BOARD OF DIRECTORS
MEETING
Board of Supervisors Chambers
700 H Street - Suite 1450
Sacramento, California

AGENDA

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Thursday **September 26, 2024** **9:00 AM**

DIRECTORS

Chair
Patrick Kennedy

Vice-Chair
Sarah Aquino

Rich Desmond	Caity Maple	Phil Serna
Sue Frost	Porshe Middleton	Donald Terry
Eric Guerra	Kevin Papineau	Shoun Thao
Patrick Hume	Sergio Robles	Mai Vang

ANNOUNCEMENTS

Members of the public may participate in the meeting in-person, by video conference via Zoom, conference line, and by submitting written comments electronically by email at boardclerk@airquality.org.

Comments submitted will be delivered to the Board of Directors by staff. Public comments regarding matters under the jurisdiction of the Board of Directors will be acknowledged by the Chairperson during the meeting. Public comments will be accepted live until the adjournment of the meeting, distributed to the Board of Directors, and included in the record.

Submit public comments via email to: boardclerk@airquality.org

Zoom Meeting Link:
https://us06web.zoom.us/j/87314130035?pwd=pTxA45BE35JssyS9bsq2AAvu2Zgaab.1

Meeting ID: 873 1413 0035
Passcode: 101299

Call In Number
(669) 900-6833
(408) 638-0968

Teleconference Locations:
Sacramento City Hall, 915 I Street, Room 5100, 5th Floor, Sacramento, CA 95814
Folsom Fire Station No. 34, 3255 Westwood Dr, Folsom, CA

CALL TO ORDER/ROLL CALL

PLEDGE OF ALLEGIANCE

BOARD CLERK ANNOUNCEMENTS

BROWN ACT

CONSENT CALENDAR

1. August 22, 2024 Board of Directors Meeting Minutes
   Recommendation: Approve the August 22, 2024 Board of Director Meeting Minutes.

2. Board of Directors Meeting Schedule for 2025

   Recommendation: Approve the 2025 Sacramento Metropolitan Air Quality Management District Board of Directors Meeting Schedule.

3. Transportation Incentive Grant to San Juan Unified School District

   Recommendation: Authorize the Executive Director/Air Pollution Control Officer to execute an agreement with San Juan Unified School District under the Low Emission Vehicle Incentive Program not to exceed $1,850,335, and make minor revisions to the contract, in consultation with the District Counsel and within the funding limits, that may be necessary to fully implement its intent.

PUBLIC HEARINGS

4. AB 617 Best Available Retrofit Control Technology Determination for Steam Methane Reforming

   Recommendation: Conduct a public hearing and 1) determine that the approval of the Best Available Retrofit Control Technology (BARCT) determination for steam methane reforming is not subject to the California Environmental Quality Act (CEQA), and 2) adopt a resolution approving the BARCT determination for Steam Methane Reforming.

DISCUSSION CALENDAR

5. Sacramento Area Sewer District Biogeneration Project and Community Bank Emission Reduction Credits

   Recommendation: (1) Receive and file a presentation on the Sacramento Area Sewer District Biogeneration Project and (2) adopt a resolution transferring a total of 30,153 pounds of nitrogen oxides (NOx) per year and a total of 12,920.3 pounds of reactive organic compounds (VOC) from the Community Bank to Sacramento Area Sewer District (SacSewer) for thirty years.

6. Light Duty Equity Programs: Update on Clean Cars 4 All, CarShare, and Mobility Hubs

   Recommendation: Receive and file a presentation on the Clean Cars 4 All (CC4A) program August 2024 relaunch, updates on the Our Community CarShare Program, and current efforts on zero emission mobility hubs.

AIR POLLUTION CONTROL OFFICER'S REPORT

7. Air Pollution Control Officer Presentation

   Recommendation: Receive and file a presentation from the Air Pollution Control Officer.

BOARD IDEAS, COMMENTS AND AB 1234 REPORTS

PUBLIC COMMENT

ADJOURN

Agenda Revision: This agenda may be revised. A final agenda will be posted on the website (www.airquality.org) and at the meeting site 72 hours in advance of the meeting. Materials submitted within 72 hours of the meeting and after distribution of the agenda packets will be made available on the Sac Metro Air District website subject to staff's ability to post the documents prior to the meeting. The order of the agenda items are listed for reference and may be taken in any order deemed appropriate by the Board of Directors. The agenda provides a general description and staff recommendation; however, the Board of Directors may take action other than what is recommended.

Testimony: The Board of Directors welcomes and encourages participation in Board meetings. When it appears there are several members of the public wishing to address the Board on a specific item, at the outset of the item the Chair of the Board will announce the maximum amount of time that will be allowed for presentation of the testimony. Matters under the jurisdiction of the Board and not on the posted agenda may be addressed by the general public immediately prior to the close of the meeting. The Board limits testimony on matters not on

the agenda to three minutes per person and not more than 15 minutes for a particular subject.

Meeting Broadcast: The meeting is videotaped in its entirety and will be cablecast without interruption on Metro Cable 14, the Government Affairs Channel and will be webcast at https://metro14live.saccounty.gov. This morning's meeting is being cablecast live and will be rebroadcast on Saturday, September 28, 2024 at 2:00 p.m. on Channel 14.

Closed Captioning: Metro Cable now provides closed captioning of the Sac Metro Air District Board meetings for the deaf and hard of hearing community. The captioning will be available on both the live and playback broadcasts on the Metro Cable television channel (Channel 14).

Assisted Listening: Assisted listening devices are available for use by the public. Please see the Clerk of the Board for further information.

Board Action: The Board of Directors may take action on any of the items listed on this agenda.

Information: Full staff reports are available for public review on the District's website (www.airquality.org), including all attachments and exhibits, or for public inspection at the District's office at 777 12th Street, Suite 300, Sacramento, CA. Copies of items prepared by staff and distributed for the first time at the meeting will be available at the back of the meeting room or may be obtained from the Board Clerk. Copies of items that were not prepared by staff may be obtained after the meeting from the Clerk. Materials related to an item on this Agenda submitted to Sac Metro Air District after distribution of the agenda packet are available for public inspection in the Clerk of the Board's office during normal business hours. For information regarding this agenda, please contact Salina Martinez, Clerk of the Sac Metro Air District Board of Directors, at 279-207-1164.

Meeting Date: 9/26/2024
Report Type: CONSENT CALENDAR
Report ID: 2024-0926-1.

1.

Title: August 22, 2024 Board of Directors Meeting Minutes

Recommendation: Approve the August 22, 2024 Board of Director Meeting Minutes.

Rationale for Recommendation: Minutes serve as the official record of the actions that occurred at board or committee meetings. It is the Board of Directors practice to approve the meeting minutes at subsequent Board meeting. The minutes are included as Attachment A.

All approved Board resolutions from the meeting are attached.

Contact: Salina Martinez, Administrative Supervisor/ Clerk of the Board, 279-207-1164

Presentation: No

ATTACHMENTS:

Attachment A: August 22, 2024 BOD Meeting Minutes
Resolution No. 2024-016 Side Agreements to Increase the Safety Shoe Allowance
Resolution No. 2024-017 General Provisions and Definitions Rule 101

Approvals/Acknowledgements

Executive Director or Designee: Alberto Ayala, Report Approved 9/17/2024

District Counsel or Designee: Kathrine Pittard, Approved as to Form 9/10/2024

Board Meeting Video

MINUTES

BOARD OF DIRECTORS
Sacramento Metropolitan Air Quality Management District
700 H Street, Suite 1450
Sacramento, California

Thursday **August 22, 2024** **9:00 AM**

DIRECTORS

Chair
Patrick Kennedy

Vice-Chair
Sarah Aquino

Bret Daniels
Rich Desmond
Sue Frost
Eric Guerra
Patrick Hume
Caity Maple
Kevin Papineau
Sergio Robles
Phil Serna
Donald Terry
Shoun Thao
Mai Vang

ANNOUNCEMENTS

Members of the public may participate in the meeting in-person, by video conference via Zoom, conference line, and by submitting written comments electronically by email at boardclerk@airquality.org.

Comments submitted will be delivered to the Board of Directors by staff. Public comments regarding matters under the jurisdiction of the Board of Directors will be acknowledged by the Chairperson during the meeting. Public comments will be accepted live until the adjournment of the meeting, distributed to the Board of Directors, and included in the record.

Submit public comments via email to: boardclerk@airquality.org

Zoom Meeting Link:
https://us06web.zoom.us/j/87314130035?pwd=pTxA45BE35JssyS9bsq2AAvu2Zgaab.1

Meeting ID: 873 1413 0035
Passcode: 101299

Call In Number
(669) 900-6833
(408) 638-0968

Teleconference Locations:
Folsom City Hall, 50 Natoma St., Folsom, CA 95630
Sacramento City Hall, 915 I Street, Room 5229, Sacramento, CA 95814
23265 N. State Route 99, Campo, CA 95240

CALL TO ORDER/ROLL CALL

Meeting was called to order.

Directors present: Sarah Aquino, Rich Desmond, Sue Frost, Eric Guerra, Caity Maple, Shoun Thao, Jay Vandenburg, and Mai Vang.

Directors absent: Bret Daniels, Patrick Hume, Patrick Kennedy, Kevin Papineau, Sergio Robles, Phil Serna, and Donald Terry.

Director Vandenburg attended and voted on behalf of Director Kevin Papineau.

PLEDGE OF ALLEGIANCE

CONSENT CALENDAR

ACTION:
Caity Maple Moved /Sarah Aquino Seconded

Ayes: Sarah Aquino, Rich Desmond, Sue Frost, Eric Guerra, Caity Maple, Shoun Thao, Jay Vandenburg, and Mai Vang.

Absent: Bret Daniels, Patrick Hume, Patrick Kennedy, Kevin Papineau, Sergio Robles, Phil Serna, and Donald Terry.

1. July 25, 2024 Board of Directors Meeting Minutes

   Recommendation: Approve the July 25, 2024 Board of Director Meeting Minutes.

Approved

2. Appointment of Hearing Board Member from the Medical Profession

   Recommendation: Pass a motion appointing Dr. Alexander Kelter to the Hearing Board as the member from the medical profession for a 3-year term beginning August 22, 2024, and ending August 21, 2027.

Motion Passed

Dr. Alexander Kelter attended the meeting and gave a brief introduction.

3. Side Agreement with the Sacramento Air District Employees' Association to Increase the Reimbursement Allowance for Safety Shoes

   Recommendation: Adopt a resolution authorizing the Executive Director/Air Pollution Control Officer to 1) execute a side agreement between the District and the Sacramento Air District Employees' Association (SADEA) for the General, Confidential General, and Supervisory Units to increase the biennial reimbursement allowance for eligible employees for safety shoes from $180 to $300, and 2) make minor changes or adjustments to the exhibit to the resolution to correct omissions and errors or for needed clarifications.

Resolution No. 2024-016

4. Sacramento City Unified School District Incentive Contract Amendment

   Recommendation: Authorize an amendment to an existing incentive agreement with the Sacramento City Unified School District (SCUSD) to increase the previously authorized not-to-exceed amount from $2,221,639 to $2,445,739.

Authorized

PUBLIC HEARINGS

5. Amendments to Rule 101 - General Provisions and Definitions

Recommendation: Conduct a public hearing for the adoption of amendments to Rule 101 – General Provisions and Definitions, and: 1) determine that the adoption of amendments to Rule 101 is exempt from the California Environmental Quality Act (CEQA); 2) adopt a resolution approving amendments to Rule 101; and 3) direct Staff to forward Rule 101 and all necessary supporting documents to the California Air Resources Board (CARB) for submittal to the U.S. Environmental Protection Agency (EPA) as a revision to the State Implementation Plan (SIP).

Resolution No. 2024-017

Diana Collazo, Monitoring, Planning and Rules Division, gave a presentation on Amendments to Rule 101 - General Provisions and Definitions.

Public Hearing was opened and closed with no public comment.

ACTION:
Rich Desmond Moved /Eric Guerra Seconded

Ayes: Sarah Aquino, Rich Desmond, Sue Frost, Eric Guerra, Caity Maple, Shoun Thao, Jay Vandenburg, and Mai Vang.

Absent: Bret Daniels, Patrick Hume, Patrick Kennedy, Kevin Papineau, Sergio Robles, Phil Serna, and Donald Terry.

DISCUSSION CALENDAR

6. Community Air Protection - South Sacramento/Florin Community Program Update

Recommendation: Receive and file an update on Assembly Bill 617 (AB 617) Community Air Protection Program for the South Sacramento-Florin community.

Lia Kollen, Monitoring, Planning and Rules Division, gave a presentation on Community Air Protection - South Sacramento/Florin Community Program Update.

Received and filed

7. District Headquarters Relocation Project Status Update

Recommendation: Receive and file an update on the District's Headquarters Relocation Project and an outlook on the hybrid model and building space needs.

Megan Shepard, Administrative Services Division, gave a presentation on the District Headquarters Relocation Project Status.

Received and filed

BOARD IDEAS, COMMENTS AND AB 1234 REPORTS

PUBLIC COMMENT

ADJOURN

RESOLUTION NO. 2024 – 016

Adopted by the Sacramento Metropolitan Air Quality Management District
Board of Directors

SIDE LETTER WITH THE SACRAMENTO AIR DISTRICT EMPLOYEES' ASSOCIATION TO INCREASE THE SAFETY SHOE REIMBURSEMENT ALLOWANCE

BACKGROUND:

A. The agreements between the District and SADEA include a reimbursement allowance for employees who are required by the District to wear safety shoes or boots in the fulfillment of their duties.

B. The allowance has remained at $180 every two years since 1996, yet prices have risen over the years making it difficult for staff to find quality footwear within the constraints of decades-old cost estimates.

C. Providing a reimbursement allowance for safety shoes or boots is essential to ensure the safety and well-being of our employees who regularly inspect manufacturing facilities, heavy equipment, and other potentially hazardous environments.

D. Proper protective footwear reduces the risk of injuries from slips, trips, falls, and heavy objects, and can prevent costly work-related accidents and downtime.

E. By investing in this necessary safety measure, the District demonstrates its commitment to maintaining a safe working environment, which ultimately protects employees from injury and the District from potential liabilities.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE BOARD OF DIRECTORS RESOLVES AS FOLLOWS:

Section 1. The side agreement with the Sacramento Air District Employees' Association to increase the safety shoe reimbursement allowance attached to this Resolution as Exhibit 1 is hereby approved, and the Executive Director / Air Pollution Control Officer, in consultation with District Counsel, is authorized to execute this agreement.

Section 2. The Executive Director/Air Pollution Control Officer, in consultation with District Counsel, is authorized to make minor changes or adjustments to the exhibit to the resolution to correct omissions and errors or for needed clarifications.

Section 3. Exhibit 1 is attached to and incorporated into this Resolution.

ON A MOTION by Director Caity Maple, seconded by Director Sarah Aquino, the foregoing resolution was passed and adopted by the Board of Directors of the Sacramento Metropolitan Air Quality Management District on August 22, 2024, by the following vote:

Ayes: Sarah Aquino, Rich Desmond, Sue Frost, Eric Guerra, Caity Maple, Jay Vandenburg (alternate for Kevin Papineau), Shoun Thao, and Mai Vang.

Noes:

Abstain:

Absent: Bret Daniels, Patrick Hume, Patrick Kennedy, Kevin Papineau, Sergio Robles, Phil Serna, and Donald Terry.

ATTEST: Salina Martinez

Digitally signed by: Salina Martinez
DN: CN = Salina Martinez email = smartinez@airquality.org C = AD O = Sac Metro Air District
Date: 2024.08.28 21:32:41 -07'00'

Clerk, Board of Directors
Sacramento Metropolitan Air Quality Management District

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Exhibit 1

SIDE AGREEMENT BETWEEN SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT AND THE SACRAMENTO AIR DISTRICT EMPLOYEES' ASSOCIATION

SAFETY SHOE REIMBURSEMENT ALLOWANCE

This Side Agreement (Agreement) between the Sacramento Metropolitan Air Quality Management District (the District) and the Sacramento Air District Employees' Association (SADEA) is entered into on August 22, 2024, as an amendment to the agreements covering the SADEA General, Supervisory and General Confidential bargaining units

The District and SADEA, collectively the "Parties," have met and conferred in good faith concerning the terms and conditions of this Agreement and agree to the following:

1. As provided for in Article 6, Section I of the existing agreements between SADEA and Management, the safety shoe reimbursement allowance for employees who are required to wear safety shoes in the fulfillment of their duties is increased from $180 to $300 every two years, effective immediately upon the execution of this Side Agreement.

2. The provisions in this Side Agreement supersede any previous agreements, whether oral or written, regarding the substance of this Side Agreement and related Memorandums of Agreement.

3. Except as provided in this Side Agreement and Side Agreements dated June 1, 2022, and November 29, 2023, all wages, hours, and other terms and conditions of employment remain in full force and effect.

This Agreement is executed on this ___ day of August 2024, by the following authorized representatives of each Party:

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

_____
Alberto Ayala, Executive Director

Date: _____

Reviewed by:

_____
Kathrine Pittard, District Counsel

Date: _____

SACRAMENTO AIR DISTRICT EMPLOYEES' ASSOCIATION

_____
Ryan Nowshiravan, President

Date: _____

Reviewed by:

_____
Jeff D. Carter, Labor Relations Consultant

Date: _____

RESOLUTION NO. 2024 – 017

Adopted by the Sacramento Metropolitan Air Quality Management District
Board of Directors

RULE 101 – General Provisions and Definitions

BACKGROUND:

A. The Board of Directors (Board) of the Sacramento Metropolitan Air Quality Management District (District) is authorized by Sections 40001, 40702, and 41010 of the California Health and Safety Code (HSC) to adopt, amend or repeal rules and regulations [HSC Section 40727(b)(2)].

B. The District is within an area designated nonattainment for the 2008 and 2015 8-hr ozone National Ambient Air Quality Standards.

C. The Board has determined that a need exists to amend Rule 101 to fulfill requirements of nonattainment new source review pursuant to 40 CFR 51.165 and incorporate eleven compounds exempted by EPA to the District's list of exempt compounds [HSC Section 40727(b)(1)].

D. The Board has determined that the meaning of Rule 101 can be easily understood by the persons affected by it [HSC Section 40727(b)(3)].

E. The Board has determined that Rule 101 is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations [HSC Section 40727(b)(4)].

F. The Board has determined that Rule 101 does not duplicate any existing state or federal regulations [HSC Section 40727(b)(5)].

G. The Board has determined that Rule 101 implements the requirements of CAA Sections 172(c)(5), 173, and 182(a)(2)(C) [HSC Section 40727(b)(6)].

H. The Board has considered a written analysis for Rule 101 in Staff's Statement of Reasons [HSC Section 40727.2].

I. The Board has maintained records of the rulemaking proceedings [HSC Section 40728].

J. The Board held a duly noticed public hearing on August 22, 2024, and considered public comments on Rule 101 [HSC Sections 40725 and 40726 and 40 CFR 51.102].

K. The Board has considered the socioeconomic impacts of Rule 101 in Staff's Statement of Reasons [HSC Section 40728.5].

L. The Board evaluated Rule 101 to determine whether it is exempt from the California Environmental Quality Act (CEQA) as an action by a regulatory agency for protection of the environment (Class 8 Categorical Exemption, §15308 State CEQA Guidelines) and as an action in which it can be seen with certainty that there is no possibility that the activity may have a significant adverse effect on the environment (§15061(b)(3), State CEQA Guidelines).

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE BOARD OF DIRECTORS RESOLVES AS FOLLOWS:

Section 1. The amendment of Rule 101 is exempt from CEQA.

Section 2. Approves and amends Rule 101 – GENERAL PROVISIONS AND DEFINITIONS, shown in the attached Exhibit A.

Section 3. Rule 101 (set forth in Exhibit A) is effective as of August 22, 2024.

Section 4. Directs Staff to forward Rule 101 and all necessary supporting documents to the California Air Resources Board for submittal to U.S. EPA as a revision to the California State Implementation Plan.

Section 5. Exhibit A is attached to and incorporated into this Resolution.

ON A MOTION by Director Rich Desmond, seconded by Director Eric Guerra, the foregoing resolution was passed and adopted by the Board of Directors of the Sacramento Metropolitan Air Quality Management District on August 22, 2024, by the following vote:

Ayes: Sarah Aquino, Rich Desmond, Sue Frost, Eric Guerra, Caity Maple, Jay Vandenburg (alternate for Kevin Papineau), Shoun Thao, and Mai Vang.

Noes:

Abstain:

Absent: Bret Daniels, Patrick Hume, Patrick Kennedy, Kevin Papineau, Sergio Robles, Phil Serna, and Donald Terry.

ATTEST: Salina Martinez

Digitally signed by: Salina Martinez
DN: CN = Salina Martinez email = smartinez@airquality.org C = AD O = Sac Metro Air District
Date: 2024.08.28 21:31:50 -07'00'

Clerk, Board of Directors
Sacramento Metropolitan Air Quality Management District

RULE 101 GENERAL PROVISIONS AND DEFINITIONS
Adopted 8-1-62
(**Amended 12-6-78, 6-5-79, 11-29-83, 9-5-96, 6-5-97, 9-3-98, 10-27-11, XX-XX-24)**

INDEX

This Page Intentionally Left Blank

100 GENERAL

101 **TITLE:** These rules and regulations shall be known as the Rules and Regulations of the Sacramento Metropolitan Air Quality Management District.

102 **APPLICABILITY:** Except as otherwise specifically provided in these rules and regulations or where the context otherwise indicates, the provisions of this rule shall apply to all rules and regulations of the Sacramento Metropolitan Air Quality Management District.

103 **SEVERABILITY:** If any regulation, rule, section, subsection, sentence, clause, phrase, or portion of these rules and regulations is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the Rules and Regulations of the Sacramento Metropolitan Air Quality Management District.

200 DEFINITIONS

201 **ATMOSPHERE:** The air that envelopes or surrounds the earth. Where air pollutants are emitted into a building not designed specifically as a piece of air pollution control equipment, such emission into the building shall be considered an emission into the atmosphere.

202 **BOARD:** The Board of Directors of the Sacramento Metropolitan Air Quality Management District.

203 **EMISSIONS UNIT:** An identifiable operation or piece of process equipment such as an article, machine, or other contrivance which controls, emits, may emit, or results in the emissions of any affected pollutant or hazardous air pollutant (HAP), directly or as fugitive emissions. Emissions unit shall not include the open burning of agricultural biomass.

204 **EXEMPT COMPOUND:**

204.1 For purposes of granting Emission Reduction Credits pursuant to Rule 204 – EMISSION REDUCTIONS CREDITS, an exempt compound is a compound which has been excluded from the definition of Volatile Organic Compounds pursuant to 40 CFR 51.100(s).

204.2 For all other purposes, a chemical identified in the following list:

a. carbon monoxide
b. carbon dioxide
c. carbonic acid
d. metallic carbides or carbonates
e. ammonium carbonate
f. methane
g. ethane
h. methylene chloride (dichloromethane)
i. 1,1,1-trichloroethane (methyl chloroform)
j. 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113)
k. trichlorofluoromethane (CFC-11)
l. dichlorodifluoromethane (CFC-12)
m. chlorodifluoromethane (HCFC-22)
n. trifluoromethane (HFC-23)
o. 1,2-dichloro 1,1,2,2-tetrafluoroethane (CFC-114)
p. chloropentafluoroethane (CFC-115)
q. 1,1,1-trifluoro 2,2-dichloroethane (HCFC-123)
r. 1,1,1,2-tetrafluoroethane (HFC-134a)
s. 1,1-dichloro 1-fluoroethane (HCFC-141b)
t. 1-chloro 1,1-difluoroethane (HCFC-142b)
u. 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124)
v. pentafluoroethane (HFC-125)

w. 1,1,2,2-tetrafluoroethane (HFC-134)
x. 1,1,1-trifluoroethane (HFC-143a)
y. 1,1-difluoroethane (HFC-152a)
z. parachlorobenzotrifluoride (PCBTF)
aa. cyclic, branched, or linear completely methylated siloxanes
bb. acetone
cc. perchloroethylene (tetrachloroethylene)
dd. 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)
ee. 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)
ff. 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC 43-10mee)
gg. difluoromethane (HFC-32)
hh. ethylfluoride (HFC-161)
ii. 1,1,1,3,3,3-hexafluoropropane (HFC-236fa)
jj. 1,1,2,2,3-pentafluoropropane (HFC-245ca)
kk. 1,1,2,3,3-pentafluoropropane (HFC-245ea)
ll. 1,1,1,2,3-pentafluoropropane (HFC-245eb)
mm. 1,1,1,3,3-pentafluoropropane (HFC-245fa)
nn. 1,1,1,2,3,3-hexafluoropropane (HFC-236ea)
oo. 1,1,1,3,3-pentafluorobutane (HFC-365mfc)
pp. chlorofluoromethane (HCFC-31)
qq. 1 chloro-1-fluoroethane (HCFC-151a)
rr. 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)
ss. 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane ($C_4F_9OCH_3$ or HFE-7100)
tt. 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OCH_3$))
uu. 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane ($C_4F_9OC_2H_5$ or HFE-7200)
vv. 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OC_2H_5$)
ww. methyl acetate
xx. 1,1,1,2,2,3,3-heptafluoro-3-methoxy-propane (n-$C_3F_7OCH_3$ or HFE-7000)
yy. 3-ethoxy-1,1,1,2,3,4,4,5,5,6,6,6-dodecafluoro-2-(trifluoromethyl) hexane (HFE-7500)
zz. methyl formate ($HCOOCH_3$)
aaa. 1,1,1,2,2,3,4,5,5,5-decafluoro-3-methoxy-4-trifluoromethyl-pentane (HFE-7300)
bbb. propylene carbonate
ccc. dimethyl carbonate
ddd. $HCF_2OCF_2OCF_2CF_2OCF_2H$ (H-Galden 1040x or H-Galden ZT 130 (or 150 or 180))
eee. trans-1,3,3,3-tetrafluoropropene (HFO-1234ze)
fff. trans-1-chloro-3,3,3-trifluoropropene (HFO-1233zd)
ggg. 2,3,3,3- tetrafluoropropene (HFO-1234yf)
hhh. 2-amino-2-methyl-1-propanol (AMP)
iii. 1,1,2,2-tetrafluoro-1-(2,2,2-trifluoroethoxy) ethane (HFE-347pcf2)
jjj. cis-1,1,1,4,4,4-hexafluorobut-2-ene (HFO–1336mzz–Z)
kkk. 1,1,1',1'-tetrafluorodimethyl ether (HFE-134)
lll. bis(difluoromethoxy)difluoromethane (HFE-236cal2)
mmm. 1,2-bis(difluoromethoxy)-1,1,2,2-tetrafluoroethane (HFE-338ppc13)
nnn. (2E)-1,1,1,4,4,4-hexaflourobut-2-ene (HFO-1336mzz(E))
ooo. perfluorocarbon compounds which fall into these classes:
  A. cyclic, branched, or linear, completely fluorinated alkanes;
  B. cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
  C. cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
  D. sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

205 **ON-SITE:** The parcel(s) of land or other real property(ies) on which an emissions unit is located.

206 **PERSON:** Any individual, firm, association, organization, partnership, business trust, corporation, company, contractor, supplier, installer, user or owner, or any state or local government agency or public district or any officer or employee thereof. “Person” also means the United States or its agencies to the extent authorized by Federal law.

207 **REGULATION:** One of the major subdivisions of the Rules and Regulations of the Sacramento Metropolitan Air Quality Management District.

208 **RULE:** A rule of the Sacramento Metropolitan Air Quality Management District.

209 **SECTION:** A section of the Rules and Regulations of the Sacramento Metropolitan Air Quality Management District unless some other rule, statute, or regulation is specifically mentioned.

210 **STANDARD CONDITIONS:** "Standard Conditions" are a gas temperature of 68 degrees Fahrenheit (20 degrees Celsius) and a gas pressure of 14.7 pounds per square inch (760 millimeters of mercury) absolute. Results of all analyses and tests shall be calculated or reported at this gas temperature and pressure.

211 **TRADE SECRET:** A trade secret includes, but is not limited to, any formula, plan, pattern, process, tool, mechanism, compound, procedure, production data, or compilation of information which:

211.1 Is not patented; and

211.2 Is known only to certain individuals within a commercial concern who are using it to fabricate, produce, or compound an article of trade or a service having commercial value; and

211.3 Gives its user an opportunity to obtain a business advantage over competitors who do not know or use it.

212 **VOLATILE ORGANIC COMPOUND (VOC):** Any compound containing at least one atom of carbon, excluding any exempt compound as defined in Section 204.

300 STANDARDS

301 **AUTHORITY TO ARREST:** In the performance of his or her duties, the Air Pollution Control Officer and his or her duly authorized agents shall have the authority and immunity of public officers and employees as set forth in the California Penal Code Section 836.5 to make arrests without a warrant whenever he or she has reasonable cause to believe that the person to be arrested has committed a misdemeanor in his presence which is in violation of any of the rules and regulations of the Sacramento Metropolitan Air Quality Management District wherein he or she has the authority to enforce or of any statute which he or she has the authority to enforce.

302 **DISCLOSURE OF DATA:** Except as provided in section 302.3, the Air Pollution Control Officer shall provide reasonable notice to the source prior to making the following data and information available to the public and other government agencies for examination and provide copies thereof where appropriate:

302.1 Air pollution data, including trade secrets, shall be disclosed in accordance with the provisions of Government Code Section 6254.7.

302.2 Data required to be submitted to the District under the Air Toxics “Hot Spots” Information and Assessment Act, and which the operator believes to be a trade secret, shall be protected from disclosure in accordance with the provisions of Health and Safety Code Section 44346.

302.3 Air pollution data required by District, state, or federal requirements will be made available to the public without prior notice to the source.

This Page Intentionally Left Blank

Meeting Date: 9/26/2024
Report Type: CONSENT CALENDAR
Report ID: 2024-0926-2.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT 2.

Title: Board of Directors Meeting Schedule for 2025

Recommendation: Approve the 2025 Sacramento Metropolitan Air Quality Management District Board of Directors Meeting Schedule.

Rationale for Recommendation: Based on the Board's established practice of meeting on the fourth Thursday of each month at 9:00 a.m., it is recommended that the Board approve the proposed 2025 meeting schedule for the Sacramento Metropolitan Air Quality Management District Board of Directors, as outlined in Attachment A.

As in prior years, the June 2025 meeting may need to be cancelled due to the summer recess of both the Sacramento County Board of Supervisors and the Sacramento City Council, which typically begins in late June. Additionally, the Board traditionally does not meet in November or December due to the holiday season. However, if deemed necessary, a meeting may be called by the Executive Director/Air Pollution Control Officer during those months.

Contact: Salina Martinez, Administrative Supervisor/ Clerk of the Board, 279-207-1164

Presentation: No

ATTACHMENTS:

Attachment A: 2025 Board of Directors Meeting Schedule

Approvals/Acknowledgements

Executive Director or Designee: Alberto Ayala, Report Approved 9/20/2024

District Counsel or Designee: Kathrine Pittard, Approved as to Form 9/17/2024

SAC METRO AIR DISTRICT
BOARD OF DIRECTORS
2025 MEETING SCHEDULE

January 23

February 27

March 27

April 24

May 22

June 26

July 24

August 28

September 25

October 23

Meeting Date: 9/26/2024
Report Type: CONSENT CALENDAR
Report ID: 2024-0926-3.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT 3.

Title: Transportation Incentive Grant to San Juan Unified School District

Recommendation: Authorize the Executive Director/Air Pollution Control Officer to execute an agreement with San Juan Unified School District under the Low Emission Vehicle Incentive Program not to exceed $1,850,335, and make minor revisions to the contract, in consultation with the District Counsel and within the funding limits, that may be necessary to fully implement its intent.

Rationale for Recommendation: The District's purchasing authority for incentive contracts requires Board approval when an incentive contract exceeds $1,000,000. Staff has received an application that will exceed the $1,000,000 threshold. Funding this project will help promote advanced technology in the Sacramento region and deploy low emission and zero-emission vehicles in many communities impacted by local air pollution.

Contact: Michael Neuenburg, Transportation and Climate Change Program Supervisor, 916-531-1119

Presentation: No

Approvals/Acknowledgements

Executive Director or Designee: Alberto Ayala, Report Approved 9/20/2024

District Counsel or Designee: Kathrine Pittard, Approved as to Form 9/10/2024

Discussion / Justification: In Fall of 2022, the District conducted competitive solicitation for applicants to receive funds to partially offset the cost of replacing combustion engines with lower emission equipment. Several applications were received. In the Fall of 2022, San Juan Unified School District applied to replace fifteen school buses with fifteen new propane school buses along with supporting infrastructure. These propane buses are near zero-emission with a gram per brake horsepower-hour (g/bhp-hr) of 0.02. The supporting infrastructure will be a 15,000 gallon propane tank with four fuel dispensers.

This application is under final review by District staff, and it is anticipated that the applicant will meet all requirements and receive the requested awards.

Financial Considerations: The total estimated project cost for San Juan Unified School District's fifteen propane buses and supporting infrastructure is $3,745,454. The District's anticipated award for the project is up to $1,850,335. The actual incentive award may be lower but will not exceed this total. Funding will come from the Carl Moyer Grant Program, Department of Motor Vehicles Surcharge, or Community Air Protection Program depending on final review.

There is sufficient funding in the approved Fiscal Year 2024/25 budget to fund this project. The applicant is responsible for the balance of the funds.

Meeting Date: 9/26/2024
Report Type: PUBLIC HEARINGS
Report ID: 2024-0926-4.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT 4.

Title: AB 617 Best Available Retrofit Control Technology Determination for Steam Methane Reforming

Recommendation: Conduct a public hearing and 1) determine that the approval of the Best Available Retrofit Control Technology (BARCT) determination for steam methane reforming is not subject to the California Environmental Quality Act (CEQA), and 2) adopt a resolution approving the BARCT determination for Steam Methane Reforming.

Rationale for Recommendation: California Assembly Bill (AB) 617 was signed into law on July 26, 2017. Among its provisions, each air district that is a nonattainment area for one or more air pollutants must adopt an expedited schedule for implementation of Best Available Retrofit Control Technology (BARCT) [California Health and Safety Code Section 40920.6]. This requirement applies to each industrial source subject to the California Greenhouse Gas Cap-and-Trade regulation [Title 17, California Code of Regulations, Section 95802 et seq.]. The District's Board of Directors adopted its expedited BARCT schedule on October 25, 2018. The schedule included a commitment to evaluate BARCT for process heaters used in steam methane reforming and, if necessary, amend District Rule 411, NOx from Boilers, Process Heaters and Steam Generators, to implement BARCT for this source category. Staff has completed its analysis of BARCT for steam methane reforming and has determined that the current NOx emission limit under Rule 411 meets BARCT requirements.

Staff is recommending the Board approve a BARCT determination for steam methane reforming, supported by Staff's analysis, that the District's Rule 411 limit on NOx emissions meets the AB 617 requirements in accordance with the District's AB 617 Expedited BARCT Implementation Schedule.

Contact: Pedro Vega, Air Quality Engineer, Monitoring, Planning, and Rules Division, (279) 207-1126

Presentation: Yes

ATTACHMENTS:

Resolution - AB 617 Steam Methane Reforming BARCT
Exhibit A - AB 617 Steam Methane Reforming BARCT Statement of Reasons
Presentation: AB 617 BARCT Determination for Steam Methane Reforming

---

Approvals/Acknowledgements

Executive Director or Designee: Alberto Ayala, Report Approved 9/20/2024

District Counsel or Designee: Kathrine Pittard, Approved as to Form 9/10/2024

Discussion / Justification: The District is designated nonattainment for the federal and state ozone standards. Because nitrogen oxides (NOx) are precursors to ozone, NOx emissions are subject to the AB 617 expedited BARCT requirements.

Air Products Manufacturing Corporation operates a hydrogen production plant in Sacramento County that is subject to the California Greenhouse Gas Cap-and-Trade regulation and, therefore, subject to the expedited BARCT requirements under AB 617. Air Products' plant produces hydrogen using a steam methane reforming process, which includes a gas-fired reformer furnace. NOx emitted with the combustion exhaust is limited under Rule 411. Staff evaluated whether additional rulemaking is necessary to ensure Air Products' steam methane

reforming operations meet BARCT requirements.

BARCT is defined as “an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source” [California Health and Safety Code Section 40406]. Based on an analysis of available control technologies, Staff has determined that the District’s Rule 411, which limits NOx emissions from steam methane reformers, meets BARCT for Air Products.

Financial Considerations: No changes to any District rules are necessary to meet the AB 617 BARCT requirements for steam methane reforming operations. As a result, no additional enforcement resources will be required beyond the staff time already dedicated to enforcement of District Rule 411.

Emissions Impact: No changes to any District rules are necessary; therefore, no emissions impact will result from the Board’s approval of the Staff recommended BARCT determination.

Economic Impact: No additional requirements will be placed on any sources. Therefore, there will be no compliance costs or impacts to employment or the economy of the region.

Public Outreach/Comments:
Staff held a public workshop to discuss the BARCT determination on August 28, 2024. A public notice for the workshop was posted on the District’s website and was also sent by e-mail to interested parties, including all those who have requested to receive rulemaking notices, on August 16, 2024. The workshop was held at the District office and participants were given the option to attend in person or via Zoom. Staff did not receive any comments during the notice period or during the workshop.

The noticing for today's hearing included:
- A notice posted on the District website with a link to the Statement of Reasons.
- Email notices to CARB and all persons who have requested rulemaking notices.

As of August 30, 2024, no comments have been received in response to the notice for today's hearing. Any comments received prior to the public hearing will be distributed to Board members at the meeting.

Environmental Review: The proposed action for the Board of Directors is to approve a determination that the District’s Rule 411, which limits NOx emissions from steam methane reformers, meets the AB 617 BARCT requirements. Staff has concluded that this action is not a project subject to the CEQA because it will not cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment [Public Resources Code Section 21065 and State CEQA Guidelines Section 15378].

RESOLUTION NO. 2024 – XXXX

Adopted by the Sacramento Metropolitan Air Quality Management District Board of Directors

AB 617 BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY DETERMINATION FOR STEAM METHANE REFORMING

BACKGROUND:

A. California Health and Safety Code (HSC) Section 40920.6(c)(1), as amended by California Assembly Bill 617 [Statutes of 2017, Ch. 136, Sec. 2. AB 617, Christina Garcia], requires each California air district that is a nonattainment area for one or more air pollutants to adopt an expedited schedule for implementation of Best Available Retrofit Control Technology (BARCT) on or before January 1, 2019.

B. Expedited BARCT is required for each industrial source subject to the California Greenhouse Gas Cap-and-Trade regulation [Title 17, California Code of Regulations, Section 95802 *et seq.*] as of January 1, 2017.

C. The Sacramento Metropolitan Air Quality Management District (District) is designated nonattainment for the federal and state ozone standards, the federal standard for particulate matter less than 2.5 microns in diameter (PM2.5), and the state standard for particulate matter less than 10 microns in diameter (PM10).

D. The Board of Directors (Board) adopted the District's expedited BARCT schedule on October 25, 2018, which identifies each industrial source for which the District must implement expedited BARCT and commits the District to evaluating BARCT and adopting or amending District rules if necessary.

E. Air Products Manufacturing Corporation, a steam methane reforming operation, is subject to the AB 617 expedited BARCT requirements.

F. Staff performed a detailed analysis of available control technologies, including cost-effectiveness and concluded that the District's Rule 411, NOx from Boilers, Process Heaters, and Steam Generators, which limits nitrogen oxide (NOx) emission from the operation of steam methane reformers, meets BARCT requirements.

G. The Board has considered Staff's AB 617 BARCT Analysis for Steam Methane Reforming.

H. A notice for this public hearing, which included a link to the AB 617 Best Available Control Technology Analysis for Steam Methane Reforming, was posted on the District's website on August 30, 2024, inviting public comment and describing how comments could be submitted.

I. An action that will not cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, is not a project subject to the California Environmental Quality Act (CEQA) [Public Resources Code Section 21065 and State CEQA Guidelines Section 15378].

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE BOARD OF DIRECTORS RESOLVES AS FOLLOWS:

Section 1. The adoption of the AB 617 BARCT Analysis for steam methane reforming is not subject to CEQA.

Section 2. The District's implementation and enforcement of District Rule 411 meets BARCT for steam methane reforming operations in Sacramento County.

Section 3. AB 617 BARCT Analysis for Steam Methane Reforming shown in the attached Exhibit A, is approved and adopted.

Section 4. Exhibit A is attached to and incorporated into this Resolution.

ON A MOTION by Director _____, seconded by Director _____, the foregoing resolution was passed and adopted by the Board of Directors of the Sacramento Metropolitan Air Quality Management District on September 26, 2024, by the following vote:

Ayes:

Noes:

Abstain:

Absent:

ATTEST:

Clerk, Board of Directors
Sacramento Metropolitan Air Quality Management District

Exhibit A

SACRAMENTO METROPOLITAN
AIR QUALITY MANAGEMENT DISTRICT

STATEMENT OF REASONS

BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY ANALYSIS FOR STEAM METHANE REFORMING

August 30, 2024

Prepared by: Pedro Vega
Air Quality Engineer

Marc Cooley
Air Quality Engineer

Reviewed by: Kevin J. Williams, Ph.D.
Program Supervisor

Approved by: Mark Loutzenhiser
Director– Monitor, Planning and Rules Division

Table of Contents

BACKGROUND

AB 617 – Community Air Protection Program

California Assembly Bill (AB) 617[1] was signed into law on July 26, 2017. Among its provisions, California Health and Safety Code (HSC) section 40920.6 was amended to require each air district that is a nonattainment area for one or more air pollutants to adopt an expedited schedule for implementation of Best Available Retrofit Control Technology (BARCT). BARCT is defined as "an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source."[2]

The Sacramento Metropolitan Air Quality Management District (SMAQMD or District) is designated nonattainment for the state and federal ozone standards, the state PM10 standard, and the federal PM 2.5 standard. Therefore, the expedited BARCT schedule applies to the control of these pollutants and their precursors. Nitrogen Oxide (NOx) is a precursor to ozone formation The expedited BARCT requirement applies to each industrial source subject to the California Greenhouse Gas Cap-and-Trade regulation.[3]

On October 25, 2018, the District's Board of Directors (Board) adopted an expedited schedule to analyze and implement BARCT in Sacramento County. The District identified three industrial sources that are subject to the California Greenhouse Gas (GHG) Cap-and-Trade regulation. One of these sources, owned by Air Products, is a Steam Methane Reforming (SMR) process.

This document presents staff's analysis of BARCT for Rule 411 - NOx from Boilers, Process Heaters, and Steam Generators. The SMR operations at Air Products have a separate limit for NOx emissions and this analysis evaluates whether the regulatory requirements for Rule 411 meet BARCT or if amendments to the District rule are necessary.

Steam Methane Reforming Operations in Sacramento

Operations in Sacramento County include two SMR Furnaces operating at Air Products 83Rd St. Facility in Sacramento. The Sacramento facility produces gaseous hydrogen by reforming natural gas with steam. Sulphur is removed from the natural gas to prevent the poisoning of the catalyst. The desulfurized gas is combined with steam and heated in the reformer furnace, then fed through nickel catalyst-filled tubes to produce hydrogen and carbon oxides in the following reaction:

$$CH_4 + H_2O \rightarrow CO + 3H_2$$

From the reformer, the gas enters a series of shift converters, where hydrogen is produced by way of reaction in the presence of an iron-chromium catalyst:

$$CO + H_2O \rightarrow CO_2 + H_2$$

To produce pure hydrogen the gas stream enters a pressure swing activation unit, a physically selective adsorption process, which raises the purity of the hydrogen gas. The resulting hydrogen gas is then prepared for delivery or sent through a liquefaction process.

---

1 Statues of 2017, CH. 136 Sec. 2. AB 617, Christina Garcia
2 HSC § 40406
3 Title 17, California Code of Regulations (CCR), § 95800 *et seq*.

Gaseous hydrogen leaving the pressure swing adsorption process is compressed and sent through activated carbon adsorption filters to remove traces of oil. The liquefaction process occurs as the gas passes through multiple expansion engines. The resulting liquid hydrogen is stored in storage tanks and delivered by tank trucks. Production of gaseous hydrogen is done in Plant B and the liquefaction and production of liquid Hydrogen is done in Plant A.

Plant A utilizes a 19.1 million British thermal units per hour (mmBtu/hr) reformer furnace, equipped with three low-NOx burners. Plant B utilizes a 37 mmBtu/hr reformer furnace, also equipped with three low-NOx burners.

AVAILABLE CONTROL TECHNOLOGY

NOx from combustion is created through three processes[4]. "Thermal NOx" forms when molecular nitrogen and oxygen from the air react at high temperatures. "Fuel NOx" is formed from the oxidation of nitrogen compounds in the fuel. "Prompt NOx" is formed first from the reaction of molecular nitrogen from the air with the fuel under fuel-rich conditions, then through subsequent oxidation of these nitrogen compounds. NOx formation varies in the combustion process depending on the air-to-fuel ratio, nitrogen content of the fuel, flame temperature, and residence time. Two primary technologies are used to limit the formation or reduce the emission of NOx to the atmosphere.

1. Ultra-low NOx burners (UNLB)
2. Selective Catalytic Reduction (SCR)

Ultra-Low NOx Burners

Ultra-Low NOx burners utilize one or a combination of control technologies (e.g., low excess air, fuel and/or air staging) in the design of the burner to reduce NOx emissions.

Low excess air reduces the amount of oxygen available for combustion and thus reducing the number of oxygen atoms available to react with nitrogen to form NOx.

Fuel staging, which is applicable to gas only, is done by burning part of the fuel at high excess air (low temperature) in a primary combustion zone. The remaining fuel is injected through another set of orifices or a gas gun into a secondary zone where combustion is completed at relatively low excess air. Since the inert products of combustion from the primary zone pass through the secondary zone, temperatures and NOx are reduced.

In air staging, fuel is mixed with part of the air in a fuel rich primary combustion zone at low temperatures and without excess oxygen. Any remaining fuel burns completely with the remaining combustion air in the secondary combustion zone through which the inert products of combustion pass.

Staff is aware of next generation burner technology demonstration projects in the South Coast Air Quality Management District that may become commercially available to reduce NOx emissions

[4] "Technical Bulletin – Nitrogen Oxides (NOx), Why and How they are Controlled." EPA. November 1999. p. 5.

to 5 ppmv without the use of SCR. However, at the current time, the technology is not available/achieved in practice for SMRs, without the use of SCR, for units less than or equal to 40 mmBtu/hr[5].

Selective Catalytic Reduction

Selective Catalytic Reduction is a post-combustion control in which combustion exhaust gas passes through a catalyst bed, where NOx reacts with a reducing agent, such as urea or ammonia. SCR systems typically can achieve NOx emission concentrations as low as 5 ppmv. SCR systems have been applied to steam-methane reformers[6] like the units at Air Products.

Air Products sought a proposal from a vendor for the engineering, design, and supply of an SCR system for the two Sacramento reformers. This proposal was provided by CECO Peerless Environmental. The proposal consisted of the design of a Catalyst Reactor Housing, supply of NOx catalyst, an ammonia injection system, and Computation Fluid Dynamic (CFD) system modeling for both reactors.

Existing Requirements for Steam Methane Reforming

The operation of the Air Products SMR Furnaces fall under the District Rule 411 - NOx from Boilers, Process Heaters, and Steam Generators. Rule 411 classifies the SMR Furnaces as Gas Fired Reformer Furnaces and limits NOx emissions to 30 parts per million by volume (ppmv, corrected to an exhaust oxygen concentration of 3%).

During the 2005 revision process for Rule 411, the District initially proposed regulating all process heaters with a HIC greater than 20 mmBtu/hr to 9 ppmv NOx. Air Products responded to the proposed rulemaking by providing information that demonstrated that while technologically was feasible to achieve 25 ppmv NOx concentrations reliably using ultra-low NOx burner (ULNB) technology, it was not cost effective for their reactors to meet the emission limit using ULNB. Some of the challenges presented included:

- Much higher operating temperatures for reforming reactors, 1900° - 2000° F
- Use of multiple burners which allows for higher peak flame temperatures
- The fuel used in the reforming process differs from standard boilers and process heaters which traditionally use natural gas. The reforming furnaces run on primarily purge gas with natural gas mainly used as a trim fuel (providing <20% of the heat input)

Also mentioned at the time, selective catalytic reduction (SCR) systems were significantly more expensive than burner replacement.[7] The District revised the proposed Rule 411 to include a category specifically for Gas Fired Reformer Furnaces with a NOx limit of 30 ppmv.

---

5 South Coast Air Quality Management District. NOx BARCT Analysis Review by Norton Engineering. December 4, 2020. p. 29.

6 Johnson Matthey , “SINOx – HT SCR catalyst” https://matthey.com/products-and-markets/energy/stationary-emissions-control/sinox-ht-scr-catalyst, accessed June 5, 2024

7 SMAQMD. Staff Report Rule 411, NOx from Boilers, Process Heaters, and Steam Generators. December 1, 2004. Attachment E, p. 14.

Expected Reductions using SCR

For the purposes of this BARCT analysis, staff calculates emissions and reductions using the allowable permit emission limits of 30 ppmv. Using the reported exhaust flow rate and composition the District calculated the reductions expected from reducing permit limits from 30 ppmv to 5 ppmv as 2.77 tons per year (TPY) for Plant A and 4.45 TPY for Plant B for a total reduction of 7.22 TPY.

COST ANALYSIS

Cost Analysis Methods

The District used a cost evaluation consistent with its procedure for evaluating the Best Available Control Technology (BACT) when evaluating cost effectiveness of control technology for the Air Products facility. In this process, capital costs are annualized and added to operating and maintenance (O&M) costs to compare them to annual emission reductions. The annualization equations are shown below.

$$CRF = \frac{i(1+i)^n}{i(1+i)^n - 1}$$

Where CRF is the Cost Recovery Factor, i is the annual interest rate, and n is the equipment lifetime. The interest rate is determined as the average interest rate on the United States Treasury Securities for the period closest to the equipment life, averaged over the previous 6 months plus 2 percent and rounded up to the next whole percent. As of May 31, 2024, the value for i is 7 percent. A higher interest rate will result in emission controls being less cost effective (i.e. less likely to be implemented). The equipment life is generally assumed to be ten years; however, SCR equipment is known to have a long equipment life. Increasing the equipment life results in more cost-effective emission controls (i.e. more likely to be implemented), so equipment life was assumed 20 years for the initial stages of the evaluation when determining whether further evaluation was needed.

$$Annualized\ Costs = CRF \times Capital\ Costs + O\&M\ costs$$

Where annualized cost is the cost of implementing emission controls annualized into current day dollars per year, capital costs are the total direct and indirect costs of implementing emission controls and O&M costs including costs to operate and maintain the emission controls. Capital costs include direct costs like equipment and indirect costs like engineering and design.

$$Cost\ Effectiveness = \frac{Annualized\ cost}{Emission\ Reductions}$$

Where Cost Effectiveness is how cost effective a control technology is at removing a pollutant in present day dollars per pound of pollutant and Emission Reduction is the amount of pollutant emission reduced by implementing the control technology in pounds per year.

Current Cost Effectiveness Thresholds

The highest cost for NOx controls approved by the District was Rule 411 which had a cost of $13.90/lb-NOx reduced in 2005. Adjusted to the most recent full year of inflation data, 2023 dollars, this equals $21.68/lb-NOx, or $43,380/ton-NOx.[8] For reference, the most recent Best Available Control Technology (BACT) threshold for major new or modified equipment construction has been established at $36,700/ton-NOx as of June 25th, 2024.[9] The BACT cost effectiveness, while not the only metric, is the primary metric by which rules are checked for cost effectiveness/economic feasibility.

Air Products Cost Estimate

The District requested that Air Products perform a cost study for the implementation of SCR for the Sacramento SMR furnaces. In 2021 Air Products combined their internal costs with a quote from CECO Peerless Environmental and presented the District a breakdown of cost shown in Table 1:

Table 1 – Air Products Cost Study Breakdown

Category	Cost
Engineering	$1,563,000
Procurement	$1,448,000
Construction/Commissioning	$3,577,000
Misc	$160,000
Taxes/Tariffs	$231,000
Reserve & Contingency	$1,047,000
Total	**$8,024,000**
Annual Operating Costs (Both Plants)	$222,000
Annualized Catalyst Costs (Both Plants)	$27,500

District EPA SCR Cost Estimate Spreadsheet & ERG Review

Equipment costs were estimated using data from the U.S. Environmental Protection Agency (EPA) Air Pollution Control Cost Manual[10]. EPA's cost control manual includes a SCR cost calculation spreadsheet to estimate costs[11]. Using the spreadsheet with the inventory calculations and provided process information staff estimated a total installation cost for SMR units at approximately $4,421,638. EPA's calculation methodology includes total capital investment and annual costs including direct and indirect costs. All costs are converted to 2023 dollars using the Chemical Engineering Plant Cost Index (CEPCI) for 2023 (Value of 798). The spreadsheet annualized the costs at an interest rate of 7% and assumed an equipment useful life of 20 years.

---

[8] 2005 Annual Average CPI 195.3, 2023 Annual Average CPI 304.7, https://www.bls.gov/cpi/tables/supplemental-files/historical-cpi-u-202404.pdf

[9] SMAQMD Memo, BACT Cost Effectiveness Thresholds – June 25th, 2024

[10] United States Environmental Protection Agency. *Cost Reports and Guidance for Air Pollution Regulations.* https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution

[11] United States Environmental Protection Agency. *Air Pollution Control Cost Estimation Spreadsheet For Selective Catalytic Reduction (SCR).* June 2019.

The District contracted Eastern Research Group to review the reasonableness of the Air Products cost study and the District's use of the EPA cost control manual. ERG noted that the EPA cost manual is intended for use with gas-fired industrial units with heat input rates between 250 mmBtu/hr and 4,100 mmBtu/hr. The units at Air Products are much smaller than this and so the EPA methodology will most likely underestimate the costs due to lack of economies of scale for smaller boilers. Due to the heat input rates being well below the recommended range of the EPA methodology an expected probable error of 30 percent is conservative and while may provide better than an order-of-magnitude error, it is likely much greater than 30 percent.[12] Overall factors that could inflate costs:

- Loss of economies of scale due to smaller heat input value
- Sharp increase in inflation which will significantly increase costs
- Increase in annualized costs due to increased interest rates
- The more difficult nature of the retrofit as shown by a larger portion of the costs in engineering and construction/commissioning costs as compared to procurement and equipment upgrade costs

ERG did note areas where costs in the Air Products model were higher than expected. Reagent costs were 12 to 38 percent higher than EPA methodology but found to be reasonable. The cost for catalyst replacement is 24 percent greater than the EPA methodology but found to be a reasonable estimate. ERG estimated the Air Products model required 5 to 11 times more power than EPA methodology estimates for the upgrade to induced draft fan and operating equipment changes. ERG states this discrepancy could be due to the Air Products furnaces falling outside the recommended heat input range, but it is not clear. After following up with Air Products the increased power demands where attributed to a more than doubling in the size of the induced draft fans in both reactor as well as transformer upgrades and other related equipment such as the instrumentation air compressors.

In Table 2 the total and annualized costs from the Air Products cost study is compared to the District's estimate using the EPA methodology. The cost breakdown from Air Products is presented without adjustment to inflation from the 2021-dollar figures originally presented to the District. The elevated levels of inflation since the original submittal of the quote, noted by ERG in their review, indicates that inflation adjustment would only increase these figures. The cost effectiveness of both estimates are also compared to the current BACT thresholds and also reference the costliest BARCT requirement the District has implemented to date.

[12] ERG Memo, Air Products SCR Cost Estimate – Draft Final Technical Memorandum – April 12, 2024

Table 2 – Cost Effectiveness Comparison

Source	Estimated NOx Emission Reductions (tpy)	Useful Life of SCR (years)	Total Costs (Includes Installation and Construction Costs)	Annualized Cost (Includes Operating and Catalyst Replacement Costs)	Cost Effectiveness ($/ton of NOx reduced)	Cost Effectiveness ($/lb of NOx reduced)
Air Products Engineering Quote	**7.22**	**20**	**$8,024,000**	**$1,006,909**	**$139,461**	**$69.73**
District Evaluation Using EPA Methodology	**7.22**	**20**	**$4,285,805**	**$478,899**	**$66,329**	**$33.16**
Highest District BARCT Cost	**-**	**-**	**-**	**-**	**$43,380**	**$21.68**
Current BACT Cost	**-**	**-**	**-**	**-**	**$36,700**	**$18.35**

BARCT AND BACT COMPARISONS TO OTHER DISTRICTS

SCAQMD BARCT Evaluation: SCAQMD does not have a BARCT evaluation for this size unit. For reference though, a BARCT analysis for NOx emissions limits for SMR units was completed by SCAQMD during the rulemaking process for adoption of Rule 1109.1 in 2021 for units ≥ 110 mmBtu/hr . SCAQMD determined the BARCT NOx emission limit for SMR units of ≥ 110 mmBtu/hr at 5 ppmv. During the rulemaking, SCAQMD considered a NOx limit of 3 ppmv by utilizing SCR upgrades but due technical feasible and incremental cost, from reducing from 5 ppmv to 3 ppmv, was not cost effective.

SMAQMD BACT Determinations: None, the District has not performed a BACT determination for this category or source. The existing equipment at Air Products were not subject to BACT. BACT is provided for reference as is considered more stringent than BARCT.

SCAQMD BACT Determination: None, SCAQMD does not list a BACT determination for SMR units.

PUBLIC COMMENTS

Staff held a public workshop to discuss the BARCT analysis on August 28, 2024. A public notice for the workshop was published on the District's website and was also be sent by e-mail to interested parties. The statement of reasons was available for public review at that time. Staff did not receive any comments during the workshop.

CONCLUSION

Comparing the costs required in both the Air Products provided model and the District's own estimation using the EPA Air Pollution Control Cost Estimation Spreadsheet the District has found that implementing SCR at the Air Products reformers would represent an 80% to 280% higher cost than has been previously required for BACT implementation in the past.

Therefore, based on the cost effectiveness determination, District staff finds District's Rule 411 emission limits for gas fired reformer furnaces meet the AB 617 requirement to implement BARCT for Air Products. No new or amended District rules need to be adopted for this category.

Appendix A – EPA SCR Costing Spreadsheets of Plants A and B

Air Pollution Control Cost Estimation Spreadsheet
For Selective Catalytic Reduction (SCR)

U.S. Environmental Protection Agency
Air Economics Group
Health and Environmental Impacts Division
Office of Air Quality Planning and Standards
(June 2019)

This spreadsheet allows users to estimate the capital and annualized costs for installing and operating a Selective Catalytic Reduction (SCR) control device. SCR is a post-combustion control technology for reducing NO_x emissions that employs a metal-based catalyst and an ammonia-based reducing reagent (urea or ammonia). The reagent reacts selectively with the flue gas NO_x within a specific temperature range to produce N_2 and water vapor.

The calculation methodologies used in this spreadsheet are those presented in the U.S. EPA's Air Pollution Control Cost Manual. This spreadsheet is intended to be used in combination with the SCR chapter and cost estimation methodology in the Control Cost Manual. For a detailed description of the SCR control technology and the cost methodologies, see Section 4, Chapter 2 of the Air Pollution Control Cost Manual (as updated March 2019). A copy of the Control Cost Manual is available on the U.S. EPA's "Technology Transfer Network" website at: http://www3.epa.gov/ttn/catc/products.html#cccinfo.

The spreadsheet can be used to estimate capital and annualized costs for applying SCR, and particularly to the following types of combustion units:

(1) Coal-fired utility boilers with full load capacities greater than or equal to 25 MW.
(2) Fuel oil- and natural gas-fired utility boilers with full load capacities greater than or equal to 25 MW.
(3) Coal-fired industrial boilers with maximum heat input capacities greater than or equal to 250 MMBtu/hour.
(4) Fuel oil- and natural gas-fired industrial boilers with maximum heat input capacities greater than or equal to 250 MMBtu/hour.

The size and costs of the SCR are based primarily on five parameters: the boiler size or heat input, the type of fuel burned, the required level of NOx reduction, reagent consumption rate, and catalyst costs. The equations for utility boilers are identical to those used in the IPM. However, the equations for industrial boilers were developed based on the IPM equations for utility boilers. This approach provides study-level estimates (±30%) of SCR capital and annual costs. Default data in the spreadsheet is taken from the SCR Control Cost Manual and other sources such as the U.S. Energy Information Administration (EIA). The actual costs may vary from those calculated here due to site-specific conditions. Selection of the most cost-effective control option should be based on a detailed engineering study and cost quotations from system suppliers. The methodology used in this spreadsheet is based on the U.S. EPA Clean Air Markets Division (CAMD)'s Integrated Planning Model (IPM) (version 6). For additional information regarding the IPM, see the EPA Clean Air Markets webpage at http://www.epa.gov/airmarkets/power-sector-modeling. The Agency wishes to note that all spreadsheet data inputs other than default data are merely available to show an example calculation.

Instructions

Step 1: Please select on the ***Data Inputs*** tab and click on the ***Reset Form*** button. This will clear many of the input cells and reset others to default values.

Step 2: Select the type of combustion unit (utility or industrial) using the pull down menu. Indicate whether the SCR is for new construction or retrofit of an existing boiler. If the SCR will be installed on an existing boiler, enter a retrofit factor between 0.8 and 1.5. Use 1 for retrofits with an average level of difficulty. For more difficult retrofits, you may use a retrofit factor greater than 1; however, you must document why the value used is appropriate.

Step 3: Select the type of fuel burned (coal, fuel oil, and natural gas) using the pull down menu. If you select fuel oil or natural gas, the HHV and NPHR fields will be prepopulated with default values. If you select coal, then you must complete the coal input box by first selecting the type of coal burned from the drop down menu. The weight percent sulfur content, HHV, and NPHR will be pre-populated with default factors based on the type of coal selected. However, we encourage you to enter your own values for these parameters, if they are known, since the actual fuel parameters may vary from the default values provided. Method 1 is pre-selected as the default method for calculating the catalyst replacement cost. For coal-fired units, you choose either method 1 or method 2 for calculating the catalyst replacement cost by selecting appropriate radio button.

Step 4: Complete all of the cells highlighted in yellow. If you do not know the catalyst volume ($Vol_{catalyst}$) or flue gas flow rate ($Q_{flue\ gas}$), please enter "UNK" and these values will be calculated for you. As noted in step 1 above, some of the highlighted cells are pre-populated with default values based on 2014 data. Users should document the source of all values entered in accordance with what is recommended in the Control Cost Manual, and the use of actual values other than the default values in this spreadsheet, if appropriately documented, is acceptable. You may also adjust the maintenance and administrative charges cost factors (cells highlighted in blue) from their default values of 0.005 and 0.03, respectively. The default values for these two factors were developed for the CAMD Integrated Planning Model (IPM). If you elect to adjust these factors, you must document why the alternative values used are appropriate.

Step 5: Once all of the data fields are complete, select the ***SCR Design Parameters*** tab to see the calculated design parameters and the ***Cost Estimate*** tab to view the calculated cost data for the installation and operation of the SCR.

Data Inputs

Enter the following data for your combustion unit:

Is the combustion unit a utility or industrial boiler? Industrial

What type of fuel does the unit burn? Natural Gas

Is the SCR for a new boiler or retrofit of an existing boiler? Retrofit

Please enter a retrofit factor between 0.8 and 1.5 based on the level of difficulty. Enter 1 for projects of average retrofit difficulty. 1.2

* NOTE: You must document why a retrofit factor of 1.2 is appropriate for the proposed project.

Complete all of the highlighted data fields:

What is the maximum heat input rate (QB)?	19.1	MMBtu/hour
What is the higher heating value (HHV) of the fuel? *HHV value of 1033 Btu/scf is a default value. See below for data source. Enter actual HHV for fuel burned, if known.	1,033	Btu/scf
What is the estimated actual annual fuel consumption?	161,970,958	scf/Year
Enter the net plant heat input rate (NPHR)	8.2	MMBtu/MW
Plant Elevation	20	Feet above sea level

If the NPHR is not known, use the default NPHR value:

Fuel Type	Default NPHR
Coal	10 MMBtu/MW
Fuel Oil	11 MMBtu/MW
Natural Gas	8.2 MMBtu/MW

Not applicable to units burning fuel oil or natural gas

Type of coal burned: Not Applicable

Enter the sulfur content (%S) = percent by weight

Not applicable to units buring fuel oil or natural gas

Note: The table below is pre-populated with default values for HHV and %S. Please enter the actual values for these parameters in the table below. If the actual value for any parameter is not known, you may use the default values provided.

Coal Type	Fraction in Coal Blend	%S	HHV (Btu/lb)
Bituminous	0	1.84	11,841
Sub-Bituminous	0	0.41	8,826
Lignite	0	0.82	6,685

Please click the calculate button to calculate weighted average values based on the data in the table above.

For coal-fired boilers, you may use either Method 1 or Method 2 to calculate the catalyst replacement cost. The equations for both methods are shown on rows 85 and 86 on the ***Cost Estimate*** tab. Please select your preferred method:

- ○ Method 1
- ○ Method 2
- ◉ Not applicable

Enter the following design parameters for the proposed SCR:

Number of days the SCR operates (t_{SCR})	365	days
Number of days the boiler operates (t_{plant})	365	days
Inlet NO_x Emissions (NOx_{in}) to SCR	0.03980	lb/MMBtu
Outlet NO_x Emissions (NOx_{out}) from SCR	0.00668	lb/MMBtu
Stoichiometric Ratio Factor (SRF)	1.050	

*The SRF value of 1.05 is a default value. User should enter actual value, if known.

Number of SCR reactor chambers (n_{scr})	1	
Number of catalyst layers (R_{layer})	3	
Number of empty catalyst layers (R_{empty})	1	
Ammonia Slip (Slip) provided by vendor	2	ppm
Volume of the catalyst layers ($Vol_{catalyst}$) (Enter "UNK" if value is not known)	UNK	Cubic feet
Flue gas flow rate ($Q_{fluegas}$) (Enter "UNK" if value is not known)	9,300	acfm

Estimated operating life of the catalyst ($H_{catalyst}$)	24,000	hours
Estimated SCR equipment life	20	Years*

* For industrial boilers, the typical equipment life is between 20 and 25 years.

Gas temperature at the SCR inlet (T)	595	°F
Base case fuel gas volumetric flow rate factor (Q_{fuel})	486.93	ft^3/min-MMBtu/hour

Concentration of reagent as stored (C_{stored})	29	percent*
Density of reagent as stored (ρ_{stored})	56	lb/cubic feet*
Number of days reagent is stored ($t_{storage}$)	14	days

*The reagent concentration of 29% and density of 56 lbs/cft are default values for ammonia reagent. User should enter actual values for reagent, if different from the default values provided.

Densities of typical SCR reagents:

50% urea solution	71 lbs/ft^3
29.4% aqueous NH_3	56 lbs/ft^3

Select the reagent used: Ammonia

Enter the cost data for the proposed SCR:

Desired dollar-year	2023				
CEPCI for 2023	798	Enter the CEPCI value for 2023	541.7	2016 CEPCI	CEPCI = Chemical Engineering Plant Cost Index
Annual Interest Rate (i)	7	Percent			
Reagent ($Cost_{reag}$)	1.870	$/gallon for 29% ammonia			
Electricity ($Cost_{elect}$) - SMAQMD BACT #s	0.1394	$/kWh			changed from default
Catalyst cost ($CC_{replace}$)	227.00	$/cubic foot (includes removal and disposal/regeneration of existing catalyst and installation of new catalyst			* $227/cf is a default value for the catalyst cost based on 2016 prices. User should enter actual value, if known.
Operator Labor Rate	60.00	$/hour (including benefits)*			* $60/hour is a default value for the operator labor rate. User should enter actual value, if known.
Operator Hours/Day	4.00	hours/day*			* 4 hours/day is a default value for the operator labor. User should enter actual value, if known.

Note: The use of CEPCI in this spreadsheet is not an endorsement of the index, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Maintenance and Administrative Charges Cost Factors:

Maintenance Cost Factor (MCF) =	0.005
Administrative Charges Factor (ACF) =	0.03

Data Sources for Default Values Used in Calculations:

Data Element	Default Value	Sources for Default Value	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Reagent Cost ($/gallon)	$0.293/gallon 29% ammonia solution 'ammonia cost for 29% solution	U.S. Geological Survey, Minerals Commodity Summaries, January 2017 (https://minerals.usgs.gov/minerals/pubs/commodity/nitrogen/mcs-2017-nitro.pdf		Check with reagent vendors for current prices.
Electricity Cost ($/kWh)	0.0676	U.S. Energy Information Administration. Electric Power Monthly. Table 5.3. Published December 2017. Available at: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a.	1/1/2023 SMUD Comercial/Industrial Rates, average of summer and winter peak and off-peak rates	Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a.
Percent sulfur content for Coal (% weight)		Not applicable to units burning fuel oil or natural gas		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/electricity/data/eia923/.
Higher Heating Value (HHV) (Btu/lb)	1,033	2016 natural gas data compiled by the Office of Oil, Gas, and Coal Supply Statistics, U.S. Energy Information Administration (EIA) from data reported on EIA Form EIA-923, Power Plant Operations Report. Available at http://www.eia.gov/electricity/data/eia923/.		Fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/electricity/data/eia923/.
Catalyst Cost ($/cubic foot)	227	U.S. Environmental Protection Agency (EPA). Documentation for EPA's Power Sector Modeling Platform v6 Using the Integrated Planning Model. Office of Air and Radiation. May 2018. Available at: https://www.epa.gov/airmarkets/documentation-epas-power-sector-modeling-platform-v6.		Check with vendors for current prices.
Operator Labor Rate ($/hour)	$60.00	U.S. Environmental Protection Agency (EPA). Documentation for EPA's Power Sector Modeling Platform v6 Using the Integrated Planning Model. Office of Air and Radiation. May 2018. Available at: https://www.epa.gov/airmarkets/documentation-epas-power-sector-modeling-platform-v6.		Use payroll data, if available, or check current edition of the Bureau of Labor Statistics, National Occupational Employment and Wage Estimates – United States (https://www.bls.gov/oes/current/oes_nat.htm).
Interest Rate (Percent)	5.5	Default bank prime rate	Per SMAQMD BACT Policy. Average interest rate on 20-year treasury security (corresponding to useful life), averaged over the prior six months (April to September, 2023). Add 2 points and round up to the next highest whole point.	Use known interest rate or use bank prime rate, available at https://www.federalreserve.gov/releases/h15/.

SCR Design Parameters

The following design parameters for the SCR were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Parameter	Equation	Calculated Value	Units	
Maximum Annual Heat Input Rate (Q_B) =	HHV x Max. Fuel Rate =	19.1	MMBtu/hour	
Maximum Annual fuel consumption (mfuel) =	(QB x 1.0E6 x 8760)/HHV =	161,970,958	scf/Year	
Actual Annual fuel consumption (Mactual) =		161,970,958	scf/Year	
Heat Rate Factor (HRF) =	NPHR/10 =	0.82		
Total System Capacity Factor (CF_{total}) =	(Mactual/Mfuel) x (tscr/tplant) =	1.000	fraction	
Total operating time for the SCR (t_{op}) =	CF_{total} x 8760 =	8760	hours	
NOx Removal Efficiency (EF) =	(NOx_{in} - NOx_{out})/NOx_{in} =	83.2	percent	0.8320688
NOx removed per hour =	NOx_{in} x EF x Q_B =	0.63	lb/hour	
Total NO_x removed per year =	(NOx_{in} x EF x Q_B x t_{op})/2000 =	2.77	tons/year	
NO_x removal factor (NRF) =	EF/80 =	1.04		
Volumetric flue gas flow rate ($q_{flue\ gas}$) =	Q_{fuel} x QB x (460 + T)/(460 + 700)n_{scr} =	9,300	acfm	
Space velocity (V_{space}) =	$q_{flue\ gas}$/$Vol_{catalyst}$ =	106.05	/hour	
Residence Time	1/V_{space}	0.01	hour	
Coal Factor (CoalF) =	1 for oil and natural gas; 1 for bituminous; 1.05 for sub-bituminous; 1.07 for lignite (weighted average is used for coal blends)	1.00		
SO_2 Emission rate =	(%S/100)x(64/32)*1x10^6)/HHV =			Not applicable; factor applies only to coal-fired boilers
Elevation Factor (ELEVF) =	14.7 psia/P =			Not applicable; elevation factor does not apply to plants located at elevations below 500 feet.
Atmospheric pressure at sea level (P) =	2116 x [(59-(0.00356xh)+459.7)/518.6]$^{5.256}$ x (1/144)* =	14.7	psia	
Retrofit Factor (RF)	Retrofit to existing boiler	1.20		

* Equation is from the National Aeronautics and Space Administration (NASA), Earth Atmosphere Model. Available at https://spaceflightsystems.grc.nasa.gov/education/rocket/atmos.html.

Catalyst Data:

Parameter	Equation	Calculated Value	Units
Future worth factor (FWF) =	(interest rate)(1/((1+ interest rate)^Y -1) , where Y = $H_{catalyts}$/(t_{SCR} x 24 hours) rounded to the nearest integer	0.3111	Fraction
Catalyst volume ($Vol_{catalyst}$) =	2.81 x Q_B x EF_{adj} x Slipadj x NOx_{adj} x S_{adj} x (T_{adj}/N_{scr})	87.70	Cubic feet
Cross sectional area of the catalyst ($A_{catalyst}$) =	$q_{flue\ gas}$ /(16ft/sec x 60 sec/min)	10	ft^2
Height of each catalyst layer (H_{layer}) =	($Vol_{catalyst}$/(R_{layer} x $A_{catalyst}$)) + 1 (rounded to next highest integer)	4	feet

SCR Reactor Data:

Parameter	Equation	Calculated Value	Units
Cross sectional area of the reactor (A_{SCR}) =	1.15 x $A_{catalyst}$	11	ft^2
Reactor length and width dimensions for a square reactor =	(A_{SCR})$^{0.5}$	3.3	feet
Reactor height =	(R_{layer} + R_{empty}) x (7ft + h_{layer}) + 9ft	53	feet

Reagent Data:

Type of reagent used: Ammonia

Molecular Weight of Reagent (MW) = 17.03 g/mole

Density = 56 lb/ft^3

Parameter	Equation	Calculated Value	Units
Reagent consumption rate ($m_{reagent}$) =	(NOx_{in} x Q_B x EF x SRF x MW_R)/MW_{NOx} =	0	lb/hour
Reagent Usage Rate (m_{sol}) =	$m_{reagent}$/Csol =	1	lb/hour
	(m_{sol} x 7.4805)/Reagent Density	0	gal/hour
Estimated tank volume for reagent storage =	(m_{sol} x 7.4805 x $t_{storage}$ x 24)/Reagent Density =	100	gallons (storage needed to store a 14 day reagent supply rounded to

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	i (1+ i)^n/(1+ i)^n - 1 = Where n = Equipment Life and i= Interest Rate	0.0944

Other parameters	Equation	Calculated Value	Units
Electricity Usage:			
Electricity Consumption (P) =	A x 1,000 x 0.0056 x (CoalF x HRF)$^{0.43}$ = where A = (0.1 x QB) for industrial boilers.	9.82	kW

Cost Estimate

Total Capital Investment (TCI)

TCI for Oil and Natural Gas Boilers

For Oil and Natural Gas-Fired Utility Boilers between 25MW and 500 MW:

$$TCI = 86{,}380 \times (200/B_{MW})^{0.35} \times B_{MW} \times ELEVF \times RF$$

For Oil and Natural Gas-Fired Utility Boilers >500 MW:

$$TCI = 62{,}680 \times B_{MW} \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers between 275 and 5,500 MMBTU/hour :

$$TCI = 7{,}850 \times (2{,}200/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers between 205 and 4,100 MMBTU/hour :

$$TCI = 10{,}530 \times (1{,}640/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers >5,500 MMBtu/hour:

$$TCI = 5{,}700 \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers >4,100 MMBtu/hour:

$$TCI = 7{,}640 \times Q_B \times ELEVF \times RF$$

Total Capital Investment (TCI) =	$1,689,354	in 2023 dollars

Annual Costs

Total Annual Cost (TAC)

TAC = Direct Annual Costs + Indirect Annual Costs

Direct Annual Costs (DAC) =	$24,357 in 2023 dollars
Indirect Annual Costs (IDAC) =	$162,204 in 2023 dollars
Total annual costs (TAC) = DAC + IDAC	$186,561 in 2023 dollars

Direct Annual Costs (DAC)

DAC = (Annual Maintenance Cost) + (Annual Reagent Cost) + (Annual Electricity Cost) + (Annual Catalyst Cost)

Annual Maintenance Cost =	0.005 x TCI =	$8,447 in 2023 dollars
Annual Reagent Cost =	$m_{sol} \times Cost_{reag} \times t_{op}$ =	$1,855 in 2023 dollars
Annual Electricity Cost =	$P \times Cost_{elect} \times t_{op}$ =	$11,991 in 2023 dollars
Annual Catalyst Replacement Cost =	$n_{scr} \times Vol_{cat} \times (CC_{replace}/R_{layer}) \times FWF$	$2,064 in 2023 dollars
Direct Annual Cost =		$24,357 in 2023 dollars

Indirect Annual Cost (IDAC)

IDAC = Administrative Charges + Capital Recovery Costs

Administrative Charges (AC) =	Annual Maintenance Cost) =	$2,729 in 2023 dollars
Capital Recovery Costs (CR)=	CRF x TCI =	$159,475 in 2023 dollars
Indirect Annual Cost (IDAC) =	AC + CR =	$162,204 in 2023 dollars

Cost Effectiveness

Cost Effectiveness = Total Annual Cost/ NOx Removed/year

Total Annual Cost (TAC) =	$186,561 per year in 2023 dollars
NOx Removed =	2.77 tons/year
Cost Effectiveness =	$67,339 per ton of NOx removed in 2023 dollars

Air Pollution Control Cost Estimation Spreadsheet
For Selective Catalytic Reduction (SCR)

U.S. Environmental Protection Agency
Air Economics Group
Health and Environmental Impacts Division
Office of Air Quality Planning and Standards
(June 2019)

This spreadsheet allows users to estimate the capital and annualized costs for installing and operating a Selective Catalytic Reduction (SCR) control device. SCR is a post-combustion control technology for reducing NO_x emissions that employs a metal-based catalyst and an ammonia-based reducing reagent (urea or ammonia). The reagent reacts selectively with the flue gas NO_x within a specific temperature range to produce N_2 and water vapor.

The calculation methodologies used in this spreadsheet are those presented in the U.S. EPA's Air Pollution Control Cost Manual. This spreadsheet is intended to be used in combination with the SCR chapter and cost estimation methodology in the Control Cost Manual. For a detailed description of the SCR control technology and the cost methodologies, see Section 4, Chapter 2 of the Air Pollution Control Cost Manual (as updated March 2019). A copy of the Control Cost Manual is available on the U.S. EPA's "Technology Transfer Network" website at: http://www3.epa.gov/ttn/catc/products.html#cccinfo.

The spreadsheet can be used to estimate capital and annualized costs for applying SCR, and particularly to the following types of combustion units:

(1) Coal-fired utility boilers with full load capacities greater than or equal to 25 MW.
(2) Fuel oil- and natural gas-fired utility boilers with full load capacities greater than or equal to 25 MW.
(3) Coal-fired industrial boilers with maximum heat input capacities greater than or equal to 250 MMBtu/hour.
(4) Fuel oil- and natural gas-fired industrial boilers with maximum heat input capacities greater than or equal to 250 MMBtu/hour.

The size and costs of the SCR are based primarily on five parameters: the boiler size or heat input, the type of fuel burned, the required level of NOx reduction, reagent consumption rate, and catalyst costs. The equations for utility boilers are identical to those used in the IPM. However, the equations for industrial boilers were developed based on the IPM equations for utility boilers. This approach provides study-level estimates (±30%) of SCR capital and annual costs. Default data in the spreadsheet is taken from the SCR Control Cost Manual and other sources such as the U.S. Energy Information Administration (EIA). The actual costs may vary from those calculated here due to site-specific conditions. Selection of the most cost-effective control option should be based on a detailed engineering study and cost quotations from system suppliers. The methodology used in this spreadsheet is based on the U.S. EPA Clean Air Markets Division (CAMD)'s Integrated Planning Model (IPM) (version 6). For additional information regarding the IPM, see the EPA Clean Air Markets webpage at http://www.epa.gov/airmarkets/power-sector-modeling. The Agency wishes to note that all spreadsheet data inputs other than default data are merely available to show an example calculation.

Instructions

Step 1: Please select on the ***Data Inputs*** tab and click on the ***Reset Form*** button. This will clear many of the input cells and reset others to default values.

Step 2: Select the type of combustion unit (utility or industrial) using the pull down menu. Indicate whether the SCR is for new construction or retrofit of an existing boiler. If the SCR will be installed on an existing boiler, enter a retrofit factor between 0.8 and 1.5. Use 1 for retrofits with an average level of difficulty. For more difficult retrofits, you may use a retrofit factor greater than 1; however, you must document why the value used is appropriate.

Step 3: Select the type of fuel burned (coal, fuel oil, and natural gas) using the pull down menu. If you select fuel oil or natural gas, the HHV and NPHR fields will be prepopulated with default values. If you select coal, then you must complete the coal input box by first selecting the type of coal burned from the drop down menu. The weight percent sulfur content, HHV, and NPHR will be pre-populated with default factors based on the type of coal selected. However, we encourage you to enter your own values for these parameters, if they are known, since the actual fuel parameters may vary from the default values provided. Method 1 is pre-selected as the default method for calculating the catalyst replacement cost. For coal-fired units, you choose either method 1 or method 2 for calculating the catalyst replacement cost by selecting appropriate radio button.

Step 4: Complete all of the cells highlighted in yellow. If you do not know the catalyst volume ($Vol_{catalyst}$) or flue gas flow rate ($Q_{flue\ gas}$), please enter "UNK" and these values will be calculated for you. As noted in step 1 above, some of the highlighted cells are pre-populated with default values based on 2014 data. Users should document the source of all values entered in accordance with what is recommended in the Control Cost Manual, and the use of actual values other than the default values in this spreadsheet, if appropriately documented, is acceptable. You may also adjust the maintenance and administrative charges cost factors (cells highlighted in blue) from their default values of 0.005 and 0.03, respectively. The default values for these two factors were developed for the CAMD Integrated Planning Model (IPM). If you elect to adjust these factors, you must document why the alternative values used are appropriate.

Step 5: Once all of the data fields are complete, select the ***SCR Design Parameters*** tab to see the calculated design parameters and the ***Cost Estimate*** tab to view the calculated cost data for the installation and operation of the SCR.

Data Inputs

Enter the following data for your combustion unit:

Is the combustion unit a utility or industrial boiler? Industrial

What type of fuel does the unit burn? Natural Gas

Is the SCR for a new boiler or retrofit of an existing boiler? Retrofit

Please enter a retrofit factor between 0.8 and 1.5 based on the level of difficulty. Enter 1 for projects of average retrofit difficulty. 1.2

* NOTE: You must document why a retrofit factor of 1.2 is appropriate for the proposed project.

Complete all of the highlighted data fields:

What is the maximum heat input rate (QB)?	37	MMBtu/hour
What is the higher heating value (HHV) of the fuel?	1,033	Btu/scf
What is the estimated actual annual fuel consumption?	313,765,731	scf/Year
Enter the net plant heat input rate (NPHR)	8.2	MMBtu/MW
Plant Elevation	20	Feet above sea level

*HHV value of 1033 Btu/scf is a default value. See below for data source. Enter actual HHV for fuel burned, if known.

If the NPHR is not known, use the default NPHR value:

Fuel Type	Default NPHR
Coal	10 MMBtu/MW
Fuel Oil	11 MMBtu/MW
Natural Gas	8.2 MMBtu/MW

Not applicable to units burning fuel oil or natural gas

Type of coal burned: Not Applicable

Enter the sulfur content (%S) = _____ percent by weight

Not applicable to units buring fuel oil or natural gas

Note: The table below is pre-populated with default values for HHV and %S. Please enter the actual values for these parameters in the table below. If the actual value for any parameter is not known, you may use the default values provided.

Coal Type	Fraction in Coal Blend	%S	HHV (Btu/lb)
Bituminous	0	1.84	11,841
Sub-Bituminous	0	0.41	8,826
Lignite	0	0.82	6,685

Please click the calculate button to calculate weighted average values based on the data in the table above.

For coal-fired boilers, you may use either Method 1 or Method 2 to calculate the catalyst replacement cost. The equations for both methods are shown on rows 85 and 86 on the ***Cost Estimate*** tab. Please select your preferred method:

- ○ Method 1
- ○ Method 2
- ◉ Not applicable

Enter the following design parameters for the proposed SCR:

Number of days the SCR operates (t_{SCR})	365	days
Number of days the boiler operates (t_{plant})	365	days
Inlet NO_x Emissions (NOx_{in}) to SCR	0.03295	lb/MMBtu
Outlet NO_x Emissions (NOx_{out}) from SCR	0.00549	lb/MMBtu
Stoichiometric Ratio Factor (SRF)	1.050	

*The SRF value of 1.05 is a default value. User should enter actual value, if known.

Number of SCR reactor chambers (n_{scr})	1	
Number of catalyst layers (R_{layer})	3	
Number of empty catalyst layers (R_{empty})	1	
Ammonia Slip (Slip) provided by vendor	2	ppm
Volume of the catalyst layers ($Vol_{catalyst}$) (Enter "UNK" if value is not known)	UNK	Cubic feet
Flue gas flow rate ($Q_{fluegas}$) (Enter "UNK" if value is not known)	14,871	acfm

Estimated operating life of the catalyst ($H_{catalyst}$)	24,000	hours
Estimated SCR equipment life	20	Years*

* For industrial boilers, the typical equipment life is between 20 and 25 years.

Concentration of reagent as stored (C_{stored})	29	percent*
Density of reagent as stored (ρ_{stored})	56	lb/cubic feet*
Number of days reagent is stored ($t_{storage}$)	14	days

*The reagent concentration of 29% and density of 56 lbs/cft are default values for ammonia reagent. User should enter actual values for reagent, if different from the default values provided.

Gas temperature at the SCR inlet (T)	540	°F
Base case fuel gas volumetric flow rate factor (Q_{fuel})	484	ft^3/min-MMBtu/hour

Densities of typical SCR reagents:

50% urea solution	71 lbs/ft^3
29.4% aqueous NH_3	56 lbs/ft^3

Select the reagent used: Ammonia

Enter the cost data for the proposed SCR:

Desired dollar-year	2023				
CEPCI for 2023	798	Enter the CEPCI value for 2023	541.7	2016 CEPCI	CEPCI = Chemical Engineering Plant Cost Index
Annual Interest Rate (i)	7	Percent			
Reagent ($Cost_{reag}$)	1.870	$/gallon for 29% ammonia			
Electricity ($Cost_{elect}$) - SMAQMD BACT #s	0.1394	$/kWh			changed from default
Catalyst cost ($CC_{replace}$)	227.00	$/cubic foot (includes removal and disposal/regeneration of existing catalyst and installation of new catalyst			* $227/cf is a default value for the catalyst cost based on 2016 prices. User should enter actual value, if known.
Operator Labor Rate	60.00	$/hour (including benefits)*			* $60/hour is a default value for the operator labor rate. User should enter actual value, if known.
Operator Hours/Day	4.00	hours/day*			* 4 hours/day is a default value for the operator labor. User should enter actual value, if known.

Note: The use of CEPCI in this spreadsheet is not an endorsement of the index, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Maintenance and Administrative Charges Cost Factors:

Maintenance Cost Factor (MCF) =	0.005
Administrative Charges Factor (ACF) =	0.03

Data Sources for Default Values Used in Calculations:

Data Element	Default Value	Sources for Default Value	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Reagent Cost ($/gallon)	$0.293/gallon 29% ammonia solution 'ammonia cost for 29% solution	U.S. Geological Survey, Minerals Commodity Summaries, January 2017 (https://minerals.usgs.gov/minerals/pubs/commodity/nitrogen/mcs-2017-nitro.pdf		Check with reagent vendors for current prices.
Electricity Cost ($/kWh)	0.0676	U.S. Energy Information Administration. Electric Power Monthly. Table 5.3. Published December 2017. Available at: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a.	1/1/2023 SMUD Comercial/Industrial Rates, average of summer and winter peak and off-peak rates	Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a.
Percent sulfur content for Coal (% weight)		Not applicable to units burning fuel oil or natural gas		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/electricity/data/eia923/.
Higher Heating Value (HHV) (Btu/lb)	1,033	2016 natural gas data compiled by the Office of Oil, Gas, and Coal Supply Statistics, U.S. Energy Information Administration (EIA) from data reported on EIA Form EIA-923, Power Plant Operations Report. Available at http://www.eia.gov/electricity/data/eia923/.		Fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/electricity/data/eia923/.
Catalyst Cost ($/cubic foot)	227	U.S. Environmental Protection Agency (EPA). Documentation for EPA's Power Sector Modeling Platform v6 Using the Integrated Planning Model. Office of Air and Radiation. May 2018. Available at: https://www.epa.gov/airmarkets/documentation-epas-power-sector-modeling-platform-v6.		Check with vendors for current prices.
Operator Labor Rate ($/hour)	$60.00	U.S. Environmental Protection Agency (EPA). Documentation for EPA's Power Sector Modeling Platform v6 Using the Integrated Planning Model. Office of Air and Radiation. May 2018. Available at: https://www.epa.gov/airmarkets/documentation-epas-power-sector-modeling-platform-v6.		Use payroll data, if available, or check current edition of the Bureau of Labor Statistics, National Occupational Employment and Wage Estimates – United States (https://www.bls.gov/oes/current/oes_nat.htm).
Interest Rate (Percent)	5.5	Default bank prime rate	Per SMAQMD BACT Policy. Average interest rate on 20-year treasury security (corresponding to useful life), averaged over the prior six months (April to September, 2023). Add 2 points and round up to the next highest whole point.	Use known interest rate or use bank prime rate, available at https://www.federalreserve.gov/releases/h15/.

SCR Design Parameters

The following design parameters for the SCR were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Parameter	Equation	Calculated Value	Units	
Maximum Annual Heat Input Rate (Q_B) =	HHV x Max. Fuel Rate =	37	MMBtu/hour	
Maximum Annual fuel consumption (mfuel) =	(QB x 1.0E6 x 8760)/HHV =	313,765,731	scf/Year	
Actual Annual fuel consumption (Mactual) =		313,765,731	scf/Year	
Heat Rate Factor (HRF) =	NPHR/10 =	0.82		
Total System Capacity Factor (CF_{total}) =	(Mactual/Mfuel) x (tscr/tplant) =	1.000	fraction	
Total operating time for the SCR (t_{op}) =	CF_{total} x 8760 =	8760	hours	
NOx Removal Efficiency (EF) =	(NOx_{in} - NOx_{out})/NOx_{in} =	83.3	percent	
NOx removed per hour =	NOx_{in} x EF x Q_B =	1.02	lb/hour	
Total NO_x removed per year =	(NOx_{in} x EF x Q_B x t_{op})/2000 =	4.45	tons/year	
NO_x removal factor (NRF) =	EF/80 =	1.04		
Volumetric flue gas flow rate ($q_{flue\ gas}$) =	Q_{fuel} x QB x (460 + T)/(460 + 700)n_{scr} =	14,871	acfm	
Space velocity (V_{space}) =	$q_{flue\ gas}$/$Vol_{catalyst}$ =	66.55	/hour	
Residence Time	1/V_{space}	0.02	hour	
Coal Factor (CoalF) =	1 for oil and natural gas; 1 for bituminous; 1.05 for sub-bituminous; 1.07 for lignite (weighted average is used for coal blends)	1.00		
SO_2 Emission rate =	(%S/100)x(64/32)*1x10^6)/HHV =			Not applicable; factor applies only to coal-fired boilers
Elevation Factor (ELEVF) =	14.7 psia/P =			Not applicable; elevation factor does not apply to plants located at elevations below 500 feet.
Atmospheric pressure at sea level (P) =	2116 x [(59-(0.00356xh)+459.7)/518.6]$^{5.256}$ x (1/144)* =	14.7	psia	
Retrofit Factor (RF)	Retrofit to existing boiler	1.20		

* Equation is from the National Aeronautics and Space Administration (NASA), Earth Atmosphere Model. Available at https://spaceflightsystems.grc.nasa.gov/education/rocket/atmos.html.

Catalyst Data:

Parameter	Equation	Calculated Value	Units
Future worth factor (FWF) =	(interest rate)(1/((1+ interest rate)^Y -1) , where Y = $H_{catalyts}$/(t_{SCR} x 24 hours) rounded to the nearest integer	0.3111	Fraction
Catalyst volume ($Vol_{catalyst}$) =	2.81 x Q_B x EF_{adj} x Slipadj x NOx_{adj} x S_{adj} x (T_{adj}/N_{scr})	223.43	Cubic feet
Cross sectional area of the catalyst ($A_{catalyst}$) =	$q_{flue\ gas}$ /(16ft/sec x 60 sec/min)	15	ft^2
Height of each catalyst layer (H_{layer}) =	($Vol_{catalyst}$/(R_{layer} x $A_{catalyst}$)) + 1 (rounded to next highest integer)	6	feet

SCR Reactor Data:

Parameter	Equation	Calculated Value	Units
Cross sectional area of the reactor (A_{SCR}) =	1.15 x $A_{catalyst}$	18	ft^2
Reactor length and width dimensions for a square reactor =	(A_{SCR})$^{0.5}$	4.2	feet
Reactor height =	(R_{layer} + R_{empty}) x (7ft + h_{layer}) + 9ft	60	feet

Reagent Data:

Type of reagent used: Ammonia

Molecular Weight of Reagent (MW) = 17.03 g/mole

Density = 56 lb/ft^3

Parameter	Equation	Calculated Value	Units
Reagent consumption rate ($m_{reagent}$) =	(NOx_{in} x Q_B x EF x SRF x MW_R)/MW_{NOx} =	0	lb/hour
Reagent Usage Rate (m_{sol}) =	$m_{reagent}$/Csol =	1	lb/hour
	(m_{sol} x 7.4805)/Reagent Density	0	gal/hour
Estimated tank volume for reagent storage =	(m_{sol} x 7.4805 x $t_{storage}$ x 24)/Reagent Density =	100	gallons (storage needed to store a 14 day reagent supply rounded to th

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	i (1+ i)^n/(1+ i)^n - 1 = Where n = Equipment Life and i= Interest Rate	0.0944

Other parameters	Equation	Calculated Value	Units
Electricity Usage:			
Electricity Consumption (P) =	A x 1,000 x 0.0056 x (CoalF x HRF)$^{0.43}$ = where A = (0.1 x QB) for industrial boilers.	19.03	kW

Cost Estimate

Total Capital Investment (TCI)

TCI for Oil and Natural Gas Boilers

For Oil and Natural Gas-Fired Utility Boilers between 25MW and 500 MW:

$$TCI = 86{,}380 \times (200/B_{MW})^{0.35} \times B_{MW} \times ELEVF \times RF$$

For Oil and Natural Gas-Fired Utility Boilers >500 MW:

$$TCI = 62{,}680 \times B_{MW} \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers between 275 and 5,500 MMBTU/hour :

$$TCI = 7{,}850 \times (2{,}200/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers between 205 and 4,100 MMBTU/hour :

$$TCI = 10{,}530 \times (1{,}640/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers >5,500 MMBtu/hour:

$$TCI = 5{,}700 \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers >4,100 MMBtu/hour:

$$TCI = 7{,}640 \times Q_B \times ELEVF \times RF$$

Total Capital Investment (TCI) =	$2,596,451	in 2023 dollars

Annual Costs

Total Annual Cost (TAC)

TAC = Direct Annual Costs + Indirect Annual Costs

Direct Annual Costs (DAC) =	$44,450 in 2023 dollars
Indirect Annual Costs (IDAC) =	$247,889 in 2023 dollars
Total annual costs (TAC) = DAC + IDAC	$292,338 in 2023 dollars

Direct Annual Costs (DAC)

DAC = (Annual Maintenance Cost) + (Annual Reagent Cost) + (Annual Electricity Cost) + (Annual Catalyst Cost)

Annual Maintenance Cost =	0.005 x TCI =	$12,982 in 2023 dollars
Annual Reagent Cost =	$m_{sol} \times Cost_{reag} \times t_{op}$ =	$2,979 in 2023 dollars
Annual Electricity Cost =	$P \times Cost_{elect} \times t_{op}$ =	$23,228 in 2023 dollars
Annual Catalyst Replacement Cost =		$5,260 in 2023 dollars
	$n_{scr} \times Vol_{cat} \times (CC_{replace}/R_{layer}) \times FWF$	
Direct Annual Cost =		$44,450 in 2023 dollars

Indirect Annual Cost (IDAC)

IDAC = Administrative Charges + Capital Recovery Costs

Administrative Charges (AC) =	0.03 x (Operator Cost + 0.4 x Annual Maintenance Cost) =	$2,784 in 2023 dollars
Capital Recovery Costs (CR)=	CRF x TCI =	$245,105 in 2023 dollars
Indirect Annual Cost (IDAC) =	AC + CR =	$247,889 in 2023 dollars

Cost Effectiveness

Cost Effectiveness = Total Annual Cost/ NOx Removed/year

Total Annual Cost (TAC) =	$292,338 per year in 2023 dollars
NOx Removed =	4.45 tons/year
Cost Effectiveness =	$65,694 per ton of NOx removed in 2023 dollars

Appendix B – CECO Peerless Cost Quote

CECO Peerless

PEERLESS MFG. CO. SYSTEMS PROPOSAL P2187199 Rev. 0

For

Air Products Sacramento
Steam-Methane Reforming Heater SCR
Aqueous Ammonia SCR

Submitted to

Ryan Wu
Air Products

Prepared by

Patrick Boyker
CECO Peerless | CECO CCA
14651 North Dallas Parkway, Suite 500
Dallas, TX 75254

Tel: 214.708.7620
www.cecoenviro.com/peerless

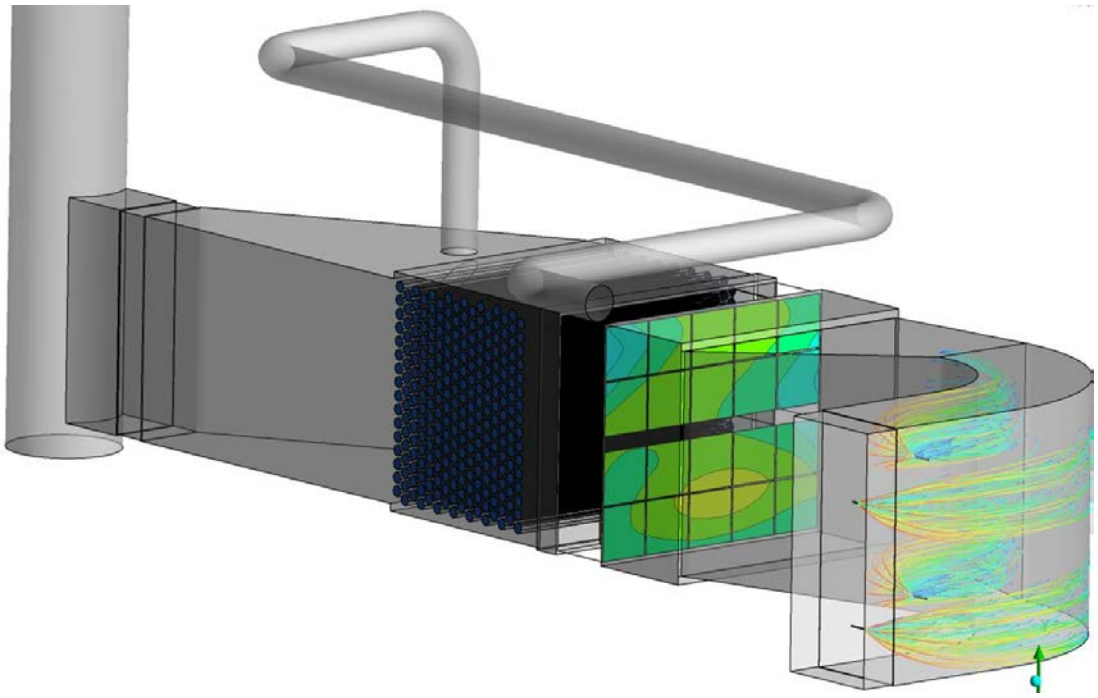
March 23, 2021

Rev	Date	Changes	By
0	3/23/2021	Budget Proposal	P. Boyker

Introduction

Peerless Manufacturing, a CECO Environmental Brand, is a global enterprise providing innovative products and solutions to the Energy industry. Focused on engineering excellence, Peerless employs more than 500 staff world-wide in selected locations close to our customers and primary markets. Complementing its network of sales, project management, engineering and aftermarket service personnel, Peerless benefits from a competitive international supply chain using its own manufacturing facilities in the USA and China and network of proven supply partners strategically located to support the market.

Peerless has a dedicated SCR staff who have supported over 1,000 SCR systems from design all the way through installation. These systems range from small package boilers to large gas turbine SCRs and vary from new installations to complex retrofits. With a wide range of technologies, Peerless has the capabilities to support and deliver complex SCR solutions.



Peerless' technical services include:

- *Inhouse CFD Modeling Analysis,*
- *Field service optimization, startup, and tuning*
- *SCR Design & Expertise*
- *Retrofit SCR Design*
- *Diagnostic testing*
- *Atomization characterization in our in house spray lab*

Peerless' product offering includes:

- *SCR Systems*
- *SNCR Systems*
- *EDGE® AIG – Ammonia Injection Grid*
- *Separation and Filtration Equipment*
- *Silencers*
- *ASME Code Vessels*
- *Marine Products*

Overview

CECO Peerless is pleased to submit our proposal to engineer, design, and supply of a SCR system to be installed in Sacramento, CA. Our scope is detailed herein and is summarized as follows:

- **Scope of Work**
  - **SCR System A:**
    - All Engineering Deliverables
    - (1) Catalyst Reactor Housing
    - (1) NOx Catalyst
    - (1) TRIM-NOX® Injection System
    - CFD Modeling of Systems
  - **SCR System B:**
    - All Engineering Deliverables
    - (1) Catalyst Reactor Housing
    - (1) NOx Catalyst
    - (1) TRIM-NOX® Injection System
    - CFD Modeling of Systems

Commercial

ITEM	QUANTITY	DESCRIPTION	Price
A	1	SCR System A as Described Below	**$221,000**
B	1	SCR System B as Described Below	**$253,500**

Design Data

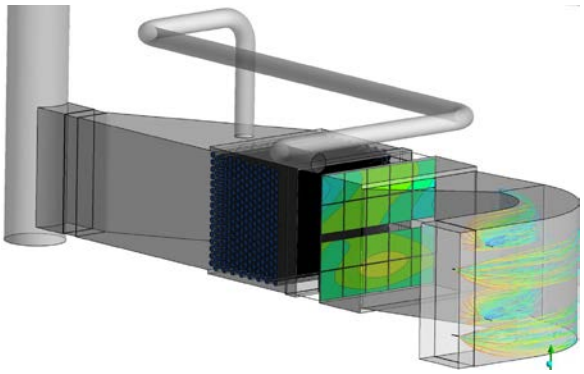
Air Products Sacramento H2 Plant - SCR Retrofit Cost Estimate						
Last Updated JCMacMurray - 01Mar2021					**UPDATE QUOTATION FOR THESE CASES**	
		Peerless			**Air Products Design Basis**	
		Tim Buttke - Southport Equipment 818.706.1400			**Joel MacMurray - 01Mar2021**	
		Plant A	**Plant B**		**Plant A**	**Plant B**
Fuel Type		Nat. gas and process gas	Nat. gas and process gas		Nat. gas and process gas	Nat. gas and process gas
Operating Hours	hr	8760	8760		8760	8760
Exhaust Mass Flow Rate - Wet Basis	lb/hr	26,500	35,290		20,901	35,074
Gas Temp	degF	Unknown	Unknown		560 - 630	510 - 570
Exhaust Composition - wet						
O2	mol%	3.6	5.4		3.22	4.07
H2O	mol%	20.7	19.13		19.56	18.51
N2	mol%	57	58		60.61	62.37
CO2	mol%	18.3	16.9		15.85	14.31
Ar	mol%	<1%	<1%		0.77	0.73
Inlet NOx - ppmvd @ 3mol% O2	ppmvd	22.6	29.2		24.0	30.3
Inlet CO - ppmvd @ 3mol% O2	ppmvd	37.4	44.9		37.4	44.9
Particulate	lb/hr	Unknown	Unknown		Nil	Nil
Inlet SO2 - ppmvd @ 3mol% O2	ppmvd	Unknown	Unknown		<0.1	<0.1
Outlet Guarantees						
NOx - ppmvd @ 3mol% O2	pppmvd	<5	<5		<5	<5
CO - ppmvd @ 3mol% O2	ppmv	<400	<400		<400	<400
NH3 Concentration	wt%	29 wt %	29 wt %		25 wt %	25 wt %
NH3 Consumption	lb/hr	~2	~2		By Vendor	By Vendor
NH3 Slip - ppmvd @ 3 mol% O3	ppmvd	Not Stated	Not Stated		<5	<5
Flue Gas Pressure Loss	inWC	Not Stated	Not Stated		By Vendor	By Vendor
Catalyst Life	yrs	Not Stated	Not Stated		4	4
Connecting Duct Dimension		Not Stated	Not Stated		24" NPS	30" NPS
Minimum Catalyst Hydaulic Dimension	mm	Not Stated	Not Stated		4.1 mm	4.1 mm

Scope of Supply

Major Equipment

Below is a summary of the major equipment supplied by Peerless.

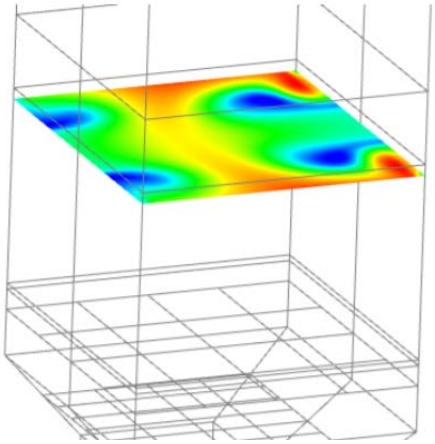
SCR System A:



- **Qty. 1 – SCR Reactor**
  - Horizontal flow design
  - Carbon Steel Housing
    - External Insulation by others
  - Top access door
  - Catalyst loading door
  - Approximate dimensions: 4'W x 4'H x 12'D
  - Approximate weight: 8,000 lbs.
  - Estimated Total System Pressure Drop: 2.5 inH2O

- **Qty. 1 - TRIM-NOX® Injection System**
  - Factory assembled and tested
  - Includes all necessary temperature, pressure and flow devises for a fully functional system
  - Injection Metering Station
    - 2 x 100% Metering Pumps
      - 0.5 hp
    - 2 x 100% Dual / Redundant ammonia injection filters
      - SS 325 mesh basket filters
    - Injection Flow Transmitter
    - Injection Pressure Transmitter
  - Estimated Ammonia Injection Rate: 1.0 lb/hr
  - Atomizing air control equipment
  - Air Assisted Ammonia Injectors
  - Approximate dimensions: 7'W x 4'D x 7.5'H.
  - Approximate weight is 1,200 lbs
  - Atomizing Air Flow Requirements: 40 SCFM / 80 PSI

- **Qty. 1 – Lot of NOx SCR Catalyst**
  - Honeycomb substrate
  - Cormetech, Umicore or Equal
  - Catalyst supplied in modules for field installation into the reactor by others based on project details
  - Inlet NOx: 24 ppmvd @ 3% O2
  - Outlet NOx: 24 ppmvd @ 3% O2
  - NH3 Slip: 5 ppmvd
  - Temperature: 560°F
  - Life Expectancy: 4 years
  - Catalyst Pressure Drop: ~1.3 inH2O



- **CFD System Analysis**
  - In-house CFD Engineers
  - Complete model of SCR system
  - Verification of NH3:NOx Distribution
  - Models of Velocity and Temperature Profiles through the system

SCR System B:

- **Qty. 1 – SCR Reactor**
  - Horizontal flow design
  - Carbon Steel Housing
    - External Insulation by others
  - Top access door
  - Catalyst loading door
  - Approximate dimensions: 4'W x 5.5'H x 12'D
  - Approximate weight: 10,000 lbs.
  - Estimated Total System Pressure Drop: 2.9 inH2O

- **Qty. 1 - TRIM-NOX® Injection System**
  - Factory assembled and tested
  - Includes all necessary temperature, pressure and flow devises for a fully functional system
  - Injection Metering Station
    - 2 x 100% Metering Pumps
      - 0.5 hp
    - 2 x 100% Dual / Redundant ammonia injection filters
      - SS 325 mesh basket filters
    - Injection Flow Transmitter
    - Injection Pressure Transmitter

- Estimated Ammonia Injection Rate: 2.0 lb/hr
- Atomizing air control equipment
- Air Assisted Ammonia Injectors
- Approximate dimensions: 7'W x 4'D x 7.5'H.
- Approximate weight is 1,200 lbs
- Atomizing Air Flow Requirements: 40 SCFM / 80 PSI

- **Qty. 1 – Lot of NOx SCR Catalyst**
  - Honeycomb substrate
  - Cormetech, Umicore or Equal
  - Catalyst supplied in modules for field installation into the reactor by others based on project details
  - Inlet NOx: 30.3 ppmvd @3% O2
  - Outlet NOx: 5 ppmvd @3% O2
  - NH3 Slip: 5 ppmvd
  - Temperature: 510°F
  - Life Expectancy: 4 years
  - Catalyst Pressure Drop: ~1.7 inH2O

- **CFD System Analysis**
  - In-house CFD Engineers
  - Complete model of SCR system
  - Verification of NH3:NOx Distribution
  - Models of Velocity and Temperature Profiles through the system

Engineering Services

BASIC ENGINEERING AND DESIGN CECO PEERLESS	CECO PEERLESS	OPTIONAL	BUYER	OUT OF SCOPE
Drawing and Document Index (if requested)	X			
P&IDs	X			
Component Specification	X			
Paint Specification	X			
Piping Specification	X			
I-O List	X			
Dilution air or exhaust blower & motor data (includes fan curves, motor drawing, motor wiring diagrams, motor performance sheet, cut sheets of auxiliary equipment)	X			
Inspection and Test Plan	X			
Utility Consumption List (includes electricity and air users)	X			
Weld Procedures and Supporting PQRs	X			
Spare Parts List	X			
Shipping Bill of Material	X			
Operation & Maintenance manuals – one electronic copy	X			
Equipment general arrangement drawings (including location of anchor bolts)	X			
Design of anchor bolts (size and length)			X	
Design of insulation (if applicable)			X	
Supply and installation of insulation (if applicable)			X	
PE Stamp (can be included for an additional cost)		X		
Design, supply, and installation of heat tracing or instrument protection (if applicable)			X	
Computation Fluid Dynamics (CFD) Modeling	X			
Trim-NOx PLC – AB Compact Logix (additional cost)		X		

Notes / Clarifications

1. 480/3/60 power are to be field wired to each pump.
2. 3x 120 VAC/20 Amp circuits are to be field wired to each metering skid.
3. Unloading and positioning of the skids is by others.
4. Catalyst installation is by others, can be added to Peerless scope for additional cost
5. Gas Path and Reactor Dimensions can be adjusted to meet site layout, duct work / economizer dimensions.

CECO PEERLESS STANDARD DESIGN SPECIFICATIONS:

Paint Specification:

Surface Preparation: SSPC SP-6, Commercial Blast Cleaning
Primer: Inorganic Zinc Primer, Carboline, Carbo Zinc 11, Gray #0700, 2-3 mils DFT
Top Coat: Carboline Carbothane 133HB, 2-2.5 mils, 4701 Gray White Color

** Applies to all CS surfaces that are not ultimately insulated (either in Peerless' shop, other shop, or in the field):*

*** All stainless steel surfaces (ferric or austenitic) will be SSPC SP-1 solvent cleaned only.*

**** Valves will not be painted (primer or top coat) regardless of material of valve or material of line in which the valve is installed*

Piping Design, Fabrication, and Testing Specifications:

Urea Systems: ASME/ANSI B31.1

All structural welding (e.g., AFCU skid base) will be designed, fabricated, and tested to ASME code, Section IX

Electrical Classification:

Enclosure Type: NEMA 4
IEC Enclosure Class: IP56
Area Classification: Non-hazardous

Native format of all drawings: AutoCAD 2006
Native format of all documents: Microsoft Word, Excel, Adobe Acrobat

** Please note all drawings and documents will be officially submitted in Adobe Acrobat format*

COMPONENT	STANDARD SUPPLIER	TECHNICALLY ACCEPTABLE ALTERNATES (Additional Cost may Apply)
Dilution Blower (high temp exhaust)	Robinson	
Dilution Blower (ambient air)	Chicago Blower	AirTech, Atlantic
Dilution Blower Motors (either type)	TECO Westinghouse	Reliance, Baldor, Siemens, GE
Electric Heater (flanged immersion style)	Chromalox	Watlow, CCI Thermal
Electric Heater Power Panels	Peerless	Chromalox
Valves – Gate (forged, smaller than 2”)	Vogt	Powell, Velan
Valves – Gate (cast, 2” and larger)	Powell	Velan, Vogt
Valves – Ball	Marwin	Velan, KF Contromatics, Metso (Jamesbury)
Valves – Check (wafer style)	Crane	Champion
Valves – Butterfly	Keystone	WKM
Valves – Globe	Velan	Vogt
Damper	Advanced Valve Design	Shanrod
Thermocouple/Thermowell	Rosemount	STI
RTD/Thermowell	Rosemount	STI
Temperature Indicator (thermometer)	Wika	Ashcroft
Temperature Transmitter	Rosemount	Honeywell
Pressure Gauge	Wika	Ashcroft, 3D Instruments
Differential Pressure Gauge	Midwest	Ashcroft
Pressure transmitter	Rosemount	Honeywell
Differential pressure transmitter	Rosemount	Honeywell
Pressure switch	SOR	Ashcroft
Flowmeter/transmitter (ammonia) – coriolis	Micromotion	
Flowmeter/transmitter (dilution media) – annubar	Rosemount	Veris
Orifice plates	Fluidic Techniques (Vickery-Simms)	Primary Flow Signal, Triad, Daniel Industries
Flow control valve (ammonia line) • Valve • Actuator (pneumatic) • Positioner (I/P) • Air regulator	 Fisher-Baumann Baumann Fisher Fisher	
Actuated Damper (exhaust line) • Damper • Actuator (pneumatic) • Solenoid valve • Limit Switches • Air regulator	 Advanced Valve Design Tyco-Morin ASCO Westlock Fisher	 Shanrod Fisher (Field Q) Burkett Topworx, Tyco-Avid SMC
Actuated ball valve (ammonia line)	Marwin	Velan, KF Contromatics, Metso

• Valve • Actuator (pneumatic) • Solenoid valve • Limit switch • Air regulator	Tyco-Morin ASCO Westlock Fisher	(Jamesbury) Rotork Burkett Topworx, Tyco-Avid SMC
Needle Valves	AGCO	Hex
Instrument Root Valves	AGCO	Hex
Instrument Manifold Valves	AGCO	Hex
Pressure regulator	Fisher	
Strainers	Armstrong	
Expansion Joints (metallic)	American Boa	Unaflex
Expansion Joints (rubber)	General Rubber	
Expansion Joints (fabric)	Johnson Expansion Joints	
Excess flow check valve	MGM	Rego
Level Indicator (float style)	Rochester	
Level indicator (bridled, magnetic flag style)	Magnetrol	K-TEK, Jerguson
Level Transmitter (guided wave radar style)	Magnetrol	Rosemount
Flow sight glass (unloading station)	Penberthy	
Remote level indication (unloading station)	Rosemount	
Pressure relief valve (vapor ammonia)	Crosby	Rego, Farris
Hydrostatic relief valve (liquid ammonia)	Rego	Crosby
Vacuum breaker valve (storage tank)	Groth	
Emergency shut-off valve (unloading station)	Fisher	Rego
Ammonia gas detectors	Scott Instruments	
Junction boxes	Peerless	
PLC's	Allen Bradley (Compact Logix)	GE Fanuc (9030 series)

Peerless reserves the right to provide alternate suppliers

COMMERCIAL TERMS

A. PROPOSAL PRICE: The price proposed is for the design, materials, or components listed. If specific design conditions differ from the inquiry, the specifications shall be modified, and an equitable adjustment shall be made in the contract price or delivery schedule, or both. Any changes in this quotation will be submitted and approved in writing.

B. DELIVERY: Typical delivery for catalyst and all equipment is within thirty-five (35) weeks from the order date, contingent upon the timely return of approved drawings/documents. Storage fees will be charged if delivery is delayed beyond the project schedule for delays not caused by Peerless Mfg. Co. (Peerless). These charges will be imposed at the time of the delay.

C. TRANSPORTATION: Shipment of the equipment shall be via Motor Freight, Ex Works, Manufacturing Point. No allowance has been made for any freight charges, special packaging, or export packaging / crating.

D. EXCLUDED ITEMS: The quoted price does not include any custom duties, tariffs, import fees, income tax, nor any other taxes, duties, levies, etc., imposed by governmental organizations. Equipment delivered to the following states will require a Tax Exemption Certificate to exclude those current state taxes from our invoice: Arizona, California, Georgia, Kentucky, Tennessee, and Texas.

E. VALIDITY: The offered price is valid for thirty (30) days from the proposal date, and thereafter, is subject to our acceptance. Due to the current fluctuation in steel prices, all pricing in this proposal must be confirmed at time of purchase order.

F. PAYMENT TERMS: Payment shall be made, net 30 days, according to the following schedule:
25% - upon receipt of order
25% - upon approved drawings
25% - upon Peerless' purchase of materials
25% - upon Peerless' notification that equipment is ready for shipment.

G. CHANGES / CANCELLATION SCHEDULE: Any changes to or cancellation of the Agreement, once accepted, are subject to written approval by Peerless under conditions that shall include, among other things, protection against any loss to Peerless.

Cancellation Schedule:
25% - after receipt of purchase order
50% - after submittal of general arrangement drawings
90% - after release to purchase materials
100% - upon release to fabricate

H. WARRANTY:

1. All hardware is under warranty for eighteen (18) months from contracted delivery or twelve (12) months from scheduled start-up, whichever occurs first. The extent of the warranty includes replacement of defective components, and is limited to material only.

2. Peerless is not responsible for any damage resulting from mis-operation or improper maintenance of the unit as described in the Peerless Operation & Maintenance Manuals for this project. Warranty is voided if the system is not operated and maintained in accordance with the Operation & Maintenance Manual.

3. The aqueous ammonia or aqueous urea must be reagent grade, diluted with fully de-ionized water to the % by weight specified above.

Schedule

Peerless provides the following preliminary estimated schedule:

Receipt of PO, Internal Kick off meeting:	1 week ARO
Submittal of GA, P&ID's:	3-6 weeks ARO
Submittal of Balance of Submittal Package	10 weeks ARO
Customer review and approval:	2 weeks after submittal
Fabrication, testing, packing:	20 weeks after approval
Total Estimated Shipment ARO:	35 weeks

Note: current estimates for catalyst delivery is 5 ***months after release to catalyst vendor****. Discussions of project timelines should be had to ensure on time deliveries.*
Note: If the above estimated schedule does not meet project demands, Peerless can discuss the project requirements to meet those demands

Terms of Payment

Schedule in above section F
Payment schedule excludes engineering field support services quoted.
Payment terms: NET 30

Validity

This is a budget proposal.

Exclusions

1. Certified emissions testing
2. Connecting duct work / IC Piping to Ammonia skid from boiler duct
3. Walkways / stairs / handrails
4. Interconnecting flu gas duct work
5. Piping from bulk storage to Trim-NOx skid and to injectors
6. Expansion joints not located on Peerless skids
7. Supply of Ammonia
8. Cable trays / glands not located on Peerless supplied skids
9. Junction boxes not located on Peerless supplied skids
10. Operating costs
11. Eye wash / safety showers
12. Unloading skid spray nozzles
13. CEMS / Emissions Analyzers
14. Compressed Air Supply
15. Shipping
16. Field installation
17. External insulation

Performance Warranty Statement

Peerless equipment is guaranteed against defects or poor performance which occur during the guarantee period.

Peerless agrees repair or replace any equipment designed and supplied by us which is found to be defective in materials or workmanship within 18 months from delivery or 12 months from initial operation, whichever occurs sooner provided we are given written notice of such defects as soon as they have been discovered. Upon such notification, Peerless shall propose a method to achieve a satisfactory correction of the defect, provided that such method need not involve premium costs (such as premium costs of overtime labor and air freight) or transportation, insurance or installation costs, except to the extent that Peerless was required to incur such costs for the original supply of the item involved. The Purchaser may agree to Peerless' proposed method or select another method. Peerless shall perform the corrective work in accordance with the method selected by the purchaser and the Purchaser shall reimburse Peerless for any difference in cost to Peerless between the method selected and the method proposed by Peerless. Such defects shall be exclusive of time effects, corrosion, erosion, or miss-operation of the process or equipment. Equipment which is not of Peerless' design and/or manufacture (valves, instruments, controls, subcontract items, etc.) will be warranted by their respective manufacturers, however, Buyer need only look to Peerless for corrective action as Peerless will act as liaison for Buyer in this respect.

CATALYST WARRANTY CONDITIONS

1. Unit operating conditions shall be within the limits of design cases specified in the Quotation.
2. The catalysts must be handled, operated, and maintained according to Peerless instruction.
3. Peerless maintains warranty protection as long as normal furnace start-up and shut-down procedures are followed and no moisture other than from flue gas or ambient air is present. The allowed start-up and shut-down temperature gradient for the catalyst is 10°C/min below and 100°C/min above the flue gas dew point.
4. Catalyst has been designed to accommodate profile maldistributions, based on a Normal Distribution, per SCR Catalyst Quotation.
5. Peerless is not responsible for catalyst deterioration caused by reagent drainage or other liquid contact to catalyst.

6. Suitable means must be employed, if needed, to clean catalyst masked or plugged by firing of particulate producing fuel. Customer will inspect visually at shutdowns and clean, as needed.
7. Access must be provided to Peerless for visual inspection and catalyst sampling. Peerless reserves the right to review the Unit's operating data at any time during the warranty period.
8. Customer must provide catalyst samples to Peerless, if requested during the warranty period, in order to maintain warranties. Peerless will provide an advance written request of a need to obtain catalyst samples, construction and sampling method that permits ease of extraction and replacement of samples, and schedule coordination for the operating plant's convenience.
9. Customer will provide a copy of all procedures and methods of analysis to be employed in catalyst evaluation for Acceptance and anytime throughout the warranty period.

CATALYST WARRANTY FULLFILLMENT

1. Peerless warranties are fulfilled at the end of the period stated in SCR Catalyst Quotation if the results:
    a. If the results of on-site tests during the warranty period indicate that the warranted values are not being met, Customer will conduct an on-site investigation to determine the cause of non-performance. If the catalyst is suspect, Peerless will conduct laboratory tests, according to the conditions specified in SCR Catalyst Quotation, to verify the catalyst performance.
    b. If the results of the laboratory tests indicate that the warranted values are being met, Peerless warranties will be deemed in fulfilment at this time and Customer will continue their investigation to determine the cause of non-fulfilment. Customer will compensate Peerless for the cost of laboratory evaluation.
    c. If the results of the laboratory tests indicate that the warranty values are not being met, Peerless will absorb cost of laboratory evaluation. Peerless will in its sole discretion, either (a) repair, replace, or add catalyst, or (b) offer Buyer a credit against the purchase price for the value of the catalyst failing to meet warranties or performance specification on a pro rata basis. Peerless's selection of (a) or (b) shall be Buyer's sole and exclusive remedy for such breach of the warranties or performance guarantees or specifications or criteria. No back-charges, administrative costs, or other fees or costs will be payable by Seller in conjunction with the exclusive remedies set forth herein.

Attachments:

- Terms and Conditions

Contact Information

Patrick Boyker
CECO Environmental
Peerless
14651 North Dallas Parkway, Suite 500
Dallas, TX 75254
pboyker@onececo.com
214-708-7620

Jeff Broderick
CECO Environmental
Peerless
884 Main St.
Monroe, CT 06468
jbroderick@onececo.com
203-610-4673

Tim Buttke
Southport Equipment
Peerless Sales Representative
tbuttke@southportequipment.com
818-618-7272

COMMERCIAL CLARIFICATIONS AND EXCEPTIONS:

- Peerless Mfg. Co. has not provided any comments to commercial terms and conditions. If our proposal is otherwise technically acceptable, Peerless requests acceptance of CECO/Peerless Standard Terms and Conditions or to negotiate a mutually agreed upon set of terms and conditions.

  Peerless requests the following major items to be considered as part of the final negotiations.

- ✓ Important information from Peerless' proposal and e-mails to be incorporated in the final contract.
- ✓ Consequential Damage Disclaimer: Seller shall not be liable for incidental, special, punitive, or consequential damages, including loss of profit or revenue, for any breach of this contract.
- ✓ Limitation of Liability
- ✓ Suspension of work: Peerless requires a cap on any potential period of suspension.
- ✓ Clear Warranty Language: See Peerless standard warranty.
- ✓ Default (Time to Cure): Peerless requires a reasonable time to commence to cure for all events of default (not less than 15 days) after notice of the supposed default or breach.
- ✓ Force Majeure Clause
- ✓ Intellectual Property of Peerless: Unless otherwise specified in this contract, buyer shall not obtain any rights or interests in any patent, copyright, confidential know-how, trademark, process or other proprietary right owned by seller or any other party and any proprietary rights developed by seller pursuant to the contract shall belong to seller.
- ✓ Exclusivity of Warranty: EXCEPT AS EXPRESSLY SET FORTH IN THIS CONTRACT, SELLER MAKES NO, AND SPECIFICALLY DISCLAIMS, REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, REGARDING ANY MATTER, INCLUDING THE MERCHANTABILITY, SUITABILITY, ORIGINALITY, FITNESS FOR A PARTICULAR USE OR PURPOSE OR RESULTS TO BE DERIVED FROM ANY GOODS, SERVICES OR OTHER ITEMS PROVIDED UNDER THIS CONTRACT.
- ✓ Confidentiality: Buyer shall handle confidentially all designs and specifications and technical, commercial, financial and other information which Buyer receives from Seller pursuant to this transaction and shall not use, copy or communicate such information to others except in the performance of Buyer's obligations pursuant to this Purchase Order or as necessary for operation and use of the goods, without prior written consent of and the payment of fair compensation to Seller. If Buyer discloses such information to any other party, as permitted by this paragraph, Buyer shall secure such party's written agreement to the same confidentiality restrictions as stipulated herein and shall cause such party to comply with such confidentiality restrictions.
- ✓ Exports: If all or any portion of the goods to be provided pursuant to this Quotation are to be exported from the United States, Buyer agrees that such exportation is subject in all respects to, and Buyer shall comply in all respects with, United States laws with respect to such export and subsequent re-export of such goods. Seller makes no representation or warranty relative to the export or re-export of such goods.
- ✓ Dispute Resolution, binding arbitration
- ✓ Change Orders: The Purchaser may be permitted to modify the specifications for the goods which Peerless is manufacturing with Peerless' written agreement. If the change effects either the price or delivery date for the goods, Peerless shall have the ability to notify the purchaser and require that, before continuing performance, the parties must agree in writing upon an equitable adjustment of the price (which may be increased or reduced) and/or the delivery date to reflect the effect of the change. In the event that the purchaser requests a change which itself or as a result of negotiations between Peerless and purchaser concerning the impact of the change, results in the need for an extension of the time required for performance by Peerless, then the time for such performance must be equitably extended in light of such matters.
- ✓ No "time is of the essence" language
- ✓ Submission to jurisdiction of Buyer's courts: Peerless prefers to submit to mutually agreed upon jurisdiction of courts in the contract.
- ✓ No payment in foreign currency, unless already agreed to by Peerless and the Buyer during the proposal stage of the contract.
- ✓ Peerless requests to limit liquidated damages (in the aggregate) to 5% of the contract price.
- ✓ Indemnities: The intellectual property indemnity shall not apply to the extent any infringement or violation results from (i) the combination or use of the equipment provided by Peerless with other equipment, software or materials, (ii) use of equipment provided by Peerless other than as anticipated by the specifications or other than in accordance with operating instructions provided by Peerless, (iii) work performed by, or other acts or omissions of, the Buyer or any party other than Peerless or (iv) modifications to the equipment provided by any party other than by Peerless. Indemnities should not apply unless the Buyer (i) promptly notifies Peerless, in writing, of any claim and (ii) reasonably cooperates with Peerless and gives Peerless full opportunity to control the response to the claim.

Indemnities must constitute the sole and exclusive remedy for the circumstance to which they relate.

- ✓ No prohibitions on subcontracting.
- ✓ Ownership: Unless otherwise specified in this Contract, Buyer shall not obtain any rights or interests in any patent, copyright, proprietary right or confidential know-how, trademark or process owned by Seller or any other party. Any and all intellectual property rights, including rights of patent, copyright and trademark, in any reports, drawings, documents, specifications, calculations, confidential know-how, materials, or processes (the "Intellectual Property Rights") owned or created by Seller and used or embodied in goods or services covered by this Quotation shall remain the sole property of Seller. Any and all Intellectual Property Rights developed by Seller, whether in the provision of goods and services covered by this Quotation or independently thereof, shall belong to Seller. Any and all right, title or interest that Buyer or any other party may have or obtain in or to Seller's Intellectual Property Rights is hereby assigned to Seller and Buyer shall take, or cause to be taken, all necessary or appropriate actions to vest such Intellectual Property Rights in Seller.
- ✓ No setoff rights pursuant to which the Buyer can "setoff" against amounts due to Peerless any amounts supposedly owed by Peerless to the Buyer, either under the contract at hand or another contract between the parties.
- ✓ Reservation of right to accept goods or services: Buyer shall promptly inspect the goods or services and accept or reject them.
- ✓ No waiver of liens by Peerless or its subcontractors except conditioned on payment.
- ✓ Interest on Unpaid Balances: Amounts not paid when due by buyer shall bear interest at the highest lawful rate on the unpaid amount from the due date until paid; provided, however, extended payment terms are acceptable only if agreed upon in writing by Seller.
- ✓ Termination for convenience whether in whole or in part: Peerless requires payment for work performed and payment for expenses which will result from such termination (e.g., termination of related contracts and reassignment of people and resources).
- ✓ The contract should specifically identify any codes or laws that Peerless must comply with, and the Purchaser shall be responsible for providing a copy of such regulations for Seller's review.

GENERAL TERMS AND CONDITIONS FOR THE SALE OF GOODS AND SERVICES

1. Applicability.
(a) These terms and conditions of sale (these "**Terms**") are the only terms which govern the sale of the goods, including equipment, machinery, materials, consumables (collectively, "**Goods**") and services ("**Services**") by CECO Environmental Corp. and all of its affiliated companies (collectively, "**Seller**") to the buyer named on the signature line of these Terms ("**Buyer**"). Any provisions or conditions of Buyer's order which are in any way inconsistent with, or in addition to these Terms shall not be binding on Seller, and shall not be applicable, except with Seller's written acceptance.

(b) The accompanying quotation (the "**Sales Confirmation**") and these Terms (collectively, this "**Agreement**") comprise the entire agreement between the parties, and supersede all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. These Terms prevail over any of Buyer's general terms and conditions of purchase regardless whether or when Buyer has submitted its purchase order or such terms. Fulfillment of Buyer's order does not constitute acceptance of any of Buyer's terms and conditions and does not serve to modify or amend these Terms.

(c) Notwithstanding anything to the contrary contained in this Agreement, Seller may, from time to time change the Services without the consent of Buyer provided that such changes do not materially affect the nature or scope of the Services, or the fees or any performance dates set forth in the Sales Confirmation.

2. **Delivery of Goods and Performance of Services**.
(a) The Goods will be shipped within a reasonable time after the receipt of Buyer's purchase order. Seller shall not be liable for any delays, loss or damage in transit.

(b) Unless otherwise agreed in writing by the parties, Seller shall ship the Goods F.O.B. from Seller's location (the "**Delivery Point**") using Seller's standard methods for packaging and shipping such Goods. Buyer shall take delivery of the Goods within ten (10) days of Seller's written notice that the Goods have been shipped to the Delivery Point. Buyer shall be responsible for all loading costs and provide equipment and labor reasonably suited for receipt of the Goods at the Delivery Point.

(c) Seller may, in its sole discretion, without liability or penalty, make partial shipments of Goods to Buyer. Each shipment will constitute a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer's purchase order.

(d) If for any reason Buyer fails to accept delivery of any of the Goods on the date fixed pursuant to Seller's notice that the Goods have been delivered at the Delivery Point, or if Seller is unable to deliver the Goods at the Delivery Point on such date because Buyer has not provided appropriate instructions, documents, licenses or authorizations: (i) risk of loss to the Goods shall pass to Buyer; (ii) the Goods shall be deemed to have been delivered; and (iii) Seller, at its option, may store the Goods until Buyer picks them up, whereupon Buyer shall be liable for all related costs and expenses (including, without limitation, storage and insurance).

(e) Seller shall use commercially reasonable efforts to meet any performance dates to render the Services specified in the Sales Confirmation, and any such dates shall be estimates only.

(f) With respect to the Services, Buyer shall (i) cooperate with Seller in all matters relating to the Services and provide such access to Buyer's premises, and such office accommodation and other facilities as may reasonably be requested by Seller, for the purposes of performing the Services; (ii) respond promptly to any Seller request to provide direction, information, approvals, authorizations or decisions that are reasonably necessary for Seller to perform Services in accordance with the requirements of this Agreement; (iii) provide such customer materials or information as Seller may reasonably request to carry out the Services in a timely manner and ensure that such customer materials or information are complete and accurate in all material respects; and (iv) obtain and maintain all necessary licenses and consents and comply with all applicable laws in relation to the Services before the date on which the Services are to start.

(g) Any and all data books, instructions, operating manuals and specifications documents will be provided by Seller in an electronic format free of charge. Bound versions may be provided at Buyer's request, subject to additional charges.

3. **Non-Delivery**.
(a) The quantity of any installment of Goods as recorded by Seller on dispatch from Seller's place of business is conclusive evidence of the quantity received by Buyer on delivery unless Buyer can provide conclusive evidence proving the contrary.

(b) Seller shall not be liable for any non-delivery of Goods (even if caused by Seller's negligence) unless Buyer gives written notice to Seller of the non-delivery within ten (10) days of the date when the Goods would in the ordinary course of events have been received.

(c) Any liability of Seller for non-delivery of the Goods shall be limited to replacing the Goods within a reasonable time or adjusting the invoice respecting such Goods to reflect the actual quantity delivered.

(d) The remedies set forth in this **Section 3** are Buyer's exclusive remedies for the delivery of Nonconforming Goods. Except as provided under **Section 3(c)**, all sales of Goods to Buyer are made on a one-way basis and Buyer has no right to return Goods purchased under this Agreement to Seller.

4. **Shipping Terms**. Delivery of the Goods shall be made F.O.B. point of shipment at Seller's location.

5. **Title and Risk of Loss**. Title and risk of loss passes to Buyer F.O.B. point of shipment unless otherwise specified. As collateral security for the payment of the purchase price of the Goods, Buyer hereby grants to Seller a lien on and security interest in and to all of the right, title and interest of Buyer in, to and under the Goods, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds (including insurance proceeds) of the foregoing. The security interest granted under this provision constitutes a purchase money security interest under the Uniform Commercial Code.

6. **Buyer's Acts or Omissions**. If Seller's performance of its obligations under this Agreement is prevented or delayed by any act or omission of Buyer or its agents, subcontractors, consultants or employees, Seller shall not be deemed in breach of its obligations under this Agreement or otherwise liable for any costs, charges or losses sustained or incurred by Buyer, in each case, to the extent arising directly or indirectly from such prevention or delay.

7. **Inspection and Rejection of Nonconforming Goods**.
(a) Buyer shall inspect the Goods within ten (10) days of receipt ("**Inspection Period**"). Buyer will be deemed to have accepted the Goods unless it promptly notifies Seller in writing of any Nonconforming Goods during the Inspection Period and furnishes such written evidence or other documentation as reasonably required by Seller. "**Nonconforming Goods**" means only the following: (i) product shipped is different than identified in Buyer's purchase order; or (ii) product's label or packaging incorrectly identifies its contents.

(b) If Buyer timely notifies Seller of any Nonconforming Goods, Seller shall, in its sole discretion, (i) replace such Nonconforming Goods with conforming Goods, or (ii) credit or refund the Price for such Nonconforming Goods, together with any reasonable shipping and handling expenses incurred by Buyer in connection therewith. Buyer shall ship, at its expense and risk of loss, the Nonconforming Goods to Seller's facility. If Seller exercises its option to replace Nonconforming Goods, Seller shall, after receiving Buyer's shipment of Nonconforming Goods, ship to Buyer, at Buyer's expense and risk of loss, the replaced Goods to the Delivery Point.

(c) Buyer acknowledges and agrees that the remedies set forth in **Section 7(b)** are Buyer's exclusive remedies for the delivery of Nonconforming Goods. Except as provided under **Section 7(b)**, all sales of Goods to Buyer are made on a one-way basis and Buyer has no right to return Goods purchased under this Agreement to Seller.
8. **Price**.
(a) Buyer shall purchase the Goods and Services from Seller at the prices (the "**Prices**") set forth in Seller's quotation or bid. Prices may be increased by Seller before delivery of the Goods to a carrier for shipment to Buyer, due to Seller's increased cost of supply. In such event, these Terms shall be construed as if the increased prices were originally inserted herein, and Buyer shall be billed by Seller on the basis of such increased prices. All Prices are F.O.B. point of shipment unless otherwise specified.

(b) Buyer agrees to reimburse Seller for all reasonable travel and out-of-pocket expenses incurred by Seller in connection with the performance of the Services.

(c) All Prices are exclusive of all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any Governmental Authority on any amounts payable by Buyer. Buyer shall be responsible for all such charges, costs and taxes; provided, that, Buyer shall not be responsible for any taxes imposed on, or with respect to, Seller's income, revenues, gross receipts, personnel or real or personal property or other assets.

9. **Payment Terms**.
(a) Buyer shall pay all invoiced amounts due to Seller within thirty (30) days from the date of Seller's invoice. Buyer shall make all payments hereunder in US dollars.

(b) Buyer shall pay interest on all late payments at the lesser of the rate of 1.5% per month or the highest rate permissible under applicable law, calculated daily and compounded monthly. Buyer shall reimburse Seller for all costs incurred in collecting any late payments, including, without limitation, reasonable attorneys' fees. In addition to all other remedies available under these Terms or at law (which Seller does not waive by the exercise of any rights hereunder), Seller shall be entitled to suspend the delivery of any Goods or performance of any Services if Buyer fails to pay any amounts when due hereunder and such failure continues for ten (10) days following written notice thereof.

(c) Progress payments specified in the Sales Confirmation will apply if the total Prices for the Goods and Services purchased hereunder is equal to or greater than $250,000.00 USD.

(d) Buyer shall not withhold payment of any amounts due and payable by reason of any set-off of any claim or dispute with Seller, whether relating to Seller's breach, bankruptcy or otherwise.

10. **Suspensions and Cancellations**.
(a) No cancellations of an order or any portion of an order by Buyer will be effective unless accepted by Seller in writing. Accepted cancellations will be subject to a charge to cover all costs and expenses incurred by Seller through the date of cancellation, plus reasonable cancellation costs and a reasonable profit margin on the completed work. Cancellation of orders for Goods made to order and not part of Seller's regular stock will not be accepted after fabrication has commenced.
(b) In the event Buyer suspends Seller's performance of work, Buyer shall reimburse Seller for all costs incurred by Seller as a result of the suspension, including, without limitation, all borrowing and opportunity costs. In the event a suspension exceeds 180 days in duration, in addition to being entitled to full reimbursement of costs, Seller shall have the unqualified right to cancel the unfinished portion of the order without liability.

11. **Limited Warranty**.

(a) Subject to the other provisions of this **Section 11**, Seller warrants to Buyer that for a period of the lesser of eighteen (18) months from the date of shipment of the Goods, or twelve (12) months after the Goods are initially placed in operation ("**Warranty Period**"), that such Goods will materially conform to the specifications set forth in Buyer's order and will be free from material defects in material and workmanship.

(b) Seller warrants to Buyer that it shall perform the Services using personnel of required skill, experience and qualifications and in a professional and workmanlike manner in accordance with generally recognized industry standards for similar services and shall devote adequate resources to meet its obligations under this Agreement.

(c) Any performance guarantee of Seller relating to the Goods with regard to compliance with any governmental specifications, including, without limitation, particulate levels or pollution controls, are specifically limited to the time of commissioning or start-up of the Goods in question. It is the Buyer's responsibility to properly maintain the Goods, monitor system performance and take corrective actions.

(d) **EXCEPT FOR THE WARRANTIES SET FORTH IN SECTIONS 11(a) AND 11(b), SELLER MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE GOODS OR SERVICES, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; OR (c) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY, WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.**

(e) Products manufactured by a third party ("**Third Party Product**") may constitute, contain, be contained in, incorporated into, attached to or packaged together with, the Goods. Third Party Products are not covered by the warranty in **Section 11(a)**. For the avoidance of doubt, **SELLER MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO ANY THIRD PARTY PRODUCT, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.**

(f) Seller shall not be liable for a breach of the warranties set forth in **Section 11(a)** and **Section 11(b)** unless: (i) Buyer gives written notice of the defective Goods or Services, as the case may be, reasonably described, to Seller within ten (10) days of the time when Buyer discovers or ought to have discovered the defect; (ii) if applicable, Seller is given a reasonable opportunity after receiving the notice of breach of the warranty set forth in **Section 11(a)** to examine such Goods and Buyer (if requested to do so by Seller) returns such Goods to Seller's place of business at Seller's cost for the examination to take place there; and (iii) Seller reasonably verifies Buyer's claim that the Goods or Services are defective.

(g) Seller shall not be liable for a breach of the warranty set forth in **Section 11(a)** and **Section 11(b)** if: (i) Buyer makes any further use of such Goods after giving such notice; (ii) the defect arises because Buyer failed to follow Seller's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods; or (iii) Buyer alters or repairs such Goods without the prior written consent of Seller.

(h) Subject to **Section 11(f)** and **Section 11(g)** above, with respect to any such Goods during the Warranty Period, Seller shall, in its sole discretion, either: (i) repair or replace such Goods (or the defective part) or (ii) credit or refund the price of such Goods at the pro rata contract rate provided that, if Seller so requests, Buyer shall, at Seller's expense, return such Goods to Seller. **ALL COSTS OF DISMANTLING, REINSTALLATION AND FREIGHT, AND THE TIME AND EXPENSES OF SELLER'S PERSONNEL FOR SITE TRAVEL AND DIAGNOSIS ONSITE UNDER THIS WARRANTY SHALL BE BORNE BY BUYER.**

(i) Subject to **Section 11(f)** and **Section 11(g)** above, with respect to any Services subject to a claim under the warranty set forth in **Section 11(b)**, Seller shall, in its sole discretion, (i) repair or re-perform the applicable Services or (ii) credit or refund the price of such Services at the pro rata contract rate.

(j) **THE REMEDIES SET FORTH IN SECTION 11(h) AND SECTION 11(i) SHALL BE THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND SELLER'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTIES SET FORTH IN SECTION 11(a) AND SECTION 11(b).**

12. **Intellectual Property Rights**.

(a) Buyer acknowledges and agrees that: (i) any and all Seller's intellectual property rights are the sole and exclusive property of Seller or its licensors; (ii) Buyer shall not acquire any ownership interest in any of Seller's intellectual property rights under this Agreement; (iii) any goodwill derived from the use by Buyer of Seller's intellectual property rights inures to the benefit of Seller or its licensors, as the case may be; (iv) if Buyer acquires any intellectual property rights, rights in or relating to any Goods (including any rights in any trademarks, derivative works or patent improvements relating thereto) by operation of law, or otherwise, such rights are deemed and are hereby irrevocably assigned to Seller or its licensors, as the case may be, without further action by either of the parties; and (v) Buyer shall use Seller's intellectual property rights solely for purposes of using the Goods under this Agreement and only in accordance with this Agreement and the instructions of Seller.

(b) Buyer shall not: (i) take any action that interferes with any of Seller's rights in or to Seller's intellectual property rights, including Seller's ownership or exercise thereof; (ii) challenge any right, title or interest of Seller in or to Seller's intellectual property rights; (iii) make any claim or take any action adverse to Seller's ownership of Seller's intellectual property rights; (iv) register or apply for registrations, anywhere in the world, for Seller's trademarks or any other trademark that is similar to Seller's trademarks or that incorporates Seller's trademarks; (v) use any mark, anywhere that is confusingly similar to Seller's trademarks; (vi) engage in any action that tends to disparage, dilute the value of, or reflect negatively on the Goods or any Seller's trademarks; (vii) misappropriate any of Seller's trademarks for use as a domain name without prior written consent from Seller; or (viii) alter, obscure or remove any Seller's trademarks, or trademark or copyright notices or any other proprietary rights notices placed on the Goods, marketing materials or other materials that Seller may provide.

13. **Seller's Intellectual Property Indemnification**.
(a) Subject to the terms and conditions of this Agreement, including **Section 13(b)** and **Section 13(c)**, Seller shall indemnify, defend and hold harmless Buyer from and against all losses awarded against Buyer in a final non-appealable judgment arising out of any claim of a third party alleging that any of the Goods or Buyer receipt or use thereof infringes any intellectual property right of a third party.

(b) If the Goods, or any part of the Goods, becomes, or in Seller's opinion is likely to become, subject to a claim of a third party that qualifies for intellectual property indemnification coverage under this **Section 13**, Seller shall, at its sole option and expense, notify Buyer in writing to cease using all or a part of the Goods, in which case Buyer shall immediately cease all such use of such Goods on receipt of Seller's notice.

(c) Notwithstanding anything to the contrary in this Agreement, Seller is not obligated to indemnify or defend Buyer against any claim (direct or indirect) under **Section 13(a)** if such claim or corresponding losses arise out of or result from, in whole or in part, (i) Buyer's marketing, advertising, promotion or sale or any product containing the Goods; (ii) use of the Goods in combination with any products, materials or equipment supplied to Buyer by a person other than Seller or its authorized representatives, if the infringement would have been avoided by the use of the Goods not so combined; or (iii) any modifications or changes made to the Goods by or on behalf of any person other than Seller or its representatives, if the infringement would have been avoided without such modification or change.

(d) **THIS SECTION 13 SETS FORTH THE ENTIRE LIABILITY AND OBLIGATION OF SELLER AND THE SOLE AND EXCLUSIVE REMEDY FOR BUYER FOR ANY LOSSES COVERED BY SECTION 13.**

14. **Limitation of Liability**.
(a) **IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY THIRD PARTY FOR ANY LOSS OF USE, REVENUE OR PROFIT OR LOSS OF DATA OR DIMINUTION IN VALUE, OR FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, REGARDLESS OF WHETHER SUCH DAMAGES WERE FORESEEABLE AND WHETHER OR NOT SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE.**

(b) **IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED THE TOTAL OF THE AMOUNTS PAID TO SELLER FOR THE GOODS AND SERVICES SOLD HEREUNDER. THE LIMITATION OF LIABILITY PROVISIONS SET FORTH IN THIS SECTION 14 SHALL APPLY EVEN IF BUYER'S REMEDIES UNDER THIS AGREEMENT FAIL OF THEIR ESSENTIAL PURPOSE.**

(c) The limitation of liability set forth in **Section 14(b)** shall not apply to (i) liability resulting from Seller's gross negligence or willful misconduct or (ii) death or bodily injury to the extent resulting from Seller's negligent acts or omissions.

15. **Insurance**. During the term of this Agreement and for a period of two (2) years thereafter, Buyer shall, at its own expense, maintain and carry insurance in full force and effect which includes, but is not limited to, commercial general liability (including product liability) in a sum no less than $1,000,000, with financially sound and reputable insurers. Upon Seller's request, Buyer shall provide Seller with a certificate of insurance from Buyer's insurer evidencing the insurance coverage specified in these Terms. Buyer shall provide Seller with thirty (30) days' advance written notice in the event of a cancellation or material change in Buyer's insurance policy. Except where prohibited by law, Buyer shall require its insurer to waive all rights of subrogation against Seller's insurers and Seller.

16. **Compliance with Law**.
(a) *Generally*. Buyer shall comply with all applicable laws, regulations and ordinances. Buyer shall maintain in effect all the licenses, permissions, authorizations, consents and permits that it needs to carry out its obligations under this Agreement. Buyer shall comply with all export and import laws of all countries involved in the sale of the Goods under this Agreement or any resale of the Goods by Buyer. Buyer assumes all responsibility for shipments of Goods requiring any government import clearance. Seller may terminate this Agreement if any governmental authority imposes antidumping or countervailing duties or any other penalties on Goods.

(b) *OFAC Representation and Warranty*. Buyer is in compliance with the International Emergency Economic Powers Act (50 U.S.C. § 1701) and all other Laws administered by OFAC or any other Governmental Authority imposing economic sanctions and trade embargoes ("**Economic Sanctions Laws**") against countries ("**Embargoed Countries**") and persons designated in such Laws (collectively, "**Embargoed Targets**"). Buyer is not an Embargoed Target or otherwise subject to any Economic Sanctions Law.

(c) *OFAC Covenant*. Without limiting the generality of **Section 16(a)**, Buyer shall comply with all Economic Sanctions Laws. Without limiting the generality of the foregoing, Buyer shall not: (i) directly or indirectly export, re-export, transship or otherwise deliver the Goods or any portion of the Goods to an Embargoed Country or an Embargoed Target; or (ii) broker, finance or otherwise facilitate any transaction in violation of any Economic Sanctions Law.

(d) *Export Regulation (EAR and ITAR) Covenant*. Buyer acknowledges that the Goods, including any software, documentation and any related technical data included with, or contained in, such Goods, and any products utilizing any such Goods, software, documentation or technical data (collectively, "**Regulated Goods**") may be subject to US export control Laws and regulations, including the Export Administration Regulations promulgated under the Export Administration Act of 1979, and the International Traffic in Arms Regulations administered by the US Department of State. Without limiting the generality of **Section 16(a)**, Buyer shall not, and shall not permit any third parties to, directly or indirectly, export, re-export or release any Regulated Goods to any jurisdiction or country to which, or any party to whom, the export, re-export or release of any

Regulated Goods is prohibited by applicable federal or foreign law. Buyer shall be responsible for any breach of this Section by its, and its successors' and permitted assigns', parent, affiliates, employees, officers, directors, partners, members, shareholders, customers agents, distributors, resellers or vendors that are not Buyer.

(e) *Foreign Corrupt Practices Act Representation and Warranty*. Buyer is in compliance with the Foreign Corrupt Practices Act of 1977, as amended ("**FCPA**") and the UK Bribery Act of 2010 ("**Bribery Act**"). Neither Buyer nor any of its representatives has: (i) used any corporate funds for any unlawful contribution, gift, entertainment or other unlawful expense relating to political activity or to influence official action; (ii) made any direct or indirect unlawful payment to any foreign or domestic government official or employee from corporate funds; (iii) made any bribe, rebate, payoff, influence payment, kickback or other unlawful payment; or (iv) failed to disclose fully any contribution or payment made by Buyer (or made by any Person acting on its behalf of which Buyer is aware) that violates the FCPA or the Bribery Act.

(f) *Anti-Bribery Covenant*. Without limiting the generality **of Section 16(a)**, Buyer shall, and shall cause its representatives to, comply with the FCPA and the Bribery Act, including maintaining and complying with all policies and procedures to ensure compliance with these Acts.

17. **Termination**. In addition to any remedies that may be provided under these Terms, Seller may terminate this Agreement with immediate effect upon written notice to Buyer, if Buyer: (a) fails to pay any amount when due under this Agreement and such failure continues for ten (10) days after Buyer's receipt of written notice of nonpayment; (b) has not otherwise performed or complied with any of these Terms, in whole or in part; or (c) becomes insolvent, files a petition for bankruptcy or commences or has commenced against it proceedings relating to bankruptcy, receivership, reorganization or assignment for the benefit of creditors.

18. **Waiver**. No waiver by Seller of any of the provisions of this Agreement is effective unless explicitly set forth in writing and signed by Seller. No failure to exercise, or delay in exercising, any right, remedy, power or privilege arising from this Agreement operates, or may be construed, as a waiver thereof. No single or partial exercise of any right, remedy, power or privilege hereunder precludes any other or further exercise thereof or the exercise of any other right, remedy, power or privilege.

19. **Confidential Information**. All non-public, confidential or proprietary information of Seller, including but not limited to, specifications, samples, patterns, designs, plans, drawings, documents, data, business operations, customer lists, pricing, discounts or rebates, disclosed by Seller to Buyer, whether disclosed orally or disclosed or accessed in written, electronic or other form or media, and whether or not marked, designated or otherwise identified as "confidential" in connection with this Agreement is confidential, solely for the use of performing this Agreement and may not be disclosed or copied unless authorized in advance by Seller in writing. Upon Seller's request, Buyer shall promptly return all documents and other materials received from Seller. Seller shall be entitled to injunctive relief for any violation of this Section. This Section does not apply to information that is: (a) in the public domain; (b) known to Buyer at the time of disclosure; or (c) rightfully obtained by Buyer on a non-confidential basis from a third party.

20. **Force Majeure**. Seller shall not be liable or responsible to Buyer, nor be deemed to have defaulted or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement when and to the extent such failure or delay is caused by or results from acts or circumstances beyond the reasonable control of Seller including, without limitation, acts of God, flood, fire, earthquake, explosion, governmental actions, war, invasion or hostilities (whether war is declared or not), terrorist threats or acts, riot, or other civil unrest, national emergency, revolution, insurrection, epidemic, lockouts, strikes or other labor disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of adequate or suitable materials, materials or telecommunication breakdown or power outage.

21. **Assignment**. Buyer shall not assign any of its rights or delegate any of its obligations under this Agreement without the prior written consent of Seller. Any purported assignment or delegation in violation of this Section is null and void. No assignment or delegation relieves Buyer of any of its obligations under this Agreement.

22. **Relationship of the Parties**. The relationship between the parties is that of independent contractors. Nothing contained in this Agreement shall be construed as creating any agency, partnership, joint venture or other form of joint enterprise, employment or fiduciary relationship between the parties, and neither party shall have authority to contract for or bind the other party in any manner whatsoever.

23. **No Third-Party Beneficiaries**. This Agreement is for the sole benefit of the parties hereto and their respective successors and permitted assigns and nothing herein, express or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit or remedy of any nature whatsoever under or by reason of these Terms.

24. **Governing Law**. All matters arising out of or relating to this Agreement are governed by and construed in accordance with the internal laws of the State of Texas, USA without giving effect to any choice or conflict of law provision or rule (whether of the State of Texas or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than those of the State of Texas. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to the transactions contemplated by these Terms and Conditions.

25. **Submission to Jurisdiction**. Any legal suit, action or proceeding arising out of or relating to this Agreement shall be instituted in the federal courts of the United States of America or the courts of the State of Texas each case located in the City of Dallas, and each party irrevocably submits to the exclusive jurisdiction of such courts in any such suit, action or proceeding.

26. **Notices**. All notices, requests, consents, claims, demands, waivers and other communications hereunder (each, a "**Notice**") shall be in writing and addressed to the parties at the addresses set forth on the face of the Sales Confirmation or to such other address that may be designated by the receiving party in writing. All Notices shall be delivered by personal delivery, nationally recognized overnight courier (with all fees pre-paid), facsimile (with confirmation of transmission) or certified or registered mail (in each case, return receipt requested, postage prepaid). Except as

otherwise provided in this Agreement, a Notice is effective only (a) upon receipt of the receiving party, and (b) if the party giving the Notice has complied with the requirements of this Section.

27. **Severability**. If any term or provision of this Agreement is invalid, illegal or unenforceable in any jurisdiction, such invalidity, illegality or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

28. **Survival**. Provisions of these Terms which by their nature should apply beyond their terms will remain in force after any termination or expiration of this Order including, but not limited to, the following provisions: Insurance, Compliance with Laws, Confidential Information, Governing Law, Submission to Jurisdiction and Survival.

29. **Amendment and Modification**. These Terms may only be amended or modified in a writing stating specifically that it amends these Terms and is signed by an authorized representative of each party.

DOMESTIC FIELD SERVICE RATE SHEET

Effective 02/2020

(Does not include Alaska, Hawaii or any U.S. territories-refer to International Rate Document)

FIELD SERVICE includes onsite inspection, maintenance, commissioning, optimization, and troubleshooting/repair of equipment in a plant system. Peerless/CCA also offers supplemental training and testing for facility personnel. These services do not include the supply of any parts and are performed only based on a purchase order issued by the ultimate customer or their authorized representative, covering the specific type of service desired. Peerless Mfg. Co/CCA's service is subject to the Field Service Terms & Conditions shown on the following page.

Service Category	Type of Service	Hourly Rates
A	Field Service Specialist	$185/Hr. – Plus Expenses
B	Commissioning Technician	$200/Hr. – Plus Expenses
C	Automation/PLC Programming	$250/Hr. – Plus Expenses
D	Combustion/De-NOx Engineer	$250/Hr. – Plus Expenses
E	Construction Supervisor	$2000/Day -Plus Expenses
F	Classroom Instructor	$185/Hr. – Plus Expenses
G	Engineering Consultation	Open Purchase Order

Billing will be based on rates in effect at the time service is rendered, at a minimum of eight (8) hours per day. Rates apply within the continental United States only.

EQUIPMENT This is company owned equipment that is available to customers. The daily rate will include the hourly rate for applicable company personnel to mobilize, operate, and monitor equipment.

Type of Equipment	Daily Rates
Truck or Trailer	105cts/mi
Portable Gas Analyzer	$340/Day
NH3 Test Equipment	$340/Day
Coal Flow Testing Equipment	$750/Day
LOI Testing	$750/Day
CEM Van Rental	$1,050/Day
Flow Laboratory Facility	$2,000/Day
*Combustion Test Rig	$3,300/Day
*Diesel Engine Test Rig	$3,300/Day

Billing will be based on rates in effect at the time service is rendered, at a daily rate. Rates apply within the continental United States only.

***Diesel Engine and Combustion Test Rigs do not include the cost of the setup & dismantling, fuel, SNCR or SCR, reagent, or freight which shall be billed at cost plus 10%**

Expenses:

A) Travel – round trip plane tickets, private or rental automobile charges from the point of regularly assigned location of the service representative plus any required local travel. Private automobile charges will be 60 cents per mile. Tolls and parking fees are additional. When our service representative goes from job to job rather than returning to his corporate office, travel charges will be distributed on a prorated basis.

B) Living – lodging, meals, and incidental costs are living expenses.

C) Training – training required for site specific access including onsite, offsite, and classroom will be billed at applicable rate.

D) Receipts for air travel, automobile rental and lodging will be available upon request. Receipts for meals and incidental costs are not required by Peerless Mfg. Co./CCA but will be supplied upon prior arrangements.

E) Special Equipment – if necessary, for start-up or is requested by the customer, Peerless Mfg. Co./CCA will furnish any special equipment:

- Rented equipment – charged at rental cost plus 15%
- Site Specific required Safety equipment be will billed to customer.

F) 10% administration fee total cost

Appendix C – Eastern Research Group Evaluation

MEMORANDUM

TO: Kevin Williams, SMAQMD

FROM: Dan Roper and Marty Wolf, ERG

DATE: April 12, 2024

SUBJECT: **Air Products SCR Cost Estimate – Draft Final Technical Memorandum**

SMAQMD directed ERG to evaluate the reasonableness of a selective catalytic reduction (SCR) cost estimate prepared by Air Products for two steam-methane reforming (SMR) furnaces located at Air Products' Sacramento hydrogen plant. Section 1 of this memorandum summarizes ERG's review and evaluation of Air Products' cost estimate. Section 2 discusses the overall cost estimate compared to U.S. EPA cost estimate methodology. Section 3 reviews capital cost components. Section 4 reviews operating cost components. Attachments 1 and 2 to this memorandum provide supporting cost estimate spreadsheets for Plants A and B, respectively.

1. EVALUATION BASIS

ERG originally reviewed three documents that Air Products submitted to SMAQMD:

- Sacramento H2 Plant SCR Cost Study slide deck dated May 14, 2021;
- Capital and Operating Cost Breakouts spreadsheet tables; and
- CECO Peerless SCR System Proposal P2187199 dated March 23, 2021.

Air Products' costs were provided in 2021 dollars. ERG previously identified several data gaps in these documents in a memo dated November 28, 2023. SMAQMD subsequently requested additional information from Air Products, which Air Products provided in an email to SMAQMD on February 16, 2024, and during a call between SMAQMD, Air Products, and ERG on February 28, 2024.

ERG evaluated Air Products' cost estimate in comparison to the SCR methodology described in U.S. Environmental Protection Agency's (U.S. EPA's) *Air Pollution Control Cost Manual*[1]. U.S. EPA also published a cost estimate template spreadsheet using this methodology which ERG used.[2] For gas-fired industrial units, this methodology is intended for heat input rates between 205 and 4,100 mmBTU/hr. The Air Products' heaters are substantially smaller at 25 and 33 mmBTU/hr. The EPA SCR cost estimate methodology may therefore underestimate the SCR costs due to a lack of economies of scale for these smaller heaters. The U.S. EPA SCR cost estimate methodology was published in June 2019 and used 2016 dollars. The U.S. EPA

[1] EPA 2019. "Chapter 2 Selective Catalytic Reduction." In EPA *Air Pollution Control Cost Manual*. https://www.epa.gov/sites/default/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf

[2] https://www.epa.gov/sites/default/files/2019-06/scrcostmanualspreadsheet_june-2019vf.xlsm

methodology uses the Chemical Engineering Plant Cost Index (CEPCI) for cost escalation from a 2016 CEPCI of 541.7. ERG updated the estimates for the following individual cost factors to 2021 basis:

- 2021 CEPCI of 708.8.
- Annual interest rate of 4 percent based on 2021 average of approximately 2 percent for 20-year treasury security plus 2 percent per SMAQMD BACT policy (for comparison, the 2021 bank prime rate was 3.5 percent).[3]
- Ammonia cost of $500/ton per Air Products.
- Electricity cost of $0.06/kWh per Air Products.
- Catalyst cost of $255/ft^3 per updated U.S. EPA Integrated Planning Model (IPM) documentation.

ERG evaluated the costs on a 2021 dollar basis for consistency with the existing Air Products documents and did not attempt to escalate to current dollars at this time. Costs are expected to have increased significantly from 2021 due to high inflation. The preliminary CEPCI for 2023 is 798, a 12.5 percent increase from 2021. The current bank prime rate is 8.5 percent, compared to 3.5 percent in 2021, which does not directly affect the total capital cost estimates but would affect the annualization of costs and cost effectiveness.

2. OVERALL COST EVALUATION

The table below summarizes the Air Products' cost estimate and results from the U.S. EPA SCR cost estimate methodology. Air Products' capital cost estimate is more than twice the U.S. EPA methodology estimate. The U.S. EPA *Air Pollution Control Cost Manual* provides "study" estimates with probable error of 30 percent. However, as noted above, the heat input rates of the two Air Products' heaters are well below the recommended range for the U.S. EPA SCR cost estimate methodology. In this case, the U.S. EPA methodology may provide better than an order-of-magnitude estimate but the probable error is more than 30 percent. Additionally, the U.S. EPA methodology has a default retrofit factor of 1 for average retrofits. The methodology document does not specify a maximum retrofit factor but the associated template spreadsheet indicates a maximum retrofit factor of 1.5. The majority of Air Products' capital costs come from engineering and construction/commissioning costs, rather than the procurement of the SCR and other equipment upgrades, which supports an assessment of this as a more difficult than average retrofit. Given the capital cost breakdown Air Products provided in its February 16, 2024 email, the retrofit nature, and the large error expected for the U.S. EPA SCR cost estimate methodology expected in this case, the capital costs differ by much less than an order of magnitude and are in reasonable agreement.

Air Products' annual operating costs are approximately six times greater than the U.S. EPA SCR cost estimate methodology. As discussed in Section 4 below, the SCR reagent (ammonia) and SCR catalyst costs are in reasonable agreement. However, Air Products' estimated electricity costs are 5 to 10 times greater than the U.S. EPA methodology. It is not clear if this discrepancy is due to the relatively small heat input rates compared to the U.S. EPA

[3] Federal Reserve Board. "H.15 Selected Interest Rates." https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H15

methodology recommended range, or if these SMR heaters require greater induced fan power to overcome the SCR pressure drop compared to other industrial heaters and boilers.

Estimate Basis	Cost Type	Plant A	Plant B	Total
Air Products	Total Capital Costs	$8,024,000		
	Annual Operating Costs[a]	$70,000	$174,000	$244,000
EPA Methodology	Total Capital Costs	$1,490,000	$1,784,000	$3,274,000
	Annual Operating Costs	$17,000	$23,000	$40,000

[a] 10-year average annual operating costs including catalyst replacements in Years 4 and 8.

3. CAPITAL COSTS

Air Products provided a breakdown of individual capital cost components in its February 16, 2024 email. In general, the estimates for new equipment, equipment upgrades, and utility upgrades appear reasonable for a study level cost estimate. As discussed above, the majority of Air Products' capital costs are from its internal engineering costs and construction costs. The high proportion of these costs relative to the control equipment costs is indicative of a more difficult retrofit application. In particular, the civil/structural and electrical/instrumentation costs together are more than twice the mechanical costs. Air Products' individual capital costs components appear reasonable for the level of detail provided. The overall difference between the Air Products' capital cost estimate and the U.S. EPA SCR cost estimate methodology is likely attributable to the size of these heaters being outside the intended scope of the U.S. EPA methodology.

4. OPERATING COSTS

4.1 SCR Reagent Costs

Air Products' estimate used 29% aqueous ammonia as the SCR reagent at a cost of $0.25 per pound (i.e., $500 per ton). The USGS reported a 2021 average ammonia price of $510 per ton.[4] Air Products' ammonia price is reasonable assuming it was expressed on a pure ammonia basis, as is common in industry. Air Products estimated use rates of 1 pound per hour (lb/hr) for Plant A and 2 lb/hr for Plant B (i.e., 8,760 lb and 17,520 lb annually). Using the U.S. EPA SCR cost estimate methodology, the estimated use rates are 0.89 lb/hr for Plant A and 1.44 lb/hr for Plant B. Air Products' estimated use rates are 12 to 38 percent greater than but reasonable compared to the U.S. EPA methodology.

4.2 SCR Catalyst Costs

The CECO Peerless SCR System Proposal did not identify the SCR catalyst volume (ft^3) or the SCR catalyst unit cost ($/$ft^3$). Air Products indicated in its February 16, 2024 email that it could not provide more details on the catalyst volume or unit cost, but that it estimated $50,000

[4] USGS 2022. "Nitrogen (Fixed)—Ammonia." In *Mineral Commodity Summaries, January 2022.* https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-nitrogen.pdf

per plant for the catalyst replacements every four years (note, this was $55,000 per plant in the earlier Operating Cost Breakouts per Plant spreadsheet). The four-year (35,040 hours) catalyst life is common for industry estimates and is similar to the U.S. EPA SCR cost estimate methodology estimate of 40,000 hours for gas-fired units.

The CECO Peerless SCR System Proposal did provide the proposed reactor dimensions which can be used to calculate the reactor volumes as 192 ft^3 for Plant A and 264 ft^3 for Plant B. The reactor volume is larger than the expected catalyst volume because there are gaps between catalyst module layers, but it can be used as an upper-bound approximation for the catalyst volume. The U.S. EPA SCR cost estimate methodology results in catalyst volumes of 115 ft^3 for Plant A and 200 ft^3 for Plant B. The proposed reactor volumes are generally consistent with the catalyst volumes predicted by the U.S. EPA methodology.

For SCR catalyst unit cost, the U.S. EPA SCR cost estimate methodology references a technical background document for U.S. EPA's Integrated Planning Model (IPM) with a catalyst unit cost of $8,000/$m^3$ in 2016 dollars (equivalent to $227/$ft^3$).[5] The IPM background document was updated in 2023 with a catalyst unit cost of $9,000/$m^3$ in 2021 dollars (equivalent to $255/$ft^3$).[6] Both versions of the IPM background document indicated the cost "includes removal and disposal of existing catalyst and installation of new catalyst," which is similar to the basis of Air Products' estimate. Using Air Products' overall replacement costs and the EPA methodology estimated catalyst volumes results in an average catalyst cost of $317/$ft^3$, which is 24 percent greater than but reasonable compared to the EPA estimates.

4.3 Electric Power Costs

Air Products assumed an electricity price of $0.06/kWh, which is lower than the 2021 average industrial price of $0.0717/kWh per the U.S. EIA.[7] Air Products estimated the increased electric power demand to be 67 kW for Plant A and 186 kW for Plant B, in both cases to supply induced draft fans and instrument air compressors. The EPA SCR cost estimate methodology primarily accounts for increased power for induced draft fan and resulted in 13 kW for Plant A and 17 kW for Plant B. Air Products' estimates are 5 to 11 times greater than the EPA methodology estimates. It is not clear if the large discrepancy between these Air Products' estimates and the EPA methodology is because these units are outside the recommended heat input range.

[5] Sargent & Lundy 2017. "IPM Model – Updates to Cost and Performance for APC Technologies – SCR Cost Development Methodology." https://www.epa.gov/sites/default/files/2018-05/documents/attachment_5-3_scr_cost_development_methodology.pdf

[6] Sargent & Lundy 2023. "IPM Model – Updates to Cost and Performance for APC Technologies – SCR Cost Development Methodology for Coal-fired Boilers." https://www.epa.gov/system/files/documents/2023-01/13527-002%20Coal-Fired%20SCR%20Cost%20Methodology.pdf

[7] U.S. Energy Information Administration. "Electricity Data Browser." https://www.eia.gov/electricity/data/browser/

AB 617 Best Available Retrofit Control Technology Determination for Steam Methane Reforming

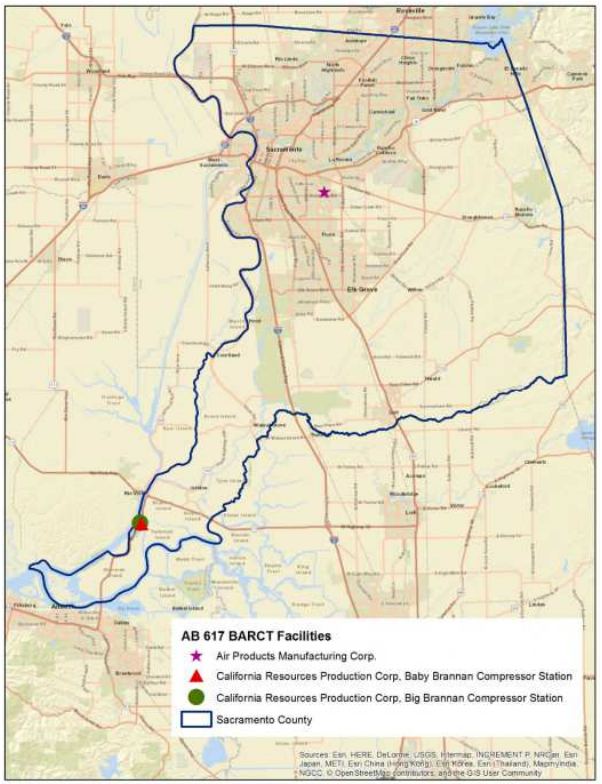
September 26, 2024

Presenter: Pedro Vega
Air Quality Engineer

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Nonattainment & Assembly Bill (AB) 617

- SMAQMD status:
  - Nonattainment for Ozone & PM
- AB 617 requirements:
  - Expedited Best Available Retrofit Control Technology (BARCT)
  - Maximum degree of reduction considering environmental, energy, and economic impacts
  - This is second expedited BARCT determination under AB 617



Steam Methane Reforming (SMR) Operations

- 2 Reforming Furnaces in Sacramento
- Natural gas & steam inputs
- Produces hydrogen gas for industrial use

Current SMR Requirements

- Rule 411 – NOx from Boilers, Steam Generators, and Process Heaters
- “Gas Fired Reformer Furnaces,” limited to 30 ppm NOx
- Current Potential to Emit (PTE) for both plants is 8.7 tons of NOx – comparable to 7,800 cars

Emissions Reduction Methods: Burner Replacement

- Ultra Low NOx Burners
  - Control NOx production through combustion process
  - Not currently available to achieve a level of 5 ppm for reformers of this size

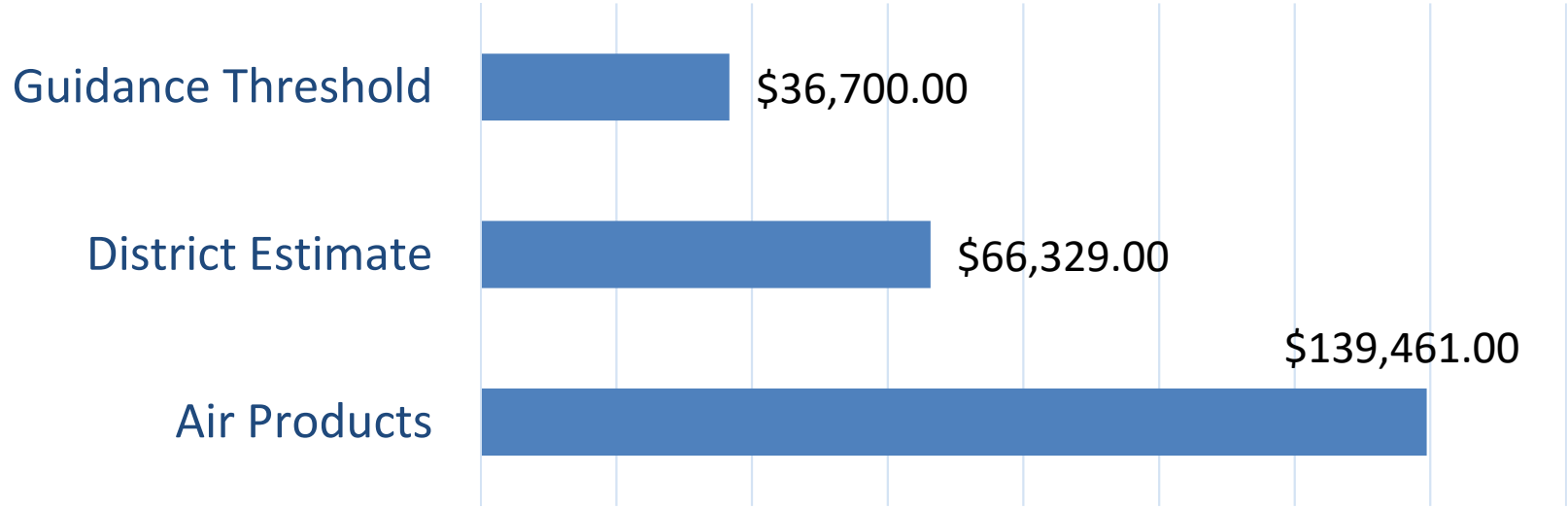
Emissions Reduction Methods: SCR

- Selective Catalytic Reduction (SCR)
  - Treats exhaust gases after combustion
  - Capable of achieving 5 ppm NOx levels
  - Commonly used for larger SMR processes
  - Determine if cost effective

Cost & Emission Reduction Projections

- Expected Reductions if SCR implemented:
  - 30 ppm ⇨ 5 ppm
  - 83% reduction in NOx emissions
- Cost Estimates:
  - Air Products Quote
  - District used estimate from US EPA
  - 3rd party evaluation by Eastern Research Group

Cost Effectiveness Analysis



- District guidance is based on statewide cost effectiveness threshold comparison
- District does not find the technology to be cost effective

Staff Recommendation

- District determination and board resolution required by AB 617
- No new or amended rule action is required
- Conduct a public hearing and approve resolution that current Rule 411 NOx limit for Gas Fired Reformer Furnaces meets BARCT requirements

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Thank You

Meeting Date: 9/26/2024
Report Type: DISCUSSION / INFORMATION
Report ID: 2024-0926-5.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT 5.

Title: Sacramento Area Sewer District Biogeneration Project and Community Bank Emission Reduction Credits

Recommendation: (1) Receive and file a presentation on the Sacramento Area Sewer District Biogeneration Project and (2) adopt a resolution transferring a total of 30,153 pounds of nitrogen oxides (NOx) per year and a total of 12,920.3 pounds of reactive organic compounds (VOC) from the Community Bank to Sacramento Area Sewer District (SacSewer) for thirty years.

Rationale for Recommendation: SacSewer is developing a biogeneration project to produce renewable energy and heat using wastewater treatment biogas at its EchoWater facility located at 8521 Laguna Station Road, Elk Grove, CA The project's air quality permit applications has been reviewed and Authorities to Construct approved by the District. As part of the permitting process, SacSewer is requesting five emission reduction credit (ERC) loans from the Community Bank to offset the NOx and VOC emissions from the operation of the biogeneration project. The Community Bank ERC loans are for a new 2.8 MW Carbonate Fuel Cell and four 3,681 HP prime power engines. Rule 205 (Community Bank and Priority Reserve Bank) requires these loans to be approved by the Board. Staff reviewed the ERC loan requests and made two findings: (1) that no cleaner NOx or VOC reduction are available than what is being proposed by the applicant, and (2) the loan request will impact the health of the Community Bank NOx ERC balance. If this loan request is approved, Staff plans to propose a future action to the Board transferring NOx ERCs from the Priority Reserve Bank to the Community Bank to address the low NOx bank balance. Staff recommends the approval of these five 30-year loan requests with no additional conditions. The installation of non-combustion equipment like the fuel cell is an important step to help support the clean energy transformation and achieve clean air quality goals for our region.

Contact: Marc Cooley, Air Quality Engineer, Monitoring, Planning and Rules Division, 279-207-1151

Presentation: No

ATTACHMENTS:

Resolution: Sacramento Area Sewer District Emission Reduction Credits
Presentation: Sacramento Sewer Biogeneration Project

Approvals/Acknowledgements

Executive Director or Designee: Alberto Ayala, Report Approved 9/20/2024

District Counsel or Designee: Kathrine Pittard, Approved as to Form 9/10/2024

Discussion / Justification:
SacSewer is a public utility that operates the sewer network, pump stations, and wastewater treatment plant for Sacramento County. Historically, SacSewer has sent the digester gas generated at their facility to Sacramento Metropolitan Utility District's nearby power plant, which burns the digester gas in its gas turbines to generate electricity. However, SacSewer's contract with SMUD to sell the excess digester gas will end in 2025. SacSewer has decided to combust the gas at the wastewater treatment plant to produce electricity and hot water/steam for the facility.

SacSewer is requesting five new ERC loans to offset emissions from the operation of a new 2.8 MW carbonate

fuel cell and four new 3,681 HP spark-ignited prime power IC engines each driving a 2.7 MW electric generator, all operating with digester gas as fuel. The electricity will be used on site and any remainder will be sent to the electrical power grid. Heat recovered from the fuel cell and the engines will be used by the anaerobic digesters to maintain optimum process conditions.

Rule 205 – Community Bank and Priority Reserve Bank – states that ERC loans from the Community Bank require Board approval when the amount of the loan request is greater than 900 pounds per quarter or the term of the loan is greater than five years. SacSewer is requesting five 30-year loans for the equipment. To approve a loan request, the Board must consider the extent to which cleaner innovative technologies have been used to minimize the credits needed, and the Board may deny the loan or add conditions to protect the health of the bank. Staff's findings on cleaner technology and the health of the bank are discussed below:

- Use of Clean Technology: The proposed equipment triggers permitting requirements to install Best Available Control Technology for VOC and NOx. The proposed fuel cell and the prime power IC engines meet the District's Best Available Control Technology (BACT) standards for equipment of similar type and size. Staff recommends the Board make this finding.

- Health of the Bank: SacSewer has requested to lease 30,153 pounds per year of NOx ERCs and 12,920.3 pounds per year of VOC ERCs for thirty years from the Community Bank. The current Community Bank balances are 39,353.3 pounds per year of NOx and 603,455.3 pounds per year of VOC. The new balances in the Community Bank will be 9,200.5 pounds per year of NOx and 590,535.0 pounds per year of VOC if the Board approves the loans to SacSewer. The ERC loan request will not significantly impact the health of the VOC balance but will significantly impact the health of the NOx balance. As a result of this loan request, Staff plans to propose a future action to the Board transferring NOx ERCs from the Priority Reserve Bank to the Community Bank to address the low NOx bank balance. With this consideration, Staff recommends the Board make this finding.

To qualify for approval at today's meeting, Rule 205 requires the permit action be completed by September 4, 2024. The permit action was subject to public review and a final A/C permit was prepared on August 30, 2024, pending approval of this credit loan request. No comments were received. Rule 205 authorizes loans to be active at the beginning of the next calendar quarter, October 1, 2024.

Staff recommends the approval of the following thirty-year ERC loan requests:

Loan Number	Permit No.	Pollutant	Emission Reductions Credit Loan Request Community Bank (lbs/quarter)				Total
			1st qtr	2nd qtr	3rd qtr	4th qtr	lbs/yr
C24-1006	27780	NOx	423	428	433	433	1,717
		VOC	121	122	124	124	491
C24-1008	27782	NOx	1,753	1,772	1,792	1,792	7,109
C24-1009	27783	NOx	1,753	1,772	1,792	1,792	7,109
C24-1010	27784	NOx	1,753	1,772	1,792	1,792	7,109
		VOC	1,132.3	1,340.2	1,451	1,396.8	5,320.3
C24-1011	27785	NOx	1,753	1,772	1,792	1,792	7,109
		VOC	1,753	1,772	1,792	1,792	7,109
Total ERC Loan Requests						NOx	30,153.0
						VOC	12,920.3
Current Community Bank Balances						NOx	39,353.3
						VOC	603,455.3
Remaining Community Bank Balances						NOx	9,200.5
						VOC	590,535.0

Financial Considerations: Staff's time is required to renew and update each loan from the Community Bank and the Priority Reserve Bank. This cost is recovered through: (1) the annual loan renewal fee paid by facilities that have loans from the District Banks as required by Section 313 of Rule 205, and (2) the hourly rate required for withdrawing credits from the District credit bank as required by Section 315 of Rule 301 – Permit Fees - Stationary Source. Therefore, the loan request is not expected to result in any additional costs to the District.

Environmental Review:
The California Environmental Quality Act (CEQA) requires state and local agencies to identify the significant adverse environmental impacts of their actions and to avoid or mitigate those impacts to the extent feasible. The first step in the review of projects subject to CEQA is to determine if the project is exempt from CEQA.

This project consists of the Sac Metro Air District leasing NOx and VOC ERCs to SacSewer to offset emission increases from their proposed project to produce heat and electricity from their digester gas. The project will result in an increase of approximately 15 tons per year of NOx and 6.5 tons per year of VOC, which would exceed the District's Thresholds of Significance (65 lb/day).

SacSewer prepared an Environmental Impact Report (EIR) analysis[1] for the project as part of the CEQA process with SacSewer as the lead agency. The District participated in the review as a commenting agency and the Environmental Impact Report was approved by the Sacramento Regional County Sanitation District on September 27, 2023.

In the EIR, SacSewer concluded the Regional Sanitation BioGeneration Facility Project would result in generation of long-term operational emissions of NOx and VOC that would exceed the District's CEQA Thresholds of Significance without mitigation. SacSewer is now seeking to lease NOx and VOC offsets for the project, which are required under District Rule 202 – New Source Review, to mitigate below the Thresholds of Significance.

SacSewer concluded that purchasing emissions offsets for the project would result in the project not exceeding the District's Thresholds of Significance or partially contribute to a nonattainment status of the Sacramento Valley Air Basin. SacSewer determined the air quality impact would be less than significant with the purchase the emission offsets.

Upon approval of the project, the District will issue the ERC loan and file a Notice of Exemption with the Sacramento County Clerk.

1 *Draft Environmental Impact Report for the Regional San Biogeneration Facility Project.* State Clearinghouse No. 2021050080.

RESOLUTION NO. 2024 –XXXX

Adopted by the Sacramento Metropolitan Air Quality Management District Board of Directors

EMISSION REDUCTION CREDITS FROM THE COMMUNITY BANK FOR SACRAMENTO AREA SEWER DISTRICT – LOAN NUMBERS C24-1006, C24-1008, C24-1009, C24-1010, and C24-1011

BACKGROUND:

A. The Board of Directors of the Sacramento Metropolitan Air Quality Management District (Board) adopted Rule 205, COMMUNITY BANK AND PRIORITY RESERVE BANK.

B. Pursuant to Rule 205, Section 101, the Community Bank is a depository of certified emission reduction credits, which may be loaned for compliance with Rule 202, NEW SOURCE REVIEW offset requirements.

C. Sacramento Area Sewer District (SacSewer) is a public utility that operates the sewer network, pump stations, and a wastewater treatment plant for Sacramento County. Emissions of Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOCs) from their proposed electricity generation project exceed offset trigger levels in Rule 202, Section 302.

D. Rule 205, Section 310 requires that loan applications to the Community Bank for amounts greater than 900 pounds per quarter or longer than five years must be approved by the Board prior to disbursement. These loans meet both of these requirements.

E. Pursuant to Rule 205, Section 310, the Board considered the impact of this loan on the health of the bank and the extent to which cleaner innovative technologies have been used to minimize the credits needed, and imposes no additional conditions on the loan.

F. Staff of SacSewer prepared an Environmental Impact Report (EIR), State Clearinghouse No. 2021050080, and the SacSewer Board approved the EIR finding that the operational emissions of the Regional Sanitation BioGeneration Facility Project will be mitigated to be less than significant.

G. Rule 205, Section 310.4 authorizes the loans be active at the beginning of the calendar quarter, October 1, 2024, because the final action on the Authority to Construct permits was taken on August 26, 2024.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE BOARD OF DIRECTORS RESOLVES AS FOLLOWS:

Section 1. The approval of the loan is exempt from CEQA.

Section 2. The Board authorizes and directs the loans for the following NOx and VOC emission reduction credits from the Community Bank to SacSewer for thirty (30) years:

Loan Number	Permit No.	`Pollutant	Emission Reductions Credit from the Community Bank (lbs/quarter)			
			1st qtr	2nd qtr	3rd qtr	4th qtr
C24-1006	27780	NOx	423	428	433	433
		VOC	121	122	124	124
C24-1008	27782	NOx	1,753	1,772	1,792	1,792
C24-1009	27783	NOx	1,753	1,772	1,792	1,792
C24-1010	27784	NOx	1,753	1,772	1,792	1,792
		VOC	1,132.3	1,340.2	1,451	1,396.8
C24-1011	27785	NOx	1,753	1,772	1,792	1,792
		VOC	1,753	1,772	1,792	1,792

Section 3. Loan numbers C24-1006, C24-1008, C24-1009, C24-1010, and C24-1011 are effective as of October 1, 2024.

ON A MOTION by Director _____, seconded by Director _____, the foregoing resolution was passed and adopted by the Board of Directors of the Sacramento Metropolitan Air Quality Management District on September 24, 2024, by the following vote:

Ayes:

Noes:

Abstain:

Absent:

ATTEST:

Clerk, Board of Directors
Sacramento Metropolitan Air Quality Management District

SacSewer Biogeneration Project

Permitting Overview & Community Bank Emission Reduction Credits

Board Meeting

September 26, 2024

Presenter: Amy Roberts, Division Director

Sacramento Area Sewer District (SacSewer) Biogeneration Project Overview

- **NOW:** power & heat from SMUD
- **FUTURE:** SacSewer makes own power & heat
- Uses waste gas as a renewable fuel
- Fuel cell provides clean electricity and promotes clean energy transition

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Why It Matters

- Opportunity for advancing cleaner technology
- Air quality advocacy by Board & Sac Metro team
- Enhances public agency partnerships
- Project paves the way for similar projects

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Project Permitting Overview

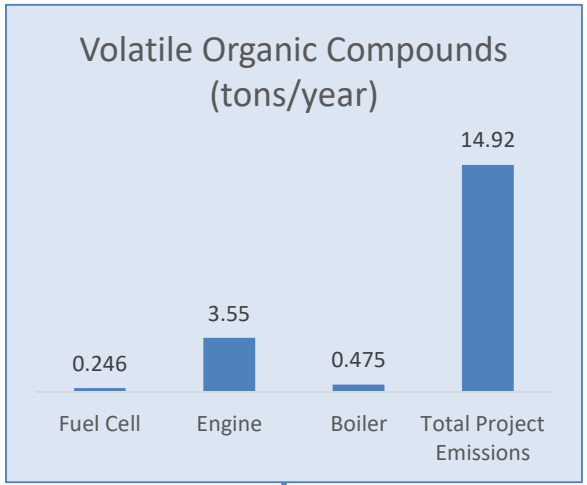
How does air quality permitting help reduce emissions and protect public health?

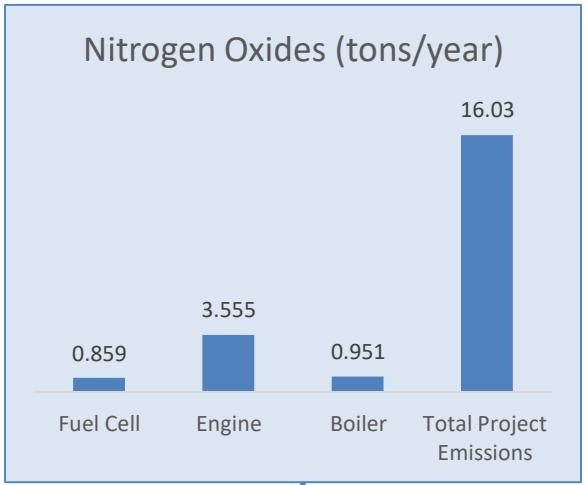
- Ensures facilities are not emitting air pollution above health protective levels
- Requires cleanest technology to be installed
- Allows for public comment on the process

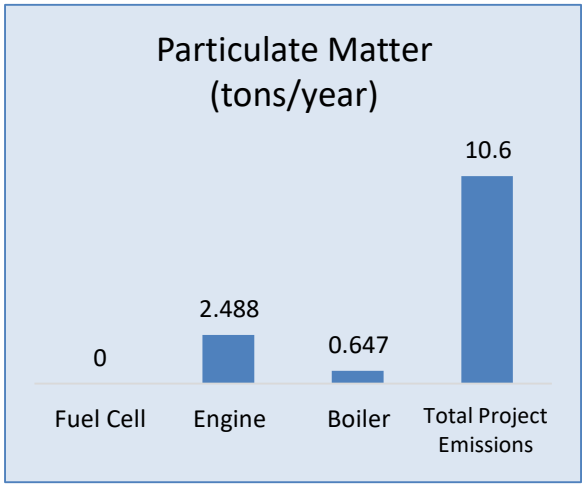
Permit Applications – District Evaluation

- District received applications November 2023
- District engineers did full evaluation of applications
  - Best Available Control Technology Determinations
  - Health Risk Assessments
  - Emission Offsets
- Proposed project equipment meets all regulations and equipment standards
- Project is required to provide emission offsets

Project Proposed Emissions



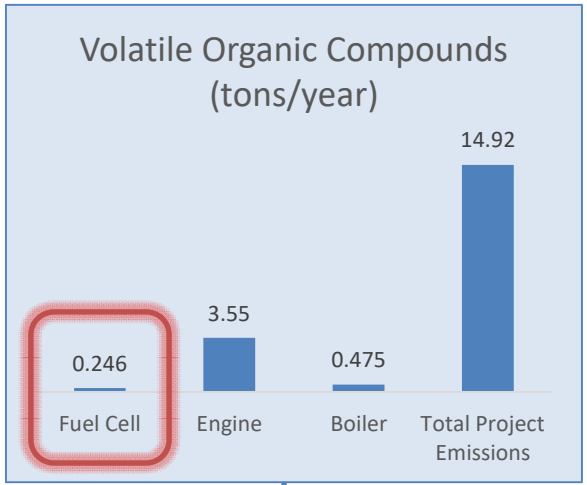


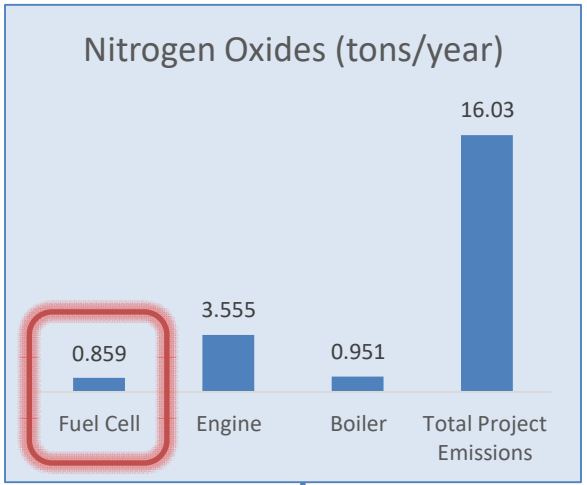


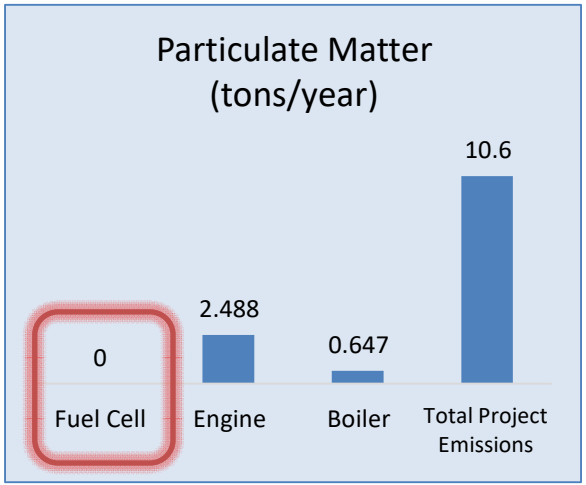
Ozone Precursor Pollutants

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Project Proposed Emissions







Ozone Precursor Pollutants

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Health Risk Assessment Summary

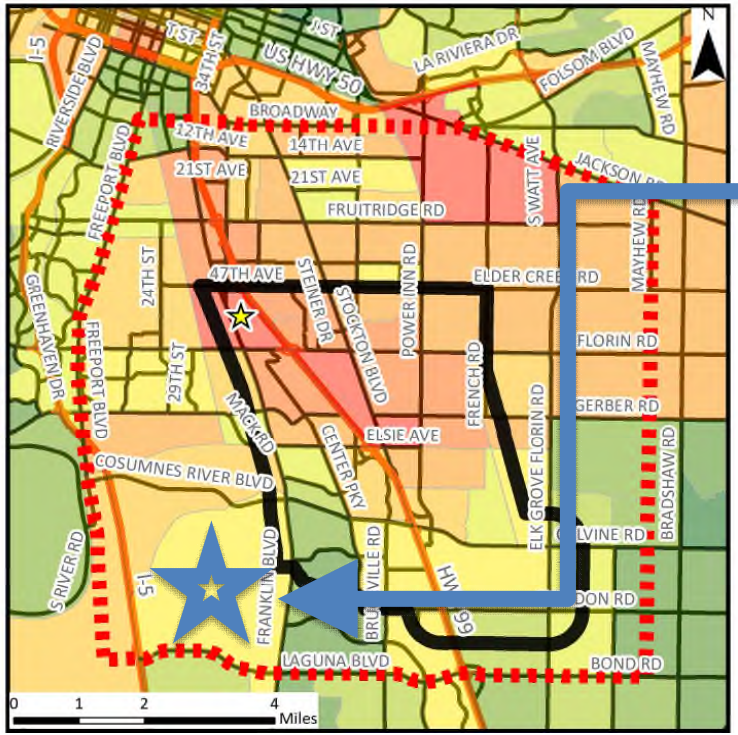
Health Risk Assessment Summary			
Type of Health Risk	Permitting Thresholds	Project HRA Results	
	Maximum	Residential	Worker
Cancer Risk (Chances per Million)	10.0	5.1	0.3
Acute Non-Cancer (Hazard Index)	1.0	0.0	0.1
Chronic Non-Cancer (Hazard Index)	1.0	0.0	0.0

California Office of Environmental Health Hazard Assessment (OEHHA) determines chemicals that are included in the Health Risk Assessment (HRA)

Project HRA shows the project is ***below*** established thresholds

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Public Notice & Community Meeting



- Public Notice started July 26
- Community Meeting August 14
  - Facility of interest
  - Located within new AB 617 Community Boundary
- <u>Authorities to Construct for all equipment issued August 26</u>

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

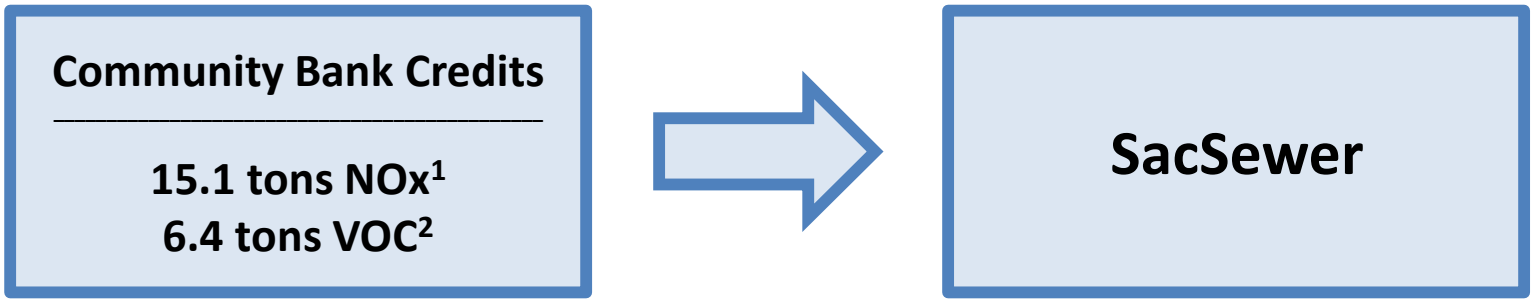
Emission Reduction Credits

Sacramento Area Sewer District (SacSewer)
Emission Reduction Credits

- Facility emissions exceed existing federal thresholds
- Project emissions must be offset using emission reduction credits (ERCs)
- Quantity of ERCs required based on total emissions
- To receive an ERC loan from the District, the project must:
  - Consider the extent cleaner innovative technologies have been used
  - Will not impede the attainment of air quality standards

Board Action

Approve the resolution transferring credits from the Community Bank to SacSewer for 30 years



[1] NOx credits in pounds (lbs) of emissions: 30,153 lbs NOx
[2] VOC credits in pounds (lbs) of emissions: 12,920.3 lbs VOC

Thank You

Meeting Date: 9/26/2024
Report Type: DISCUSSION / INFORMATION
Report ID: 2024-0926-6.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT 6.

Title: Light Duty Equity Programs: Update on Clean Cars 4 All, CarShare, and Mobility Hubs

Recommendation: Receive and file a presentation on the Clean Cars 4 All (CC4A) program August 2024 relaunch, updates on the Our Community CarShare Program, and current efforts on zero emission mobility hubs.

Rationale for Recommendation: The Sac Metro Air District received funds from the California Air Resources Board (CARB) to develop and deploy the Our Community CarShare and the Clean Cars 4 All Programs in Sacramento County. Staff will provide an update on the two programs and how both light duty equity programs support the 4-Agency Sacramento Area Zero Emission Vehicle (ZEV) Development Strategy Mobility Hub efforts.

Contact: Jaime R. Lemus, Director, Transportation and Climate Change Division, (916) 201-8414

Presentation: Yes

ATTACHMENTS:

Presentation: Light Duty Equity Programs

Approvals/Acknowledgements

Executive Director or Designee: Alberto Ayala, Report Approved 9/20/2024

District Counsel or Designee: Kathrine Pittard, Approved as to Form 9/10/2024

Discussion / Justification: The Sac Metro Air District received an additional $12,000,000 from the CARB to expand the CC4A program county-wide and include additional services. This new phase of the program, which launched on August 20, 2024, will increase the base grant amount to $9,500 with a maximum of $12,000 for Sacramento County residents that reside in a disadvantaged community (DAC). E-bikes are now being offered as an alternative clean mobility option. Despite expanding the program county-wide, the CC4A focus will remain on DACs, using data from CalEnviroscreen 4.0. District staff will provide updates on program launch as well as program outreach.

CARB and Sac Metro Air District funding continues to support the Our Community CarShare Sacramento Program (OCCS). These grant funds have been used to pilot a car-sharing program in the greater Sacramento area to benefit disadvantaged communities. Staff will provide an update on its tenth and latest community site in the Mangan Park Neighborhood Community. The next expansion is in partnership with the City of Sacramento to include the OCCS program at select library and community center sites throughout the city.

The CC4A and the OCCS Program are two of Sac Metro Air District's light duty community equity programs. In a continued effort to support the 4-Agency Sacramento Area ZEV Development Strategy Mobility Hub efforts, the Sac Metro Air district was part of a team that received a grant from the Federal Department of Energy to build three mobility hubs on Sacramento Regional Transit (SacRT) property in north Sacramento. The grant, in partnership with CALSTART and SacRT, constructs the mobility hubs at existing light rail stations with input from the local communities. The Air District will assist with infrastructure and vehicles based on the direction received from surrounding communities. The total project cost is $2.5 million, and the grant will cover $1.5

million.

Emissions Impact: The CC4A program reduces greenhouse gas (GHG) and criteria pollutant emissions from the transportation sector. Since 2019, a total of 901 vehicles have been replaced by a combination of conventional hybrid, plug-in hybrid, and battery electric vehicles, resulting in the reduction of 9,573 tons of GHG and 8.42 tons of criteria pollutants over the project life. As of June 30, 2024, a total of 869 funded participants have successfully scrapped their old vehicle at Pick n Pull, permanently removing these vehicles and their emissions from the roads of Sacramento County communities.

Since 2017 the OCCS program has reduced GHG emissions by 1,400 Metric Tons of carbon dioxide, 686 lbs of nitrogen dioxide, 33 lbs. of fine particulate matter (PM2.5) and 136 lbs. of reactive organic gases. The Program has reduced vehicle miles traveled by 1.3 million miles and reduced fossil fuel usage by 117,575 gallons of gasoline.

Economic Impact: For CC4A, the additional $12 million dollars will continue to stimulate the regional economy through the District's network of participating electric vehicle dealerships, e-bike retailers, vehicle dismantlers, and charging infrastructure providers and contractors.

OCCS has received $5.8 million from CARB in 4 phases. The Sac Metro Air District continues to support the program with Moyer/Community Air Protection funding for infrastructure installation at the OCCS sites. Since the CARB Greenhouse Gas Reduction Fund (GGRF) is coming to an end, the Sac Metro Air District will continue to support the program with Sacramento Emergency Clean Air Transportation funds.

Public Outreach/Comments: District board members were notified by email on August 20, 2024, and asked to share the CC4A program with constituents. Several Community Based Organizations have been contacted and made aware of the program relaunch. CC4A staff have participated in several outreach events and will continue to target underserved communities.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Light Duty Equity Programs

Clean Cars 4 All, CarShare, and Mobility Hubs

September 28, 2024

Presenter: Raef Porter, Program Manager

0

Clean Cars 4 All (CC4A) - Program Metrics

1331

210

389

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

CC4A - Dollars Invested Into Our Region

Money Snapshot

- Over $9.5 Million invested in Sacramento
  - Participants via Auto Dealers
  - Dismantlers
  - EV Charging Companies
- In last 10 months, $2 million in grant funding
  - Program is more efficient

The program helps to stimulate the regional economy, provides clean and reliable transportation, and supports California's climate goals!

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

CC4A - Program Updates

New phase of program launched August 2024

- Expanded to all Sacramento County
- Increased Grant amounts
  - Base = $9,500 / Max = $12,000
- Now Includes E-bike's
- Conventional Hybrids until November 2024
- Will focus only on Plug in Hybrid EV, Battery EV and Fuel Cell EV

Priority will remain with DAC

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

CC4A - Program Outreach

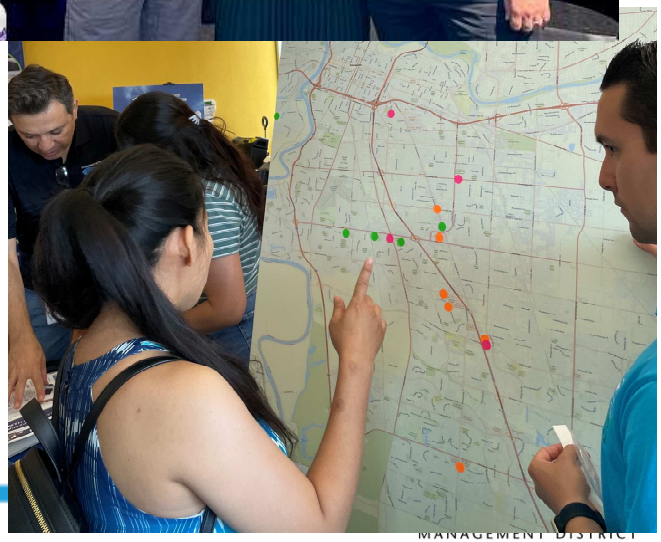
Focus on communities with low participation rates

Partnership's

- Community Based Organizations
- Sacramento Area Bicycle Advocates (SABA)
- SMUD "ride and drive" events

Dealership Trainings

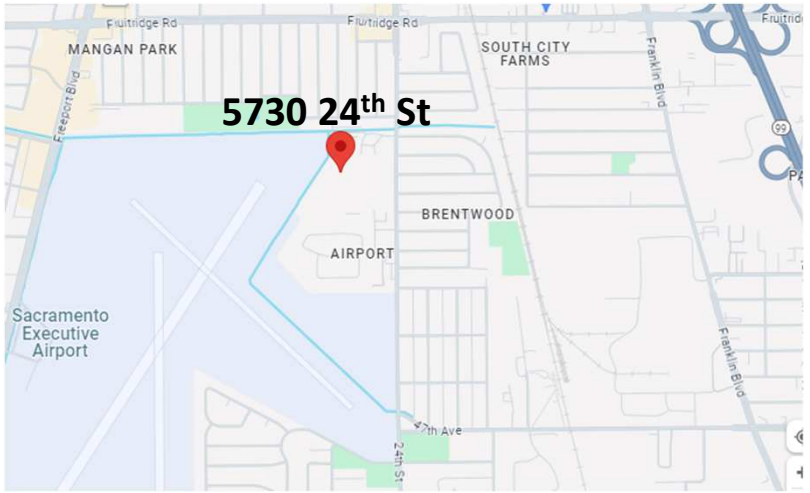
- Zoom training with CC4A Team
- Education on program updates



Our Community CarShare (OCCS) Update

New Site – Mangan Park

- Partnership with City of Sacramento
- City corp yard near Mangan Park Community
- Within AB617 boundaries
- Zero emission transportation
- 6 Level II chargers



Existing Sites – 10 Locations

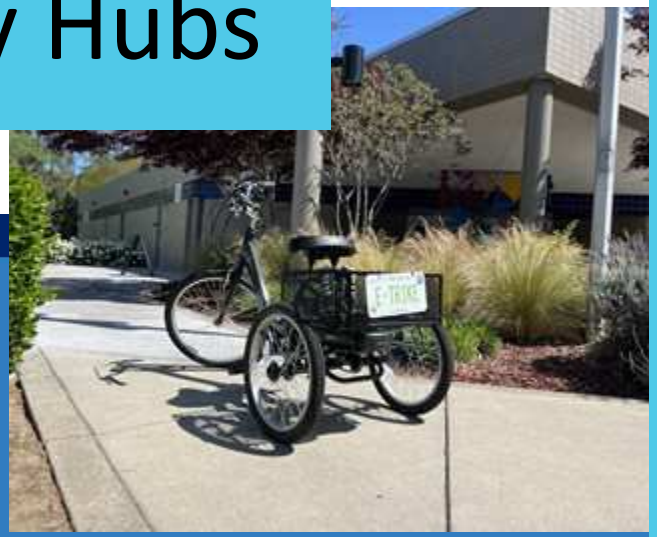
- SHRA - Edgewater, Riverview, Alder Grove
- Mutual Housing at Lemon Hill, at Sky Park, on the Greenway
- Eskaton - Jefferson Manor, CHOC - Washington Square, Del Paso Mobility Hub

OCCS Program Statistics

- Total Program Reservations – 56,407
- Total Program Emission Reductions = 1,400 metric tons of CO_2e
- Reduced Vehicles Miles Traveled (VMT) by 1.3 million miles
- Reduced fossil fuel usage by 117,575 gallons of gasoline

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

52 Mobility Hubs



SacRT Mobility Hubs

EXAMPLES INCLUDE

- E-bike and e-scooter parking
- Car share pick-up and drop-off
- Electric vehicle changing
- Connections to shuttles, bus and/or light rail

Join us for a pop-up Mobility Hub

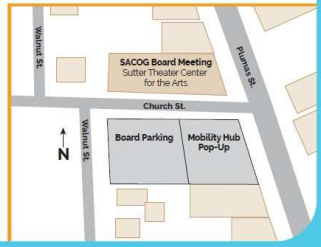
See how mobility hubs can:

- Improve transportation connections for communities
- Create safe, comfortable public spaces
- Enhance accessibility throughout the region

8AM, Thursday June 20
732 Plumas Street, Yuba City

For more information visit sacog.org/mobilityhubs

SACOG
In partnership with Yuba Sutter Transit, City of Yuba City, Yuba Sutter Arts & Culture , Creative Arts Center, Blue Zones Project - Yuba Sutter



SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Community Resource Project Mobility Hub

Louise Perez Community Center

3835 41st Ave.

Partnerships with SMUD

Potential for:
CarShare
Solar and Battery Storage

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Next Steps

- Fully implement projects in process
- Continue working with 4-Agency partnership
  - SACOG's Mobility Hub Design
  - SMUD Community Strategies
  - SacRT Mobility Hub implementation
- Foster regional partnerships to identify more opportunities
- Identify and secure funding for additional locations

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Meeting Date: 9/26/2024
Report Type: AIR POLLUTION CONTROL OFFICER'S REPORT
Report ID: 2024-0926-7.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT 7.

Title: Air Pollution Control Officer Presentation

Recommendation: Receive and file a presentation from the Air Pollution Control Officer.

Rationale for Recommendation: A primary responsibility of the Air Pollution Control Officer / Executive Director (APCO) is to keep the Board of Directors informed of important or incidental matters related to the Air District. Therefore, the APCO regularly presents to the Board during public meetings noteworthy items such as past successes, progress of current activities and future endeavors, updates regarding relevant legislation, anticipated media events, and material internal changes.

Contact: Alberto Ayala, Executive Director/Air Pollution Control Officer, 279-207-1122

Presentation: Yes

Approvals/Acknowledgements

Executive Director or Designee: Alberto Ayala, Report Approved 9/19/2024

District Counsel or Designee: Kathrine Pittard, Approved as to Form 9/19/2024
