reverse osmosis membranes do not reject the carbon dioxide, which is naturally dissolved in the source seawater, and this carbon dioxide is retained in dissolved form in the fresh drinking water created by desalination.

The modest number of fleet vehicles used by plant personnel will create a small amount of GHG emissions, but since these emissions make up less than 5% of the Project's carbon footprint, these emissions are considered *de minimis* and are not required to be reported (CCAR General Reporting Protocol of March 2007 (Chapter 5)). The Project will not store or use fossil fuels on site, and will not self-generate electricity that emits GHGs. As a result, Project operations will not create significant direct sources of GHG emissions. There are no direct fugitive emissions from the plant.

The Project's sole significant source of GHG emissions will be indirect emissions resulting from purchased electricity. All of the electricity supply for the desalination plant operations will be provided by SDG&E. Therefore, the complete accounting of significant GHG emissions for the Project will consist entirely of indirect emissions resulting from electricity purchased from SDG&E.³

Currently, about 65% of the electricity supplied by SDG&E is generated from fossil fuels.⁴ As a result, until SDG&E switches to 100% "green" power supply sources, the Project operations will be indirectly linked to the generation of GHGs.

The total net indirect GHG emissions of the Project from the stationary combustion of fossil fuels to generate electricity is dependent on three key factors: (1) how much electricity is used by

² The California Coastal Commission conditioned the Project's Coastal Development Permit on Poseidon committing the first \$1 million spent on this program to the revegetation of areas impacted by wildfires in the San Diego region.

³ Typically, GHG emissions from construction of a project are not included in the on-going reporting of GHGs from operations. In fact, GHGs from construction are not typically accounted for in a GHG inventory at all.

⁴ SDG&E Power Content Label, September 2007.

the Project; (2) sources of energy (fossil fuels, wind, sunlight, etc.) used to generate the electricity supplied to the plant, and (3) the Avoided Emissions, i.e., the amount of energy saved or emissions avoided as a direct result of the Project's operations. These factors will vary over time.

A. ELECTRICITY USE BY THE PROJECT

The Project will operate continuously, 24 hours a day for 365 days per year, to produce an average annual drinking water flow of 50 million gallons per day (MGD). The total baseline power use for this plant is projected to be 31.3 average megawatts (aMW), or 4.9 MWh per acre-foot (AF) of drinking water. The power use incorporates both production of fresh drinking water, as well as conveyance and delivery of the water to the distribution systems of the public water agencies that have contracted to purchase water from the Project. The total annual electricity consumption for the Project Baseline Design is 274,400 MWh/yr.

B. SDG&E'S EMISSION FACTOR

The Project will purchase all of its electricity from SDG&E.⁵ Accordingly, the appropriate emission factor to use for the Project's indirect GHG emissions from its electricity use is SDG&E's independently verified and published emission factor for the electricity purchased and consumed during the previous year. The certified emission factor for delivered electricity in 2006 is set forth in the utility's Annual Emissions Report published by CCAR in April 2008. In the published Emissions Report, the current certified emission factor for SDG&E's 2006 delivered electricity is 780.79 lbs of CO₂ per delivered MWh of electricity.

Circumstances will change over the life of the Project. SDG&E's emission factors are updated annually and the amount of energy consumed by the Project may change.⁶ As a result, it will be necessary to recalculate the net indirect GHG emissions of the Project on an annual basis using the actual SDG&E emission factor reported to the CCAR (or CARB). Until the mandatory reporting of emission factors under AB 32 is available, the emission factors for SDG&E registered with CCAR are the best available for purposes of planning and permitting this Project.

Statewide initiatives to expand the use of renewable sources of electricity are expected to decrease the emission factors of all California power suppliers in the future. For example, approximately 6% of SDG&E's retail electricity is currently generated from renewable resources (solar, wind, geothermal, and biomass).⁷ In their most-recent Long-term Energy Resource Plan, SDG&E has committed to increase energy from renewable sources by 1% each year, reaching

⁵ If at any time in the future the Project obtains all or part of its electricity from an entity other than SDG&E, the appropriate CCAR emission factor for that entity shall be used.

⁶ SDG&E Annual Emissions Reports to CCAR have changed each year. For years, 2004, 2005, and 2006 the emissions factors have been 614, 546 and 781 lbs. of CO₂/MWh, respectively.

⁷ SDG&E Power Content Label, September 2007.

20% by year 2017. These and other reductions are expected to further reduce the Project’s net indirect GHG emissions over time.

Table 1 summarizes the Project’s estimated gross indirect CO₂ emissions from purchased electricity for Project operations, based on the most current information.

Table 1 – Identification of Gross Indirect CO₂ Emissions from Purchase of Electricity for Project Operations

Source	Total Annual Power Use (MWh/year)	Total Annual Emissions (metric tons CO ₂ /year)
Project Baseline Design	274,400	97,165

PART II: ON-SITE AND PROJECT-RELATED REDUCTION OF GHG EMISSIONS

To determine the Project’s indirect GHG emissions, on-site and project-related reductions in emissions must also be considered. These are carbon emission reductions that result from measures that reduce energy requirements (increased energy efficiency, potential onsite solar, recovery of CO₂ and green building design), as well as Project-related emissions that will be avoided (Avoided Emissions) as a direct result of the Project and its various components (coastal wetlands restoration, and reduced energy use from water reclamation, ~~and replacing Customers’ SWP water with water from the Project~~). The total of each year’s indirect GHG emissions will be determined using CARB- or CCAR-approved emissions factors for SDG&E ~~and the State Water Project~~.

A. INCREASED ENERGY EFFICIENCY

Poseidon has committed to implement certain measures to reduce the Project’s energy requirements and GHG emissions, and will continuously explore new technologies and processes to further reduce and offset the carbon footprint of the Project, such as the use of carbon dioxide from the ambient air for water treatment. These measures are set forth below.

The Project’s high-energy efficiency design incorporates state-of-the-art features minimizing plant energy consumption. One such feature is the use of a state-of-the-art pressure exchanger based energy recovery system that allows recovery and reuse of 33.9% of the energy associated with the reverse osmosis (RO) process. A significant portion of the energy applied in the RO process is retained in the concentrated stream. This energy bearing stream (shown with red arrows on Figure 2) is applied to the back side of pistons of cylindrical isobaric chambers, also

known as “pressure exchangers” (shown as yellow cylinders on Figure 2). These energy exchangers recover and reuse approximately 45% of the energy used by the RO process.⁸

Figure 2 – Energy Recovery System for the Carlsbad Seawater Desalination Plant

[Note: Figure provided in original.]

Currently there are no full-scale seawater desalination plants in the US using the proposed state-of-the-art pressure exchanger energy recovery technology included in the “High Efficiency Design” (Table 2). All existing seawater desalination projects in the US, including the 25 MGD Tampa Bay seawater desalination plant, which began commercial operation on January 25, 2008, are using standard energy recovery equipment — i.e., Pelton wheels (see Figure 2). Therefore, the Pelton wheel energy recovery system is included in the “Baseline Design” in Table 2.

The pressure exchanger technology that Poseidon proposes to use for the Project is a national technology. The manufacturer of the pressure exchangers referenced in Table 2 of the Project Power Budget is Energy Recovery, Inc., a US company located in San Leandro, California (www.energyrecovery.com).

A pilot-scale seawater desalination plant using the pressure exchanger technology proposed by Poseidon and supplied by Energy Recovery, Inc. has been in operation at the US Navy’s Seawater Desalination Testing Facility in Port Hueneme, California since 2005. The overall capacity of this desalination plant is 50,000 to 80,000 gallons per day. The pilot testing work at this facility has been conducted by the Affordable Desalination Collaboration (ADC), which is a California non-profit organization composed of a group of leading companies and agencies in the desalination industry (www.affordabledesal.com). A portion of the funding for the operation of this facility is provided by the California Department of Water Resources (DWR) through the state’s Proposition 50 Program. The DWR provides independent oversight of this project and reviews project results. In addition, representatives of the California Energy Commission and the California Department of Public Health are on the Board of Directors of the ADC.

The proposed pressure exchanger technology (i.e., the same pressure exchanger employed at the ADC seawater desalination plant) was independently tested at Poseidon’s Carlsbad seawater desalination demonstration plant. More than one year of testing has confirmed the validity of the conclusions of the ADC for the site-specific conditions of the Project. The test results from the Carlsbad seawater desalination demonstration plant were used to calculate the energy efficiency of the pressure exchangers included in Table 2. Poseidon’s technology evaluation work at the Carlsbad seawater desalination demonstration plant was independently reviewed and recognized by the American Academy of Environmental Engineers and by the International Water Association, who awarded Poseidon their 2006 Grand Prize in the field of Applied Research.

⁸ The “45% percent energy recovery and reuse” refers to the gross energy recovery potential, while the “33.9% energy recovery and reuse” refers to the actual energy savings associated with the energy recovery system. The difference between gross and actual energy savings is due to mechanical inefficiencies of the recovery system and associated friction losses. Thus, for purposes of calculating the overall energy savings, Table 2 correctly reflects 33.9% savings associated with the pressure exchanger.

Table 2 – Comparison of Baseline and High-Efficiency Power Budget for 50 MGD Water Production Capacity

[Note: Table provided in original.]

Figure 3 – Tampa Bay Desalination Plant Pelton Wheel Energy Recovery System

[Note: Figure provided in original.]

Table 2 presents a detailed breakdown of the projected power use of the Project under a Baseline Design and High-Energy Efficiency Design. As indicated in this table, the Baseline Design includes high efficiency motors for all pumps, except the largest reverse osmosis feed pumps, and a Pelton wheel energy recovery system, which is the most widely used “standard” energy recovery system today. The total desalination power use under the Baseline Design is 31.3 aMW, which corresponds to a unit power use of 15.02 kWh/kgal⁹ (4,898 kWh/AF).¹⁰

In addition to the state of the art-pressure exchanger system described above, the High-Energy Efficiency Design incorporates premium efficiency motors and variable frequency drives (VFDs) on desalination plant pumps that have motors of 500 horsepower or more. The total desalination plant energy use under the High-Energy Efficiency Design is 28.1 aMW, which corresponds to unit power use of 13.488 kWh/kgal¹¹ (4,397kWh/AF).¹²

The main energy savings result from the use of pressure exchangers instead of Pelton wheels for energy recovery. The pressure exchangers are projected to yield 2,650 hp (2.0 aMW)¹³ of power savings, which is 6.3 % reduction of the total power use of 31.3 aMW. Converted into unit power savings, the energy reduction of 2.0 aMW corresponds to 0.95 kWh/kgal¹⁴ (310 kWh/AF)¹⁵. The installation of premium-efficiency motors and VFDs on large pumps would result in additional 1.2 aMW (4%) of power savings.

The power savings of 0.95 kWh/kgal associated with the use of pressure exchangers instead of Pelton wheels for energy recovery are substantiated by information from several full-scale desalination plants ~~which~~that have recently replaced their existing Pelton wheel energy recovery systems with pressure exchangers in order to take advantage of the energy savings offered by this technology. Poseidon’s submission of this Plan to the Commission included documentation

⁹ 31.3 MWh x 1,000 kW/MW/Average Fresh Water Production Rate of 2083 kg/h.

¹⁰ 15.02 kWh/kgal x 326 kgal/AF.

¹¹ 28.1 MWh x 1,000kW/MW/2083 kgal/h.

¹² 13.488 KWh/kgal x 326 kgal/AF.

¹³ 2650 HP x 0.746 kw/HP

¹⁴ 2.0 x 1000 kw/MW/2083kgal/HR

¹⁵ 0.95 kwh/kgal x 326 kgal/AF

entitled “Energy Recovery in Caribbean Seawater”, which contains energy data for a seawater desalination plant in Mazarron, Spain where a Pelton wheel system was replaced with PX pressure exchangers. As indicated on Table 2 of Attachment 1, the replacement resulted in energy reduction from 3.05 kWh/m³ to 2.37 kWh/m³ (i.e., 0.68 kWh/m³ or 2.57 kWh/kgal). The total actual energy reduction resulting from the use of state-of-the-art desalination and energy recovery technologies and design will be verified by direct readings of the total electricity consumed by the desalination plant at the Project’s substation(s) electric meter(s) and documented as soon as the Project is fully operational.

B. GHG EMISSION REDUCTION BY GREEN BUILDING DESIGN

The Project will be located on a site currently occupied by an oil storage tank no longer used by the power plant. This tank and its content will be removed and the site will be reused to construct the Project. Because the facility is an industrial facility, LEED-level certification will not be feasible; but to the extent reasonably practicable, building design will follow the principles of the Leadership in Energy and Environmental Design (LEED) program. LEED is a program of the United States Green Building Council, developed to promote construction of sustainable buildings that reduce the overall impact of building construction and functions on the environment by: (1) sustainable site selection and development, including re-use of existing industrial infrastructure locations; (2) energy efficiency; (3) materials selection; (4) indoor environmental quality, and (5) water savings.

The potential energy savings associated with the implementation of the green building design as compared to that for a standard building design are in a range of 300 MWh/yr to 500 MWh/yr. The potential carbon footprint reduction associated with this design is between 106 and 177 tons of CO₂ per year. The energy savings associated with incorporating green building design features into the desalination plant structures (i.e., natural lighting, high performance fluorescent lamps, high-efficiency HVAC and compressors, etc.) are based on the assumption that such features will reduce the total energy consumption of the plant service facilities by 6 to 10 %. As indicated in Table 2, the plant service facilities (HVAC, lighting, controls and automation, air compressors and other miscellaneous power uses) are projected to have power use of 760 hp (250 hp + 120 hp + 40 hp + 100 hp + 250 hp = 760 hp) when standard equipment is used. The total annual energy demand for these facilities is calculated as follows; 760 hp x 0.746 kW/hp x 0.001 kW/MW x 24 hrs x 365 days = 4,967 MWh/yr. if use of green building design features result in 6 % of energy savings, the total annual power use reduction of the service facilities is calculated at 0.06 x 4,967 MWh/yr = 298.02 MWh/yr (rounded to 300 MWh/yr). Similarly, energy savings of 10 % due to green building type equipment would yield 0.1 x 4,967 MWh/yr = 496.7 MWh/yr (rounded to 500 MWh/yr) of savings. The total actual energy reduction resulting from the use of the green building design will be verified by direct readings of the total electricity consumed by the desalination plant at the Project’s substation(s) electric meter(s) and documented as soon as the Project is fully operational.

C. ON-SITE SOLAR POWER GENERATION

Poseidon is exploring the installation of rooftop photovoltaic (PV) system for solar power generation as one element of its green building design. Brummitt Energy Associates of San

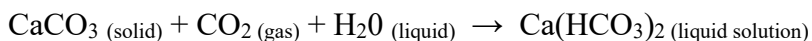
Diego completed a feasibility study in March 2007 of a photovoltaic system at the Carlsbad Desalination Plant. If the solar installation described by Brummitt is implemented, the main desalination plant building would accommodate solar panels on a roof surface of approximately 50,000 square feet, with the potential to generate approximately 777 MWh/yr of electricity. If installed, the electricity produced by the onsite PV system would be used by the Project and therefore would reduce the Project's electrical demand on SDG&E. The corresponding reduction of the Project's indirect emissions would be 275 tons of CO₂ per year. Poseidon is exploring other solar proposals and will update this information as it becomes available. Ultimately, the electricity and corresponding GHG savings of any on-site solar installation will be documented in the Project's annual electricity usage information. Poseidon will use commercially reasonable efforts to implement an on-site solar power project if it is reasonably expected to provide a return on the capital investment over the life of the Project.

If Poseidon proceeds with an onsite PV system, the total actual energy reductions resulting from the use of on-site solar power generation will be verified by direct readings of the total electricity consumed by the desalination plant at the Project's substation(s) electric meter(s) and documented once the system is fully operational.

D. RECOVERY OF CO₂

Approximately 2,100 tons of CO₂ per year are planned to be used at the Project for post-treatment of the product water (permeate) produced by the reverse osmosis (RO) system. Carbon dioxide in a gaseous form will be added to the RO permeate in combination with calcium hydroxide or calcium carbonate in order to form soluble calcium bicarbonate which adds hardness and alkalinity to the drinking water for distribution system corrosion protection. In this post-treatment process of RO permeate stabilization, gaseous carbon dioxide is sequestered in soluble form as calcium bicarbonate. Because the pH of the drinking water distributed for potable use is in a range (8.3 to 8.5) at which CO₂ is in a soluble bicarbonate form, the carbon dioxide introduced in the RO permeate would remain permanently sequestered. During the treatment process the calcium carbonate (calcite – CaCO₃) reacts with the carbon dioxide injected in the water and forms completely soluble calcium bicarbonate as follows:¹⁶

¹⁶ This chemical reaction and information presented on Figure 4 are well known from basic chemistry of water. See American Water Works Association (AWWA) (2007) Manual of Water Supply Practices, M46, Reverse Osmosis and Nanofiltration, Second Edition; <http://www.chem1.com!CO/hardwater.html>; <http://llwww.cotf.eduletelmodules/watreg31WOassess3b.html>. Once the desalinated drinking water is delivered to individual households, only a small portion of this water will be ingested directly or with food. Most of the delivered water will be used for other purposes – personal hygiene, irrigation, etc. The calcium bicarbonate ingested by humans will be dissociated into calcium and bicarbonate ions. The bicarbonate ions will be removed by the human body through the urine (<http://www.chemistry.wustl.edu/~courses/genchem/TutorialsBuffers/carbonic.htm>). Since the CO₂ is sequestered into the bicarbonate ion, human consumption of the desalinated water will not result in release of CO₂. The bicarbonate in the urine will be conveyed along with the other sanitary sewerage to the wastewater treatment plant. Since the bicarbonate is dissolved, it will not be significantly impacted by the wastewater treatment process and ultimately will be discharged to the ocean with the wastewater treatment plant effluent. The ocean water pH is in a range of 7.8 to 8.3, which would be adequate to maintain the originally sequestered CO₂ in a soluble form – see Figure 4 above. Other household uses of drinking water, such as personal hygiene, do not involve change in drinking water pH as demonstrated by the fact that pH of domestic wastewater does not differ significantly from that of the drinking water. A portion of the household drinking water would likely be used for irrigation. A significant



At the typical pH range of drinking water (pH of 8.3 to 8.5) the carbon dioxide will remain in the drinking water in soluble form (see Figure 4) and the entire amount (100 %) of the injected carbon dioxide will be completely dissolved.

Figure 4 — Relationship between free carbon and pH

(Source: <http://www.cotf.edu/ete/modules/waterq3/WQassess3b.html>)

[Note: Figure provided in original.]

A small quantity of carbon dioxide used in the desalination plant post-treatment process is sequestered directly from the air when the pH of the source seawater is adjusted by addition of sulfuric acid in order to prevent RO membrane scaling. A larger amount of CO₂ would be delivered to the Project site by commercial supplier for addition to the permeate. Depending on the supplier, carbon dioxide is of one of two origins: (1) a CO₂ Generating Plant or (2) a CO₂ Recovery Plant. CO₂ generating plants use various fossil fuels (natural gas, kerosene, diesel oil, etc.) to produce this gas by fuel combustion. CO₂ recovery plants produce carbon dioxide by recovering it from the waste streams of other industrial production facilities **which that** emit CO₂ rich gasses: breweries, commercial alcohol (i.e., ethanol) plants, hydrogen and ammonia plants, etc. Typically, if these gases are not collected via CO₂ recovery plant and used in other facilities, such as the desalination plant, they are emitted to the atmosphere and therefore, constitute a GHG release.

To the extent that it is reasonably available, Poseidon intends to acquire the carbon dioxide from a recovery operation. Use of recovered CO₂ at the Project would sequester 2,100 tons of CO₂ per year in the Project product water. The total annual use of carbon dioxide (i.e., 2,100 tons/CO₂ per year) in the water treatment process was determined based on the daily carbon dioxide consumption presented in Table 4.6-2 of Section 4.6 “Hazards and Hazardous Materials” of the certified Carlsbad desalination project Environmental Impact Report (EIR). The daily consumption of CO₂ in this table is 12,540 lbs of CO₂/day. The annual consumption is calculated as 12,540 lbs/day x 365 days /2,200 lbs/ton = 2,080.5 lbs of CO₂/yr (which was rounded to 2,100 lbs/yr). The daily amount of carbon dioxide in Table 4.6-2 of the EIR was calculated based on the dosage needed to provide adequate hardness (concentration of calcium bicarbonate) in the seawater to protect the water distribution system from corrosion. This amount was determined based on pilot testing of distribution system piping and household plumbing at the Carlsbad seawater desalination demonstration project. The testing was completed using the same type of calcium carbonate chips as those planned to be used in the full-scale operations. Every load of carbon dioxide delivered to the desalination plant site will be accompanied by a certificate that states the quantity, quality and origin of the carbon dioxide and indicates that this carbon dioxide was recovered as a site product from an industrial application of known type of production (i.e., brewery, ethanol plant, etc.), and that it was purified to meet the requirements associated with its use in drinking water applications (i.e., the chemical is NSF approved). The plant operations manager will receive and archive the certificates for verification

amount of the calcium bicarbonate in the irrigation water would be absorbed and sequestered in the plant roots (<http://www.Dubmedcentral.nih.gov/paerender.fcgi?artid=540973&paeindex=1>). The remaining portion of calcium bicarbonate would be adsorbed in the soils and/or would enter the underlying groundwater aquifer.

purposes. At the end of the year, the operations manager will provide copies of all certificates of delivered carbon dioxide to the independent ~~third-party~~third party reviewer (currently the California Center for Sustainable Energy) responsible for verification of facility compliance with the Energy Minimization and Greenhouse Gas Reduction Plan.

As noted, verification would be provided through certificates of origin received from suppliers of CO₂ delivered to the Project site indicating the actual amount of CO₂ delivered to the site, date of delivery, origin of the CO₂, and the purity of this gas. Poseidon will place conditions in its purchase agreements with CO₂ vendors that require transfer of CO₂ credits to Poseidon and otherwise ensure that the CO₂ is not accounted for through any other carbon reduction program so as to avoid “double counting” of associated carbon credits.

E. AVOIDED EMISSIONS FROM REDUCING ENERGY NEEDS FOR WATER RECLAMATION

The Project will result in Avoided Emissions because it will cause a change in operations by the Carlsbad Municipal Water District (CMWD), which owns and operates a water reclamation facility that includes micro-filtration (MF) and RO treatment for 25% of its water supply. The purpose of the MF/RO system is to reduce the salinity of the recycled water to below 1,000 mg/L so it will be suitable for irrigation. The elevated salinity of the recycled water is due in part to the salinity of the City’s drinking water supply.

The Project will effectively eliminate this problem by lowering the salinity in the source water of the communities upstream of the water recycling facility, thereby eliminating the need for operation of the MF/RO portion of the water recycling process. Implementation of the Project will significantly reduce or possibly eliminate the need to operate the MF/RO system, leading to Avoided Emissions from the lower electricity use by CMWD. This will reduce the carbon footprint of the Carlsbad Water Reclamation Facility as follows: 1,950 MWh/yr x 780.79 lbs of CO₂/MWh = 1,522,541 lbs of CO₂/yr (690 tons of CO₂/yr).

The total ~~actual~~ energy reduction that would result from the higher quality water use upstream of the water recycling facility will be verified annually by CMWD, using actual billing and performance data. This will be accomplished ~~through a comparison of the~~by comparing the pre-Project energy use attributable to the RO/MF portion of the water recycling process to the post-Project energy use.

~~F. AVOIDED EMISSIONS FROM DISPLACED IMPORTED WATER~~

~~Another source of Avoided Emissions will result from the Project’s introduction of a new, local source of water into the San Diego area; water that will displace imported water now delivered to Customers from the State Water Project (SWP) — a system with its own significant energy load and related carbon emissions.~~

~~One of the primary reasons for the development of the Project is to replace imported water with a locally produced alternative drought-proof source of water supply. Currently, San Diego County imports approximately 90% of its water from two sources — the SWP and the Colorado River.~~

~~These imported water delivery systems consist of a complex system of intakes, dams, reservoirs, aqueducts and pump stations, and water treatment facilities.~~

~~The proposed Project will supply 56,000 acre-foot of water per year to the San Diego region. The Project will provide direct, one-to-one replacement of imported water to meet the requirements of the participating water agencies, thus eliminating the need to pump 56,000 ~~acre feet~~ **acre-foot** of water into the region.¹⁷~~

~~The 2003 multi-state Colorado River quantitative settlement agreement forced Metropolitan Water District of Southern California (MWD) to reduce its pumping from the Colorado River by 53% — from 1.20 MAFY to 0.56 MAFY. **As a result,** MWD now operates its imported water delivery system to base load its Colorado River allotment and ~~draw~~ **draws** from the SWP only as needed to serve demand that cannot be met by the lower cost water available from the Colorado River Aqueduct. Consequently, the proposed Project will reduce ~~the~~ Customers demand on the SWP.~~

~~The total amount of electricity needed to provide treated water to Poseidon’s public agency partners via the SWP facilities is shown in Table 1. The net power requirement to pump an acre-foot of water through the East Branch of the SWP is 3,248 KWh (source: DWR). Approximately 2% of the SWP water pumped to Southern California is lost to evaporation from Department of Water Resources’ reservoirs located south of the Tehachapi Mountains (source: DWR). The evaporation loss results in a net increase of 68.3 KWh per acre-foot of SWP water actually delivered to Southern California homes and businesses. Finally, prior to use, the SWP water must be treated to meet Safe Drinking Water Act requirements. The San Diego County Water Authority (SDCWA) entered into a service contract with CH2M Hill Constructors, Inc., to operate its Twin Oaks Water Treatment Plant with a guaranteed electricity consumption of 100 KWh/AF of water treated (source: SDCWA). The electricity required to deliver an acre-foot of treated water to the SDCWA is shown in Table 3.~~

Table 3 — State Water Project Supply Energy Use

Energy Demand	KWh/AF	Source
Pumping Through East Branch	3248	DWR
Evaporation Loss	68	DWR
Twin Oaks Water Treatment Plant	100	SDCWA
Total	3416	

~~The demand reduction **of demand** for imported water is critical to Southern California’s water supply reliability, so much so that MWD not only supports the Project, but has also committed \$14 million annually to reduce the cost to Poseidon’s customers. Under MWD’s program, \$250 will be paid to water agencies for every acre-foot of desalinated water purchased from the Carlsbad facility, *so long as the desalinated water offsets an equivalent amount of imported water.* MWD has established “Seawater Desalination Policy Principles and Administrative~~

¹⁷ See Poseidon Resources Corporation *Letter to Paul Thayer Re: Desalination Project’s Impact on Imported Water Use*, November 8, 2007, including attachments from nine water agencies (**Attached as Appendix E**).

~~Guidelines” that require recordkeeping, annual data submittals, and MWD audit rights to ensure that MWD water is offset.”¹⁸~~

~~The benefits of a reduction in demand on MWD’s system are reflected in, among other things, the energy savings resulting from the pumping of water that – but for the Project – would have to continue. For every acre-foot of SWP water that is replaced by water from the proposed Project, 3.4 MWh of electricity use to deliver water to Customers is avoided, along with associated carbon emissions. And since the Project requires 4.4 MWh of electricity to produce one acre-foot of water, the net electricity required to deliver water from the Project to Customers is 1.0 MWh/AF.~~

~~Because the Project will avoid the use of 56,000 AFY of imported water to Customers, once in operation, the Project will also avoid 190,641 MWh/yr of electricity consumption otherwise required to deliver that water to Customers, as well as the GHG emissions associated with pumping, treatment and distribution of this imported water. At 780.79 lbs CO₂ per MWh,¹⁹ the total expected Avoided Emissions as a result of the Project is 67,506 metric tons CO₂/yr. Each year, Poseidon will be credited with Avoided Emissions based on the most recent SWP emission factors and the amount of water Poseidon produces.~~

G. AVOIDED EMISSIONS THROUGH COASTAL WETLANDS

The Project also includes the restoration and enhancement of marine wetlands. The restoration project will be in the proximity of the Project. These wetlands will be set-aside and preserved for the life of the Project. Once the wetlands are restored, they will act as a carbon “sink” or carbon sequestration project trapping CO₂.

Tidal wetlands are very productive habitats that remove significant amounts of carbon from the atmosphere, a large portion of which is stored in the wetland soils. While freshwater wetlands also sequester CO₂, they are often a measurable source of methane emissions. Coastal wetlands and salt marshes, however, release negligible amounts of greenhouse gases and therefore, their carbon sequestration capacity is not measurably reduced by methane production.

Based on a detailed study completed in a coastal lagoon in Southern California, the average annual rate of carbon sequestration in coastal wetland soils is estimated at 0.033 kg of C/m².yr (a 5,000-year average, Brevick E.C. and Homburg J.A., 2004).²⁰ In tidal ecosystems, sediment accumulation rates (via suspended sediment supply, tidal water flooding, etc.) exhort a major

¹⁸ MWD’s program is documented in a June 22, 2007 letter from its General Manager to Peter Douglas, Executive Director of the California Coastal Commission, as well as various contracts with relevant water agencies.

¹⁹ Since the SWP does not have a published Annual Emissions Report with the CCAR, Poseidon used the certified emission factor for SDG&E system. Poseidon believes this a conservative estimate and will update its calculations when more accurate data is available.

²⁰ [www.slc.ca.gov/Reports/Carlsbad Desalination Plant Response/Attachment 4.pdf](http://www.slc.ca.gov/Reports/Carlsbad%20Desalination%20Plant%20Response/Attachment%204.pdf)

control on carbon sequestration rates. Soil carbon sequestration rates determined recently in the Tijuana Estuary on the Mexico/USA border were determined to be 0.343 kg of C/m².yr (Cahoon et. al 1996).²¹ (4 = Cahoon, D.R., J.C. Lynch, and A. Powell, Marsh vertical accretion rates in a Southern California estuary, U.S.A., Estuar. Coast. Shelf Sci., 43, 19-32, 1996).

Given that the total area of the proposed wetland project is 37 acres, the carbon sequestration potential of the wetlands is between 4.9 and 51 tons of C/m².yr. These numbers are calculated as follows: Sequestration Rate (.033 kg of C/m².yr and 0.343 kg of C/m².yr) x Area (37 acres = 149,732.5 m²) x Weight conversion (1000 kg C = 1 metric ton of C) = tons of C sequestered/m².yr (as given above). To get from this unit the standard greenhouse gas unit of tons of CO₂ (not C) of sequestered per year, the conversion factor is 3.664. Therefore, the emissions avoided from the wetlands are estimated to be between 18 and 188 tons of CO₂ per year.

In order to verify the actual soil carbon sequestration rate of the proposed wetland ecosystem, site-specific measurements will need to be made. Protocols for wetlands are currently being developed for inclusion within the Clean Development Mechanism of the Kyoto Protocol, and Poseidon will use these protocols until CCAR makes its own wetland protocol available.

Table 4 summarizes the expected on-site and project-related reductions of GHG Emissions.

Table 4 – Expected On-site and Project-Related Reduction of GHG Emissions

Source	Total Annual Reductions in Power Use (MWh/year saved)	Total Annual Emissions Avoided (metric tons CO ₂ / year avoided)
Reduction due to High-Efficiency Design	(28,244)	(10,001)
Green Building Design	(300 to 500)	(106 to 177)
On-site Solar Power Generation	(0 to 777)	(0 to 275)
Recovery of CO₂	(N/A)	(2,100)
Reducing Energy Needs for Water Recycling	(1,950)	(690)
Reducing Water Importation	(190,641)	(67,506)
Sequestration in Coastal Wetlands	(N/A)	(18 to 188)
Subtotal On-site Reduction Measures	(N/A)	(80,421 to 80,937) (12,915 to 13,431)

PART III: IDENTIFICATION OF MITIGATION OPTIONS TO OFFSET ANY REMAINING GHG EMISSIONS

Offsite reductions of GHG emissions that are not inherently part of the Project include actions taken by Poseidon to participate in local, regional, state, national or international offset projects that result in the cost-effective reduction of GHG emissions equal to the indirect Project

²¹ www.sfbayjv.org/Tools/climate/CarbonWtlandsSummarv 07 Trulio.odf

emissions Poseidon is not able to reduce through other measures.²² One such offset project – the expenditure of one million dollars to reforest areas burned out by fires in the San Diego region in the fall of 2007 – has been identified by the CCC as the first priority among these measures. Poseidon will implement this project using the CARB- or CCAR-approved Forest Project Protocol or the upcoming CARB/CCAR Urban Forest Project Protocol, depending on the type of project Poseidon selects. Subject to the provisions of Sections III.C, E and F below, other carbon offset projects, except for ~~RECs~~RECS, will be purchased by Poseidon through/from CCAR, California APCDs / AQMDs, CARB, or other providers of offsets approved by the Executive Director or Commission (collectively, “Third Party Providers”).²³ The exact nature and cost of the offset projects and RECs will not be known until they are acquired by Poseidon. Offsets or RECs will also be used as the swing mitigation option to “true-up” changes over time to the Project’s net indirect GHG emissions, as discussed below.

A. ANNUAL “TRUE-UP” PROCESS

Since the quantity of offsets required will vary from year-to-year, the goal of the annual “True Up” process is to enable Poseidon to meet the subject year’s need for metric tons of offsets by purchasing or banking offsets in the short-term, while allowing Poseidon to make long-term purchases and bank offsets to decrease market exposure and administrative costs. To complete the True-Up process, Poseidon will use verification and accounting procedures of CARB, CCAR, or any California APCD / AQMD for measures obtained through those entities. Additionally, the third party independent reviewer selected, currently the California Center for Sustainable Energy (CCSE), will obtain the latest SDG&E emission factor from the annual ~~web-~~web-based CARB or CCAR Emissions Report within 60 days of the end of each calendar year, or the date of publication of the CARB or CCAR Emissions Report on the relevant CARB or CCAR web site, whichever is later. Within 120 days of the end of the prior calendar year or publication of the emission factor (whichever is later), CCSE, with assistance from Poseidon as needed, will gather electricity usage data, relevant data regarding Avoided Emissions, and then calculate the necessary metric tons of offsets required for the subject year. The subject year’s emissions will be calculated using actual billing data and the emissions factor for the relevant annual period. The subject year’s calculated metric tons of net emissions will be compared to the amount of metric tons of offsets previously acquired by Poseidon to determine if Poseidon has a positive or negative balance of net GHG emissions for the subject year, and all of this information will be included in the Annual GHG Report to be submitted to the Commission each year as discussed below. If there is a positive balance of net GHG emissions, Poseidon will purchase offsets to eliminate the positive balance, and provide the Commission with

²² This Plan requires Poseidon to join CCAR’s Climate Action Reserve, so that it may implement some of this Plan through the Reserve.

²³ Part 4, Section 38562(d)(1)&(2) states that CARB regulations covering GHG emission reductions from regulated “sources” must ensure that such reductions are “real, permanent, quantifiable, verifiable, . . . enforceable [and additional]”. While the Project is not a “source” under AB 32 and the criteria are not currently defined under implementing regulations, Third Party Providers will evaluate potential offset projects against equivalent criteria using their own protocols that employ the same criteria.

documentation substantiating that purchase, within 120 days of the date the positive balance is identified in the Annual GHG Report. If there is a negative balance of GHG emissions, the surplus offsets may be carried forward into subsequent years or sold by Poseidon on the open market.

Prior to the commencement of Project operations, Poseidon will be required to purchase offsets sufficient to cover estimated net (indirect) GHG emissions for at least the first year of operation (subject to Commission staff concurrence), or to cover a longer period of time at Poseidon's option, based on the most recently published SDG&E emission factor from CARB or CCAR and estimated electricity usage data for the first year of the Project period for which offsets are initially purchased. Poseidon will have the option to purchase offsets for any longer period of time up to and including the entire 30-year life of the Project, subject to Poseidon's above-stated obligation to address any positive balance in net GHG emissions that may subsequently arise. Beginning with the Sixth Annual Report, Poseidon can maintain a negative balance of net GHG emissions over a rolling five-year period. Poseidon will purchase enough GHG reductions measures that conform to the Plan such that it will not incur a positive net GHG emissions balance over any rolling five-year period.

B. CARBON OFFSETS PROJECTS AND CREDITS

Subject to the provisions of Sections III.C, E and F below, Poseidon will purchase carbon offset projects, except for RECs, through/from CARB, CCAR, or California APCDs / AQMDs. An offset is created when a specific action is taken that reduces, avoids or sequesters greenhouse gas (GHG) emissions in exchange for a payment from an entity mitigating its GHG emissions. Examples of offset projects include, but are not limited to: increasing energy efficiency in buildings or industries, reducing transportation emissions, generating electricity from renewable resources such as solar or wind, modifying industrial processes so that they emit fewer GHGs, installing cogeneration, and reforestation or preserving forests.

One type of offset project is Renewable Energy Credits (RECs), also known as Green Tags, Renewable Energy Certificates or Tradable Renewable Certificates. Each REC represents proof that 1 MW of electricity was generated from renewable energy (wind, solar, or geothermal). For GHG offsetting purposes, purchasing an REC is the equivalent of purchasing 1 MW of electricity from a renewable energy source, effectively offsetting the GHGs otherwise associated with the production of that electricity. RECs may be sold separately from the electricity.

Except as specified below, offset projects that Poseidon implements pursuant to this Plan will be those approved by CARB, CCAR, or any California APCD / AQMD as conforming to AB 32 requirements. Poseidon is committed to acquiring cost-effective offsets that meet rigorous standards, as detailed in this Plan. By requiring adherence to the principles, practices and performance standards described here, the Plan is designed to assure that selected offset projects will mitigate GHG emissions as effectively as on-site or direct GHG reductions. Adherence will ensure that the offset projects acquired by Poseidon are real, permanent, quantifiable, verifiable, enforceable, and additional, consistent with the principles of AB 32.

C. OFFSET ACQUISITION AND VERIFICATION

Poseidon shall acquire offsets through/from CCAR, CARB or California APCD/AQMD-approved projects. Acquisition of RECs are not limited to purchase from CCAR, CARB, or a California APCD/AQMD.

If sufficient offsets are not available from CCAR, CARB or a California APCD/AQMD at a price that is reasonably equivalent to the price for offsets in the broader domestic market, Poseidon may submit a written request to the Executive Director requesting that an additional offset provider, including without limitation any existing member of the Offset Quality Initiative, which includes CCAR, The Climate Trust, Environmental Resources Trust and The Climate Group/Voluntary Carbon Standard, be designated as a Third Party Provider from/through whom Poseidon may purchase offsets under the Plan.²⁶ In deciding whether or not to approve Poseidon's request, the Executive Director shall consider whether or not the proposed Third Party Provider is an independent and non-affiliated entity that adheres to substantially similar principles and evaluation criteria for high quality offsets as CCAR, CARB, a California APCD/AQMD or any Third Party Provider previously approved by the Executive Director or the Commission. The Executive Director shall determine whether or not to approve Poseidon's request to designate a Third Party Provider within 60 days. Any dispute between Poseidon and Commission Staff regarding the approval or denial of the requested entity may be brought by Poseidon to the ~~CCC~~Coastal Commission for hearing and resolution at the next available hearing date.

Poseidon's Annual GHG Report, discussed in Section III.D below, shall include an accounting summary and documentation from CCAR, CARB, a California APCD/AQMD and approved Third Party Providers, as applicable, which verifies that offsets obtained by Poseidon have been verified by CCAR, CARB, a California APCD/AQMD or ~~an~~ an approved Third Party Provider.

D. ANNUAL REPORT

Poseidon will provide an Annual GHG Report that will describe and account for Poseidon's annual and cumulative balance of verified net GHG emissions reductions. The Annual GHG Report will ~~include analysis and validation from CCSE of~~ analyze and validate : (1) the annual GHG emission calculations for the Project, (2) the positive or negative balance in Poseidon's net GHG emissions, (3) the acquisition of offsets and/or RECs in accordance with this Plan, and (4) any other information related to Poseidon's effects to mitigate GHG emissions resulting from the Project's electricity usage. Each year, CCSE will obtain the new emission factor from CCAR or CARB and prepare and submit Poseidon's Annual GHG Report within 180 days of the date of publication of CCAR/CARB emissions reports. The Annual GHG Report shall be submitted to the CCC and the CSLC, with a copy to Poseidon. In the event that the Annual GHG Report indicates that Poseidon has a positive balance of net GHG emissions for a particular year, Poseidon shall purchase offsets, and provide the Commission with

²⁶ The fee charged to Poseidon by the Commission for any request to approve additional offset providers pursuant to Section III.C., or to otherwise make the Plan workable by facilitating Poseidon's purchase of offsets/RECs to zero out the Project's net indirect GHG emissions, shall not exceed \$5,000.00.

documentation substantiating that purchase, within 120 days of the submission of an Annual GHG Report to the Commission. If an approved Annual GHG Report demonstrates that Poseidon possesses a negative balance of net GHG emissions, Poseidon will be free to carry those surplus offsets forward into subsequent years or sell them on the open market. Beginning with the Sixth Annual Report, Poseidon can maintain a negative balance of net GHG emissions over any rolling five-year period. Poseidon will purchase enough GHG reductions measures that conform to the Plan such that it will not incur a positive net GHG emissions balance over any rolling five-year period.

Before commencing Project operations, Poseidon shall submit its first Annual GHG Report for Commission staff review and approval, which will evidence sufficient offsets to zero out the Project's estimated net indirect GHG emissions for the first year. All subsequent reports will cover one calendar year.

E. CONTINGENCY IF NO GHG REDUCTION PROJECTS ARE REASONABLY AVAILABLE

At any time during implementation of this Plan, Poseidon may seek a determination from the Executive Director that (i) offset projects in an amount necessary to mitigate the Project's net indirect GHG emissions are not reasonably available; (ii) the "market price" for carbon offsets or RECs is not reasonably discernable; (iii) the market for offsets/RECs is suffering from significant market disruptions or instability; or (iv) the market price has escalated to a level that renders the purchase of offsets/RECs economically infeasible to the Project. Any request submitted by Poseidon shall be considered and a determination made by the Executive Director within 60 days. A denial of any such request may be appealed by Poseidon to the Commission for hearing and resolution at the next available meeting date. If Poseidon's request for such a determination is approved by the Executive Director, Poseidon may, in lieu of funding offset projects or additional offset projects, deposit money into an escrow account (to be approved by the Executive Director) to be used to fund GHG offset programs as they become available, with Poseidon to pay into the fund in an amount equal to \$10.00 per metric ton for each ton Poseidon has not previously offset, adjusted for inflation from 2008.²⁷ The period of time the escrow account contingency may be ~~utilized~~used under this Section shall be determined by the Executive Director or the Commission at the time Poseidon's request to use the contingency is approved, based on circumstances as they exist at the time of the request. Within 180 days of the Executive Director's determination pursuant to this Section, Poseidon will be required to submit a plan for Executive Director approval that identifies one or more entities ~~who~~that will use monies deposited into the escrow account to implement carbon offset projects.

F. CONTINGENCY IF NEW GHG REDUCTION REGULATORY PROGRAM IS CREATED

If, at any time during the life of the Project, ~~the~~ SDAPCD, South Coast Air Quality Management District (SCAQMD), or any other California APCD/AQMD or the California Air Resources

²⁵~~27~~27 \$10.00 per metric ton is a conservative figure, as offset credits were trading at \$4.90 per metric ton on the Chicago Climate Exchange as of market close on July 2, 2008.

Board (CARB) initiates a carbon tax or carbon offset program that would allow Poseidon to purchase carbon offsets or payment of fees to compensate for GHG emissions, Poseidon may, at its option, elect to pay into such a program in order to fulfill all or part of its obligations under the Plan to offset net indirect GHG emissions caused by the Project. By receiving certification from the relevant receiving entity that Poseidon has satisfied its obligations under the applicable regulatory program, Poseidon will be deemed to have satisfied its obligation under the Plan to offset net indirect GHG emissions for the part of the offset obligations under the Plan for which such certification is made. Subject to the approval of the relevant receiving entity, Poseidon may carry over any surplus offsets acquired pursuant to the Plan for credit in the new regulatory program.

G. EXAMPLES OF OFFSET PROJECTS

Offset projects typically fall within the seven major strategies for mitigating carbon emissions set forth below. A similar range and type of offset projects should be expected from a purchase by Poseidon, although it is difficult to anticipate the outcome of Poseidon's offset acquisitions at present.

1. **Energy Efficiency** (Project sizes range from: 191,000 metric tons to 392,000 metric tons; life of projects range from: 5 years to 15 years)
 - Steam Plant Energy Efficiency Upgrade
 - Paper Manufacturer Efficiency Upgrade
 - Building Energy Efficiency Upgrades
2. **Renewable Energy** (Project sizes range from: 24,000 metric tons to 135,000 metric tons; life of projects range from: 10 years to 15 years)
 - Small Scale Rural Wind Development
 - Innovative Wind Financing
 - Other renewable resource projects could come from Solar PV, landfill gas, digester gas, wind, small hydro, and geothermal projects
3. **Fuel Replacement** (Project size is: 59,000 metric tons; life of project is: 15 years)
 - Fuels for Schools Boiler Conversion Program
4. **Cogeneration** (Project size is: 339,000 metric tons; life of project is: 20 years)
 - University Combined Heat & Power
5. **Material Substitution** (Project size is: 250,000 metric tons; life of project is: 5 years)
 - Cool Climate Concrete
6. **Transportation Efficiency** (Project sizes range from: 90,000 metric tons to 172,000 metric tons; life of projects range from: 5 years to 15 years)
 - Truck Stop Electrification
 - Traffic Signals Optimization

7. **Sequestration** (Project sizes range from: 59,000 metric tons to 263,000 metric tons; life of projects range from: 50 years to 100 years)
 - Deschutes Riparian Reforestation
 - Ecuadorian Rainforest Restoration
 - Preservation of a Native Northwest Forest

H. POTENTIAL OFFSET PROJECTS FUNDED BY POSEIDON

Participants at the May 2, 2008 CCC Workshop proposed several potential projects that were suggested to be wholly or partially funded by Poseidon. Proposers were not prepared at that time to provide details for these projects other than generally describing the project concept. As a result, it is not yet possible to evaluate them for consistency with the applicable criteria for valid GHG reduction projects. The projects include the following:

- Reforestation Projects in the San Diego area ravaged by the 2007 fires
- Urban Forestry projects
- Estuary sequestration project
- Wetlands projects
- Fleet Fuel Efficiency Increase & Replacement project
- Accelerated Fleet Hybrid Deployment
- Large-Scale Solar PV project on a covered reservoir
- Mini-Hydro from installing pressure reducing Pelton wheels
- Solar Water Heating for a new city recreation swimming pool
- Lawn Mower Exchange Program (gas exchanged for electric mowers)
- Truck Fleet Conversion (especially older trucks from Mexico)
- School Bus Conversions
- White Tag projects or Energy Efficiency projects

Subject to the provisions of Sections III.C, E and F above, Poseidon will purchase these or other potential offset projects, except for ~~RECs~~RECS, through/from CARB, CCAR, or any California APCD / AQMD.

H.I. SEQUESTRATION THROUGH REFORESTATION

The CCC identified as a carbon offset project the reforestation of areas in the San Diego Region impacted by the wildfires that occurred during the fall of 2007. Specifically, at the ~~CCC's~~Coastal Commission's request, Poseidon has agreed to invest the initial \$1.0 million it spends on offset projects in reforestation activities in the San Diego Region. Poseidon commits to using either the CARB/CCAR Forest Project Protocols or the upcoming CARB/CCAR Urban Forest Project Protocol depending on the type of project Poseidon selects.

H.III. RENEWABLE ENERGY PARTNERSHIPS

Poseidon is exploring the possibility of participating in renewable energy projects with its water agency partners. Subject to the provisions of Sections III.C, E and F above, any offset projects implemented pursuant to this Plan, except for RECs, will be purchased through/from CARB,

CCAR, or any California APCD / AQMD. Table 5 presents a summary of some of the project opportunities and associated GHG offsets that are under consideration.

Table 5 – Potential Renewable Energy Partnerships

Desalination Project Public Partner / Location	Green Power Project Description	Annual Capacity of Green Energy Projected to be Generated by the Project (MWh/yr)
City of Encinitas	95 KW Solar Panel System Installed on City Hall Roof	160
Valley Center Municipal Water District	1,000 KW Solar Panel System	1,680
Rainbow Municipal Water District	250 KW Solar Panel System	420
Olivenhain Municipal Water District / Carlsbad Municipal Water District / City of Oceanside	Various solar and hydroelectric generation opportunities	To Be Determined
Santa Fe Irrigation District	Hydropower generation facility at R.E. Badger Filtration Plant	To Be Determined
	Total Renewable Power Generation Capacity (MWh/yr)	2,260

~~KKK~~. IMPLEMENTATION SCHEDULE

An illustrative schedule setting forth timing for implementation of Poseidon’s Plan elements, assuming regulatory approval is achieved in August 2008, is set forth in the following Implementation Schedule.

Table 6 – Implementation Schedule for the Plan

Measure	Process	Timing
Regulatory Approval		August 2008
Submit First Annual GHG Report	First Annual Report*, submitted to Commission staff for review and approval, shall be include enough detailed emissions reductions measures to achieve a projected zero net GHG emissions balance.	Before operations commence.

<p>Offset and REC Purchases Sufficient to Zero Out Estimated net indirect GHG emissions for first year of operations.</p>	<p>Subject to the provisions of Sections III.C, E and F above, offset projects or credits, except for RECs, will be implemented through CCAR, CARB or any California APCDs / AQMDs.</p>	<p>Before operations commence.</p>
<p>Annual True-Up Process, and all Subsequent Annual GHG Reports</p>	<p>Poseidon will submit its Annual GHG Report to Commission staff for review and approval. Once approved, Poseidon will purchase additional offsets as necessary to maintain a zero net GHG emissions balance, or bank or sell surplus offsets. Poseidon can demonstrate compliance over a rolling 5-year period in the Sixth Annual Report.</p>	<p>Each year, Poseidon will obtain the new emission factor from CARB or CCAR, and prepare and submit Poseidon’s Annual GHG Report within 180 days of the date of publication of CCAR/CARB emissions reports. If the report shows a positive net GHG emissions balance, Poseidon is required to purchase offsets, and submit proof of such purchase to Commission Staff, within 120 days from the date of the Annual GHG Report.</p>

* First Annual GHG Report will use projected electricity consumption. All subsequent Annual GHG Reports will use the previous year’s electricity consumption data.

LJLL. THE PROJECT’S ANNUAL NET-ZERO CARBON EMISSION BALANCE

Table 7 presents a summary of the assessment, reduction and mitigation of GHG Emission for the proposed Project. As Shown in the table, up to 83% of the GHG Emissions associated with the proposed Project could be reduced by on-site reduction measures, and the remainder would be mitigated by off-site mitigation projects and purchase of offsets or RECs. It should be noted that on-site GHG reduction activities are expected to increase over the useful life (i.e., in the next 30 years) of the Project because of the following key reasons:

- SDG&E is planning to increase significantly the percentage of green power sources in its electricity supply portfolio, which in turn will reduce its emission factor and the Project’s net indirect GHG emissions.

- Advances in seawater desalination technology are expected to yield further energy savings and net indirect GHG Emission reductions. Over the last 20 years, there has been a 50% reduction in the energy required for seawater desalination.

Table 7 – Expected Assessment, Reduction and Mitigation of GHG Emissions

Part I: Identification of GHG Amount Emitted		
Source	Total Annual Power Use (MWh/year)	Total Annual Emissions (metric tons CO₂/year)
Project Baseline Design	274,400	97,165
Part 2: On-site and Project-Related Reduction of GHG Emissions		
Reduction due to High-Efficiency Design	(28,244)	(10,001)
Green Building Design	(300 to 500)	(106 to 177)
On-site Solar Power Generation	(0 to 777)	(0 to 275)
Recovery of CO₂	(NA)	(2,100)
Reducing Energy Needs for Water Recycling	(1,950)	(690)
Reduced Water Importation	(190,641)	(67,506)
Sequestration in Coastal Wetlands	(NA)	(18 to 188)
Subtotal On-site Reduction Measures	(NA)	(80,421 to 80,937) (12,915 to 13,431)
Net GHG Emissions		16,422 to 16,228 67506
Part 3: Additional Off-site Reductions of GHG Emissions		
Sequestration Through Reforestation	(NA)	(245)
Potential Renewable Energy Partnerships	(0 to 2,260)	(0 to 800)
Subtotal Off-site Measures	(NA)	(245-1,045)
Offset and REC Purchases	(NA)	(16,499 to 15,067) (67,506)
Net GHG Emissions		0

