

Gasoline Aftermarket Emission Reduction Opportunities

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National Association of Clean Air Agencies

Conference Call

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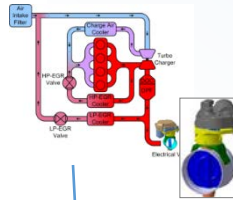


MECA Technology Portfolio has Evolved over 41 years

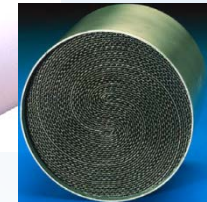
Fuel Combustion Controls



Air Handling



Filters & Substrates



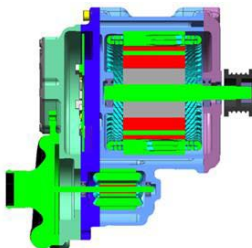
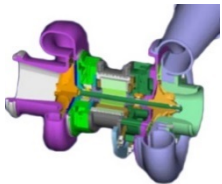
Exhaust System Integration



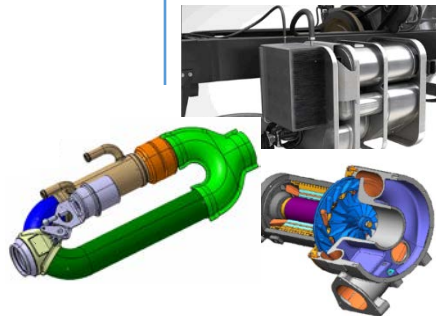
Evaporative Controls



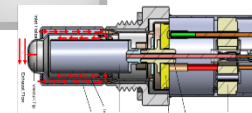
Powertrain Electrification



Waste Heat Recovery



OBD Sensors



Outline

- Overview of aftermarket converter requirements and benefits
- MECA aftermarket converter test results
- Concerns with implementing CARB aftermarket converter regulations in other states
- Aftermarket Converter Sales
- Industry Green Converter Proposal
- Conclusions



Federal and CARB Aftermarket Catalyst Programs

| PROGRAM ELEMENTS | FEDERAL | CARB |
|---|--|--|
| Warranty | 25,000 miles | 5 years or 50,000 miles |
| Emissions Limits over FTP-75 | HC/CO/NO _x catalyst efficiencies of 70/70/30% | Applicable vehicle certification limit (<i>formerly 70/70/60%</i>) |
| OBD Compatibility | No MIL illumination on OBD converters | OBD MIL demonstration 1.5X OEM threshold or 2.6X emission limit |
| Aging/Testing Procedures | 25,000 miles of road aging | Allow engine dynamometer aging with RAT-A cycle |
| Reporting & Certification Obligations | Manufacturer catalyst labeling and warranty requirements, test | Labeling, Warranty, Quarterly quality reporting requirements |
| Used Converters | Yes | No |
| Emission Benefits (HC+NO _x) | | 36 tons per day CA (2012) 3.66 tpd in NY (2012) 3 tpd in MD (2020) 32 tpd in OTR (2020) |



MECA Aftermarket Converter Test Program

- Goal: Quantify the tailpipe emissions of California and Federal aftermarket converter technologies over the FTP test cycle. Provide the results to support harmonizing the requirements across 50 states.
- Approach: Selected five LEV I vehicles that represent the U.S. fleet for side by side evaluation after 25,000 and 50,000 equivalent miles of vehicle aging.
- Results published in Society of Automotive Engineers Technical Paper 2013-01-1298



Average Emission Benefits: CARB vs. Federal Catalyst

LEV I test fleet, Three cars and Two trucks

| | THC (g/mile) | | | CO (g/mile) | | | NOx (g/mile) | | |
|---------------------|--------------|-------------|-------------|--------------|-------------|-------------|--------------|-------------|-------------|
| | <i>Fresh</i> | <i>25k</i> | <i>50k</i> | <i>Fresh</i> | <i>25k</i> | <i>50k</i> | <i>Fresh</i> | <i>25k</i> | <i>50k</i> |
| California | 0.10 | 0.12 | 0.13 | 0.08 | 0.12 | 0.16 | 0.10 | 0.15 | 0.21 |
| Federal | 0.16 | 0.30 | 0.45 | 0.12 | 0.34 | 0.51 | 0.21 | 0.95 | 1.55 |
| % Difference | 38% | 60% | 71% | 33% | 65% | 69% | 52% | 84% | 86% |



Issues with Implementing CARB Regulations in Other States

- States may choose to adopt the CARB aftermarket program under their state code of regulations
- Different effective years in state programs causes confusion among installers and consumers
- Consumers may be motivated to purchase cheaper federal converters out of state
- Enforcement is complicated if I/M is OBD based
- I/M must include a visual inspection and confirmation that proper converter is installed on the vehicle
- Lead time to new regulations is critical to allow transition of product and inventory
- Educate the distribution network about the new requirements
- MECA supports a stringent national program that matches federal aftermarket converter requirements with those in California



Issues with National CARB Program

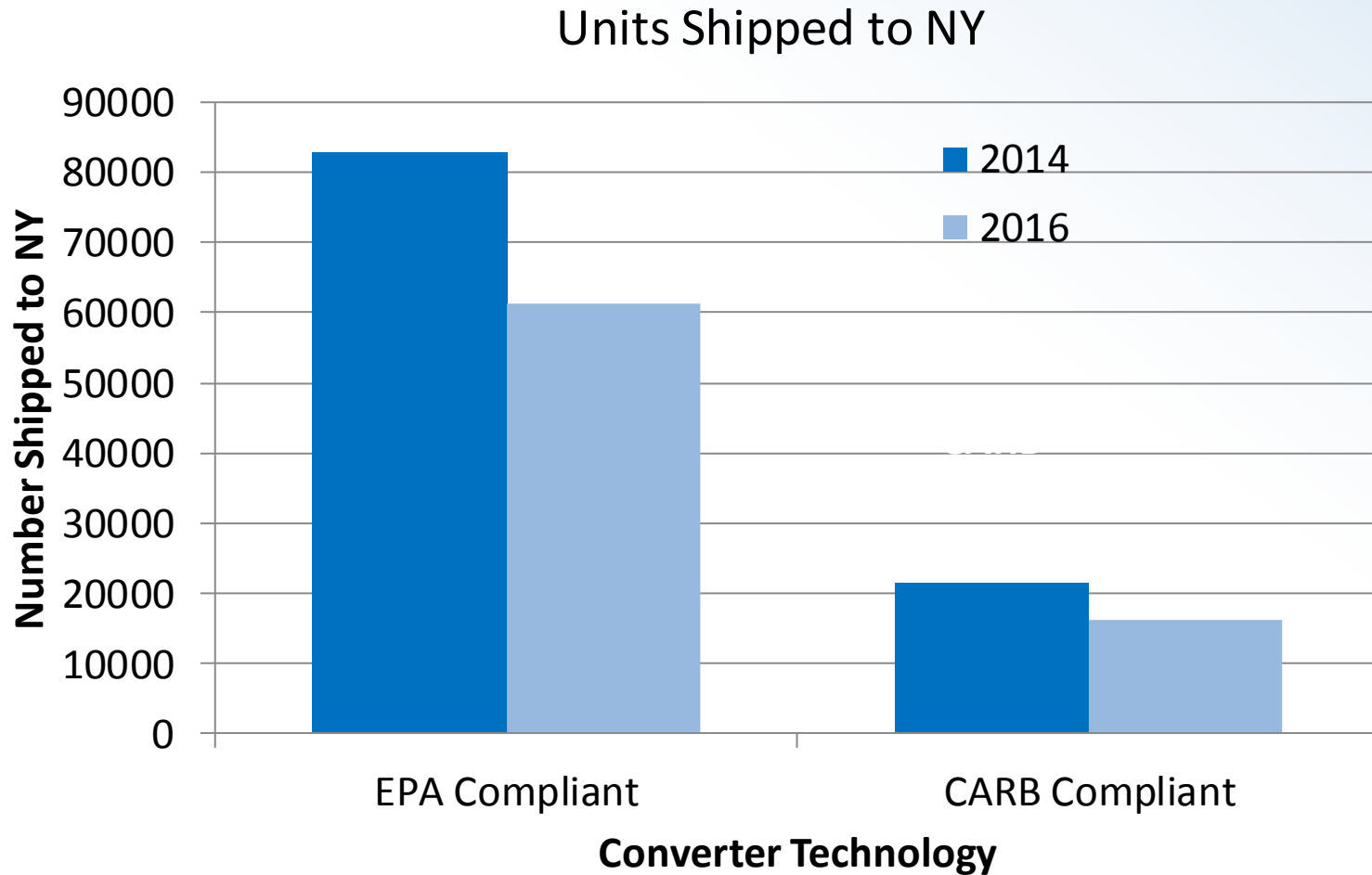
- Doesn't include federally certified vehicles (15% of vehicles)
- Doesn't include vehicles < 5 years old (ARB amendments)
- Significant number (40%) of engine families are not covered by CARB EOs
- CARB process requires reapplication with each new model year even when converter technology is unchanged
- State I/M programs need to include visual inspection to prevent illegal converters
- CARB doesn't have resources to handle national program

MECA Aftermarket Converter Sales Results

| Category | Region | 2012 | 2013 | Chng. from Prior | 2014 | Chng. from Prior | 2016 | Chng. from Prior |
|---|------------------------------|-----------|-----------|------------------|-----------|------------------|-----------|------------------|
| Total number of converters shipped (EPA and CARB Compliant) | New York | 132,541 | 125,382 | -5% | 104,306 | -17% | 71,616 | -32% |
| | North America (exc. CA) | 2,422,495 | 2,025,913 | -16% | 1,837,949 | -9.5% | 2,288,738 | +25% |
| | North America (including CA) | 2,643,167 | 2,611,841 | -1% | 2,330,975 | -11% | 2,708,403 | +16% |
| EPA Compliant Converters | New York | 132,116 | 119,162 | -10% | 82,835 | -31% | 61,184 | -26% |
| | North America (exc. CA) | 2,383,463 | 1,986,144 | -17% | 1,765,533 | -11% | 2,248,250 | +27% |
| CARB Compliant converters | New York | 425 | 6,220 | 1,364% | 21,471 | 245% | 16,194 | -25% |
| | North America (exc. CA) | 39,032 | 39,769 | +2% | 72,416 | +82% | 56,475 | -22% |



NY Aftermarket Converter Experience



Current Aftermarket Situation Outside of CA and NY

- Federal 1986 policy remains in place and enforceable until further notice
- EPA's Office of Enforcement and Compliance Assurance is considering whether to rescind the 1986 aftermarket converter policy and apply Memo 1A (Tampering policy) to aftermarket converters just like all other aftermarket parts.
- EPA believes it lacks authority to regulate in-use vehicles and aftermarket parts outside of Memo 1A.
- Options on the table
 - CARB program is only legal aftermarket exemption policy under Memo 1A
 - Memo 1A allows for OEM converters, third-party replacement (identical to OEM) converters or CARB aftermarket converters to be sold
 - EPA could update standards for federal exemption program (1986 policy) to match CARB aftermarket requirements (preferred approach)
 - Green Sticker Program
- OECA and OTAQ to agree on path forward



Industry-Run Green Sticker Program

- “Green Sticker” licensing program based on API DEF or lube licensing program
- Performance and durability requirements equal to CARB
- Data and application submission like existing federal program
- Manufacturers pay application fee (per converter technology) for review of performance data and vehicle list by program administrator
- Administrator issues license to display Green Sticker on converter
- Manufacturers pay annual fee to cover cost of annual performance audit testing
 - Annual fees calculated based on number of applications and sales
- Labs contracted by administrator to conduct independent audit testing
 - Purchase converter and conduct physical and chemical analysis of precious metal content and catalyst
 - Disagreement may trigger complete aging and complete FTP emission test
- Failure of audit may lead to penalties such as rescinding of license or legal action
- States would agree to only allow sale of CARB and Green Sticker converters
- EPA must exempt Green Sticker converters from Memo 1A (tampering)



OTC Comparison of Aftermarket Program Options

| Option | Challenges |
|-----------------------------------|---|
| Status Quo | Doesn't result in acceptable emission reductions |
| Memo 1A | Difficult enforcement between OEM and replacement parts would lead to "race to the bottom" and unacceptable emission reductions |
| Federal Update (recommended) | Requires EPA action and potential authority issues |
| CARB aftermarket (OTC Model Rule) | Relies heavily on CARB certification, lack and diversity of vehicle coverage, interstate issues |
| Green Sticker Program | Certifications and audits outside of agency control, SIP credit becomes more challenging |

Conclusions and Recommendations

- Gasoline converters have made significant technological advances since 1986.
- Stringent National federal program offers ozone non-attainment regions with a near-term tool to clean-up existing passenger car fleet in parallel with fleet turn over to cleaner vehicles.
- MECA believes that a revised federal aftermarket program is the most cost effective way to achieve maximum emission benefits while avoiding implementation issues.
- Green Sticker converter program offers alternative path that involves industry, states and federal EPA
- U.S. EPA, states, aftermarket converter manufacturers and other stakeholders need to collaborate to identify a policy to reduce in-use fleet emissions