

Medium Fleet Average Calculator User Guide

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Introduction

Nearly all commercially-operated self-propelled off-road diesel vehicles of 25 horsepower (hp) or greater used in California and most two-engine on-road vehicles (except on-road two-engine sweepers) are subject to the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Off-Road Regulation).

To assist medium fleets (2,501 to 5,000 total hp) with planning for compliance with the Off-Road Regulation, we have developed the Medium Fleet Average Calculator. The calculator is a spreadsheet that takes the vehicle hp and engine model year for each vehicle in a fleet and calculates its current Oxides of Nitrogen (NO_x) emissions and upcoming emissions performance requirements each year from 2017 to 2023. Fleets can enter actions taken on vehicles such as retrofits, retirements, and engine repowers during each compliance year to see how these actions will affect their compliance. In this way, a fleet can experiment with a variety of different actions to find the compliance path that works best for them. For information about complying with the Off-Road Regulation, please visit our Knowledge Center at <http://www.arb.ca.gov/msprog/ordiesel/knowcenter.htm>.

Important Notes

- The Air Resources Board received authorization from the U.S. Environmental Protection Agency to enforce all provisions of the Off-Road Regulation on September 13, 2013.
- The calculator requires **Microsoft Excel 2010**, and may not work with older versions.
- This calculator is only for fleets subject to the medium fleet requirements. Only fleets with 2,501 to 5,000 total hp are considered medium.
- The calculator reflects the December 2010 revisions to the Off-Road Regulation (i.e., those that became effective in December 2011).
- The calculator does **NOT** account for all provisions in the regulation. Provisions not reflected in the calculator include:
 - all subsections of Vehicles and Systems Used in Place of Diesel Vehicles (§2449(d)(1)), except for subsection (B) Electric Vehicles;
 - Exemptions from Best Available Control Technologies (BACT) (§2449.1(b)(2))
 - Order of BACT Requirements (§2449.1(b)(4))

Please familiarize yourself with the provisions above before turning over vehicles in the calculator to ensure you receive the proper amount of credits.

Calculator Overview

White Cells	User inputs vehicle information here.
Grey Cells	Locked cells. Most grey cells contain calculations that return values based on the data entered into the white cells.
Orange Cells	Indicates a cell with user input that has been altered from the previous compliance year, allowing fleets to track their changes.
Green Cells	Indicates a beneficial aspect. In a given year if the fleet has met either the Fleet Average Target or the BACT Requirement, the fleet is in compliance, and the appropriate cell will be displayed as green. Additionally, green cells in the Effect on Fleet Avg. column indicate a beneficial influence on the Fleet Average Index for that year; darker green cells indicate more benefits to your fleet.
Red Cells	Indicates a detrimental aspect. In a given year if the fleet has not met either the Fleet Average Target or the BACT Requirement, the fleet is not in compliance, and the appropriate cells will turn red. Additionally, red cells in the Effect on Fleet Avg. column indicate a detrimental influence on the Fleet Average Index for that year; darker red cells indicate a greater detriment to your fleet.

Using the Calculator

Step 1: Review Instructions Tab

Upon opening the Fleet Average Calculator you will see the Instructions tab. Carefully read over the sections pertaining to cells with user input, order of vehicle turnover and BACT exemptions, and cells with calculated data.

Step 2: Entering Initial Fleet Information



Figure 1: The Initial Fleet Info tab is near the bottom of the spreadsheet.

After reading the instructions, click on “Initial Fleet Info”, as shown in Figure 1 above. Initial Fleet Info is where you enter the baseline information for your fleet as it existed (or will exist) on December 31, 2015. The calculator cannot properly track fleet changes made prior to 2016, as any such changes will affect the early credit totals of the fleet instead of normal retirement credit. Most of the cells are optional, but the Engine Model Year and Engine Horsepower are required. The easiest way to enter your fleet data is to copy it from your Diesel Off-road On-line Reporting System (DOORS) account and paste it into the calculator; see Appendix A for instructions. The calculator automatically updates its calculated values as you enter information. If you have low-use vehicles, vehicles with on-road engines, Verified Diesel Emission Control Strategies (VDECS) retrofits, electric vehicles, or vehicles with non-standard engines, indicate those additions in the appropriate cells as shown in Figure 2 on the next page. Additionally, you do not need to include agricultural vehicles, dedicated snow-removal vehicles, emergency-use

vehicles, or vehicles awaiting sale in the list – even though you must report such vehicles in DOORS, they are not counted in the total hp or emissions calculations.

Early Credits:		Baseline fleet information as of December 31, 2015												
Total Fleet Horsepower	2016 Fleet Average Index													
3022	6.2													
Vehicle EIN	Vehicle Serial Number	Your Vehicle Number	Engine Model Year (Required)	Engine Horsepower (Required)	Designated Low-Use	On-Road Engine	PM VDECS Level	NOx VDECS % reduction	Purchase Year / Type if Electric	Emission Factor if Non-standard	Engine Tier	Emission Factor	Effect on Fleet Avg. Index	Target Factor
x	x	x	1970	400	Permanent						T0	14.1	N/A	4.5
x	x	x	1977	300	Year-by-year						T0	13.0	N/A	4.5
x	x	x	1990	450			Two				T0	7.3	4.3	4.5
x	x	x	1982	300			Highest	40%			T0	5.5	0.3	4.5
x	x	x	1990	450							T0	8.9	2.8	4.5

Figure 2: A fleet's baseline information has been entered into the calculator.

Once all of the vehicles in your fleet have been entered, you must manually enter any early credits you have accrued prior to December 31, 2015. You may find your early credits within the Compliance Snapshot page in DOORS. Log in to your account in DOORS and click on your fleet in the left-hand window. A series of options will appear in the middle window once you've selected your fleet. Scroll down to the bottom of these options (using the middle window's scroll bar), click on the Compliance Snapshot button as shown in Figure 3 below, and you will be taken to your fleet's Compliance Snapshot page.



Figure 3: Finding the Compliance Snapshot button in DOORS.

Scroll down to the Credit Summary table on the Compliance Snapshot Page and add together all of the Horsepower Credits listed in the Early Repowers/Rebuilds, Early Replacement, Early VDECS Double Credit, Early Reduced Fleet HP, 2010-2011 Reduced Fleet HP, and Interim Replacement/Retirement rows as shown in Figure 4 below. Finally, enter the total into the Early Credits cell in the Initial Fleet Info tab as shown in Figure 5 below. You may leave the Early Credits cell blank if you have none.

Credit Summary		
Reference Regulation Section 2449.1(b)	These credits are provided in sections of the regulation cited in the right column. You may show or hide individual credit details by clicking the labels or Show All Credit Details	Horsepower Credit (Rounded)
(13)	Early Repowers/Rebuilds	0
(14)	Early Replacement	0
(15)	Early VDECS Double Credit - Highest level PM VDECS credit - NOx + Not highest level PM VDECS credit - NOx + Highest level PM VDECS credit	2,323
(16)	Early Reduced Fleet HP (only to be used after 2014)	1,534
(17)	2010-2011 Reduced Fleet HP	0
(18)	Interim Replacement/Retirement	1,536

Figure 4: The Early Credits total in this example is 5,393.

Early Credits:	150
Total Fleet Horsepower	3022
2016 Fleet Average Index	6.2

Figure 5: Enter your fleet's Early Credits here, in the Initial Fleet Info tab.

Step 3: Actions Taken on the Fleet for the 2017 Compliance Date

All Remaining Vehicles Exempt from this year's BACT Requirement:														
Actions taken on fleet between January 1, 2016 and December 31, 2016														
Total Fleet Horsepower	2017 Fleet Average Index	2017 Fleet Average Target	1/1/2017 Target Met	2017 BACT Requirement	BACT Credits Earned	1/1/2017 BACT Met	Carryover BACT Req. for 1/1/2018	Extra BACT Credit for 1/1/2018						
3322	7.6	4.6	NO	298	550	YES		252						
Vehicle EIN	Vehicle Serial Number	Your Vehicle Number	Engine Model Year (Required)	Engine Horsepower (Required)	Designated Low-Use	On-Road Engine	PM VDECS Level	NOx VDECS % reduction	Purchase Year / Type if Electric	Emission Factor if Non-standard	Engine Tier	Emission Factor	Effect on Fleet Avg. Index	Target Factor
x	x	x	1970	Retired										
x	x	x	1977	300							TO	13.0	2.8	4.5

Figure 6: Determine your compliance for the first compliance date in the “2016 Compliance” tab.

Once you have entered your initial fleet information, click on the “2016 Compliance” tab at the bottom of the spreadsheet as shown previously in Figure 1. All of the information in the Initial Fleet Info tab is automatically copied over into this tab, and all future compliance years have their information copied over from the previous year. At the top of the table in this tab is a breakdown of whether or not your fleet will be considered to be in compliance on the January 1, 2017, compliance date, as shown in Figure 6 above. In this tab you can enter various actions on the vehicles in your fleet in order to meet either the Fleet Average Target or the BACT Requirement for 2017; these changes will appear as orange so you can track what you’ve changed, again as shown in Figure 6 above. Your Fleet Average Index can be lowered in order to meet the Fleet Average Target by reducing the emissions across your fleet (retiring older vehicles, adding new ones, etc.), whereas the BACT Requirement can be met by generating credits through vehicle retirement, engine repowers, and VDECS retrofits. Some actions will lower your Fleet Average Index while also generating credits. The following actions can be taken to meet either of the above requirements:

- **Retiring a vehicle:** To retire a vehicle from your fleet, choose the “retired” option in the drop-down menu in the Engine Horsepower cell for the vehicle, as shown in Figure 7 below. Retiring older vehicles will help lower your Fleet Average Index, and if the vehicle meets the Order of BACT Requirements, retiring it will generate credits. Please see “Step 4: Bringing a Fleet into Compliance for the 2017 Compliance Date” for more information on the Order of BACT Requirements and BACT Exemptions.

Year (Required)	Horsepower (Required)	Low-t
1970	Retired	
1977	300	
1990	Retired	
1982	300	
1990	450	
1991	200	

Figure 7: Designating vehicles as retired.

- **Entering a newly purchased vehicle:** To enter in a new vehicle, enter in its engine model year and hp (and any applicable optional information) at the bottom of the current list of vehicles. Newer engines will help lower your Fleet Average Index.
- **Repowering a vehicle:** To repower a vehicle with a new engine, replace its engine model year and hp with the new engine’s model year and hp, as shown in Figure 8 on the next page. Repowering a vehicle will lower your Fleet Average Index and if the vehicle meets the Order of BACT Requirements, repowering it will generate credits if the new engine is a higher tier than the old engine. Please see “Step 4: Bringing a Fleet into Compliance for the 2017 Compliance Date” for more information on the Order of BACT Requirements.

(Required)	(Required)	Low-Use	(Required)	(Required)	Low-Use
1970	400		2007	380	
1977	300		2008	320	
1990	450		1990	450	
1982	300		1982	300	
1990	450		1990	450	
1991	200		1991	200	

Figure 8: Designating vehicles as repowered with new engines.

- Entering a VDECS:** To enter in a new VDECS retrofit that reduces Particulate Matter (PM) emissions, choose its level from the drop-down menu of the PM VDECS Level column. Keep in mind that level 1 VDECS will not lower your Fleet Average Index, nor will it generate credits. If the VDECS reduces NOx emissions, enter in its percent reduction value into the NOx VDECS % Reduction column. Some VDECS may reduce both PM and NOx emissions. To see if there is a verified exhaust retrofit available for a given vehicle, visit the VDECS webpage at <http://www.arb.ca.gov/msprog/ordiesel/vdecs.htm>. Level 2 or highest-level PM VDECS and all NOx VDECS will lower your Fleet Average Target, but only highest level PM VDECS and NOx VDECS will generate credits. Note that the Order of BACT Requirements do not apply to VDECS.
- Designating a vehicle as Low-Use:** To mark a vehicle as year-by-year or permanent low-use, select the appropriate choice in the drop-down menu in the Designated Low-Use column. Low-use vehicles are not counted in your total fleet hp or your Fleet Average Index. Year-by-year low-use vehicles can be brought out of low-use at any time with no penalties. Permanent low-use vehicles cannot be brought out of low-use unless they meet the Adding Vehicles Requirements (§2449(d)(6)), but vehicles designated as permanent low-use will generate retirement credits as long as they meet the Order of BACT Requirements. Please see “Step 4: Bringing a Fleet into Compliance for the 2017 Compliance Date” for more information on the Order of BACT Requirements.

Step 4: Bringing a Fleet into Compliance for the 2017 Compliance Date

In order for a fleet to be in compliance for a given compliance date, its Fleet Average Index must be equal to or less than its Fleet Average Target, OR the fleet must generate enough credits to meet that year’s BACT Requirement. The BACT Requirement is the BACT Rate multiplied by the total fleet hp, and the “BACT Requirement” cell shows how many credits are needed each year. Compliance with either method is demonstrated in the Target Met and BACT Met cells, shown below in Figure 9.

All Remaining Vehicles Exempt from this year's BACT Requirement:								
Actions taken on fleet between January 1, 2016 and 1/1/2018								
Total Fleet Horsepower	2017 Fleet Average Index	2017 Fleet Average Target	1/1/2017 Target Met	2017 BACT Requirement	BACT Credits Earned	1/1/2017 BACT Met	Carryover BACT Req. for 1/1/2018	Extra BACT Credit for 1/1/2018
3722	8.3	4.6	NO	298	150	NO	148	
Vehicle EIN	Vehicle Serial Number	Your Vehicle Number	Engine Model Year (Required)	Engine Horsepower (Required)	Designated Low-Use	On-Road Engine	PM VDECS Level	NOx VDECS % reduction
x	x	x	1970	400				
x	x	x	1977	300				
x	x	x	1990	450				

Figure 9: This fleet is not yet compliant with the first compliance date.

Once a fleet has met either the Fleet Average Target or the BACT Requirement for a Compliance Year, the appropriate cell or cells will show green instead of red, as shown in Figure 10 below. Any excess credits will carry over into the next Compliance Year for later use (also shown in Figure 10).

All Remaining Vehicles Exempt from this year's BACT Requirement:								
Actions taken on fleet between January 1, 2016 and 1/1/2018								
Total Fleet Horsepower	2017 Fleet Average Index	2017 Fleet Average Target	1/1/2017 Target Met	2017 BACT Requirement	BACT Credits Earned	1/1/2017 BACT Met	Carryover BACT Req. for 1/1/2018	Extra BACT Credit for 1/1/2018
3322	7.6	4.6	NO	298	550	YES		252
Vehicle EIN	Vehicle Serial Number	Your Vehicle Number	Engine Model Year (Required)	Engine Horsepower (Required)	Designated Low-Use	On-Road Engine	PM VDECS Level	NOx VDECS % reduction
x	x	x	1970	Retired				
x	x	x	1977	300				
x	x	x	1990	450				

Figure 10: This fleet has met the BACT Requirement for the year, so it is in compliance. They also have 252 credits for future compliance dates.

Not all vehicles that are turned over are eligible to generate credits. Turning over a Tier 2 or better vehicle will only generate credits if there is no other non-exempt Tier 0 or Tier 1 vehicle in the fleet. Note that the calculator does not actually account for the incorrect order of vehicle turnover (Order of BACT Requirements) or for turning over vehicles that are exempt from the BACT Requirements. For example, the calculator will allow a fleet to generate credits for turning over a Tier 2 vehicle before any non-exempt Tier 0 vehicles, but in actuality, no credits will be generated for the fleet. BACT exemptions are explained in the following section. If all of the remaining vehicles in your fleet are exempt from the BACT Requirement in a given year, then your fleet does not need to meet the Fleet Average Target or the BACT Requirement, and your fleet is considered to be in compliance for that year. In the calculator, you can indicate that you have no remaining non-exempt vehicles in the "All Remaining Vehicles Exempt from this Year's BACT Requirement" cell at the top of the table in any given Compliance Year, as shown in Figure 11 below.

All Remaining Vehicles Exempt from this year's BACT Requirement: Yes								
Actions taken on fleet between January 1, 2016 and 1/1/2018								
Total Fleet Horsepower	2017 Fleet Average Index	2017 Fleet Average Target	1/1/2017 Target Met	2017 BACT Requirement	BACT Credits Earned	1/1/2017 BACT Met	Carryover BACT Req. for 1/1/2018	Extra BACT Credit for 1/1/2018
3722	8.3	4.6	YES		150	YES		150
Vehicle EIN	Vehicle Serial Number	Your Vehicle Number	Engine Model Year (Required)	Engine Horsepower (Required)	Designated Low-Use	On-Road Engine	PM VDECS Level	NOx VDECS % reduction
x	x	x	1970	400				
x	x	x	1977	300				

Figure 11: Indicating that you have no more non-exempt vehicles to turnover.

BACT Exemptions

Some vehicles are exempt from the BACT Requirements, meaning they are not required to be turned over or otherwise meet the BACT Requirements. The exemptions for both large and medium fleets are as follows:

- A vehicle that is less than 10 years old from its date of manufacture on the compliance date (for example, the January 1, 2017 compliance date) is exempt.
- If a vehicle had the highest-level PM VDECS installed within the last 6 years, it is exempt.
- If the vehicle came equipped with an original equipment manufacturer diesel particulate exhaust filter, or if the vehicle has a Tier 4 Interim or Tier 4 Final engine, then it is exempt.

- If the vehicle had the highest-level PM VDECS installed prior to January 1, 2013, then that vehicle may be considered exempt. Note that no more than 15 percent of the total fleet hp can qualify for this exemption.

The calculator does not take these exemptions into account, and it will give credit for actions taken on an exempt vehicle, even if the fleet has not met the Order of BACT requirements (as previously stated, the regulation requires all Tier 0 and Tier 1 engines in a fleet to be turned over or retrofitted before BACT credit is granted for actions taken on Tier 2 or higher engines). Please keep this in mind when using the calculator. If you do turn over exempt vehicles, indicate the turnover by just deleting the engine model year and hp as shown in Figure 12 below. A fleet that does not meet the Fleet Average Target must still meet the BACT Requirement with the vehicles that do not qualify for an exemption. If all of the vehicles in a fleet qualify for an exemption, the fleet is exempt from the BACT and Fleet Average Requirements for that year and will be considered to be in compliance. Note that the exemptions listed above do not lower the hp on which the BACT Requirements are calculated. For more information, see section 2449.1(b)(2) of the Off-Road Regulation.

Vehicle Number	Engine Model Year (Required)	Engine Horsepower (Required)	Designated Low-Use
x			
x			
x	1990	450	
x	1982	300	
x	1990	450	

Figure 12: If a vehicle that is Exempt from the BACT Requirements is turned over, indicate this by deleting its engine model year and hp entirely.

Step 5: Using the Calculator for 2018 and Beyond

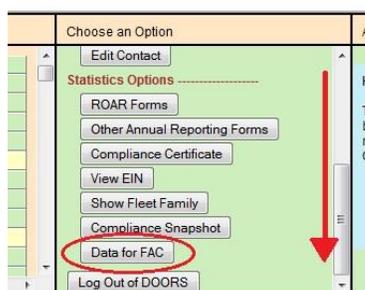
Once your actions in the calculator have brought your fleet into compliance for 2017, you can start planning out your compliance for future years. Click on the “2017 Compliance” tab, then plan out your compliance strategy for that year just like you did for the 2017 compliance year. Continue on through each successive year in this manner, and you can make a complete strategy for complying with the Off-Road Regulation many years in advance.

If you have any questions or comments about the Fleet Average Calculator, please contact Kyle Goff, Air Resources Technician II, by phone at (916) 323-1414, or by email at kgoff@arb.ca.gov.

Appendix A: Guide to Pasting Fleet Data from the Diesel Off-Road Online Reporting System (DOORS) into the Fleet Average Calculator

If you do not already have your fleet data in a format such as a spreadsheet that can easily be pasted into the Fleet Average Calculator, your fleet data may be copied from your DOORS account.

The Air Resources Board recommends you first copy all of your data from DOORS into a **blank** Excel workbook, and then paste the appropriate portion into the Fleet Average Calculator. If you have a different version of Excel than shown in these instructions, your menu selections may be different; see Excel help for information. Please note that the Fleet Average Calculator is not designed to work with Excel versions other than Excel 2010.

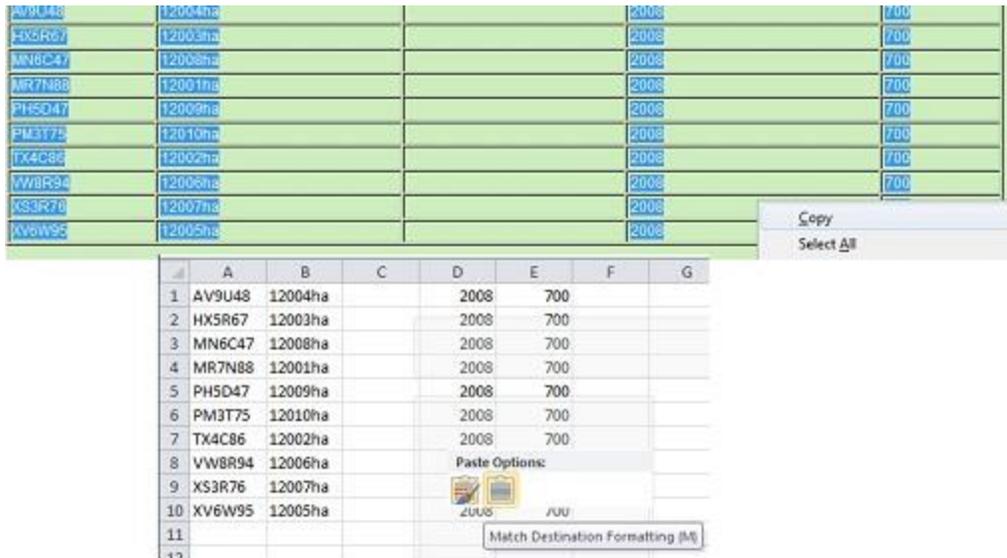


To copy your fleet data from your DOORS account, log into DOORS, choose “Data for FAC” button at the bottom of the main menu below Compliance Snapshot.

The Fleet Average Calculator data page in DOORS looks like the figure below. There are five fields. The calculator needs engine model year and horsepower (hp). You can copy and paste all five columns directly into the Fleet Average Calculator. Notice that clicking on a column heading will sort all the data. For example, clicking on the “Eng hp” column heading will sort all data by lowest to highest hp, or click again and all data will sort by highest to lowest hp.

Excel Fleet Average Calculator Data				
Copy the vehicle information below and paste into the Excel Fleet Average Calculator .				
EIN	Veh serial num	Your veh num	Eng model year	Eng hp

Select your data by holding down the left mouse button and moving the mouse, then right-click and choose Copy (or select from the top menu in Excel).



You can copy all the data at one time using Select All. However not all of the data needs to be copied at one time; portions may be done at a time, which may be easier if you have many vehicles in your fleet. Be sure to avoid copying the same data twice. To paste the data into the calculator, right-click and choose “Values” under “Paste Options”. After the data is in the calculator, check all the columns to ensure each field is correct.

The Fleet Average Index in the Fleet Average Calculator can be checked against the Average shown in the “Fleet Target and Average Emission Rates” table in the Compliance Snapshot in DOORS. They should match, but if they do not, there are likely exempt vehicles (such as vehicles designated in DOORS as low-use) that have not yet been marked correctly in the Fleet Average Calculator.