Update on District's Low-Cost Air Monitoring Sensor Action Plan

San Joaquin Valley Air Pollution Control District
Governing Board Study Session
September 19-20, 2018

District's Air Monitoring Efforts

- District invests significant resources and effort operating and maintaining extensive air monitoring network
  - Numerous sites throughout Valley measuring various pollutants, providing timely information to the public
  - Ensure that collected data is high quality and defensible when compared against federal air quality standards
  - Follow strict federal guidelines for regularly scheduled maintenance, calibrations, and certifications
  - Regular independent audits by CARB and EPA
  - Extensive training to staff who maintain, operate, and calibrate the District's expansive air monitoring network

Low-Cost Sensor Technology

- Attractive option for citizen science due to low-cost and ease of use
- Factors impacting accuracy and validity of low-cost sensor data include:
  - Lack of maintenance and calibration
  - Placement of sensors
  - Many sensors built with low-precision components
  - Data collection and interpretation issues
- Due to these limitations, low-cost sensor data should be used with caution when making regulatory decisions
- Low-cost sensor data can still be helpful in providing better understanding of air quality trends and fluctuations
  - Without support of higher grade monitoring information, proper procedures, and sound technical oversight, usefulness of low-cost sensor data could be limited in developing effective emissions reduction strategies

Low-Cost Air Monitoring Sensor Action Plan

- Use of low-cost sensor technology anticipated to grow in coming years
- Due to extensive experience with siting, operating, and maintaining air quality equipment, District in position to provide valuable education and guidance
- Recognizing the need to proactively respond to these issues, in October 2017 your Board established a low-cost air monitoring sensor action plan

Low-Cost Air Monitoring Sensor Action Plan (cont'd)

- Work in partnership with other agencies to test the accuracy of various sensor technologies available to the general public
- Collocate personal air quality sensors at various District air monitoring sites to compare accuracy
- Define and share with the public the information that can reliably be ascertained from personal air quality sensors

Low-Cost Air Monitoring Sensor Action Plan (cont'd)

- Develop educational materials and guidance documents on proper placement of monitoring
- Provide guidance for how data should be interpreted and used, making clear collected data not to be used for regulatory monitoring
- Engage in partnerships and oversight with community groups and businesses who wish to use personal air monitoring sensors for monitoring projects
- Provide public education and training to the public through web-based tools and/or public meetings

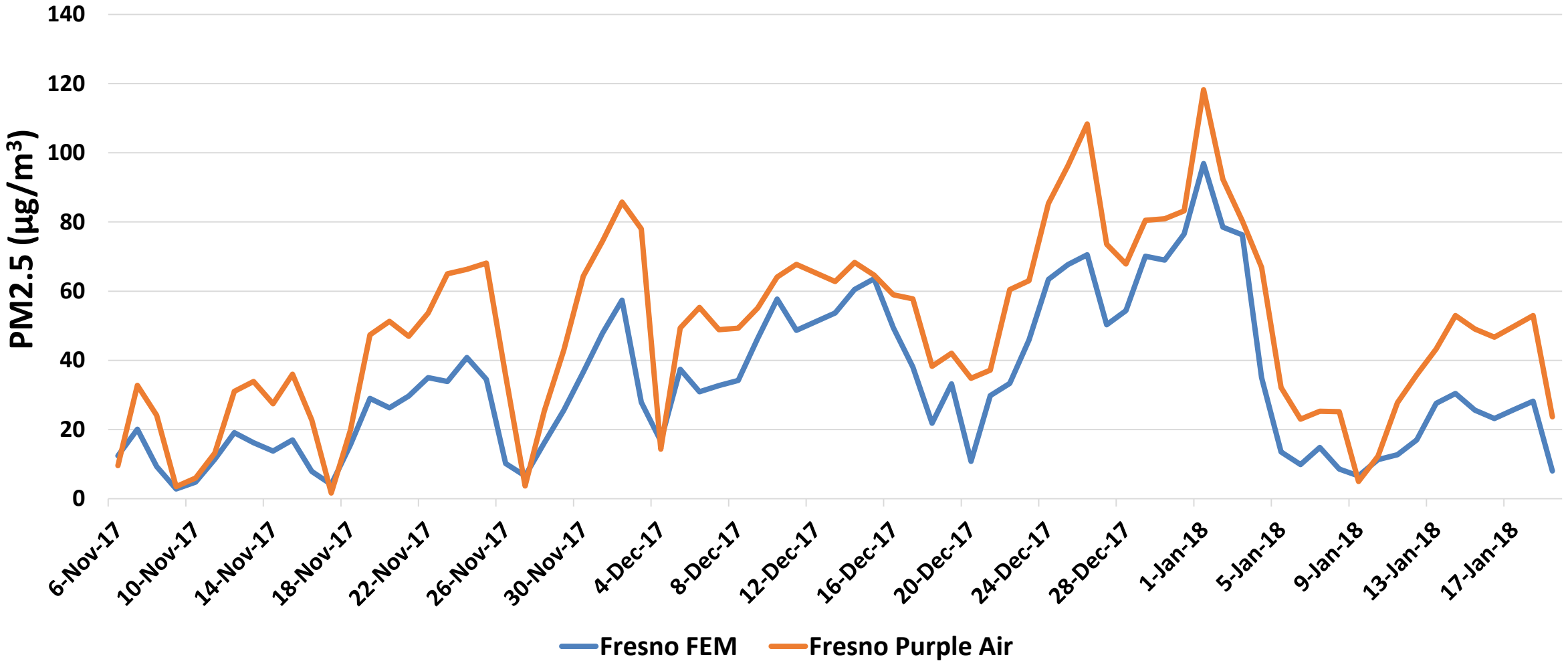
Low-Cost Air Monitoring Sensor Action Plan (cont'd)

- District has already begun to take action in implementing action plan, including:
  - Testing low-cost sensor technology across the Valley through collocation with regulatory-grade monitors
  - Developing educational materials and guidance documents
  - Engaging with community groups and businesses interested in air quality monitoring efforts

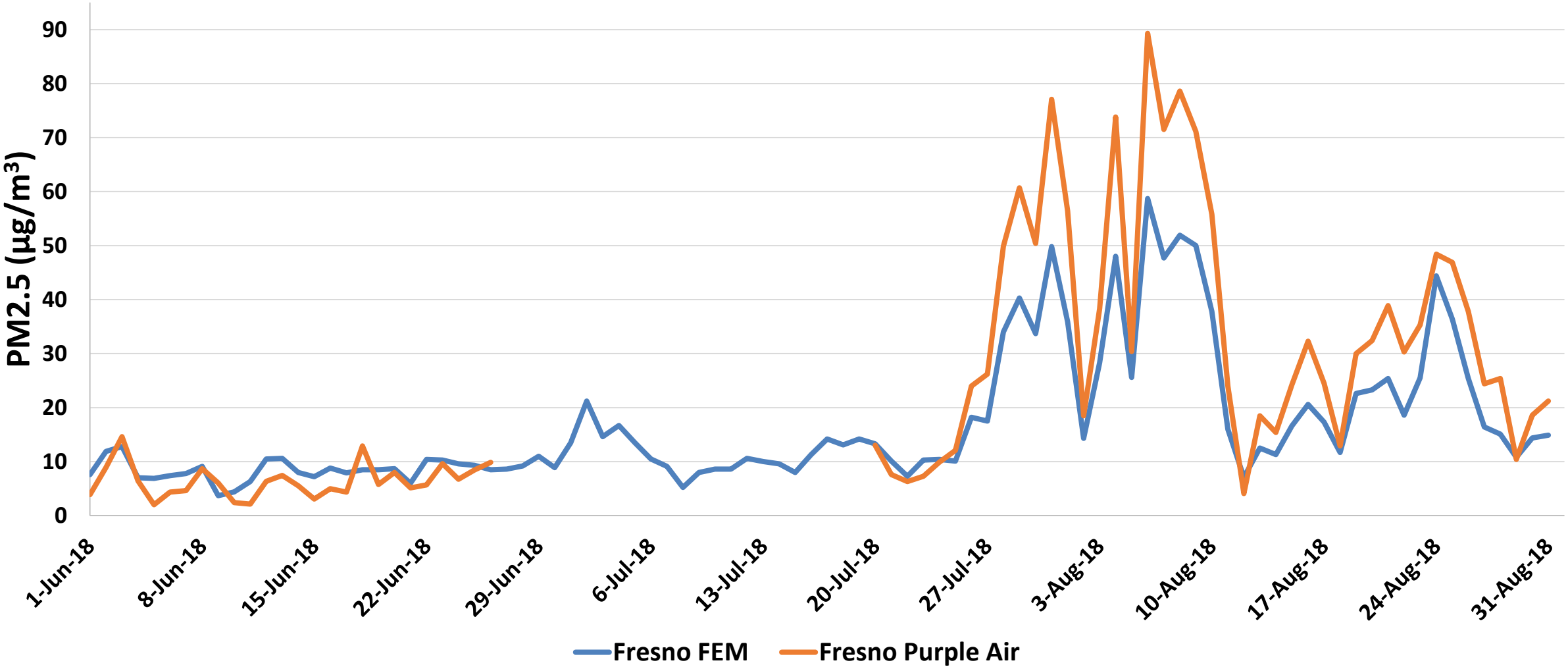
District TEST Program

- District has established the Technical Evaluation of Sensor Technology (TEST) program to assess the performance of low-cost sensors in Valley conditions
  - Compare low-cost sensors against regulatory-grade monitors
  - Analyze monitoring data spatially and temporally
  - Provide sensor evaluations to the public
- Deployment of low-cost sensors at air monitoring sites across the Valley to test performance in varying air quality and meteorological conditions
- Expanded in-house laboratory facility to test various particulate matter and gas sensors
- Through TEST, District conducted preliminary evaluations of performance of PurpleAir and Clarity low-cost sensors at Valley air monitoring sites
- Performance reports of these sensors are available on District's TEST program webpage

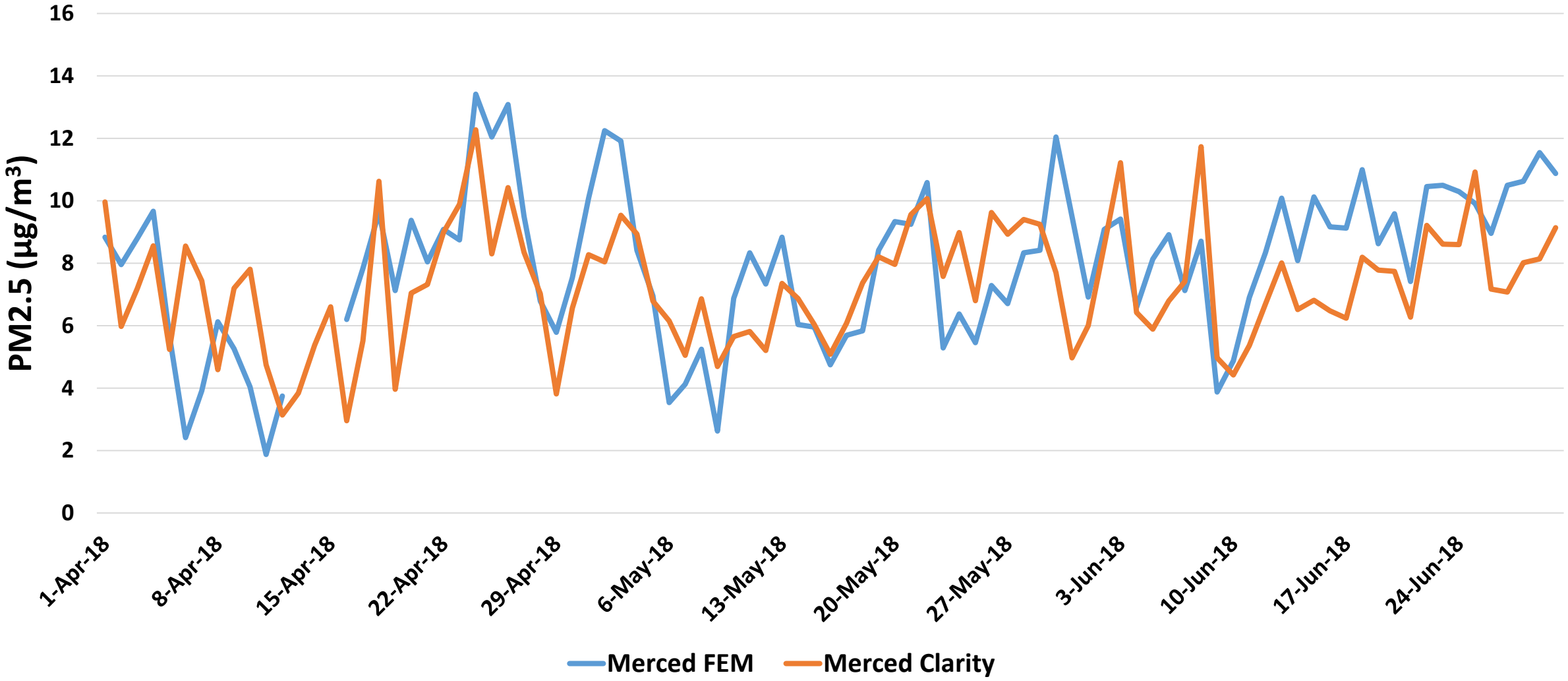
PurpleAir Performance during 2017-2018 Winter Season in Fresno



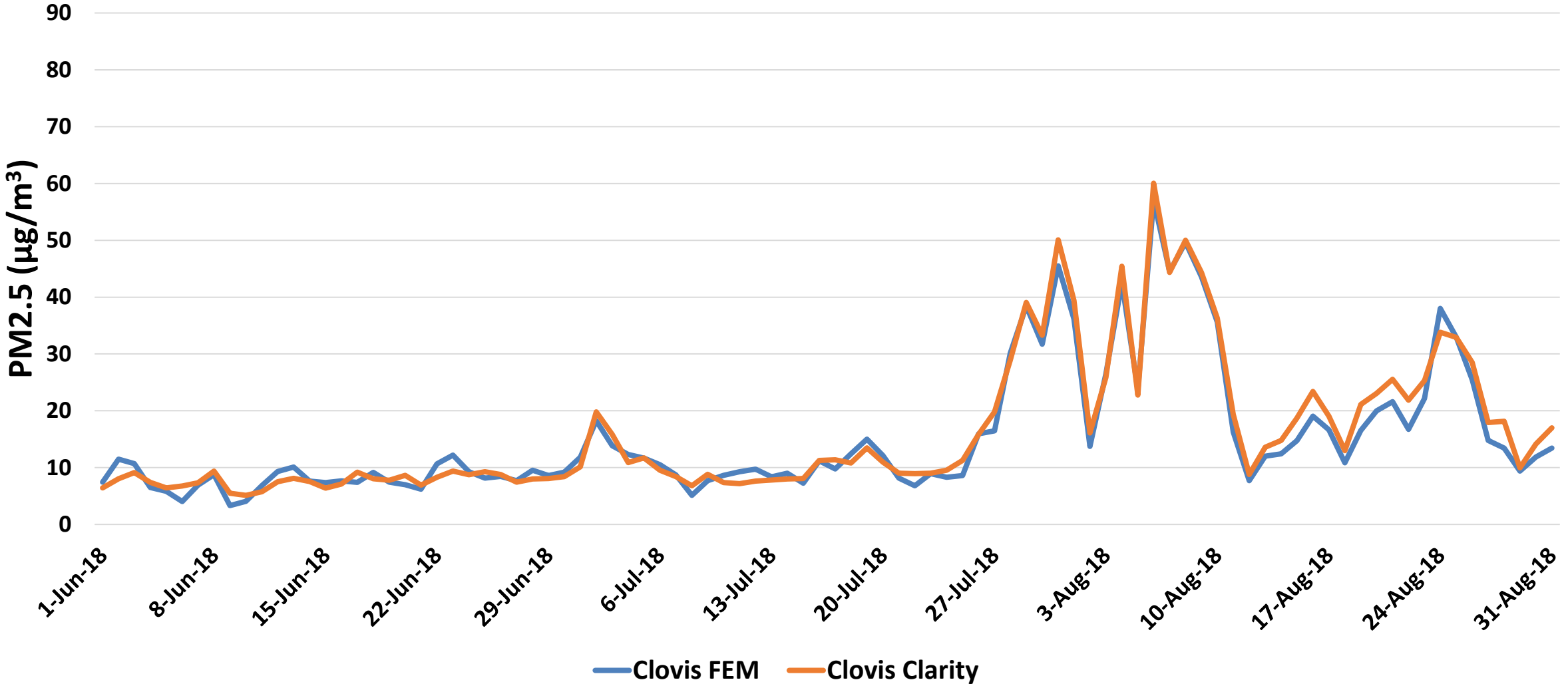
PurpleAir Performance during 2018 Wildfire Season in Fresno



Clarity Performance during 2nd Quarter of 2018 in Merced



Clarity Performance during 2018 Wildfire Season in Clovis



Partnering to Deploy Community Air Monitoring

- As CARB continues to develop implementation of AB 617, low-cost sensors expected to be widely used in communities
- Use of low-cost sensors in community air monitoring will depend on:
  - Air monitoring needs of the area
  - Pollution sources of interest in the community
  - Value of low cost sensors relative to needs and concerns of the community
- Role of monitoring technologies to be defined in District's community air monitoring plans under AB 617
- Work with entities interested in community monitoring
  - Provide education regarding low-cost sensor limitations, proper sensor siting practices, and careful collection, interpretation and use of data
  - Could be helpful if coupled with monitoring assistance from District, good operating practices, and inclusive stakeholder engagement

Providing Low-Cost Sensor Education and Guidance

- To provide assistance to Valley residents and communities interested in operating low-cost sensors, District will:
  - Provide educational materials and guidance documents on air monitoring sensor operation, and data collection and interpretation
  - Partner with other agencies and organizations to leverage similar resources
  - Potentially hold public workshops to provide training, best-practices, and raise awareness of low-cost sensor limitations
- Future results from District's TEST program will be made available and utilized to assist in consideration of low-cost sensors as part of community monitoring efforts

Providing Low-Cost Sensor Education and Guidance (cont'd)

- District will seek to partner with other agencies such as EPA, CARB, and South Coast to expand understanding of low-cost sensor performance in the region
- For ease of accessibility, District has developed a webpage on this topic, which will include:
  - Educational and guidance materials
  - TEST program evaluations of sensor performance
  - Links to other available low-cost sensor resources
  - Information on the District's regulatory air monitoring network and new air monitoring resources