

## Executive Summary: PA No. 14 – GHG Offset Purchases

### Description

A GHG offset purchase program would entail purchasing GHG offset projects that give SCWD or SqCWD the sole legal right to claim the GHG emission reductions from the project. There are a numerous types of GHG offset projects but they can include: direct reductions of the use of fossil fuels, methane capture at a landfill or wastewater treatment plant, or a reforestation project, among others.

SCWD and SqCWD could use GHG offset purchases to build a portfolio of medium and long-term offsets to meet the agencies reduction goals, and/or as an annual “true-up” tool, in which the number of GHG offsets could change each year based on the amount of GHG reduction needed to meet the agencies’ desired GHG reduction goals.

### Amount of GHG Reduction

One GHG offset represents a reduction of one metric ton of carbon dioxide equivalent (CO<sub>2</sub>e). So, 100 GHG offsets equals 100 metric tons (MT) of CO<sub>2</sub>e. In the offset market place SCWD and SqCWD could buy as many GHG offsets as needed to meet their GHG reduction goals.

### Project Life and Sustainability

A GHG offset purchase program would provide GHG reductions for the length of the contract term of the offset purchase, and the term can range from one year to the life of the offset (i.e. – 1 to 20 years). SCWD and SqCWD would chose the life of the offset and could buy either short-term, medium-term or long-term offsets to meet their needs.

### Project Cost

GHG offset costs vary depending on the type and source of the offset. This assessment assumes that SCWD and SqCWD would purchase certified offsets. The price of an offset currently is approximately \$10-\$13 per MT CO<sub>2</sub>e and is likely to increase over time. To offset 100 MT CO<sub>2</sub>e per year, the average annual cost would be approximately \$5,700 for 20 years, for 250 MT about \$8,200 per year, and for 1,000 MT about \$21,000 per year. There is a substantial one-time set-up cost (from legal fees and staff time) that is approximately the same regardless of the amount of offsets purchased. So, of one were to purchase a larger amount of offsets, this one-time fee is spread over more offsets, and the cost per offset is reduced. The table below shows that the lifecycle cost per MT of CO<sub>2</sub>e drops from \$48 for 100 MT to \$17 for 1,000 MT.

**Table ES-1: GHG Offset Purchase Summary**

Project	Life (yr)	Capital Cost (\$)	Average Annual Net Cost (\$/Yr)	Avg Annual GHG Reductions (MT/Yr)	Lifecycle Energy Cost (\$/KWh)	Lifecycle GHG Reduction Cost (\$/MT)
GHG Offsets (100 MT)	20	\$30,800	\$5,659	100	N/A	\$48
GHG Offsets (250 MT)	20	\$62,000	\$8,213	250	N/A	\$27
GHG Offsets (1,000 MT)	20	\$218,000	\$20,981	1,000	N/A	\$17

# Draft Project Assessment No. 14 – GHG Offset Purchases

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## Description

Greenhouse gas (GHG) offsets, or a carbon offsets, are a tradable commodity representing the reduction of one metric ton of carbon dioxide equivalent (MT CO<sub>2</sub>e). GHG offsets may be purchased by SCWD and SqCWD to counteract the direct and indirect emissions from the desalination plant.

A global compliance market place already exists since the establishment of the European system in 2005. In 2007 that market traded 2,918 million MT of offsets valued at over \$66 billion dollars. The market for compliance offsets already exists in the eastern US through the Regional Greenhouse Gas Initiative (RGGI). In 2008, 72 million MT of offsets were traded with a value of \$263 million. The compliance market will come into existence in California with the implementation of California's cap & trade system (the basic rules for the cap & trade system were approved in December 2010). The system could be up and running in 2012. The market for voluntary offsets and carbon reduction projects exist now and in 2008 123 million MT were traded with a value of \$705 million.

There are essentially three markets or three types of offset projects that exist or are expected to be created in the future regulatory environment:

- Compliance Offsets
- Voluntary Offsets
- Carbon Reduction Projects

In order to categorize an offset one needs to look at the offset project specifics and determine which standard the project meets. The standard for each of these types of offset projects is different. Compliance offsets are meant to be traded in the regulatory cap & trade environment and thus must meet the highest standard in order to qualify. These projects must meet all the eligibility criteria set forth in AB 32: additional, real, permanent, quantifiable, verifiable, and enforceable and be based on a an approved protocol (see discussion below) and registered with the California Climate Action Registry. Voluntary offsets are outside the regulatory cap-and-trade system, meet the AB 32 criteria, but are not covered by an approved protocol nor would they be registered. These types of projects are usually set-up through a contract between the project developer and the buyer (e.g., a bi-lateral contract). Carbon reduction projects are offsets that cannot necessarily meet the AB 32 criteria or are not covered by any approved protocol, but are projects that intuitively known to cause reductions in GHGs. An example might be materials recycling programs.

This assessment focuses only on compliance and voluntary offsets because it is likely they will be the type of offsets that regulators will accept for the **scwd**<sup>2</sup> Energy Minimization and GHG Reduction Plan. This would be consistent with what the regulators did for Poseidon's Carlsbad 50 MGD desalination project.

Compliance and voluntary offsets must be certified, and there are numerous entities that have established processes to certify offset projects:

- California Climate Action Reserve (CAR)
- Chicago Climate Exchange (CCX)

- Gold Standard (GS)
- Voluntary Carbon Standard (VCS)

There are numerous other participants in the voluntary marketplace that sell offsets (e.g., NativeEnergy), and large brokers that develop, certify and sell offset project (e.g., 3Degrees and EcoSecurities). The US Department of Energy's (DOE) Energy Efficiency and Renewable Energy (EERE) Green Power Network lists over 30 different retailers nationwide (<http://apps3.eere.energy.gov/greenpower/markets/carbon.shtml>). In addition, CAR's CRT marketplace lists a variety of carbon credit retail, wholesale, brokers, and exchanges (<http://www.climateactionreserve.org/how/crt-marketplace>). The organizations help customers buy, sell, and market environmental commodities including verified carbon offsets. Many organizations are based in California, such as 3Degrees, which is headquartered in San Francisco.

There is a rigorous process that an offset project must go through in order to be certified by any one of these entities. Every offset must be certified and verified by an independent third-party. As part of the submittal of a project for certification it must:

- Describe the GHG offset project and the project developer's qualifications.
- Explain how the project meets the AB 32 eligibility criteria: additional, real, permanent, quantifiable, verifiable, and enforceable.
- Explain the methodology/protocol for calculating the project emission reductions, including the quantification of the baseline and the project's incremental emission reductions
- Monitoring and verification plan

Most certifying entities have restrictions about what types of offsets they will accept and certify; and some like CAR limit their acceptance to only projects that have fully vetted, peer reviewed, and approved protocols and methodologies. For instance, CAR currently only has protocols for nine types of offset projects:

- Forests (sequestration)
- Urban Forests (sequestration)
- Landfills
- Livestock
- Coal-Mine Methane
- Organic Waste Composting
- Organic Waste Digestion (ie – wastewater digesters)
- Nitric Acid Production
- Ozone Depleting Substances

An agricultural protocol is currently in the scoping process.

Developers of these project types must register their GHG reduction projects with a third party verification agency, such as CAR. For certified and verified offset projects CAR will issue carbon offset credits known as Climate Reserve Tonnes (CRT). Once the GHG offsets have

been registered, project owners may sell the offsets as compliance offset. However, since the regulatory compliance market and cap-and-trade system will not be established for California until 2012, offsets are currently only traded in the voluntary market.

There are two ways that SCWD and SqCWD likely would use offsets:

1. Purchase short-term to long-term offsets (i.e., 1 to 20 years) to help build a portfolio of GHG reduction projects to meet their GHG reduction goals.
2. Use offset purchases as an annual tool to meet their annual GHG reduction target. On an annual basis SCWD and SqCWD will need to calculate the necessary MT of CO<sub>2</sub> it will need to reduce. To perform this calculation, SCWD and SqCWD will obtain the latest PG&E emission factor from the annual web-based California Air Resources Board (CARB) Emissions Report. SCWD and SqCWD will gather electricity usage data and then calculate the necessary metric tons of offsets required for the subject year. The subject year's calculated metric tons of net emissions will be compared to the amount of metric tons of offsets previously acquired by SCWD and SqCWD to determine if SCWD and SqCWD have a positive or negative balance of net GHG emissions for the subject year. If there is a positive balance of net GHG emissions, SCWD and SqCWD can purchase offsets to eliminate the positive balance. If there is a negative balance of net GHG emissions, the surplus offsets may be carried forward into subsequent years or sold by SCWD and SqCWD on the open market. This annual "true-up" process will enable SCWD and SqCWD to meet each year's need by purchasing or banking short-term one-year offsets.

GHG offsets **do not** include renewable energy credits (RECs), which represent the environmental attributes of the power produced from renewable energy projects (RECs are discussed in Project Assessment No. 9), nor energy efficiency projects.

## History and Technical Maturity

California is the furthest along with respect to creating a regulatory framework for dealing with climate change and GHGs. In 2006, they passed the AB 32 the "Global Warming Solutions Act" which created GHG reduction goals, established a mandatory emissions reporting requirement, required the state to develop a plan to achieve the reduction goals, and called for a cap-and-trade system as part of the many measures needed to meet their GHG targets. CARB is currently working closely with six other western states and four Canadian provinces through the Western Climate Initiative (WCI) to design a regional cap-and-trade program. The program and rules are scheduled to go into effect and be legally enforceable by January 1, 2012. The cap-and-trade system will create a relatively small compliance market for carbon offsets. AB 32 also embraced most of the offset criteria initially established by the Kyoto Treaty. AB 32 also required that all offsets must be: additional, real, permanent, quantifiable, verifiable, and enforceable. Offsets also must be certified, verified and registered.

At the federal level, the US Environmental Protection Agency (EPA) has established a mandatory reporting program, and has the authority to regulate GHGs. They are currently in the process of developing that regulatory program.

In the earlier history of offsets there were offsets offered for sale did not meet the standards that they need to meet today. Rightfully, this caused the public to be quite skeptical of offsets, and first impressions are difficult to erase. However, since that time there has been an incredible amount of work to establish the certification rules and infrastructure that was described above.

Given the amount of rigor offsets now need to go through to become certified they have become increasingly more legitimate. While some may still be skeptical, once they become familiar with the rules and infrastructure they become more accepting of offsets. Today most people consider offsets as mature and legitimate.

## Reliability and Operational Complexity

The purchase of GHG offsets presents minimal operational complexities to SCWD and SqCWD. The program will require some administrative assistance and management. The certification and verification process painstakingly developed over the past decade requires a monitoring and verification program that ensures that the GHG emission reductions are quantifiable, real and permanent.

## Sustainability

A GHG offset purchase program would provide GHG reductions for the length of the contract term of the offset purchase, and the term can range from one year to the life of the offset (i.e. – 1 to 20 years). SCWD and SqCWD would choose the life of the offset and could buy either short-term, medium-term or long-term offsets to meet their needs.

## Local Considerations

Retailers and vendors of carbon credits offer either a part of their portfolio of offset projects or a project-specific GHG offset. In either case, SCWD and SqCWD would know where the offsets are coming from. SCWD and SqCWD may elect to purchase GHG offsets from only local projects. This would however be subject to the timing and availability of local projects.

By purchasing GHG offsets from local projects, SCWD and SqCWD would be investing in a project that directly benefits the local community. Such projects may include: forestry set-aside projects, urban forestry projects, re-forestation of areas damaged by recent fires, biogas production projects at local livestock farms and/or wastewater treatment plants, diversion of organics from local landfills, methane capture at a local landfill, and restoration of coastal wetlands. The benefit to the local community would be the creation of jobs, enhanced awareness and education, and reduction of local GHG emissions. Depending on the type of project, there may also be reductions in local energy consumption and local waste.

For example, currently there are a total of 42 projects either listed or registered with CAR in California. There is only one registered project located within Santa Cruz County – the Lompico Forest Carbon Project (<http://www.sempervirens.org/climate.php>) – which was developed in conjunction with PG&E and their Climate Smart program. The 425-acre forest preservation project was one of the first registered in the state of California under CAR's Forestry Protocol. In accordance with the Forestry Protocol's carbon accounting standards, this project sequesters 11,708 MT CO<sub>2</sub>e (or approximately 28 MT CO<sub>2</sub>e per acre). None of these offsets are currently available for purchase by SCWD or SqCWD.

If no local projects are available at the time of purchase, SCWD and SqCWD could pursue GHG offset project elsewhere in California or elsewhere in the country. Alternatively, SCWD and SqCWD could do its own RFP to solicit local qualified offset projects, thereby stimulating the supply of local projects. While this of course will take some effort and time to put out an RFP; it will increase the likelihood that the offsets will be local.

The specific environmental impacts of the purchasing of GHG offsets will depend on the type of GHG offset project. For example, methane capture at a landfill will have positive impacts to air and land, whereas a re-forestation project will be beneficial to air, land, water, and aesthetics. In general, all GHG offset projects will have positive environmental impacts.

Air: Most projects do not create air pollution, some actually enhance air quality, and any reduction in electricity use would also reduce GHG emissions.

Land: Most qualified projects would occur within the footprint of an existing facility and would not have a land impact. Forestry and urban forestry projects could possibly have positive impact on land use.

Water: Most offset projects would have little to no impact on water use; however, forestry related project will need water for irrigation. With proper design and care, projects should not have an impact on water quality.

Noise: Most offset project would have construction noise issues, and any methane recovery for electricity generation projects and composting operations could create significant noise issues.

Aesthetic/Visual: Most qualified projects would occur within the footprint of an existing facility and would not have an aesthetic/visual impact. Forestry and urban forestry projects could possibly have positive impact.

Waste by-product: Most offset projects would not have waste by-products. Forestry project will have slash from thinning, and landfill projects would probably not create additional leachate. Livestock projects, wastewater digestion projects, and composting projects will likely result in a reduction or beneficial use of the waste by-products.

## Energy Savings and GHG Reductions

A GHG offset project would not produce or save energy. The amount of GHG reduction would be based on how many carbon credits are purchased. Again, one GHG offset represents a reduction of one metric ton of carbon dioxide equivalent (CO<sub>2</sub>e).

SCWD and SqCWD could choose to offset some or all of their direct and indirect emissions related to the **scwd**<sup>2</sup> desalination plant. For planning purposes, this assessment estimates the amount of offsets required to offset the annual indirect GHG emissions from the proposed desalination plant running at half capacity, which equates to approximately 2,000 MT CO<sub>2</sub>e per year.

**Table 1: Estimated GHG Reductions for GHG Offset Purchases**

Project	Annual Energy Produced or Saved	Annual GHG Reduction (MT CO <sub>2</sub> e/yr)	Lifetime GHG Reduction (MT CO <sub>2</sub> e)
GHG Offsets (100 MT)	0	100	2,000
GHG Offsets (250 MT)	0	250	5,000
GHG Offsets (1,000 MT)	0	1,000	20,000

## Cost

In the aftermath of the California Air Resources Board's (ARB) positive vote on a cap & trade system in December 2010, the price of pre-compliance offsets increased to \$13/MT for the week of January 3-7, 2011. Compliance offset prices would likely command a higher price than this price for pre-compliance projects. For instance, in the well established and mature European Union's Emissions Trading Scheme (EU-ETS) the current trading price is about 14.38 Euros (about \$18.70/MT at current exchange rates). The prices in the EU-ETS have dropped since the first half of 2008 when there were at 20 Euros/MT (about \$27/MT). Prices reached 22 Euros/MT (about \$29/MT) at the end of the second half of 2008, and fell to 13 Euros/MT (about \$17/MT) in the first half of 2009.

Recent studies done by the Congressional Budget Office (CBO) and the U.S. Environmental Protection Agency (EPA), both of which were completed in June 2009, estimated a system price for a national cap & trade system. These studies provide reasonable price estimates for SCWD and SqCWD even though they are estimate for a national system based on the 2009 Waxman/Markey bill and somewhat dated. There are to our knowledge no better price forecasts available. Both the CBO and EPA estimate 2015 starting price at around \$12-\$16/MT. They differ in their escalation rates (EPA at a flat 5% per year, and CBO starting at 17% per year in 2016 and dropping to 10% by 2020), and therefore end up at different 2020 price estimates (EPA at just over \$15/MT and CBO at over \$22/MT). Estimates for the future 2020 price in the EU-ETS are in the range of 22-30 Euros/MT (\$28/MT to \$39/MT at today's exchange rates). Table 2 summarizes the current market prices and forecast for 2015 and 2020 prices.

**Table 2: Current and Estimated Future Offset Market Prices**

Market	Price
California Voluntary Market	\$13 per MT (2011)
EU-ETS	\$19 per MT (2011) \$28 to \$39 per MT (2020)
EPA	\$12 per MT (2015) \$15 per MT (2020)
CBO	\$12 per MT (2015) \$22.40 per MT (2020)

Many factors influence the price of carbon offsets including the type of project, location, and certifying protocol and/or agency. This assessment assumes that SCWD and SqCWD would purchase certified offsets. This assessment assumes a 2012 price of about \$10.40/MT, escalating at 5% per year, resulting in a 2015 price of \$12.04. This is reasonable and is consistent with the EPA and CBO studies, and consistent with recent California market prices. However, recent prices for offsets have dipped into the \$2/MT CO<sub>2</sub>e, and it is possible with the lack of action at the federal level and on the California cap-and-trade system the price could again fall to single digit price levels. Using a \$10.40/MT starting price would be a conservative assumption.

To offset 100 MT CO<sub>2</sub>e per year, the average annual cost would be approximately \$5,700 for 20 years, for 250 MT about \$8,200 per year, and for 1,000 MT about \$21,000 per year. There is a substantial one-time set-up cost (from legal fees and staff time) that is approximately the same regardless of the amount of offsets purchased. So, if one were to purchase a larger amount of offsets, this one-time fee is spread over more offsets, and the cost per offset is reduced. The table below shows that the lifecycle cost per MT of CO<sub>2</sub>e drops from \$48 for 100 MT to \$17 for 1,000 MT. Table 3 provides a summary of the estimated costs of a GHG offset program. There are no incentives for the purchase of GHG offsets.

**Table 3: Estimated GHG Offset Project Costs**

Project	Life (yr)	Capital Cost (\$)	Average Annual Net Cost (\$/yr)	Lifecycle Energy Cost (\$/kWh)	Lifecycle GHG Reduction Cost (\$/MT)
GHG Offsets (100 MT)	20	\$30,800	\$5,659	N/A	\$48
GHG Offsets (250 MT)	20	\$62,000	\$8,213	N/A	\$27
GHG Offsets (1,000 MT)	20	\$218,000	\$20,981	N/A	\$17

### Summary of Advantages and Disadvantages

Advantages:

- Relatively low cost projects (\$/MT).
- Minimal up-front capital requirement.
- Operationally simple. Minimal staffing to track and administer the program over time.
- Flexibility. Can purchase various amounts for various lifetimes. Can be an effective tool during the annual true-up process.

Disadvantages:

- Risk that costs (\$/MT) could be higher than the estimate in future years.
- Potential lack of available, cost-effective local projects. If none are available in the market, it may require SCWD and SqCWD to do a RFP to stimulate its own set of local offset projects.
- The general public does not understand how GHG offsets are certified and often question whether offsets are real and permanent. SCWD and SqCWD may need to do public education about the rigor these offsets go through before pursuing a GHG offset purchase program.