

**FINAL ENVIRONMENTAL IMPACT REPORT
GRAYSON REPOWERING PROJECT**

ENVIRONMENTAL IMPACT ANALYSIS
March 1, 2018

4.5 GREENHOUSE GASES

Global warming is the observed increase in the average temperature of the Earth's surface. The effects of increasing greenhouse concentration in the atmosphere may contribute to global warming. The major greenhouse gases (GHG)s are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

GHGs in the atmosphere absorb solar radiation reflected by the earth, which leads to warming of the atmosphere. GHGs also radiate energy both upwards toward space and downward to the surface of the earth. The downward direction of GHGs radiation is commonly called the "greenhouse effect."

Most GHGs can be produced through biogenic (natural) and anthropogenic (human-caused) processes. Biogenic sources include the combustion of biological material in forest fires, fermentation, decomposition or processing of biologically based materials. Some of the main sources of greenhouse gases due to human activity are the burning of fossil fuels, agricultural activities, and the use of chlorofluorocarbons (CFCs) in refrigeration and fire suppression systems.

Global Warming Potential is a measure of how much a greenhouse gas contributes to global warming relative to the heat contributed by a similar mass of carbon dioxide. CH₄ and N₂O have Global Warming Potential of 25 and 298 times that of CO₂, respectively. For this analysis, greenhouse gases other than CO₂ will be scaled to a single factor to determine the equivalent amount of CO₂ (CO₂e) for each gas. For CO₂, the scaling factor is 1.0. The scaling factors for CH₄ and N₂O are 25 and 298, respectively. USEPA developed emission factor tables to estimate the GHG emissions from various equipment and activities.

Table 4-34 summarizes the applicable federal, state, and local air laws, ordinances, regulations and standards (LORS) pertaining to GHG for the Project.

4.5.1 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Table 4-34 Applicable Federal, State, Local LORS for GHG

LORS	Administering Agency
Federal	
Title 40 CFR, Part 52, Subpart A, Section 52.21 – Prevention of Significant Deterioration of Air Quality	SCAQMD with USEPA Region IX oversight
40 CFR Part 60 Subpart TTTT (potentially delayed implementation) – Standards of performance for Greenhouse Gas Emissions for Electric Generating Units	USEPA Region IX
40 CFR Part 98, Subpart D: Mandatory Reporting of Greenhouse Gases Rule for Electricity Generation	USEPA Region IX



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LORS	Administering Agency
State	
Executive Order S-3-05	CARB
Assembly Bill 32 32 – Global Warming Solutions Act	CARB
Executive Order B-30-15	CARB
Assembly Bill 197 and Senate Bill 32	CARB
Assembly Bill 398	CARB
Local	
SCAQMD Rule 1714 – Prevention of Significant Deterioration for Greenhouse Gases	SCAQMD with USEPA Region IX oversight
Greener Glendale Plan	City of Glendale

Federal LORS

Title 40 CFR, Part 52, Subpart A, Section 52.21 – Prevention of Significant Deterioration of Air Quality

Beginning January 2, 2011, GHG emissions became subject to PSD regulations with emissions increase threshold of 75,000 tons CO_{2e} per year. Under certain circumstances, PSD review is not triggered solely based on GHG emissions. A facility will be required for PSD review if its annual CO_{2e} is equal or more than 75,000 tons and any of the regulated NSR (non-GHG) pollutants emissions exceed the applicable PSD threshold of 100 or 250 tons per year for power generating facilities.

Even though GHG emissions of the Project is expected to be more than 75,000 CO_{2e} tons per year, it is not expected to trigger PSD review for any of the non-GHG pollutants. Therefore, PSD permitting for the Project is not required.

Title 40 CFR Part 60, Subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units.

Based on the Presidential Executive Order 13783 of March 28, 2017, the Administrator of the USEPA will take necessary actions to review the Clean Power Plan Rules and Regulations, including the final rule entitled “Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Source: Electric Utility Generating Units.” If appropriate, the Administrator shall, as soon as practicable, suspend, revise, or rescind those rules and regulations (The White House – Presidential Executive Order 2017).

Until then, the Project is subject to Clean Power Plan Rules and Regulations, specifically 40 CFR Part 60 Subpart TTTT: Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units. This subpart establishes emission standards and compliance schedules for the control of GHG emissions from stationary combustion turbines that commence construction after January 8, 2014; and has a base load rating greater than 250 MMBtu/h of natural gas and is capable of generating 25 MW of electricity. Even though this subpart may be revised or rescinded, the proposed gas turbines are expected to meet the established CO₂ emission

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standards of 120 lb CO₂/MMBtu for non-base load gas turbines and 1,000 lb CO₂/MWh of gross energy output for base load gas turbines.

Title 40 CFR Part 98, Subpart D – Mandatory Greenhouse Gas Reporting for Electricity Generation.

The GHG Mandatory Reporting Rule (MRR) requires facility containing one or more electric generating units must submit annual GHG emission inventory to USEPA. The MRR includes calculation methodologies in reporting the GHG emissions. The Grayson Power Plant is currently subject to the reporting requirement and the facility will continue to be subject to the requirement after the Project is completed.

State LORS

California Executive Order S-3-05

In June 2005, Governor Schwarzenegger signed Executive Order S-3-05 that established GHG emission reduction goals for the State of California and developed responsibilities among the state agencies to ensure the reduction goals are met. The established targets are to reduce GHG emissions to 2000 levels by 2010, to reduce GHG emissions to 1990 levels by 2020, and to reduce GHG emissions to 80 percent below the 1990 levels by 2050. The first and second goals became law by the legislation known as Assembly Bill 32 or Global Warming Solutions Act of 2006.

Assembly Bill 32 – Global Warming Solutions Act of 2006

Assembly Bill 32 (AB 32), which was signed by Governor Arnold Schwarzenegger on September 27, 2006, is the first enforceable state-wide program in the U.S. to limit all GHG emissions from major industries. AB 32 requires the state of California to reduce its GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. The California Air Resource Board has subsequently developed an emissions reduction plan to achieve this goal. The reduction plan includes adopting regulations, developing a cap and trade program, and expanding of energy efficiency and renewable programs (CARB 2017a).

Executive Order B-30-15

In April 2015, Governor Brown signed Executive Order B-30-15 that sets GHG emission reduction goal to 40 percent below 1990 levels by 2030. This Executive Order was codified into law by the legislation known as SB 32.

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Assembly Bill 197 and Senate Bill 32 of 2017

Senate Bill 32 (SB 32) was signed into law on September 8, 2016 by Governor Brown. This bill requires a GHG emissions reduction of 40 percent below the 1990 levels by 2030. The SB 32 went into effect on January 1, 2017.

Assembly Bill 197 (AB 197), which was signed into law on September 8, 2016, becomes operative only if SB 32 is enacted and becomes effective on January 1, 2017. This bill creates the Joint Legislative Committee on Climate Change Policies; this Committee will advise and make recommendations to the Legislature concerning the state's programs, policies, and investments related to climate change.

AB 197 will require CARB to publish an annual emission inventory of greenhouse gases, criteria pollutants, and toxic air contaminants for each facility that reports to the state board and local air districts. It also requires CARB, when updating rules and regulations to achieve GHG emissions reductions beyond the statewide GHG emission limit, to follow specified requirements, consider the social costs of the emissions of GHG, and prioritize specified emission reduction rules and regulations in an effort to protect impacted and disadvantaged communities.

Assembly Bill 398

In July 2017, the California legislature passed Assembly Bill 398 (AB 398) to extend the state's cap and trade program from January 1, 2021 through December 31, 2030.

The Project is expected to cause GHG emissions in excess of the annual 25,000 metric tons cap and trade eligibility threshold. Therefore, the Project is expected to be subject to the cap and trade regulation and will comply by purchasing GHG offset credits in addition to use its California GHG allocations to mitigate emissions.

Local LORS

SCAQMD Rule 1714 – Prevention of Significant Deterioration for Greenhouse Gases

This rule sets forth preconstruction review requirements for GHG emissions to implement federal PSD requirements. As discussed in the above section of 40 CFR, Part 52, Subpart A, Section 52.21, the Project is expected to exceed the PSD threshold of 75,000 CO₂e tons per year. However, the Project is not expected to triggered PSD threshold for any non-GHG pollutants; therefore, PSD permitting is not required for the Project.

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Greener Glendale Plan

In addition to the State cap and trade program, the City of Glendale adopted Plan, The Greener Glendale Plan (Plan), to address sustainability and climate change and to use the United Nations Urban Environmental Accords as a framework for sustainability actions. The Plan contains specific measures the City can take to reduce GHG emissions from seven focus areas, such as energy, water, waste, transportations, urban design, urban nature, and environmental health. Pursuant to the Plan, the City of Glendale, at minimum, should meet regional GHG reduction targets of 8 percent by 2020, and 13 percent by 2035. The Project's consistency with the Greener Glendale Plan is discussed in Section 4.5.34.

4.5.2 ENVIRONMENTAL IMPACTS

Thresholds of Significance

The SCAQMD significance threshold for GHG emissions from an industrial project is 10,000 metric tons (MT) CO_{2e} per year. This threshold applies to GHG emissions from both construction and operation of the Project. When adopting its threshold, the SCAQMD Governing Board authorized the use of GHG offset credits as mitigation.

4.5.3 PROJECT IMPACTS

Threshold: *Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

The Project will replace the existing three boilers (Unit 3, 4, and 5) and three combustion gas turbines (Unit 8A, and 8BC) with four new combustion gas turbines (Unit 10, 11, 12, and 13). GHGs are emitted from the existing units due to the combustion of both natural gas and landfill gas. The proposed new equipment is expected to generate less GHG emissions on a pound per megawatt-hour basis than the existing equipment that is to be removed from service.

The average of annual fuel consumption from the most recent five years (2012 through 2016) is used in conjunction with emission factors that are approved by CARB and USEPA to estimate GHG emissions from the replaced units. Table 4-35 summarizes the historic actual GHG emissions and a detailed GHG emission inventory is included in Appendix F.

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Table 4-35 Baseline GHG Emission Rates

Devices	CO ₂ (MT/year)	CH ₄ (MT/year)	N ₂ O (MT/year)	Total CO ₂ e (MT/year)
Boiler 3 (Natural Gas)	4,789	0.09	0.01	4,794
Boiler 3 (Landfill Gas)*	18,565 5,635	0.35	0.073	18,584 5,664
Boiler 4 (Natural Gas)	17,783	0.34	0.03	17,801
Boiler 4 (Landfill Gas)*	66,097 20,061	1.235	0.124	66,165 20,164
Boiler 5 (Natural Gas)	27,461	0.52	0.05	27,490
Boiler 5 (Landfill Gas)	77,760 23,601	1.457	0.2914	77,839 23,772
Gas Turbine 8A	4,607	0.09	0.01	4,612
Gas Turbine 8BC	5,601	0.11	0.01	5,607
Facility Occupancy**	213.38	0.52	0.01	270
Total GHG Emissions:				223,162 109,852
<p>Note: *Boilers 3, 4, and 5 combusted both natural gas and landfill gas during 2012 through 2016. Landfill gas is currently piped from the Scholl Canyon Landfill to the Grayson Power Plant. However, by the time the Project is constructed, landfill gas will be retained and combusted at the Scholl Canyon Landfill. As a result, GHG emissions from the landfill gas combustion are not included in the baseline emissions inventory when determining the net GHG increase for the Grayson Repowering Project. ** Facility occupancy GHG emissions were estimated based 50 full time employees. Staffing levels are not expected to change due to the Project.</p>				

The Project will result in GHG emissions due to both construction and operation activities. The GHG construction emissions would be generated primarily by the off-road construction equipment and on-road vehicles. During facility operations, natural gas combusted in the new combustion turbines, diesel fuel combusted in the emergency engine, and facility occupancy related activities will contribute to GHG emissions. The facility occupancy related activities include water usages, power usages, and vehicle trips to the facility.

Additionally, the Project will include a new Fairmont switchyard, to be comprised of 21 circuit breakers containing SF₆. The new switchyard will have similar gas insulated switchgear geographic information system (GIS) system as the existing Kellogg switchyard. The potential SF₆ releases from the new switchyard were estimated based on the historical SF₆ releases from the existing Kellogg switchyard and adjusted based on the circuit breakers at Kellogg switchyard.

CalEEmod was used to calculate GHG emissions from the construction and facility occupancy related activities. USEPA emission factors for GHG inventories were used to estimate the GHG emissions from the proposed equipment. Tables 4-36 and 4-37 summarize the GHG emissions during the construction of the Project and the net increase of GHG emissions from operating the proposed power generating facility. A detailed GHG emission inventory is included in Appendix F.

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Table 4-36 GHG Emissions During the Construction of the Project

Device/Activity	CO ₂ (MT/year)	CH ₄ (MT/year)	N ₂ O (MT/year)	Total CO ₂ e (MT/year)
Construction	1,322	0.19	0	1,327

Table 4-37 Net Increase of GHG Emissions from the Operation

Device/Activity	CO ₂ (MT/year)	CH ₄ (MT/year)	N ₂ O (MT/year)	Total CO ₂ e (MT/year)
SCC-800 Combined Cycle Unit 10	185,722	3.5	0.35	185,914
SCC-800 Combined Cycle Unit 11	185,722	3.5	0.35	185,914
TRENT60 Simple Cycle Unit 12	52,047	0.98	0.10	52,100
TRENT60 Simple Cycle Unit 13	52,047	0.98	0.10	52,100
Emergency Engine	12.30	0.0002	0.00002	12
SF ₆ releases (Fairmont Switchyard)	0	0	0	96
Facility Occupants (Operational)	213.38	0.52	0.01	270
Total GHG Emissions:				476,406
Total Baseline GHG Emissions (excluding GHG emission from landfill gas combustion):				60,574
Net Increase of GHG Emissions:				415,832
Note: Once the Boilers 3, 4, and 5 are dismantled, the landfill gas will be combusted in Biogas Renewable Project. The GHG emissions from the landfill gas combustion will be counted toward the baseline GHG emissions for the Biogas Renewable Project, which consist of construction new power generation facility at the Scholl Canyon Landfill.				

As shown in Table 4-37, the net increase of GHG emissions from the operation of the Project exceeds the significance threshold of 10,000 metric tons per year. The GHG emissions exceedance is solely contributed from operating the proposed combustion turbines and transformers. However, the Project is required comply with the State cap and trade program by reporting CO₂e emissions from the Grayson Power Plant and acquiring allowances and offset credits to mitigate 100 percent of GHG emissions from the combustion equipment and transformers. Net emissions after mitigation will include only emissions related to facility occupants and will be well below the 10,000-metric ton significance threshold.

Level of Significance before Mitigation:

Less than Significant Impact

Mitigation Measures:

No mitigation is required

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Level of Significance after Mitigation:

Less than Significant Impact

Threshold: *Would the Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?*

Even though the Project will generate GHG emissions exceeding the CO₂e significance threshold of 10,000 metric tons per year, the Project will be required to comply with the State cap and trade program, which was established to support the State's goals to reduce GHG emission to 40 percent below 1990 by 2030 and 80 percent below 1990 levels by 2050. Emissions from the Project will be fully offset through the retirement of GHG allowances held by GWP, and additional credits to be purchased by GWP.

The Project includes installing and operating newer equipment that generates less GHG emissions on a pound per megawatt-hour basis than the existing equipment at Grayson Power Plant. In addition, the Project will allow the City to maximize the import of renewable energy sources through the limited existing transmission capacity into the City which will further assist the City in meeting the Renewable Portfolio Standards and GHG reductions specified in the Greener Glendale Plan. The Project is therefore consistent with the Greener Glendale Plan.

Level of Significance before Mitigation:

Less than Significant Impact

Mitigation Measures:

No mitigation is required

Level of Significance after Mitigation:

Less than Significant Impact