

Considerations for Reducing Emissions from the In-Use Diesel Fleet

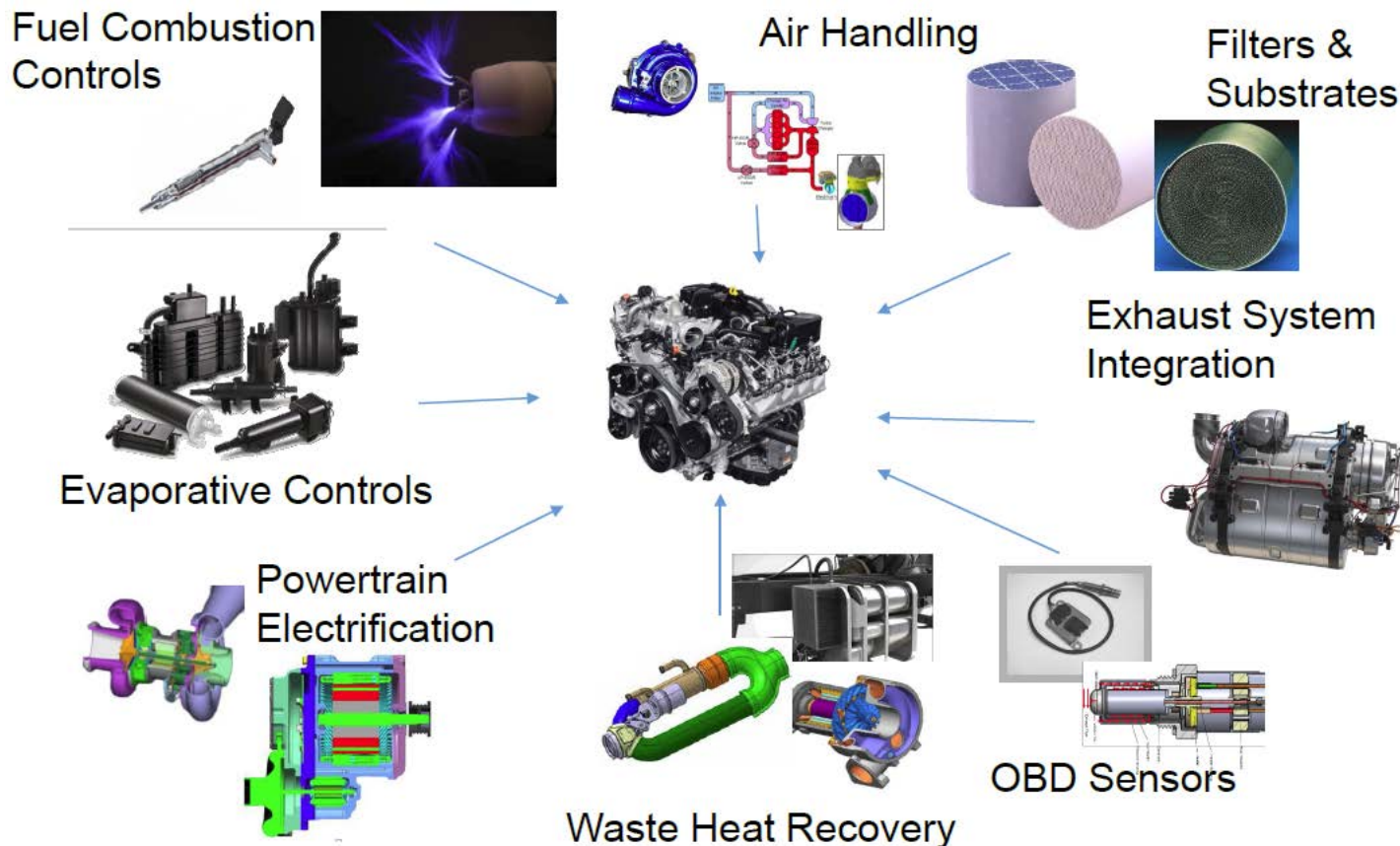
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Manufacturers of Emission Controls Association

- Technology voice for emission control industry with air regulatory agencies and stakeholders since 1976
- 41 member companies commercializing emission control and efficiency technologies for all sizes of internal combustion engines



Significant Retrofit Experience in U.S.

- Approximately 120,000 on- and off-road DPF retrofits in U.S. since 2001
- Greater than one million DOC retrofits worldwide
- Extensive experience with retrofit technologies exists for on-road vehicles
 - School buses, transit buses, long- and short-haul trucks, refuse haulers, utility vehicles
- Retrofit experience continues for many off-road applications
 - Construction equipment, port vehicles/equipment, marine engines and locomotives, stationary IC engines

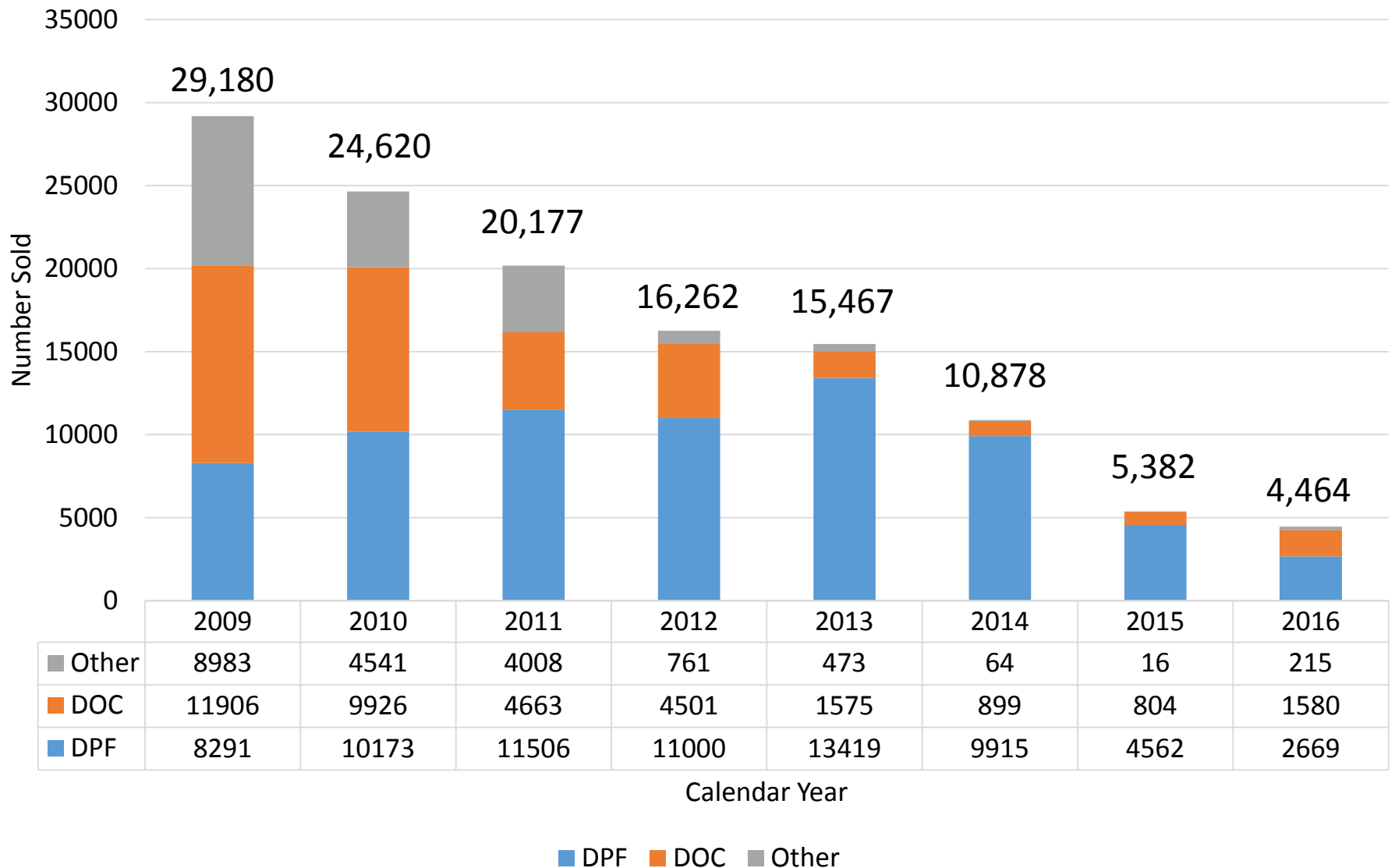
Passive DPF Locomotive Retrofit in California



Active DPF+SCR Tugboat Retrofit at Port of LA



MECA Diesel Retrofit Sales Survey Results for U.S. (On-Road and Off-Road, 2009-2016)



Federal DERA Funding

- Diesel Emissions Reduction Act (DERA) appropriations
 - FY 2009-2010: \$120 million (plus additional \$300 million from the American Recovery and Reinvestment Act of 2009)
 - FY 2011: \$50 million
 - FY 2012: \$30 million
 - FY 2013: \$20 million
 - FY 2014: \$20 million
 - FY 2015: \$30 million
 - FY 2016: \$50 million
 - FY 2017: \$60 million
- For FY 2018, Senate appropriations bill for EPA includes \$40 million for DERA, House bill includes \$75 million

FY 2017 DERA Grants and Rebates

- EPA appropriated \$60 million in DERA funding for FY 2017
 - 2017 National Clean Diesel Funding Assistance Program RFP announced in April (~\$11 million); funding increased to ~\$34 million in June; award announcements being made this fall
 - 2017 DERA School Bus Rebate Program announced in September (~\$7 million); up to \$1 million available for retrofit funding requests; announcement of selectees expected in January 2018
 - 2017 Tribal Clean Diesel Funding Assistance Program RFP announced in October (\$1.5 million); application deadline on January 18, 2018

Current List of Available EPA-/ARB-Verified Level 3 Retrofit Technologies (as of August 2017)

- U.S. EPA (<https://www.epa.gov/verified-diesel-tech/verified-technologies-list-clean-diesel>)
 - 6 on-road passive DPFs (includes 2 DPF+SCR)
 - 2 on-road active DPFs
 - 3 off-road passive DPFs
 - 3 off-road active DPFs (includes 1 DPF+SCR)
 - 2 off-road SCR systems (NOx control)
 - 1 locomotive SCR system (NOx control)
- California ARB (www.arb.ca.gov/diesel/verdev/vt/cvt.htm)
 - 14 on-road passive DPFs (includes 1 DPF+LNC and 1 DPF+EGR)
 - 7 on-road active DPFs
 - 1 off-road passive DPF
 - 5 off-road active DPFs
 - 9 Level 3 devices for TRUs or APUs
 - 13 Level 3 devices for stationary engines

Need to Preserve Benefits of Diesel Vehicles Certified with Emission Control Devices

- Diesel vehicles certified with emission control devices:
 - 2007 and newer on-road, heavy-duty trucks
 - Tier 4 off-road equipment certified with DPFs
 - Over 380 engine families certified between 1994 and 2009 with DOCs
- Aftermarket DPFs provide lower-cost replacement option
 - For DPFs that have been damaged or that require replacement (e.g., deteriorate through normal usage) after OEM warranty period, end-users have expressed interest in purchasing less expensive aftermarket DPFs
 - Availability of lower-cost DPFs may cause more timely replacement of failed DPFs and would ensure continued emission benefits

California ARB's Regulation for New Aftermarket DPFs

- ARB adopted regulation for new aftermarket DPFs in April 2016 (approved in April 2017)
- Establishes criteria for approval of aftermarket DPFs for MY 2007-2009 on-road, heavy-duty diesel engines
- Requirements include emissions and durability testing
- Protections for end-users similar to ARB's retrofit verification program (e.g., two-year warranty)

Need to Improve Effectiveness of Existing State Heavy-Duty I/M Programs

- Improper truck maintenance and/or tampering can lead to increased vehicle emissions
- Currently, 19 states in U.S. have heavy-duty I/M programs
- State I/M test criteria have changed little over past 20 years
 - Regulations for new heavy-duty engines have become increasingly stringent over same period
 - Current I/M test criteria used by states (i.e., smoke opacity limits) out of date for modern trucks
- More stringent I/M test criteria needed to ensure benefits of new trucks maintained throughout vehicle intended service life

California ARB's Truck Inspection Programs

- Current smoke inspection requirements in CA for Heavy-Duty Vehicle Inspection Program (HDVIP) and Periodic Smoke Inspection Program (PSIP):
 - 40% opacity limit for 1991 and newer
 - 55% for 1990 and older
 - SAE J1667 snap acceleration smoke test procedure
- ARB proposing lower opacity limits:
 - For 2007 and newer MYs and DPF-equipped engines: 5% opacity limit
 - For non-DPF-equipped engines:
 - 20% opacity limit for 1997-2006 MYs
 - 30% opacity limit for 1991-1996 MYs
 - 40% opacity limit for pre-1991 MYs
 - ARB estimates 90-95% of current on-road heavy-duty fleet would pass recommended opacity limits
- ARB staff plans to present proposal to Board in Spring 2018

Summary

- Retrofits will continue to be needed for legacy diesel fleet
- Aftermarket DPFs provide effective lower-cost filter replacement option
- More effective state I/M strategies needed for new technology heavy-duty vehicles