Adopt Proposed Amendments to District Rule 4354 (Glass Melting Furnaces)

San Joaquin Valley Air Pollution Control District
Governing Board Meeting

December 16, 2021

Rule 4354 Overview

- District Rule 4354 first adopted September 14, 1994
  - Sixth generation rule
- Establishes emissions limitations of NOx, CO, VOC, SOx, and PM10 from glass furnaces
- NOx emissions reduced by 75% to date
- Industrial control technologies required for glass melting furnaces to meet existing stringent limits
- Rule requirements approved as meeting Most Stringent Measures (MSM) by U.S. EPA in July 2020
- Specific types of glass melting furnaces have different limits, due to variations in the glass production process, residency time in the furnace, temperature requirements, etc.

Further Emission Reductions Needed

- Valley's challenges in meeting federal air quality standards unmatched due to unique geography, meteorology, and topography
- Substantial reductions needed to achieve federal PM2.5 and ozone standards – need to go beyond current limits
- Proposed amendments address:
  - Commitment in *2018 PM2.5 Plan* to further reduce emissions from glass furnaces
  - Commitment included in Board/CARB-approved AB 617 South Central Fresno Community Emission Reduction Program
- District staff have conducted comprehensive review of requirements in other air districts, lowest emission limits being achieved in installations statewide, and costs and feasibility of most effective emission control technologies available

Health Benefits of Emissions Reductions

- Exposure to PM2.5 and ozone linked to a variety of health issues, including asthma, chronic bronchitis, irregular heartbeat, respiratory/cardiovascular hospitalizations, and other issues
- District implements control measures to lower direct PM2.5 and precursor emissions throughout the Valley
  - NOx emissions key precursor to ammonium nitrate, which is large portion of total PM2.5 during peak winter season (also key precursor for ozone)
  - SOx emissions precursor to ammonium sulfate, key component of PM2.5 concentrations in the Valley
  - Direct PM2.5 emissions reductions also important to meet health-based standards
- Proposed rule amendment will support goal of attaining health-based federal standards for PM2.5 and ozone, and help to protect public health

Glass Melting Facilities in San Joaquin Valley

- Valley home to six glass-making facilities with glass melting furnaces
  - ***Container glass***: Any glass manufactured by pressing, blowing in molds, rolling, or casting (e.g. bottles) (3 facilities)
  - ***Fiberglass***: Material consisting of fine filaments of glass (1 facility)
  - ***Flat glass***: Glass produced by the float, sheet, rolled, or plate glass process (e.g. windows) (2 facilities)
- Furnaces only shut down once per lifetime during "rebuild" process (every 12-15 years)

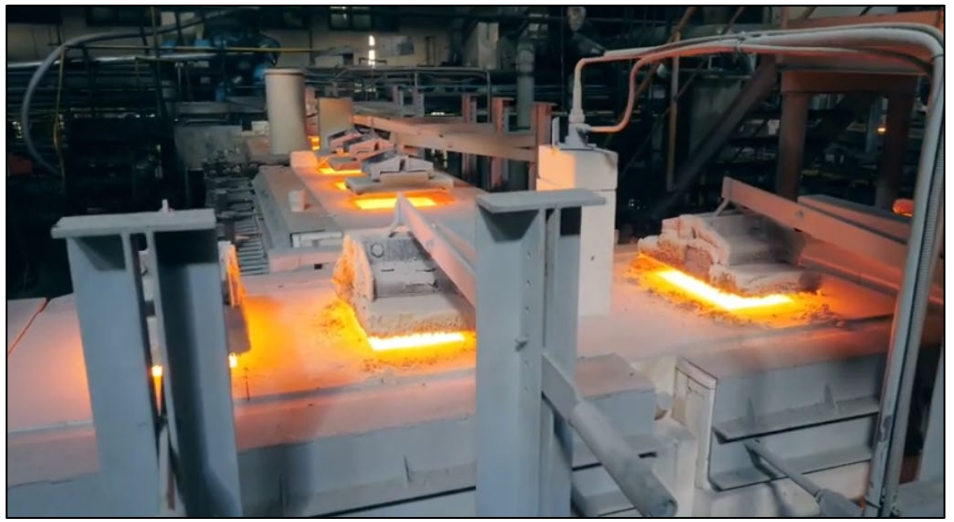


Image credit: Cesyco, 2020

Current Controls in Use at Valley Glass Plants

NOx Control Technologies

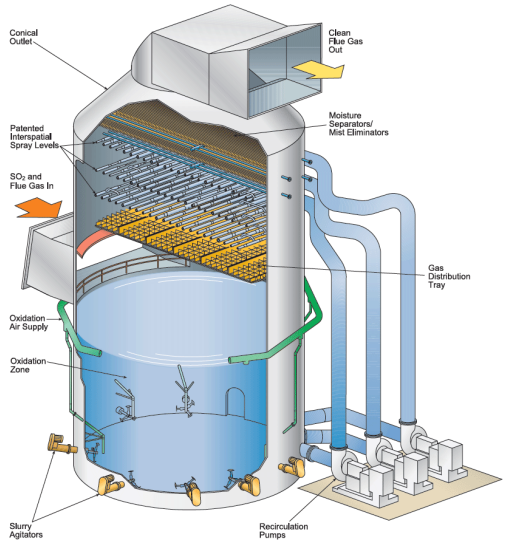
- Selective Catalytic Reduction (SCR)
- Oxy-Fuel fired furnaces
- Selective Non Catalytic Reduction (SNCR)

Particulate Matter Control Technologies

- Electrostatic Precipitator (ESP)
- Ceramic filter system

SOx Control Technologies

- Dry Scrubber Systems
- Semi-dry Scrubbers Systems



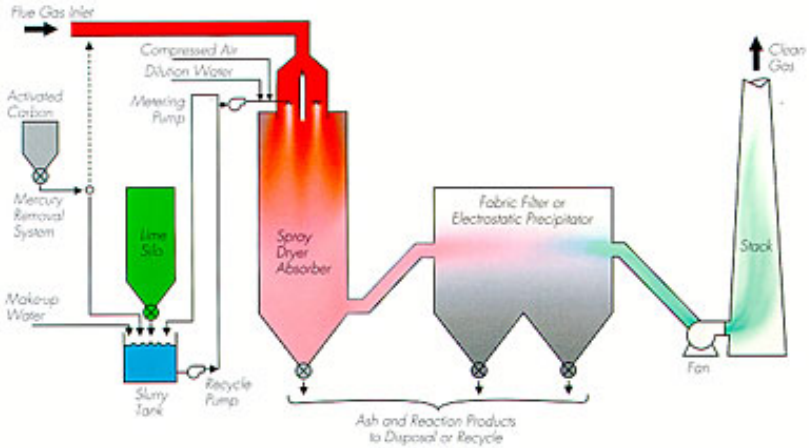
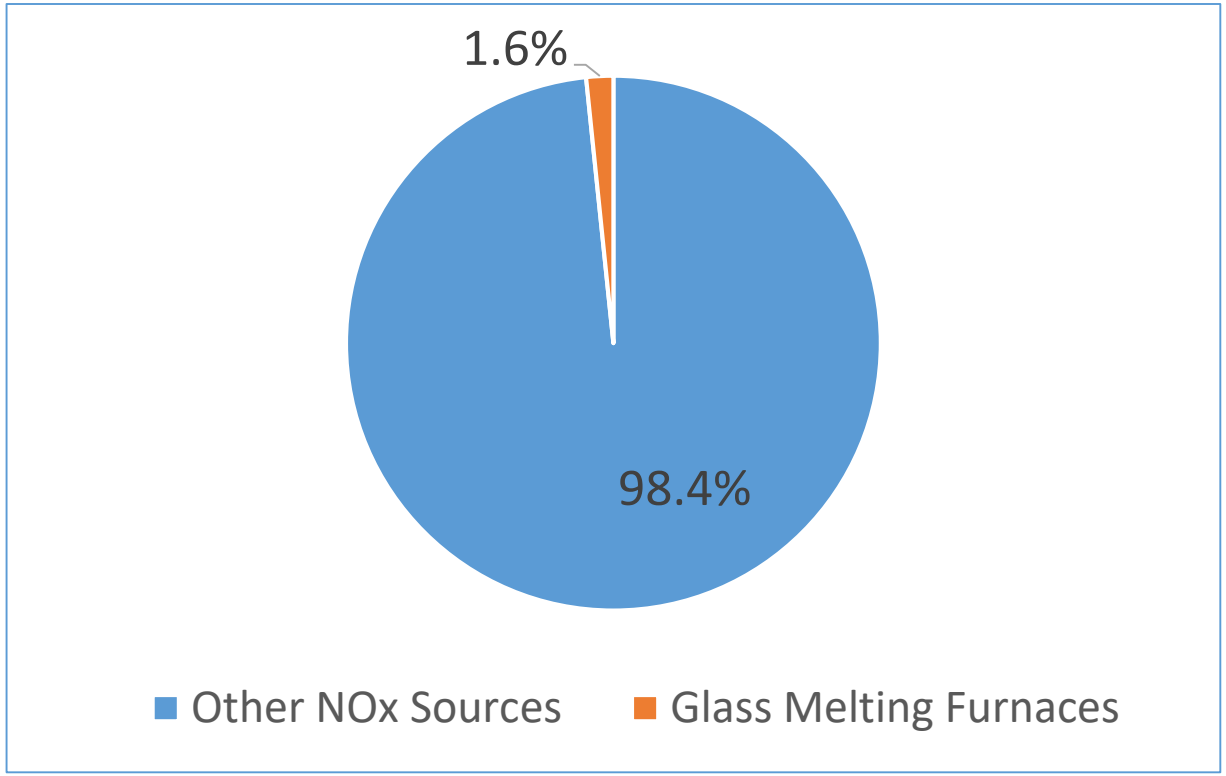


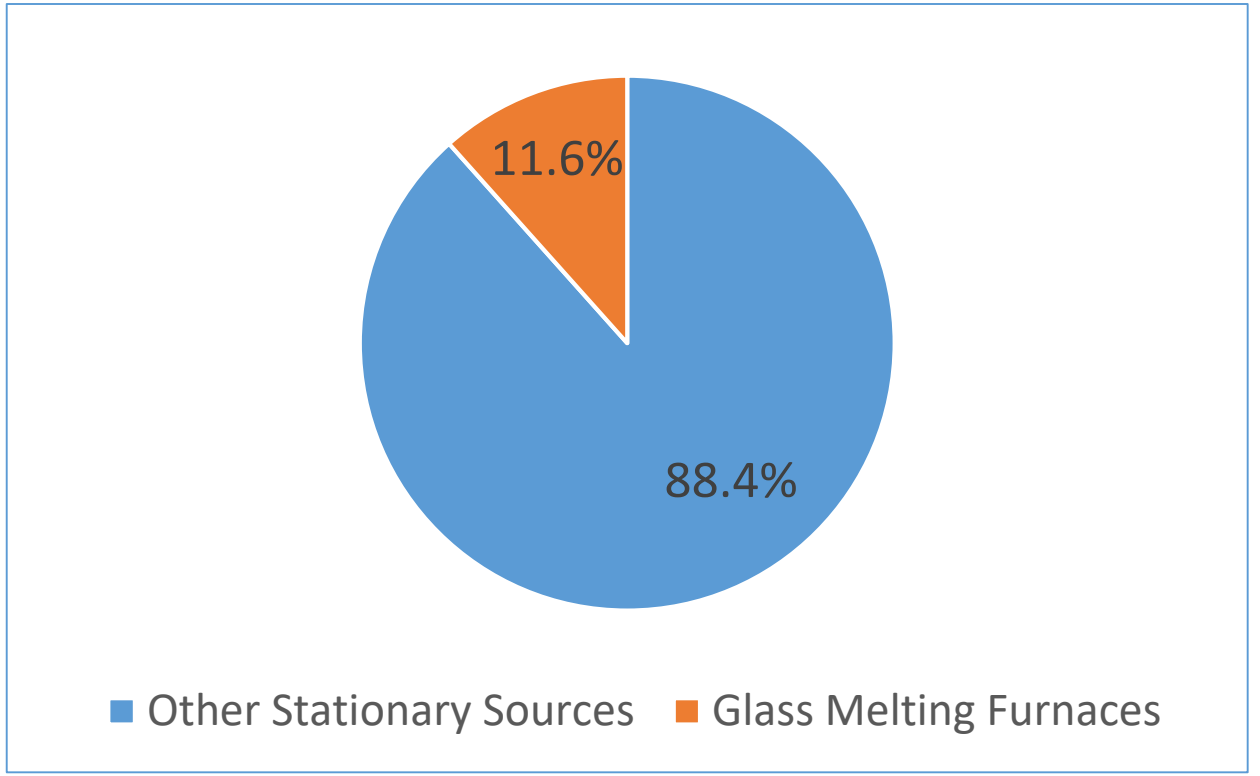
Image credit: Babcock & Wilcox, 2016

Emissions from Glass Melting Furnaces

All NOx Emissions in the Valley
Mobile, Stationary, & Area Sources



NOx Emissions from
Stationary Sources in the Valley



Glass melting furnaces represent approximately 0.9% of total direct PM2.5 emissions, and 2.3% of total stationary source direct PM2.5 emissions in the Valley

Proposed Rule 4354 Requirements: Container Glass Melting Furnaces

- Proposing to lower existing NOx emissions limits with phased compliance schedule for container glass facilities
  - Current NOx limit 1.5 lb/ton glass pulled
  - Proposed Phase I limit: 1.1 lb-NOx/ton glass pulled based on rolling 30-day avg.
    - January 1, 2024 compliance deadline
  - Proposed Phase II limit: 0.75 lb-NOx/ton glass pulled based on rolling 30-day avg.
    - Phase-in by furnace rebuild schedule starting January 1, 2024, no later than December 31, 2029
- Proposing to lower existing PM10 emission limits
  - Current limit 0.5 lb/ton glass pulled based on 24-hr block avg.
  - Proposed limit: 0.2 lb/ton glass pulled based on 24-hr block avg. (Jan. 1, 2024)
- Proposing to lower existing SOx emission limits
  - Current rule limit for SOx up to 1.1 lb/ton glass pulled on 30-day avg.
  - Proposed limit: 0.85 lb/ton glass pulled on 30-day avg. (Jan. 1, 2024)

Proposed Rule 4354 Requirements: Flat Glass Melting Furnaces

- Proposing to lower existing NOx emissions limits with phased compliance schedule for flat glass facilities:
  - Current NOx rule limit:
    - 3.2 lb/ton glass pulled (2.9 for Early Enhanced Schedule) on 30-day avg.
    - 3.7 lb/ton glass pulled (3.4 for Early Enhanced Schedule) on 24-hr block avg.
  - Proposed Phase I limits - January 1, 2024 compliance deadline:
    - 2.5 lb/ton glass pulled on 30-day rolling avg.
    - 2.8 lb/ton glass pulled on 24-hr block avg.
  - Proposed Phase II limits - phase in by furnace rebuild schedule starting January 1, 2024, no later than December 31, 2029:
    - 1.5 lb/ton glass pulled on 30-day rolling avg.
    - 1.7 lb/ton glass pulled on 24-hr block avg.

Proposed Rule 4354 Requirements: Flat Glass Melting Furnaces (cont'd)

- Proposing to lower existing PM10 emission limits – compliance by January 1, 2024
  - Current limit: 0.7 lb/ton glass pulled based on 24-hr block avg.
  - Proposed limit: 0.2 lb/ton glass pulled based on 24-hr block avg.
- Maintaining existing stringent SOx limits for flat glass melting furnaces
  - Facilities already employing maximum control feasible to reduce SOx emissions
  - Further SOx emissions control not technologically feasible based on plant design and NOx control systems

Cost-Effectiveness Analysis

- Sources for cost estimates
  - Actual costs provided by facilities, engineering estimates, and control technology vendors & manufacturers
  - Various sources for the cost of electricity, fuel, and replacement
  - Cost factors from EPA's Office of Air Quality Planning and Standards
- Range in potential costs based on varying potential compliance approaches and cost estimates (full range included in analysis)
- Staff held virtual meetings with facilities, vendors, manufacturers, and other stakeholders to gather cost figures
- Full details of cost-effectiveness analysis provided in staff report documentation
  - $3,000-$54,000/ton NOx reduced
  - $5,000-$11,000/ton SOx reduced

Estimated Emission Reductions

Glass Type	NOx Emission Reductions (tons/day)
Container Glass	0.80
Flat Glass	0.87
TOTAL	**1.67**

Glass Type	SOx Emission Reductions (tons/day)
Container Glass	0.07
TOTAL	**0.07**

Glass Type	PM10 Emission Reductions (tons/day)
Container Glass	0.04
Flat Glass	0.09
TOTAL	**0.13**

Socioeconomic Impact Analysis

- Socioeconomic Impact Analysis conducted by third-party consultant, Eastern Research Group (Staff Report, Appendix D)
  - COVID-19 adjusted baselines and multiple recovery scenarios used in modeling
  - Impacts assessed using Board and CARB-approved methodology
  - High costs and potentially significant impacts – phased approach achieves significant reductions with limited flexibility to plan for additional controls during rebuild processes

Public Process to Amend Rule 4354

- *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards*
  - Adopted: November 15, 2018
- Public scoping meeting held December 3, 2020
- Public workshops held on September 30, 2021 and November 4, 2021
- Regular updates provided at Citizens Advisory Committee (CAC), Environmental Justice Advisory Group (EJAG), and District Governing Board meetings
- Community engagement through AB 617 Steering Committees
- Initial proposed rule posted for public review on November 4, 2021
  - Final proposed rule posted November 16, 2021
- Ongoing opportunities for public input throughout rule development process

Summary of Comments

Comments

- Compliance deadlines should be delayed
- Compliance deadlines should be moved up
- Operational costs and impacts are high and flexibility is needed

Responses

- Emission reductions are needed to meet health-based standards and amendments fulfill Plan commitment
- Amendments continue to establish most stringent measure in nation
- Phased approach achieves needed reductions while allowing some limited time to plan for extensive new controls needed to meet stringent new limits
- Robust public process conducted to allow for stakeholder input

Recommendations

1. Adopt proposed amendments to Rule 4354 (Glass Melting Furnaces)

2. Authorize the Chair to sign the attached Resolution