

# Review Preliminary Cost and Incentive Funding Estimates for Measures Aimed at Reducing Emissions for District's PM2.5 Attainment Strategy

San Joaquin Valley Air Pollution Control District  
Governing Board Meeting

March 16, 2017



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# Valley's Attainment Challenges Unmatched by Any Other Region

- District currently developing federally mandated attainment plans for multiple PM2.5 standards through extensive public process
- Valley's ozone and PM2.5 precursor emissions at historically low levels through decades of implementing most stringent stationary and mobile regulatory control program in nation
- District also operates most effective and efficient incentive grants program
  - Invested over \$1.6 billion in public/private funding in clean air projects
  - Achieved over 130,000 tons of emissions reductions
- Current control strategy through adopted local and state measures will achieve significant additional reductions in years to come



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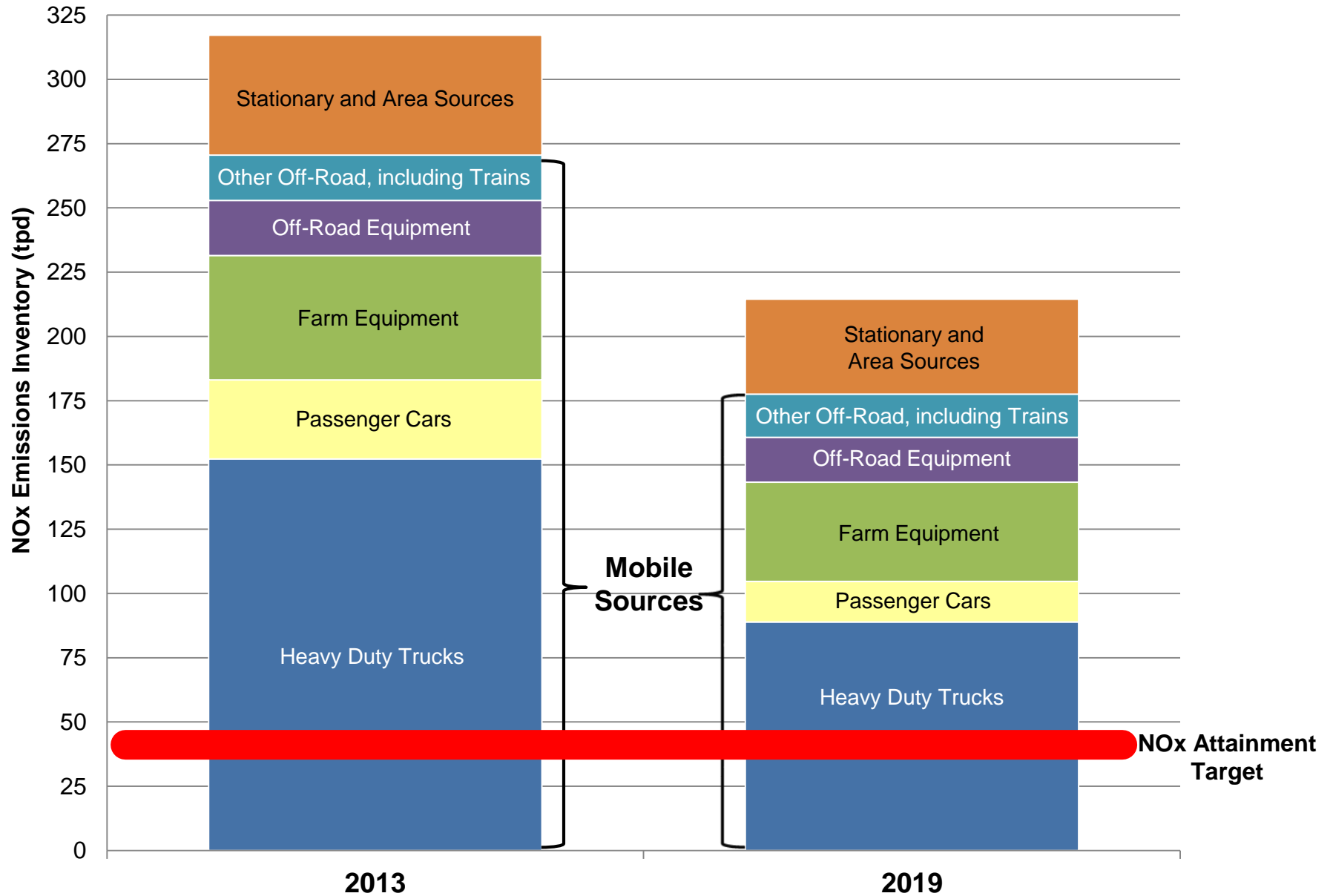
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# Meeting Latest PM2.5 standards Requires Enormous Reductions in Emissions in Short Timeframes

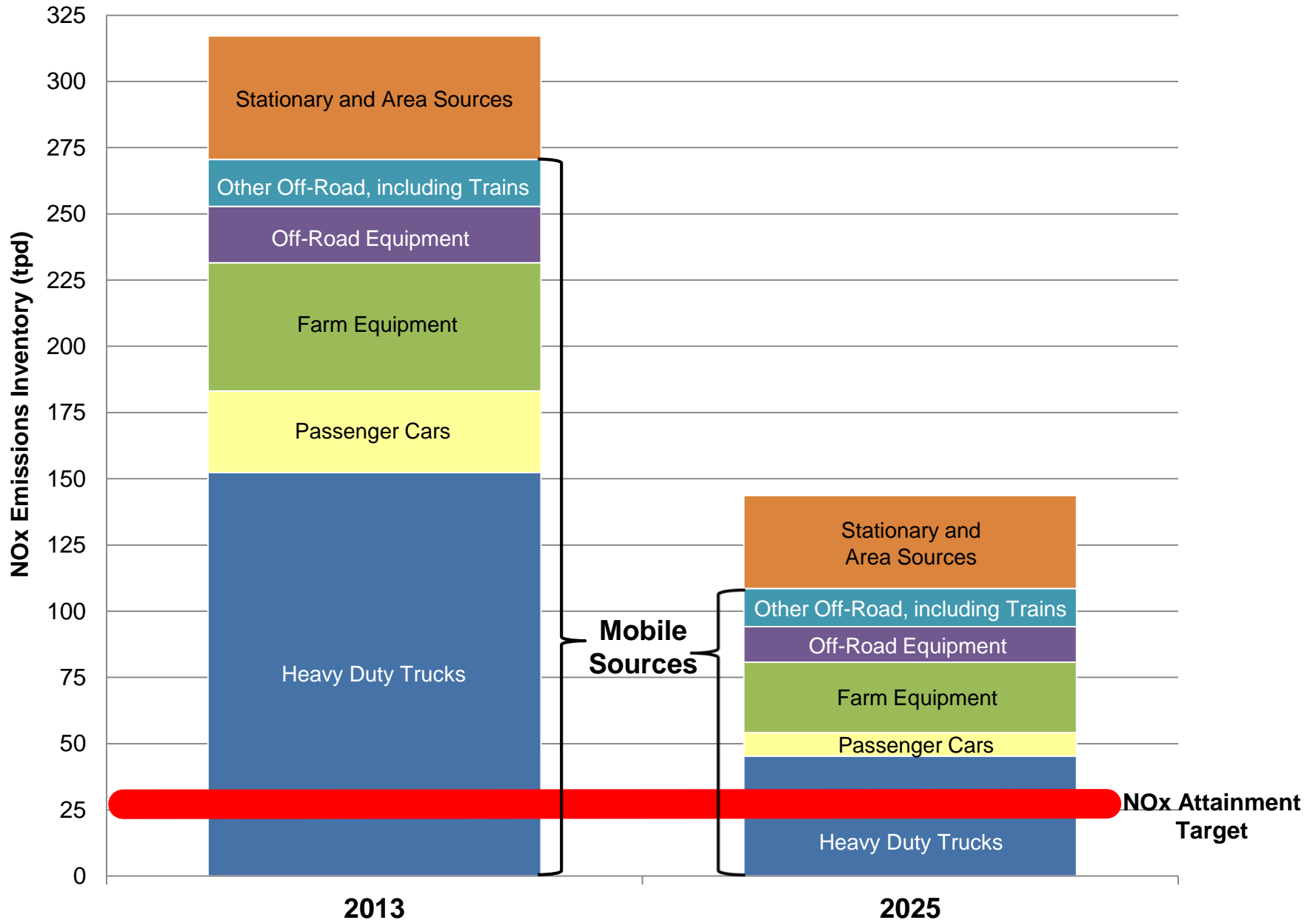
- Federal PM2.5 deadlines:
  - 2019 for 2006 standard (24-hour 35  $\mu\text{g}/\text{m}^3$ )
  - 2021 for 2012 standard (annual 12  $\mu\text{g}/\text{m}^3$ , Moderate classification)
  - 2025 for 2012 standard (annual 12  $\mu\text{g}/\text{m}^3$ , Serious classification)
- Initial estimates indicated that, in addition to significant reductions in directly emitted PM2.5 emissions, another 140 tons per day of reductions in NOx necessary by 2019
- More recent District modeling indicates that needed NOx reductions might be even greater at 174 tons per day
  - District submitted results of latest modeling to ARB for review and concurrence



# Additional Emissions Reductions Required for Attainment After Direct PM2.5 Reductions (2019 Serious Deadline for 2006 24-hr PM2.5 Std)



# Additional Emissions Reductions Required for Attainment After Direct PM2.5 Reductions (2025 Serious Deadline for 2012 Annual PM2.5 Std)



# District List of Ambitious Measures

- At latest workshop, presented list of ambitious measures with overly optimistic projections for timing and effectiveness
  - Replace all almond harvesters in Valley with latest low-emitting harvester technologies
  - Install PM control technology on larger under-fired charbroilers installed within last 10-15 years (360 out of 1,800)
  - Enhance CMPs for ag operations to reduce directly emitted PM
  - Replace 23,628 older high emitting residential wood-burning devices with cleaner devices
  - Electrify 1,053 ag pump engines in areas impacting peak PM<sub>2.5</sub> sites where access to electricity is available
  - Lower NO<sub>x</sub> limit for container glass plants
  - Lower NO<sub>x</sub> emissions from various boiler, steam generator, process heaters > 5 MMBtu/hr
  - Lower NO<sub>x</sub> emissions from various boiler, steam generator, process heaters 2 to 5 MMBtu/hr



# District List of Ambitious Measures (cont'd)

- Install ultra-low NOx flare technology and require additional flare minimization practices
- Lower NOx emissions from various non-agricultural engine categories
- Replace 74,912 heavy heavy-duty trucks with upcoming 0.02 g/bhp-hr ultra-low NOx trucks that are 90% cleaner than 2010 trucks recently required by ARB's Truck and Bus Regulation
- Replace 110,000 medium heavy-duty trucks with upcoming 0.02 g/bhp-hr ultra-low NOx trucks that are 90% cleaner than 2010 trucks recently required by ARB's Truck and Bus Regulation
- Replace 102,936 light heavy-duty trucks with upcoming 0.02 g/bhp-hr ultra-low NOx trucks that are 90% cleaner than 2010 trucks recently required by ARB's Truck and Bus Regulation
- Install 2,622 natural gas fueling stations for deployment of 0.02 g/bhp-hr ultra-low NOx heavy duty trucks
- Replace 320,000 passenger vehicles with zero-emission vehicles
- Replace 76 locomotives with new Tier 4 locomotives



# Feasibility of Ambitious Measures

- Feasibility and ability to achieve estimated reductions for ambitious measures highly unlikely
  - Lack of commercially available technology and necessary fueling infrastructure
  - High implementation cost - \$51.5 billion
  - Extremely short implementation timeframe before federal deadlines
- Final scope, design and effectiveness of measures to be considered subject to comments from Valley businesses and residents through public participation process
- Even assuming best case scenario, projected reductions fall short of achieving attainment in 2019, 2021, or 2025



# Funding Imperative for Valley's Efforts to Achieve Expedited Reductions in Emissions

- As evident from sheer scale of fleet and equipment turnover required, regulations alone not sufficient to achieve reductions in timeframe necessary under federal law
- Abundantly clear without significant increase in funding for incentive-based measures, attaining standards not possible
- Reduction in emissions from trucks continues to be major priority in any conceivable strategy for attainment
- Under last truck regulation adopted by state, truck owners purchased or will soon purchase compliant 2010 model year trucks by 2023
  - Adopting new truck rule asking same truck owners to now purchase newer trucks and before 2019 to 2025 attainment deadlines extremely difficult
- District's attainment strategy will utilize all available local funding sources necessary to achieve expeditious reductions



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Under-fired Charbroilers</b>			
Install PM control technology by 2019 on larger under-fired charbroiler units installed within the last 10-15 years (360 out of a total of 1,800)	\$100,000	\$36,000,000	\$60,000,000
<b>Ag Engines</b>			
Electrify 1,053 ag pumps (50% of total) in areas impacting peak PM2.5 sites where access to electricity available	\$60,000	\$63,180,000	\$84,240,000
<b>Residential Wood-burning Devices</b>			
Replace 7,876 residential wood-burning devices by 2019 with cleaner devices	\$1,671	\$13,163,738	\$33,754,016
Replace 5,251 residential wood-burning devices in 2020 through 2021	\$1,671	\$8,775,825	\$22,502,677
Replace 10,501 residential wood-burning devices in 2022 through 2025	\$1,671	\$17,551,650	\$45,005,354



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Almond Harvesters</b>			
Replace 325 almond harvesters by 2019 with new almond harvester technologies capable of 50% PM2.5 control efficiency with local funding by 2019 (325 out of a total of 650)	\$44,500	\$14,462,500	\$28,925,000
Replace 325 almond harvesters by 2019 with new almond harvester technologies capable of 50% PM2.5 control efficiency with NRCS funding by 2019 (325 out of a total of 650)	\$44,500	\$14,462,500	\$28,925,000
<b>Public Fleets</b>			
Replace 181 public transit buses with 0.02 g/bhp-hr by 2019	\$300,000	\$54,300,000	\$108,600,000
Replace 222 solid waste collection trucks with 0.02 g/bhp-hr by 2019	\$165,000	\$36,630,000	\$73,260,000
Replace 617 school buses with 0.02 g/bhp-hr by 2019	\$92,500	\$57,072,500	\$114,145,000
Replace 977 public agencies and utilities fleet vehicles with 0.02 g/bhp-hr by 2019	\$90,000	\$87,930,000	\$175,860,000



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Light-duty Vehicles (Passenger Cars, SUVs, Pick-up Trucks, etc.)</b>			
Replace 320,000 light-duty cars and trucks by 2019 with zero-emission vehicles	\$10,000	\$3,200,000,000	\$6,400,000,000
<b>Light Heavy-duty Trucks (LHD)</b>			
Replace 89,237 LHD Trucks by 2019 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$30,000	\$2,677,110,000	\$5,354,220,000
Replace 5,330 LHD Trucks through 2020-2021 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$30,000	\$159,900,000	\$319,800,000
Replace 8,369 LHD Trucks through 2022-2025 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$30,000	\$251,070,000	\$502,140,000
<b>Medium Heavy-duty Trucks (MHD)</b>			
Replace 110,000 MHD Trucks by 2019 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$60,000	\$6,600,000,000	\$13,200,000,000
<b>Natural Gas Infrastructure</b>			
Install 2,622 natural gas fueling stations as necessary to deploy 75,536 HHD 0.02 g/bhp-hr natural gas trucks by 2025	\$480,000	\$1,258,560,000	\$3,146,400,000

# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Heavy Heavy-duty Trucks (HHD)</b>			
Replace 67,728 HHD Trucks by 2019 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$100,000	\$6,772,800,000	\$13,545,600,000
Replace 1055 HHD Trucks by 2019 with 0.02 g/bhp-hr with local funds, Prop 1B	\$100,000	\$105,500,000	\$211,000,000
Replace 68 HHD Trucks by 2019 with 0.02 g/bhp-hr with Federal Funding	\$100,000	\$6,800,000	\$13,600,000
Replace 2,194 HHD Trucks between 2020 to 2021 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$100,000	\$219,400,000	\$438,800,000
Replace 540 HHD Trucks between 2020 to 2021 with 0.02 g/bhp-hr with Local Funds, Prop 1B	\$100,000	\$54,000,000	\$108,000,000
Replace 50 HHD Trucks between 2020 to 2021 with 0.02 g/bhp-hr with Federal funding	\$100,000	\$5,000,000	\$10,000,000
Replace 2,282 HHD Trucks between 2022 to 2025 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$100,000	\$228,200,000	\$456,400,000
Replace 895 HHD Trucks between 2022 to 2025 with 0.02 g/bhp-hr with Local Funds, Prop 1B	\$100,000	\$89,500,000	\$179,000,000
Replace 100 HHD Trucks between 2022 to 2025 with 0.02 g/bhp-hr with Federal Funding	\$100,000	\$10,000,000	\$20,000,000

# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Agricultural Equipment</b>			
Replace 20,649 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$65,000	\$1,342,185,000	\$2,684,370,000
Replace 21 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with currently allocated Cap and Trade funding	\$65,000	\$1,365,000	\$2,730,000
Replace 969 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with Local, Moyer funds	\$65,000	\$62,985,000	\$125,970,000
Replace 969 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with NRCS funds	\$65,000	\$62,985,000	\$125,970,000
Replace 84 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with Federal funding	\$65,000	\$5,460,000	\$10,920,000



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Agricultural Equipment</b>			
Replace 8,669 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$75,000	\$650,175,000	\$1,300,350,000
Replace 465 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with Local District, Moyer	\$75,000	\$34,875,000	\$69,750,000
Replace 465 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with NRCS Funds	\$75,000	\$34,875,000	\$69,750,000
Replace 67 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with Federal funding	\$75,000	\$5,025,000	\$10,050,000



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Agricultural Equipment</b>			
Replace 2,471 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$95,000	\$234,745,000	\$469,490,000
Replace 817 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with Local District, Moyer	\$95,000	\$77,615,000	\$155,230,000
Replace 817 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with NRCS Fund	\$95,000	\$77,615,000	\$155,230,000
Replace 105 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with Federal funding	\$95,000	\$9,975,000	\$19,950,000



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Incentives	Estimated Total Implementation Cost
<b>Off-road Equipment</b>			
Replace 18,000 Vehicles by 2019 with Tier 4 with new state regulation and or funding for incentives programs	\$40,000	\$720,000,000	\$1,440,000,000
<b>Locomotives</b>			
Replace 64 Locomotives by 2019 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$2,000,000	\$128,000,000	\$192,000,000
Replace 12 Locomotives by 2019 with Tier 4 with Prop 1B	\$2,000,000	\$24,000,000	\$35,250,000
<b>TOTAL</b>		<b>Estimated Incentives</b>	<b>Estimated Total Cost</b>
		<b>by 2025</b>	<b>by 2025</b>
Total		\$25,513,248,713	\$51,547,187,047

