



Diesel Emissions Reduction Act Update & Retrofitting Agricultural Engines

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What is the Diesel Technology Forum?

Objective:

A not-for-profit educational/trade organization dedicated exclusively to increasing awareness about clean diesel technology among policymakers, fleet managers and the media.

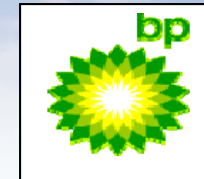
Membership:

Includes energy companies, engine and vehicle manufacturers, and emission control device manufacturers

Methods:

Educational materials and outreach events

DTF - Clean Diesel Leaders



Honeywell



NAVISTAR[®]

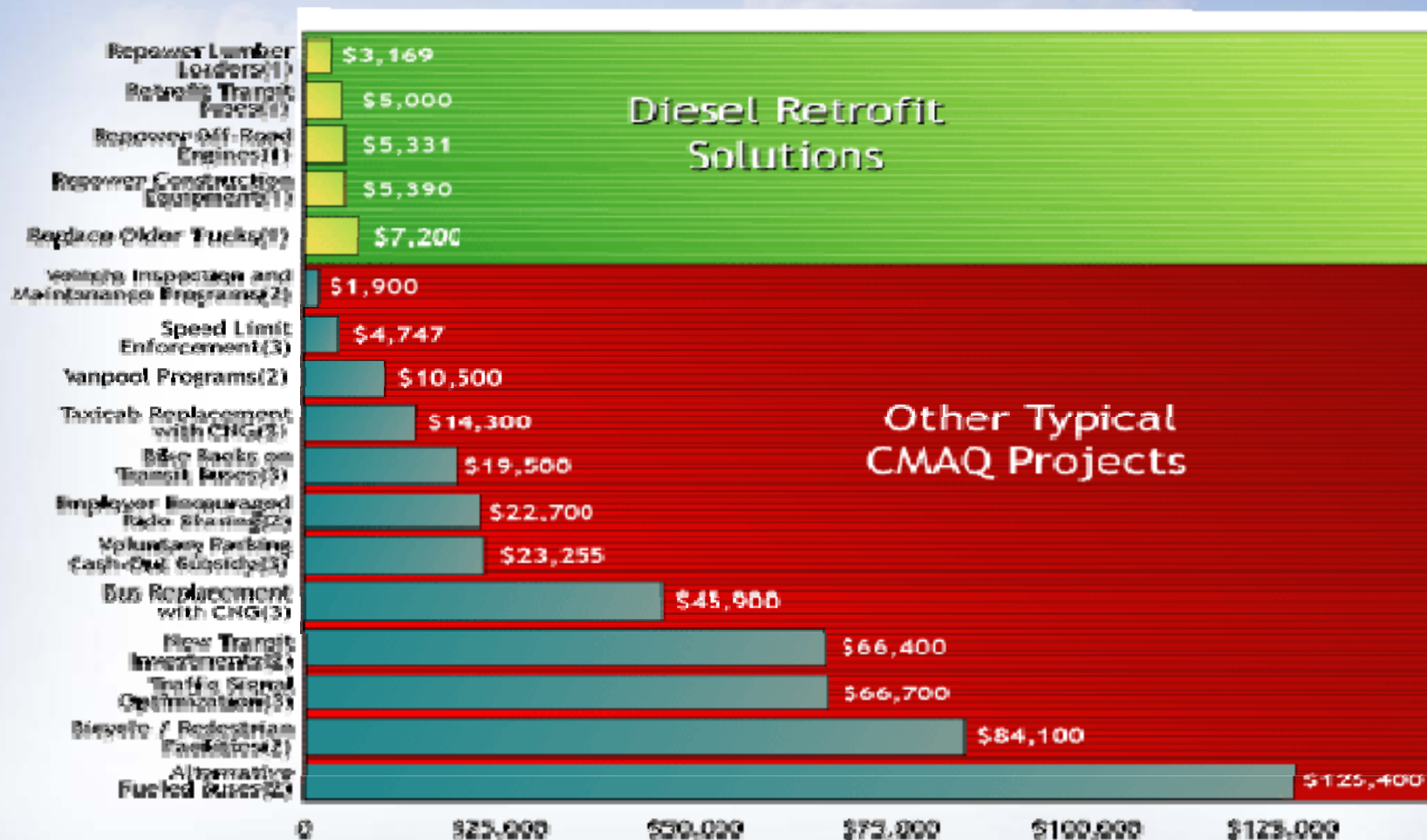


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Diesel Emissions Reduction Act

- Dedicated diesel retrofit funding created under the Energy Policy Act of 2005
- Authorized \$200 million/yr for 5 years
- 70/30 funding split (federal/state)
- 50% of funding must go to public fleets
- Priority for non-attainment areas
- Defines retrofit to include the 5 R's (repower, rebuild, refuel, replace, & retrofit)
- Promotes adoption of commercially available green technology, which provide manufacturing, marketing and maintenance jobs in all 50 states.
- Expires at end of FY2011

Diesel Retrofit Cost Effectiveness



DERA to Date

- \$464.7 million to date - \$164.7 million in annual appropriations & \$300 million through ARRA. President Obama requested \$60 million in FY2011.
- More than 600 applications received for the \$300 million under the ARRA. Approx \$2 billion requested, more than \$2 billion in matching funds offered.
- Nearly 400 applications received for the \$84 million available in FY2009 and FY2010 (not including \$36 million for state programs). Approx \$570 million requested, more than \$1 billion in matching funds offered.
- EPA estimates that more than \$1 billion in qualified, unfunded project proposals have been received.

National Clean Diesel Program

Estimated \$60M for FY2011

National

Estimated \$42 Million (70%)

State

(30%)

Estimated \$18 Million FY2011

National Clean Diesel
Funding Assistance Program
Estimated \$32M for FY2011

State Clean Diesel Grant Program 2011 \$18M

State Base

Matching Bonus

Clean Diesel Emerging Technologies Program
\$4M for FY2011

SmartWay Clean Diesel Innovative Finance Program
Estimated \$6M for FY2011

Budget amounts for FY
2011 are estimated

National Clean Diesel Funding Assistance Program: Eligible Entities

- Regional, state, local, tribal or port agency with jurisdiction over transportation or air quality; and
- Nonprofit organization or institution which
 - Represents or provides pollution reduction or educational services to persons or organizations that operate diesel fleets; or
 - Has, as its principal purpose, the promotion of transportation or air quality

National Clean Diesel Funding Assistance Program: Eligible Fleets and Equipment

On and off road diesel engines/vehicles such as:

- Buses
- Medium or heavy duty trucks
- Marine engines
- Locomotives
- Construction vehicles
- Cargo handling (including at a port or airport)
- Agriculture
- Mining
- Power generation

National Clean Diesel Funding Assistance Program: Use of Funds

- Cannot fund the cost of emissions reductions mandated under Federal, State or Local law
 - Cannot fund after effective date of requirement
 - Can fund early compliance
- Grants are not for emissions testing
- Grants are not for fueling infrastructure
- Technologies and engines must be verified and/or certified by USEPA or CARB

National Clean Diesel Funding Assistance Program: Funding coverage

- 100% for verified exhaust controls
- 100% for certified engine upgrades
- 100% for incremental cost of cleaner fuels
- 75% for certified engine repowers
- 25% for all certified replacements
- 100% for verified idle reduction technologies
- 100% for verified aerodynamic technologies and low rolling resistance tires

National Clean Diesel Funding Assistance Program: Priority Projects

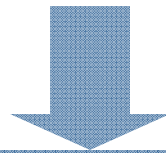
- Maximize public health benefits
- Most cost-effective
- In areas with high population and air quality issues
- Areas that receive a disproportionate quantity of air pollution
- Maximize the useful life of the engine
- Conserve diesel fuel and utilize ULSD (early introduction for nonroad projects)

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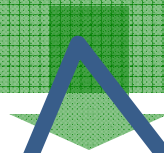
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Matching Bonus

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State Clean Diesel Grant Program: Overview

- “States shall use funds to develop and implement grant and low-cost revolving loan programs as appropriate to meet state needs and goals relating to the reduction of diesel emissions”
- If state matches base allocation dollar for dollar, state receives additional 50% of base amount
- All 50 states and District of Columbia are eligible
- Matching funds not required
- Verified technologies not required
- Funding not utilized reverts to national program

DERA Reauthorization (FY2012-2016)

- Effort led by Senators Voinovich & Carper to reauthorize DERA for another 5 years (FY2012-2016)
- Program changes in reauthorization proposal
 - Expands eligible entities to include private fleets who contract to government agencies
 - Eliminates required 50% funding for public fleets
 - Calls for simplified application process
 - Reemphasizes priority for projects which demonstrate cost-effectiveness and health benefits
 - Removes restriction on using funds for programs mandated by state or local law
 - Allows EPA to implement rebate as well as grant or loan programs

Retrofitting Agricultural Equipment

- Very little done under DERA
 - CA, UT, FL, ID, WI
- Most common are irrigation pumps
- Greatest number in CA
- Less retrofit pressure than on-road diesel vehicles and construction industry
- Tremendous emissions reduction and efficiency gains are possible



EPA Nonroad Emissions Regulations

kW	hp	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 - 7	0 - 10					7.5 0.80			7.5 0.40							
8 - 18	11 - 24					7.5 0.80			7.5 0.40							
19 - 36	25 - 49				7.5 0.60				7.5 0.30					4.7 0.03		
37 - 56	50 - 74				7.5 0.40				4.7 0.30	Option 1*				4.7 0.03		
									4.7 0.40	Option 2*			4.7 0.03			
57 - 74	75 - 99				7.5 0.40				4.7 0.40				3.4 0.19 0.02			0.40 0.19 0.02
75 - 129	100 - 174			6.6 0.30				4.0 0.30					3.4 0.19 0.02			0.40 0.19 0.02
130 - 224	175 - 299			6.6 0.20												0.40 0.19 0.02
225 - 449	300 - 599	6.4 0.20						4.0 0.20				2.0 0.19 0.02				0.40 0.19 0.02
450 - 559	600 - 749		6.4 0.20													
≥ 560	≥ 750						6.4 0.20					3.6 0.19 0.10				3.6 0.19 0.04

*In the 50 to 75 horsepower category there are two options. Option 1 requires a reduced PM level (.30 vs .40) but allows Final Tier 4 to be delayed one year (2013).

NOTE: The vertical dashed lines separating the years show when the seven-year life of the Tier 3 Equipment Flexibility Provision ends and engines can no longer be placed in vehicle production.

Fuel Sulfur Regulations

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Nonroad	5000 ppm						500 ppm				15 ppm				
On-road	500 ppm						15 ppm								

Legend

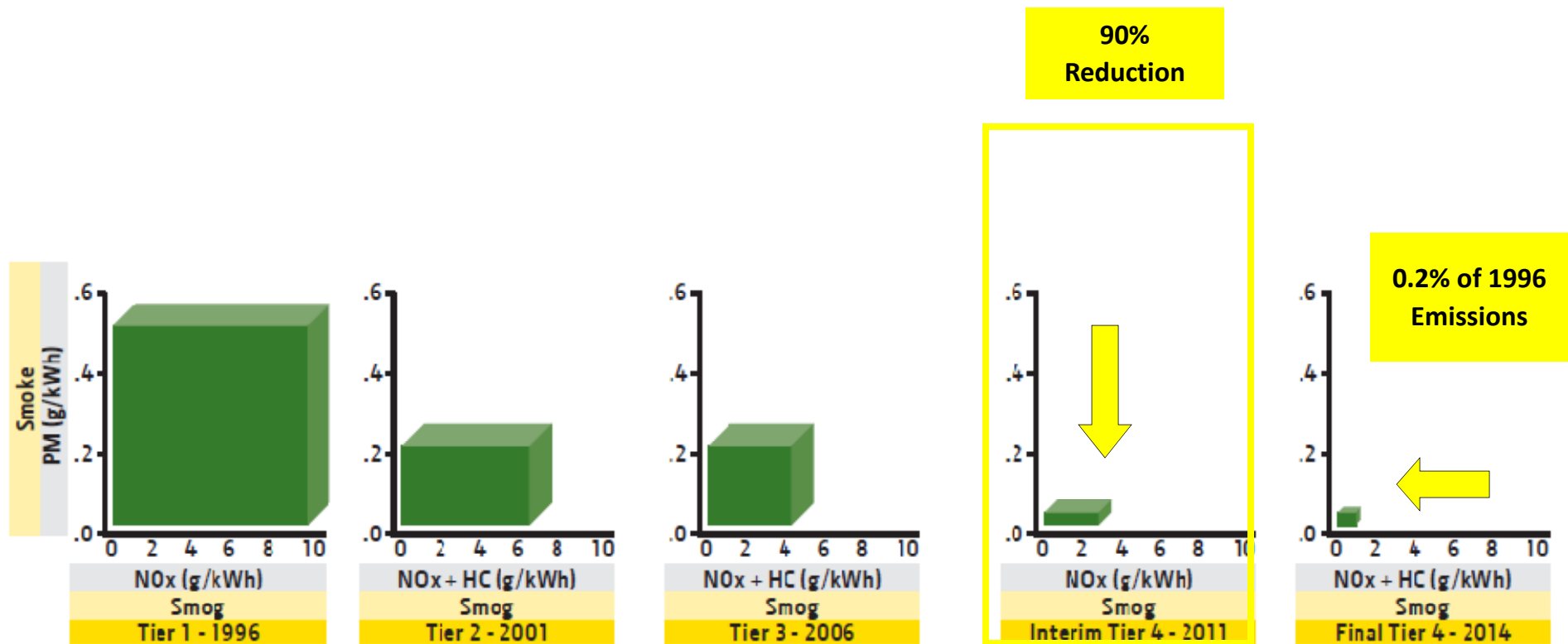
EPA	Tier 1	Tier 2	Tier 3	Interim Tier 4	Final Tier 4

New emissions regulations take effect January 1 of the year indicated by color change unless otherwise noted.

Examples

NOx	2.0	2.0, the maximum amount of nitrogen oxide (NOx) allowed in grams / kW-hr.
NMHC	0.19	0.19, the maximum amount of nonmethane hydrocarbons (NMHC) allowed in grams / kW-hr.
PM	0.025	0.025, the maximum amount of particulate matter (PM) allowed in grams / kW-hr.
NMHC + NOx	7.5	7.5, the maximum amount of NMHC + NOx allowed in grams / kW-hr.
PM	0.60	0.60, the maximum amount of PM allowed in grams / kW-hr.

EPA Off-Road Emissions Regulations 174 to 750 Engine HP



Ultra-low sulfur diesel (15ppm) required since Jan 2007

Sales by Size Class of Tractors in California

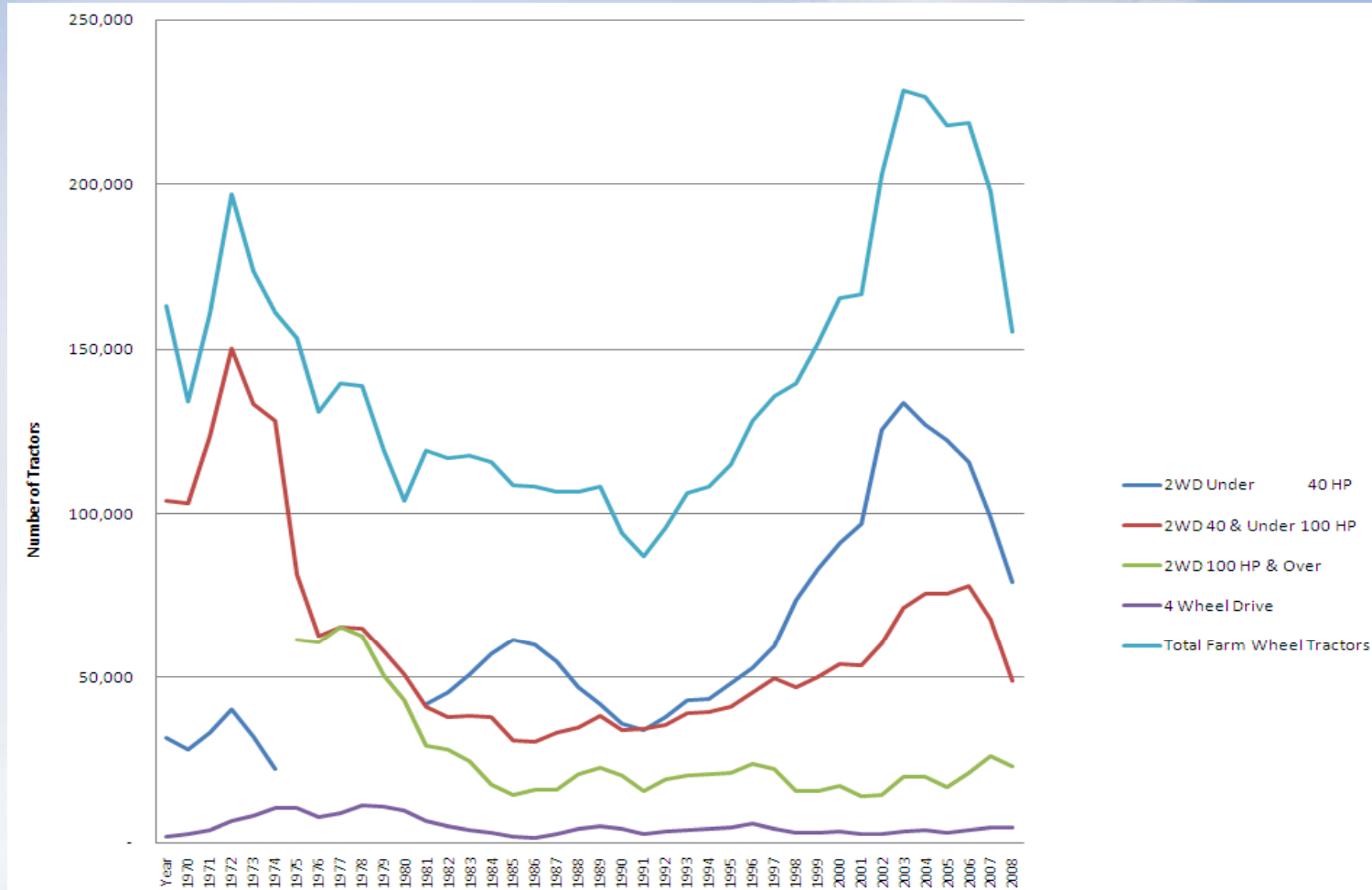


90% of tractors in CA
Are less than 100hp

Source: Agriculture Equipment Manufacturers

Product Family	Tractors			
State(s):	California			
State	Product	Model Class	Size Class	1978-2010 Industry
CA	2-Wheel Drive Tractors			
			< 20	11%
			20 < 30	26%
			30 < 40	10%
			40 < 50	6%
			50 < 60	3%
			60 < 70	4%
			70 < 80	9%
			80 < 90	12%
			90 < 100	9%
			100 < 110	2%
			110 < 120	1%
			120 < 140	0%
			120 < 130	1%
			130 < 140	0%
			140 < 160	1%
			140 < 150	0%
			150 < 160	0%
			160 < 180	1%
			160 < 170	0%
			170 < 180	0%
			180 & Ove	0%
			180 < 200	1%
			200 & Ove	1%
			200 < 220	0%
			220 & Ove	1%
			220 < 240	0%
			240 & Ove	1%

USA Tractor Sales History

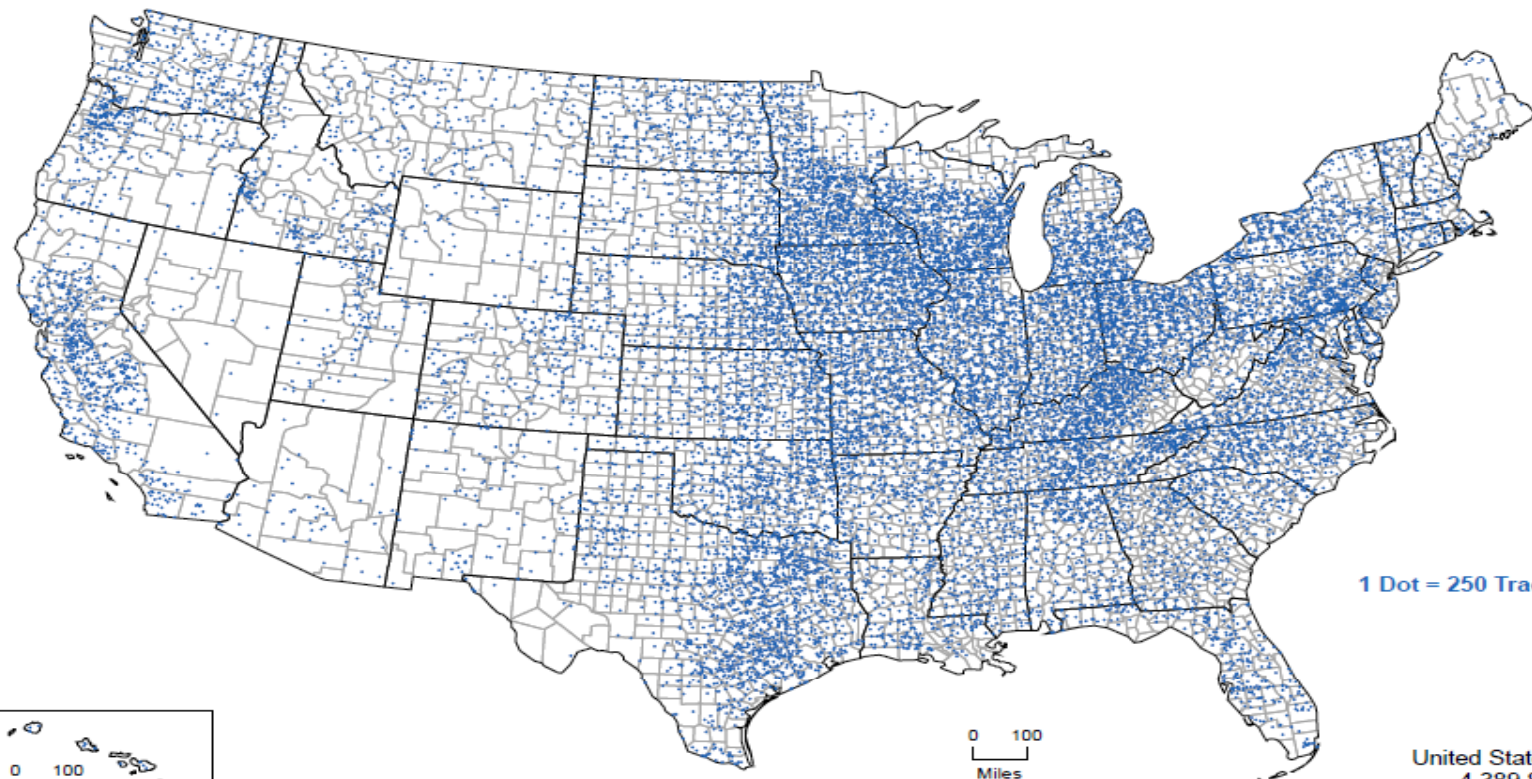


Source: Agriculture Equipment Manufacturers

2007 USDA Census

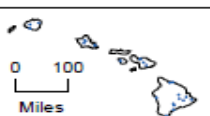


Tractors on Operations: 2007



1 Dot = 250 Tractors

United States Total
4,389,812



Analysis of Ag Repower/Retrofit to Upgrade Emissions Compliance 1 Tier Level

Year	Product	EST Tier Level	Model	Avg. 2010 Eng Hours	Per Hour Adjustment*	2010 Adjusted Retail Cash Value	HP - Engine	Est Repower at Retail	Repower vs. Residual	Est. Retrofit to Tier 2/3	Est. Retrofit to Residual
1991	2WD	0	2955	6180	1.00	\$18,519	97	\$15,746	85%	\$10,000	64%
	2WD	0	4455	6180	1.50	\$35,831	142 (PTO)	\$23,550	66%	\$20,000	85%
	4WD	0	8960	6180	3.00	\$51,575	370	\$55,160	107%	\$30,000	54%
	Combine	0	9600	3160	9.60	\$31,280	260	\$39,805	127%	\$30,000	75%
1996	2WD	1	5500	4870	1.00	\$13,178	55	\$9,890	75%	\$10,000	101%
	2WD	1	7600	4870	1.40	\$33,800	110	\$17,755	53%	\$20,000	113%
	2WD	1	8300	4870	2.40	\$60,239	200	\$30,625	51%	\$30,000	98%
	4WD	1	8870	4870	4.10	\$67,457	350	\$52,075	77%	\$30,000	58%
	Combine	1	9400	2770	10.60	\$41,974	185	\$28,480	68%	\$30,000	105%
2002	2WD	2	5420	3420	1.50	\$15,883	65 (PTO)	\$14,895	94%	\$10,000	67%
	2WD	2	6420	3240	1.90	\$36,670	90 (PTO)	\$19,035	52%	\$20,000	105%
	2WD	2	7810	3420	2.60	\$63,772	150 (PTO)	\$27,125	43%	\$30,000	111%
	2WD	2	8420	3420	3.40	\$103,079	235 (PTO)	\$41,575	40%	\$30,000	72%
	4WD	2	9420	3420	5.10	\$121,139	425	\$63,025	52%	\$30,000	48%
	Combine	2	9650	1840	3.10	\$105,806	290	\$44,095	42%	\$30,000	68%
2006	2WD	3	5355	1620	1.60	\$17,419	55	\$9,965	57%	N/A	N/A
	2WD	3	6420	1620	1.90	\$29,946	90	\$14,970	50%	N/A	N/A
	2WD	3	8230	1620	3.50	\$112,840	200	\$30,700	27%	N/A	N/A
	4WD	3	9320	1620	5.20	\$141,985	375	\$55,725	39%	N/A	N/A
	Combine	3	9560	890	32.70	\$134,790	275	\$41,425	31%	N/A	N/A

Repower Cost - est \$143/HP plus Labor at \$75/Hour to R&R (25-35 Hours per machine)

Note: pre 1991 Vehicles have structural engines thus not viable for a repower.

Official Guide Values as of Fall 2010

Hours above Avg is Discounted per hour by Adjustment Factor (in \$)

Exhaust Retrofit Concerns

- ARB and Cal/OSHA developed an interim policy to address off-road retrofit visibility concerns.
 - Specific criteria for impact on field of vision
 - Defined by interruption of sight of operator
 - Particularly problematic on smaller equipment
- Beyond visibility – additional concerns RE: exhaust heat temperatures
- Interim policy available at:
www.arb.ca.gov/msprog/ordiesel/documents/retrofitvisguide.pdf

Examples of Small Tractors and Use



Agriculture Retrofit Considerations

- **Exhaust control devices**
 - Not available/suitable for all equipment (age, size)
 - Visibility/safety issues can be a factor
 - Warranty issues
 - No efficiency gains

- **Repowers**
 - Not available for pre-1991 structural engines
 - Can provide efficiency as well as emissions reduction benefits
 - May not be cost effective considering residual value of equipment

Agriculture Retrofit Considerations

- **Replacements**
 - Most expensive option
 - Offers greatest efficiencies and emission reduction benefits (esp. retiring Tier 0 and Tier 1)
 - Additional benefits (ie. safety - ROPS, operator comfort)

- **Idle Reduction**
 - Available for wide range of equipment
 - Relatively low cost
 - Provides emissions & efficiency benefits