OSAR STRATEGIC ROADMAP & REGULATORY TIMELINE

OSAR Launch

- Lit Review and OEM data mine
- > Evaluate Data metrics with existing data sets (EMA, UCR, WVU, others)
- > AQMD/EPA/ARB Study

2020

OEM Early Adoption

- > Estimate baseline emissions (OEM deploy with support)
- Define accuracy
- Evaluate data metrics
- > Exhaust flow OBD signal

2021

Laboratory Evaluation & **Improvements**

- > Development test plan for sensor evaluations and metrics
- > Propose recommendation for sensor improvements

2022

Sensor **Innovations**

Evaluate sensor improvements in beta programs

Final Sensor Evaluation

- > Evaluate new sensor; cold operation, high accuracy telematics 1000+ trucks
- Consider retrofits
- Discuss compliance evaluation with I/M
- > PM Sensing Maybe Consider

Ongoing Truck and Bus Fleet Turnover (by 2023)

2018

2019

2020

2021

2022

2023

2024

2025

2026

2027

REAL Proposed

2020

Regulatory **Development**

2022

Engine and Vehicle CO2

NOx Rule EPA HD NOx NPRM

Standards (Step 1)

- > Modified NTE
- > Euro -VI(d) reporting
- > Longer warranty (step 1)
- > Warranty reporting and corrective action changes
- > OBD REAL (NOx, CO2)

2024

Engine and Vehicle CO2 Standards (Step 2)

- > NOx:
 - > 0.05-0.08 g/hp-hr FTP/SET
 - > 0.05-0.024 g/hp-hr LLC
 - > 10 g/hp idle
- > PM: 0.05 g/hp-hr
- > Pre-conditioning, break-in, FUL aging
- > Euro VI(d) compliance
- > OBD Changes, Separate CA AB&T
- > REAL in-use pilots
- > ZEV truck requirement

2027

Engine and Vehicle CO2 Standards (Step 3)

- ➤ NOx:
- >0.0x g/hp-hr FTP/SET
- **≻TBD LLC** >TBD Idle
- > Longer useful life
- > Alt durability life (DF) program
- > Euro VI(e) with cold start, down to idle
- > REAL in-use compliance option
- > Longer warranty (step 2)

