City of Palo Alto (ID # 11616)

City Council Staff Report

Report Type: Consent Calendar **Meeting Date: 12/7/2020**

Council Priority: Climate/Sustainability and Climate Action Plan

Summary Title: Carbon Neutral Gas Plan Review

Title: Staff and the Utilities Advisory Commission (UAC) Recommend the Council Adopt a Resolution Amending the City's Carbon Neutral Gas Plan to Continue to Achieve Carbon Neutrality for the City's Natural Gas Supply Portfolio

From: City Manager

Lead Department: Utilities

Recommendation

Staff and the Utilities Advisory Commission (UAC) recommend the Council adopt a resolution amending the City's Carbon Neutral Gas Plan, which includes the following key elements:

- Continue the Carbon Neutral Gas Plan to offset carbon emissions from City natural gas sales;
- Continue to restrict purchases to carbon offset project types which adhere to California Air Resources Board (CARB) cap and trade compliance protocols, including U.S. Forest, U.S. Urban Forest, U.S. Livestock, U.S. Sourced and Destroyed Ozone Depleting Substances, U.S Mine Methane Capture, and U.S. Rice Cultivation; or any other Project Type subsequently approved by CARB;
- Restrict purchases to CARB's vintage requirements;
- Continue to limit transactions to spot[1] purchases;
- Rate impacts of individual offset transactions are limited to under $19 per ton of CO_2e. This is consistent with the Council-approved maximum rate impact or 10¢/therm; and
- Maintain a preference for California projects as long as it does not result in a price premium.

Executive Summary

Palo Alto implemented a Carbon Neutral Gas Plan in FY 2018, staff report 7533[2] whereby carbon offsets are purchased to match the carbon emissions associated with all City of Palo Alto

[1] Staff identifies spot purchases as buying offsets that have already been created, verified, and are ready to be sold.

Utilities annual natural gas sales. Nearly four years into the plan, staff is revisiting the plan to clarify and refine plan parameters and update the community on the activities to date. The Carbon Neutral Gas Plan is provided as Exhibit A to the Resolution (Attachment A). Implementation of the Carbon Neutral Gas Plan will be carried out by staff.

Background

Natural gas use by residents, businesses, and City facilities contributes about 150,000 tons CO_2e annually, representing about 30% of the City's total 500,000 tons CO_2e footprint. This total does not include community greenhouse gas (GHG) emissions such as air travel, transportation, meat consumption, etc.

In December 2016, Council adopted Resolution 9649[3], staff report 7533, approving a Carbon Neutral Gas Plan to achieve carbon neutrality for the gas supply portfolio by FY 2018 using high-quality carbon offsets with a cost cap of up to 10/¢/therm. Council also directed staff to develop a Carbon Neutral Gas Plan implementation plan.

The Council-adopted Sustainability and Climate Action Plan (S/CAP) Framework[4] established a goal to reduce Palo Alto's greenhouse gas (GHG) emissions by 80% compared to 1990 levels by 2030. On December 11, 2017, Palo Alto City Council accepted a 2018-2020 Sustainability Implementation Plan[5] that included a goal to mitigate the impacts of natural gas use through carbon offsets as a bridging strategy to electrification. Purchasing carbon offsets to mitigate natural gas emissions and evaluating local offsets is a Council-approved key action.

Given the resolution was approved four years ago, staff is providing an update on the Plan implementation, performance to date, and proposing refinements to the Plan.

Discussion

Offsets Overview

A carbon offset is a reduction in CO_2e emissions to compensate for CO_2e emitted elsewhere. Offsets enable buyers to balance out their emissions. By productizing carbon offsets, a market is created for buyers and sellers to reduce CO_2e emissions, which in turn, incentivizes lower cost solutions to emission reductions. While carbon offsets are still a relatively young environmental product, the global market for carbon offsets has seen continued demand growth, and in 2018, the global voluntary market was estimated at approximately $300 million with cumulative volume over 1.2 billion metric tons transacted[6]. There is a robust marketplace for carbon offsets from both voluntary purchases, similar to those carried out under the City's Plan, as well as for compliance purchases, similar to the California Cap and Trade Program.

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[2] https://www.cityofpaloalto.org/civicax/filebank/documents/54882
[3] https://www.cityofpaloalto.org/civicax/filebank/documents/55728
[4] https://www.cityofpaloalto.org/civicax/filebank/documents/64814
[5] https://www.cityofpaloalto.org/civicax/filebank/documents/63141
[6] https://hubs.ly/H0m5qf60

Offsets balance out pollution across geographies but do not stop emissions from occurring in Palo Alto. As such, in the hierarchy of climate actions, reducing one's own sources of emissions is viewed as superior to carbon offsets created elsewhere. Further, there are inherent challenges in accurately measuring emission reductions from offsets, and there is greater certainty in measuring the impact of reducing one's own emissions. Though, given that emissions are a global problem, carbon offsets still provide significant value as a tool in a broader portfolio of climate actions to reduce emissions.

The most common offsets generated and sold into compliance and voluntary markets are those from forestry projects. These projects protect forests and sequester carbon through improved forest management, avoided conversion, or afforestation. Offset sales provide landowners an economic incentive to implement best forest management practices, avoid conversion of forest lands, or allow reforestation of trees, instead of cutting them down to sell lumber or develop the land for other revenue streams like commercial/residential real estate or agriculture use. It's estimated that over $1 billion has been paid to U.S woodland owners[7] not to cut forests.

While forests sequester carbon, dairy digesters capture methane instead of allowing it to release into the atmosphere. Most dairy farms store manure in a lagoon; creating an anaerobic environment in which the manure produces methane that is released into the atmosphere as it breaks down. Over an extended period of time, methane can be about 85 times more potent compared to carbon dioxide. Capturing and putting the methane to productive use, such as generating electricity, prevents that methane from entering the atmosphere. Since the dairy farmer built a system above and beyond what is required to manage the manure, a carbon offset is produced and can be sold to recoup some of the farmer's investment.

Similar to dairy digesters, offsets may be generated by methane capture at coal mines. To operate a coal mine safely, methane must be drained from the coal seam. Voluntarily capturing the methane that would otherwise emit to the atmosphere and putting it to a beneficial use such as electricity generation creates an offset, and therefore, revenue to recoup some of that investment.

"Additionality" is a key feature of all offsets, meaning actions taken to reduce emissions must be done on a voluntary basis without any requirement by federal, state, or local laws or regulations. Furthermore, offset projects must demonstrate that the project activity is not business-as-usual and that reductions would not have happened without the revenue from offset sales. Forestry, dairy digesters, and coal mine capture projects are three of the six project types approved by the California Air Resources Board and included in Palo Alto's Carbon Neutral Gas Plan. Attachment B contains visual representations of coal mine methane capture and dairy digester projects. Attachment C provides detail on all six project types.

Offset Concerns

[7] https://www.wsj.com/articles/preserving-trees-becomes-big-business-driven-by-emissions-rules-11598202541?mod=hp_lead_pos7

Carbon offset markets gained momentum in 2005 as a result of the Kyoto Protocol which established the Clean Development Mechanism (CDM) as the method to measure and verify emission benefits. Over time, research highlighted flaws with CDM-issued offsets that involve the lack of robust additionality tests, poor accounting possibly resulting in double counting, inaccurate savings estimation, leakage (an increase in emissions in one location resulting from a decrease in another location), and permanence. Environmental activists and concerned citizens have criticized carbon offsets by questioning whether these projects would occur without the offset market and uncovered inaccuracies in actual emission reductions. Further, not enough offsets can be created to meet the total emission reduction targets needed to address global warming concerns. Finally, purchasing offsets enables buyers to continue creating emissions. All of these are points to be cognizant of when evaluating the role of carbon offsets as a climate action strategy.

Mitigation of Offset Concerns

While there is inherent uncertainty involved in estimating emission reductions that result from carbon offset projects, there are many ways these concerns have been addressed in today's offset market, including offsets developed for California's Cap and Trade Program. The City does have a compliance obligation under California's Cap and Trade program; the regulations limit the use of offsets to 8% of capped emissions. The City's Carbon Neutral Gas Plan is separate and distinct from the City's Cap and Trade obligations. Under California's Cap and Trade Program, CARB established protocols[8] for six project types.

1. U.S. Forest Projects
2. Urban Forest Projects
3. Livestock Projects
4. Ozone Depleting Substances Projects
5. Mine Methane Capture projects
6. Rice Cultivation Projects

CARB adopted these protocols and approved carbon offset registries via a rigorous rulemaking process detailed in CARB's Process for the Review and Approval of Compliance Offset Protocols[9]

CARB developed each of these protocols to create real, additional, verifiable, and permanent emission reductions[10]. Though there are periodic studies that critique or recommend improvements, CARB's protocols have addressed many of the earlier issues or critiques with carbon offsets which originated from the Clean Development Mechanism. Offsets purchased

8 httpshttps://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/ct_reg_unofficial.pdf://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/ct_reg_unofficial.pdf

9 https://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/compliance-offset-protocol-process.pdf

10 https://govt.westlaw.com/calregs/Document/IAB809A46C9794E3EAA751C21B72AE536?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

under Palo Alto's Carbon Neutral Gas Plan are restricted to projects that are tracked by CARB approved registries and comply with CARB protocols. Attachment C contains detailed descriptions of each of the project types and the protocols. CARB protocols have strict additionality requirements, thorough verification processes, detailed monitoring and reporting to demonstrate permanence.

Offsets can be part of a bridging strategy while technologies and policies evolve to accelerate the ability to directly reduce emissions in a cost-effective manner.

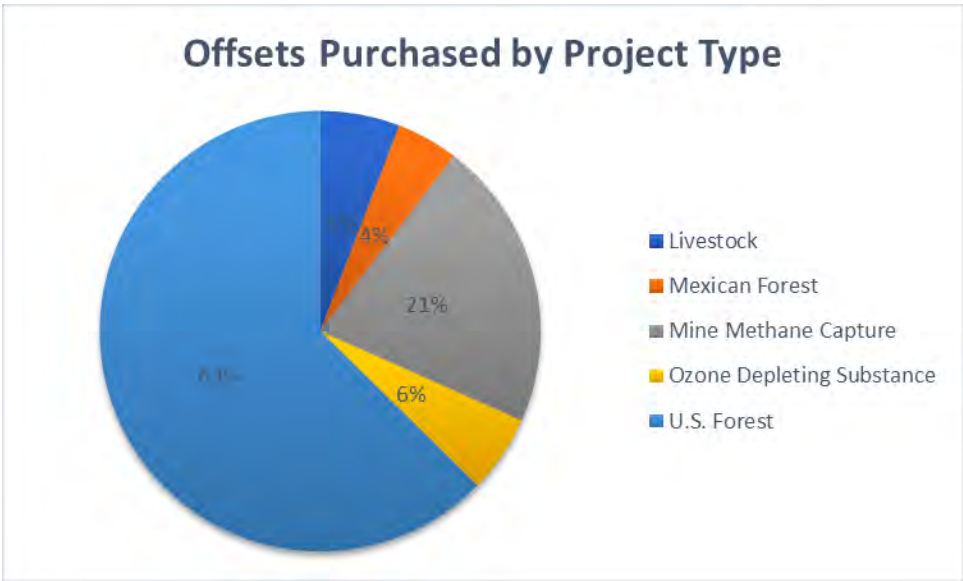
Potential to use Carbon Offsets for Other City Emissions

Carbon offsets can and have been used by cities, corporations and individuals to mitigate emissions from sources beyond those resulting from burning natural gas. This report only addresses carbon offset use in the context of the Carbon Neutral Gas Plan and does not contemplate an expanded role to achieve the other City sustainability goals.

Carbon Neutral Gas Plan Overview to Date

Since July 2017, emissions resulting from customers burning natural gas has been mitigated 100% by carbon offset purchases equal to CPAU's natural gas sales. When the plan was established four years ago, staff limited the purchases of offsets to project types accepted by CARB-approved California Cap and Trade compliance protocols. Council approved five enabling agreements with brokers that sell carbon offsets. The standard form agreement was approved via staff report 8717[11] (Reso 9703[12]), and the five enabling agreements were approved via staff report 8717, (Reso 9704[13]), staff report 9418[14] (Reso 9787[15]), staff report 9793[16] (Reso 9793[17]), and staff report 9700[18], (Reso 9798[19]). Staff executes approximately two transactions per year to buy offsets. A maximum rate impact of up to 10¢/therm ($19/ton CO_2e) was approved, and to date the cost of offsets has averaged less than 3¢/therm ($6.25/ton CO_2e). The figure below illustrates the project types represented in the offset purchases to date.

[11] https://www.cityofpaloalto.org/civicax/filebank/documents/61081
[12] https://www.cityofpaloalto.org/civicax/filebank/documents/62672
[13] https://www.cityofpaloalto.org/civicax/filebank/documents/63428
[14] https://www.cityofpaloalto.org/civicax/filebank/documents/66195
[15] https://www.cityofpaloalto.org/civicax/filebank/blobdload.aspx?t=65848.47&BlobID=66767
[16] https://www.cityofpaloalto.org/civicax/filebank/documents/66733
[17] https://www.cityofpaloalto.org/civicax/filebank/blobdload.aspx?t=71268.52&BlobID=67695
[18] https://www.cityofpaloalto.org/civicax/filebank/documents/67432
[19] https://www.cityofpaloalto.org/civicax/filebank/blobdload.aspx?t=68967.47&BlobID=68099



Offsets used for Cap and Trade compliance must go through one final certification step by CARB. CARB-certified offsets may not be used for Palo Alto's Carbon Neutral Gas Plan, however, the offsets the City purchases adhere to the same CARB protocols as do those that are sold in the compliance offset pool. Council also approved a purchase for about 10% of FY 2019 carbon offset needs from a forestry project near Palo Alto's sister city, Oaxaca, Mexico (staff report 8564[20], Reso 9725[21]) utilizing a protocol nearly identical to that applied to U.S. forestry projects. While the plan includes a preference for local and California located projects, there is no Council-approved premium for California projects. To date, none of the offset projects have originated in California. Attachment D shows details of all carbon offset transactions thus far.

There are two potential opportunities for local projects. Palo Alto administers a refrigerator recycling program and may purchase offsets resulting from the destruction of the related ozone depleting substances. Pricing has not been determined, and the quantities represent less than 1% of Palo Alto's offset needs. The second local project could be Urban Forestry which staff is exploring.

Review of Carbon Neutral Gas Plan Parameters

Spot Purchases versus Investing in Projects

There are two ways to procure offsets. The first is to purchase offsets on the "spot market". These offsets have already been created, verified, are ready to be sold, and are tracked by CARB approved registries. The other is to invest in projects that will generate offsets in the future. For example, an organization might provide capital to a dairy farmer so that the dairy farmer can build a digester. The investor receives offsets over a period of time once the digester is operational. This is similar to investing in a power plant and receiving energy over a period of time.

[20] https://www.cityofpaloalto.org/civicax/filebank/documents/62302
[21] https://www.cityofpaloalto.org/civicax/filebank/documents/62688

The Carbon Neutral Gas Plan is currently restricted to spot purchases. Because the plan is a bridge to electrification, and therefore a shorter-term strategy, and because project investment inherently carries more risk, staff recommends continuing to limit transactions to spot purchases.

Approved Project Types and Vintages
The plan currently restricts the purchase of offsets to project types that adhere to CARB protocols. These include U.S. forest, urban forest, livestock, ozone depleting substances, mine methane capture, and rice cultivation projects. CARB allows offsets generated in 2006 or later.

Staff has reviewed the CARB protocols and is satisfied that CARB's requirements and standards ensure projects are real, additional, accurate, and verifiable. Staff recommends continuing restricting offsets to project types which adhere to CARB protocols. In addition, staff recommends mirroring CARB's vintage requirements for offset purchases for the Carbon Neutral Gas Plan in the future. This means that projects must have been completed in 2006 or later.

CARB currently does not have a protocol for forestry projects outside of the U.S. Should another opportunity arise like the 2017 purchase from the forestry project in Oaxaca, staff will follow the same process by bringing it to Council for consideration.

Approved Prices for Offset Transactions
The Carbon Neutral Gas Plan includes an overall rate impact cap of up to 10¢/therm, approximately $19/ton CO_2e. To provide clarity for Plan implementation, staff recommends that no single transaction will exceed $19 per ton CO_2e.

Basis for Offset Quantities Purchased
Offsets are purchased in quantities that match CPAU's natural gas sales. The Plan covers natural gas sales and explicitly excludes any local distribution losses or other upstream emissions. Staff intends to cover this topic as part of a broader S/CAP discussion.

Resource Impact
There is no new resource impact expected from the adoption of this resolution.

Policy Implications
The Carbon Neutral Gas Plan is consistent with the Council-adopted 2018-2020 Sustainability Implementation Plan[22] which included a goal to mitigate the impacts of natural gas use through carbon offsets and key actions including purchasing carbon offsets to mitigate natural gas emissions.

[22] https://www.cityofpaloalto.org/civicax/filebank/documents/63141

Next Steps
If the Carbon Neutral Gas Plan modifications are approved by Council, staff will implement the changes immediately, beginning with offset purchases for the second half of FY20.

Stakeholder Engagement
On October 7, 2020, the UAC considered a proposed update to the Carbon Neutral Gas Plan. In an effort to address Council's previously stated preference for California carbon offsets, staff recommended an authorized 10% premium to paid for in-state carbon offsets. Citing the lack of sustainability advantage from a project in California versus somewhere else and the current economic environment, the UAC did not support the premium. Because California projects may yield co-benefits such as jobs and cleaner air, all else being equal, staff will continue to favor in-state carbon offsets. The proposed Carbon Neutral Gas Plan, as shown in Attachment A, Exhibit A, was modified to reflect this change. At the UAC request, staff also reworded the objective of the Plan to clarify the intent is to mitigate GHG emissions from natural gas usage in the City as a bridging strategy toward absolute reductions in natural gas use.

With the two changes described above, the UAC voted unanimously to recommend Council approval of the amended Carbon Neutral Gas Plan.

Environmental Review
The Council's adoption of a resolution modifying the Carbon Neutral Gas Plan does not meet the definition of a project, pursuant to section 21065 of the California Environmental Quality Act (CEQA). Offset project developers are responsible for performing necessary environmental reviews and acquiring permits as offset projects are developed.

Attachments:
- Attachment A: Resolution
- Exhibit A: Carbon Neutral Gas Plan
- Attachment B: Project Visuals
- Attachment C: CA Air Resources Board Compliance Offset Protocols
- Attachment D: Carbon Neutral Gas Plan Implementation

Not Yet Approved

Resolution No. _____
Resolution of the Council of the City of Palo Alto
Amending the Carbon Neutral Natural Gas Plan to
Continue to Achieve Carbon Neutrality for the City's
Natural Gas Supply Portfolio

R E C I T A L S

A. In December 2007, Council adopted the City's Climate Protection Plan which set aggressive greenhouse gas (GHG) emission reduction goals to be achieved by the year 2020.

B. In March 2013, Council approved Resolution 9322 directing staff to achieve carbon neutrality for the electric supply portfolio by 2013 through the use of a combination of hydroelectric resources, long-term renewable resources and short-term renewable energy resources and/or renewable energy certificates ("RECs").

C. On September 9, 2013, Council approved Resolution 9372 modifying and suspending portions of the PaloAlto**Green** Program and directed staff to develop a PaloAlto**Green** Gas (PAG Gas Program) Program.

D. On April 21, 2014, Council approved Resolution 9405 establishing the voluntary PAG Gas Program to provide the opportunity for residential and commercial customers to economically reduce or eliminate the impact of GHG emissions associated with their gas usage through the purchase of certified environmental offsets.

E. In April 2016, Council adopted a GHG reduction goal of 80% by the year 2030. GHG emissions associated with natural gas used by City of Palo Alto Utilities customers were 135,000 metric tons of carbon dioxide equivalent, or 27% of the City's GHG emissions, in 2015.

F. Staff initially proposed a Carbon Neutral Natural Gas Plan that would use a combination of physical biogas and high-quality environmental offsets to achieve a carbon-neutral gas portfolio by fiscal year 2018 by maximizing the amount of biogas in the portfolio while holding the rate impact at a maximum limit of ten cents per therm (10 ¢/therm).

G. On August 31, 2016, the Utilities Advisory Commission voted 6-1 to recommend Council approve a Carbon Neutral Gas Plan using a combination of physical biogas and high-quality environmental offsets to achieve a carbon-neutral gas portfolio and direct staff terminate the PAG Gas Program.

H. On October 18, 2016, the Finance Committee voted 2-1 to instead recommend that Council:

I.

(i) Adopt a resolution that (a) approves a Carbon Neutral Natural Gas Plan that would

enable the City to achieve a carbon-neutral gas supply portfolio starting in Fiscal Year (FY) 2018 with a rate impact not to exceed ten cents per therm (10 ¢/therm); and (b) terminate the PAG Gas Program established by Resolution 9405; and

(ii) Direct staff to: (a) develop an implementation plan for the Carbon Neutral Natural Gas Plan; (b) provide an option for Council to consider prioritizing local offsets; and (c) prioritize maximizing carbon reduction within the 10 ¢/therm rate impact cap.

J. On December 5, 2016, Council adopted Resolution 9649 approving a carbon neutral gas plan starting in fiscal year 2018 with a rate impact not to exceed ten cents per therm (10 ¢/therm) and terminated the PAG Gas program established by Resolution 9405.

K. On October 7, 2020, the Utilities Advisory Commission voted 7-0 to recommend Council approve the amended Carbon Neutral Gas Plan as outlined in Exhibit A.

The Council of the City of Palo Alto RESOLVES as follows:

SECTION 1. The Council hereby adopts a resolution:

1. Approving an amended Carbon Neutral Natural Gas Plan, as shown in Exhibit A, enabling the City to maintain a carbon-neutral gas supply portfolio.

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SECTION 2. The Council's adoption of this Resolution, which amends the Carbon Neutral Natural Gas Plan, does not meet the definition of a project, pursuant to section 21065 of the California Environmental Quality Act (CEQA). Offset project developers will be responsible for acquiring necessary environmental reviews and permits as those projects are developed.

INTRODUCED AND PASSED:

NOES:

ABSENT:

ABSTENTIONS:

ATTEST:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
Assistant City Attorney

APPROVED:

_____
City Manager

_____
Director of Utilities

_____
Director of Administrative Services

CITY OF PALO ALTO CARBON NEUTRAL GAS PLAN

EXHIBIT A TO RESOLUTION NO._____
ADOPTED BY COUNCIL ON: _____
RECOMMENDED FOR APPROVAL BY UTILITIES ADVISORY COMMISSION ON: Oct. 7, 2020

Carbon Neutral Gas Plan Objective:

Originally adopted by the City Council on December 5, 2016[1], the objective of the City's Carbon Neutral Gas Plan is to mitigate the GHG emissions resulting from natural gas use in the City of Palo Alto through the purchase of high-quality carbon offsets as a bridging strategy toward absolute reductions in natural gas use. Implementation of the Carbon Neutral Gas Plan will be carried out by staff.

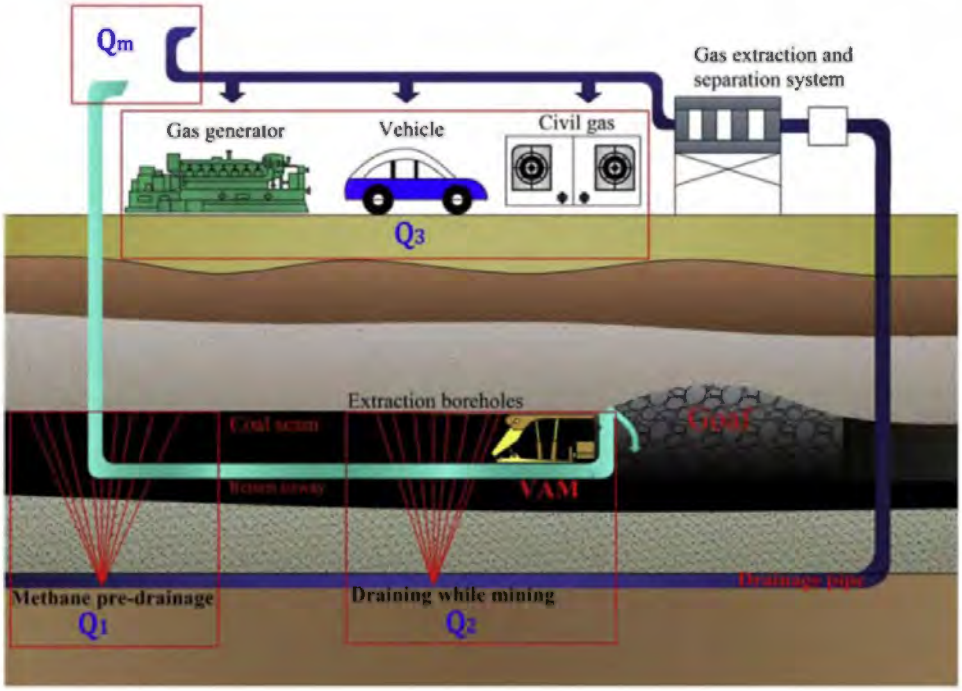
Carbon Neutral Gas Plan Elements:

1. The quantity of offsets purchased to meet the City's Carbon Neutral Plan objectives will be matched to carbon emissions associated with the City's natural gas sales volume;
2. Offset purchases must be from project types which adhere to California Air Resource Board (CARB)-approved cap and trade compliance protocols, currently including U.S. Forest, U.S. Urban Forest, U.S. Livestock, U.S. Sourced and Destroyed Ozone Depleting Substances, U.S Mine Methane Capture, and U.S. Rice Cultivation; or any other project type subsequently approved by CARB;
3. Offset purchases are restricted to CARB's vintage requirements, which currently permit offsets generated in 2006 or later;
4. Offset transactions are limited to spot purchases, which are for offsets that have already been created, verified, and are ready to be sold;
5. Rate impacts of individual offset transactions are limited to under $19 per ton of CO_2e. This is consistent with the Council-approved maximum rate impact of 10¢/therm.
6. In implementing the Carbon Neutral Gas Plan, staff will maintain a preference for California projects as long as this preference does not result in a price premium.

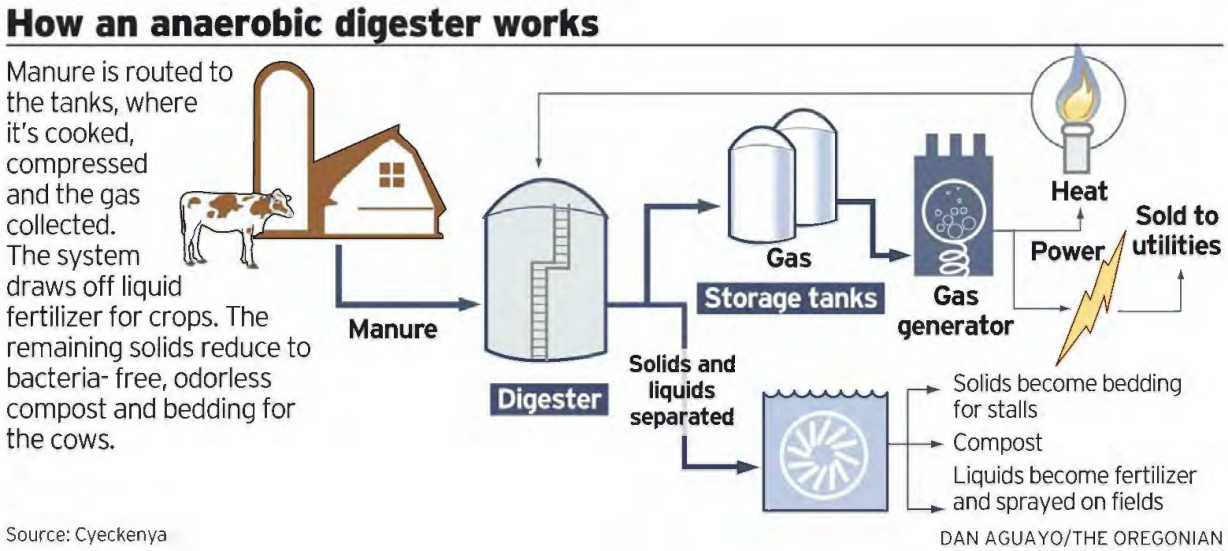
[1] Staff report 7533.

ATTACHMENT B: Carbon Offset Project Visuals

Mine Methane Capture



Dairy Digester



ATTACHMENT C: California Air Resources Board Compliance Offset Protocols[1]

1. Livestock Projects: Capturing and Destroying Methane from Manure Management Systems

This protocol defines a set of activities designed to reduce GHG emissions that result from anaerobic manure treatment at dairy cattle and swine farms. Projects that install a biogas control system (BCS) that captures and destroys methane gas from anaerobic manure treatment and/or storage facilities on livestock operations are eligible.

Project Definition:

(a) The BCS must destroy methane gas that would otherwise have been emitted to the atmosphere in the absence of the offset project from uncontrolled anaerobic treatment and/or storage of manure.
(b) Captured biogas can be destroyed on-site, transported for off-site use (e.g. through gas distribution or transmission pipeline), or used to power vehicles.
(c) A centralized digester that integrates waste from more than one livestock operation meets the definition of an offset project.

CARB Livestock Protocol[2]

2. Mine Methane Capture Projects: Capturing and Destroying Methane From U.S. Coal and Trona Mines

This protocol includes four mine methane capture activities designed to reduce GHG emissions that result from the mining process at active underground mines, active surface mines, and abandoned underground mines.

The following types of mine methane capture activities are eligible:

(a) Active Underground Mine Ventilation Air Methane Activities are projects that install a ventilation air methane (VAM) collection system and qualifying device to destroy the methane in ventilation air otherwise vented into the atmosphere through the return air shaft(s) as a result of underground coal or trona (sodium carbonate compound used to make baking soda) mining operations.
(b) Active Underground Mine Methane Drainage Activities are projects that install equipment to capture and destroy methane extracted through a methane drainage system that would otherwise be vented into the atmosphere as a result of underground coal or trona mining operations.
(c) Active Surface Mine Methane Drainage Activities are projects that install equipment to capture and destroy methane extracted through a methane drainage system that would otherwise be vented into the atmosphere as a result of surface coal or trona mining operations.

[1] https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program/compliance-offset-protocols
[2] https://ww3.arb.ca.gov/regact/2014/capandtrade14/ctlivestockprotocol.pdf

(d) Abandoned Underground Mine Methane Recovery Activities are projects that install equipment to capture and destroy methane extracted through a methane drainage system that would otherwise be vented into the atmosphere as a result of previous underground coal mining operations.

CARB Mine Methane Capture Protocol[3]

3. Ozone Depleting Substances Projects: Destruction of U.S. Ozone Depleting Substances Banks

This protocol defines a set of activities designed to reduce GHG emissions by the destruction of eligible Ozone Depleting Substances (ODS) at a single qualifying destruction facility.

ODS destroyed under this protocol must be from one or more of the eligible sources listed below:

(a) Refrigerants from industrial, commercial or residential equipment, systems, and appliances or stockpiles;
(b) ODS blowing agents extracted and concentrated from appliance foams; or
(c) Intact foam sourced from building insulation.

CARB Ozone Depleting Substances Protocol[4]

4. Rice Cultivation Projects

This protocol includes three rice cultivation project activities designed to reduce GHG emissions that result from rice cultivation on fields in the California and Mid-South Rice Growing Regions.

The following types of rice cultivation activities are eligible:

(a) Dry Seeding Activities are projects that sow seeds into a dry or moist, but not flooded, seedbed by drilling or broadcasting seeds onto rice fields, resulting in the reduction of methane that would otherwise be released into the atmosphere if the seeds were wet-seeded.
(b) Early Drainage in Preparation for Harvest Activities are projects that drain or dry standing water, while the soil is still saturated, from rice fields earlier during the rice growing season in preparation for harvest, resulting in the reduction of methane that would otherwise be released into the atmosphere if the rice fields were drained or dried on the customary date.
(c) Alternate Wetting and Drying Activities are projects that cyclically wet and dry the rice fields during the growing season to reduce methane emissions that would otherwise be released into the atmosphere if the project employed continuous flooding.

CARB Rice Cultivation Protocol[5]

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[3] https://ww3.arb.ca.gov/regact/2013/capandtrade13/ctmmcprotocol.pdf
[4] https://ww3.arb.ca.gov/regact/2014/capandtrade14/ctodsprotocol.pdf
[5] https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/protocols/rice/riceprotocol2015.pdf

5. U.S. Forest Projects: Sequestered Carbon on Forestland.

The protocol provides offset project eligibility rules; methods to calculate an offset project's net effects on greenhouse gas (GHG) emissions and removals of CO_2 from the atmosphere (removals); procedures for assessing the risk that carbon sequestered by a project may be reversed (i.e. released back to the atmosphere); and approaches for long-term project monitoring and reporting. The protocol is designed to ensure that the net GHG reductions and GHG removal enhancements caused by an offset project are accounted for in a complete, consistent, transparent, accurate, and conservative manner and may therefore be reported as the basis for issuing ARB or registry offset credits.

U.S. Forest Projects include reforestation, conversion avoidance and forest management. Forest management practices may include increasing time between harvest, increasing productivity by thinning diseased and suppressed trees, increasing productivity by managing brush and short-lived forest species, and planting more trees.

CARB Resource Page for US Forest Protocol[6]

6. Urban Forest Projects: Sequestered Carbon in Urban Canopy

This protocol applies to a planned set of urban tree planting and maintenance activities that permanently increase carbon storage, taking into account GHG emissions associated with planting and maintenance of project trees. Only offset projects located in the United States and its territories are eligible under this protocol.

CARB Urban Forest Protocol[7]

[6] https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program/compliance-offset-protocols/us-forest-projects/2015

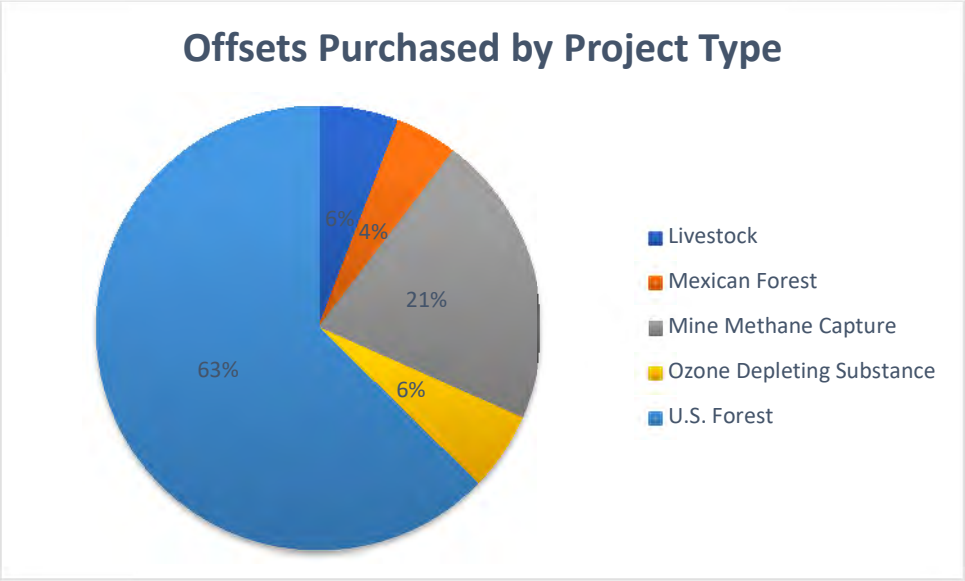
[7] https://ww3.arb.ca.gov/regact/2010/capandtrade10/copurbanforestfin.pdf

ATTACHMENT D: Carbon Neutral Gas Plan Implementation to Data

Deal #	Counterparty	Project	Date Purchased	Offset Purchased (Tons)	Offset Purchase Rate ($/ton)	Cost ($)	Protocol	Vintage
1	3Degrees	Grotegut Dairy	9/25/2017	1,408	7.50	10,560	Livestock	2009
2	3Degrees	Grotegut Dairy	9/25/2017	3,852	7.50	28,890	Livestock	2010
3	3Degrees	Grotegut Dairy	9/25/2017	655	7.50	4,913	Livestock	2011
4	Element Markets	Green Trees	9/27/2017	148,000	7.70	1,139,600	U.S. Forest	2012, 2013, 2014, 2015
5	ICICO	San Juan Lachao	12/13/2017	17,000	8.00	136,000	Mexican Forest	2016
6	3Degrees	Grotegut Dairy	9/25/2018	16,057	6.15	98,751	Livestock	2011, 2012, 2013
7	3Degrees	Blandin Forest	9/25/2018	33,943	6.25	212,144	U.S. Forest	2013, 2014
8	ACT	Pocosin+	12/20/2018	23,903	2.75	65,733	U.S. Forest	2002, 2003, 2004
9	Element Markets	Refex ODS	12/20/2018	21,418	4.95	106,019	Ozone Depleting Substance	2011
10	3Degrees	Blandin Forest	12/20/2018	29,679	5.70	169,170	U.S. Forest	2013, 2014
11	Element Markets	Methane Capture	9/12/2019	80,000	4.70	376,000	Mine Methane Capture	2007

Project	Protocol	Description
Grotegut Dairy	Livestock	Grotegut Dairy is a 3,900 milk-cow operation in Newton, Wisconsin with a methane capture system.
Green Trees	U.S. Forest	GreenTrees Advanced Carbon Restored Ecosystem is reforestation of agricultural lands into native hardwood forest in Mississippi, Louisiana, Arkansas, and Illinois
San Juan Lachao	Mexican Forest	Protection of forests located in High Biological Value Zones which contain flora and fauna listed in the Mexican Endangered Species List and the International Union for Conservation of Nature's Red List of Threatened Species. Project in San Juan Lachao near Palo Alto's Sister City of Oaxaca.
Blandin Forest	U.S. Forest	Blandin Native American Hardwoods Conservation and Carbon Sequestration project in Minnesota.
Pocosin+	U.S. Forest	These projects are all forested land that will not be disturbed by human development. Without this protection, the forests would be converted to grow wheat or corn. Forest conservation plays a vital role in protecting freshwater systems like lakes. The forests around the lakes act as natural water filters and purify the water for all who use it. The projects also support healthy populations of red wolf, bald eagle, black bear, and various bird species.
Refex ODS	Ozone Depleting Substance	The RemTec facility in Bowling Green, Ohio uses an argon arc plasma destruction device to achieve 99.99 percent removal. The majority of refrigerants originated in California, and all were sourced within the United States. The RemTec facility uses an argon arc plasma destruction device to achieve the required destruction and removal efficiency of 99.99 percent. The majority of ODS refrigerants originated in California, and all were sourced within the United States.
Methane Capture	Mine Methane Capture	This project is the first of its kind. Peabody Natural Gas, LLC removed methane from the North Antelope Rochelle Coal Mine before mining. The methane was compressed and transported to a natural gas pipeline and distributed to a national gas grid for use as fuel. Before implementation of the project, all the methane was vented to the atmosphere.

Protocol	Sum of Offset Purchased (Tons)	Percentage of Offset Purchased	Sum of Cost ($)	Average of Offset Purchase Rate ($/ton)
Livestock	21,972	6%	$143,113	$7.16
Mexican Forest	17,000	5%	$136,000	$8.00
Mine Methane Capture	80,000	21%	$376,000	$4.70
Ozone Depleting Substance	21,418	6%	$106,019	$4.95
U.S. Forest	235,525	63%	$1,586,647	$5.60
Grand Total	**375,915**	**100%**	**$2,347,779**	**$6.25**



Year	Sum of Offset Purchased (Tons)	Sum of Cost ($)	Average of Offset Purchase Rate ($/ton)
2017	170,915	$1,319,963	$7.64
2018	125,000	$651,817	$5.16
2019	80,000	$376,000	$4.70
Grand Total	**375,915**	**$2,347,779**	**$6.25**