

Diesel Emissions Quantifier (DEQ) Frequently Asked Questions

General Questions

Black carbon, also known as elemental carbon, is a potent climate change agent found in diesel particulate matter. Does EPA have plans to include black carbon in the DEQ so the climate change impacts can be estimated?
At this time EPA does not have plans to include black carbon in the DEQ.

Do you envision including C3 marine vessels in the DEQ?

C3 marine engines and the ocean-going vessels are currently beyond the scope of what is modeled in the DEQ. EPA has provided "[Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories](#)" to help users calculate emissions reductions. Please contact EPA's Helpline at 1-877-NCDC-FACTS or cleandiesel@epa.gov for assistance with the calculations.

In calculating lifetime benefits, does the DEQ consider the remaining life of the vehicle or of the emission control device?

Lifetime calculations are based on the life of the vehicle, not the emission control device. EPA assumes once a vehicle is retrofitted, it will remain retrofitted for the life of the vehicle.

Can the DEQ be used to estimate benefits for the Congestion Mitigation and Air Quality Improvement Program (CMAQ)?

Yes, the DEQ is an estimation tool that may be used for CMAQ planning purposes.

Does the DEQ give results in metric tons or short tons?

Short tons.

Can the DEQ be used for light duty projects (diesel pickups)?

The DEQ calculates emission reductions for heavy-duty vehicles only. The [National Mobile Inventory Model \(NMIM\)](#) can be used to calculate emission reductions for both heavy-duty and light-duty vehicles.

Is there a way to save more than three scenarios using a single login account in the DEQ?

No. However, you may open as many accounts as you wish and can save three scenarios for each account. Each account requires a unique e-mail address.

Data Entry Questions on Vehicle Fleets

How do you estimate emissions for a fleet with multiple, diverse vehicles? Must a separate report be generated for each vehicle?

It depends on your preference and the desired precision of the results. You may generate a report for each vehicle or group of similar vehicles. Alternately, you may run a single report using 'average' inputs to minimize the number of runs. For example, if similar vehicles are spread evenly over model years 1998 -2003, they may be averaged together, entered as 2001, and run as a single report.

Why are maintenance and operating costs not entered into the DEQ?

These costs associated with a retrofit project are not included in the DEQ results.

Sometimes when I am trying to enter my fleet information, I cannot select the model year for my fleet.

Depending on the type of fleet, the DEQ may assume that only certain model years can be retrofitted. In this case, you may need to select the closest model year to your fleet, which will have an effect on the estimated results.

How does the DEQ calculate the life of a vehicle? Can that value be overridden?

The DEQ considers the application, engine type, and model year in generating a default lifetime for each vehicle. For on-highway vehicles, the lifetime is set at 30 years; for non-road applications, the lifetime will vary. These defaults can not be overridden.

How can I calculate baseline emissions using the DEQ?

To calculate baseline emissions, simply enter the information about your fleet, but do not include any technology changes.

Can the DEQ be used to calculate emissions reductions by replacing a diesel engine with electric technology?

Replacing a diesel engine with an electric technology would result in zero diesel emissions. In this case, you could calculate the baseline emissions (see question above), which would equal the emissions reduced.

What if I have vehicles in both on-road and off-road applications?

The DEQ can support multiple vehicle groups, including a mix of on-highway and non-road for a given retrofit scenario.

Which inputs are for a single vehicle and which are for the entire fleet?

Usage rate and all other vehicle fleet data should be entered for a single vehicle. Fuel Volume is the only input that is entered for the entire fleet.

If idle reduction cannot be selected for off-road equipment, how do you quantify emissions reductions if you want to put an automatic shutdown device on an off-road vehicle?

At this time the DEQ does not support idling strategies in non-road engines.

Data Entry Questions on Fuels & Technologies

How do you enter data for alternative fuel engine calculations?

To calculate emission reductions for a vehicle that is switching to an alternative fuel, first enter the vehicle fleet information under the “Enter New Vehicle Group Information” and save that information. Then go to “Apply New Technology to Vehicle Group”, under “Technology Type” select “Fuel Options” and under “Technology” select your fuel type.

Can I use the DEQ to estimate emissions from Truck Stop Electrification (TSE) projects?

The DEQ can calculate idling emissions reduced based on the number of idling hours that are eliminated due to the use of the TSE. You will have to make some general assumptions about the trucks that will be using this TSE.

Is there a scenario for using the DOC+CCV (Diesel Oxidation Catalyst + Closed Crankcase Ventilation) or DPF+CCV (Diesel Particulate Filter + Closed Crankcase Ventilation) combination technology? How about CCV by itself?

CCV is included under “Emission Control Devices” as DOC+CCV, or DPF+CCV (Diesel Particulate Filter + CCV). It is not listed as a stand-alone retrofit technology. If you are using CCV as a stand-alone, select “Other Emission Control Devices” from the “Technology” menu and enter the reduction percentages from the manufacturer.

Does the DEQ also calculate emission reductions for engine replacements?

Yes. Under “Technology Type”, select “Engine Replacement/Repower”. Then under “Technology” select “Engine Replacement”.

With our retrofit, we will be changing from one fuel type to another. How is this handled in the DEQ?

First, go to the “Enter New Vehicle Group Information” section and enter the vehicle information. Then “Select Fuel Type” that was being used before the retrofit.

Under “Apply A New Technology to the Vehicle Group,” apply as many technologies as you would like to the vehicle(s). One of the “Technology Type” options is “Fuel Options”, so select the fuel that the vehicle(s) will be using after the retrofit. Save your work. You can return to that vehicle group and add another technology, such as a retrofit device.

Is there an option for combined technologies such as engine repower with DOC or DPF?

Some combined technologies are not available as an option, but you can create your own combination by applying multiple technologies to one vehicle or group. After selecting your first technology and saving it, select another technology and save that to the current vehicle group you are working.

In the off-road field, DOC unit costs varies depending on engine size. Can we average the costs per unit or must we do a separate run for each application?

You can either use one unit or average them, depending on how you will use your data and how precise you want your results to be.

What if the DEQ doesn't list the same fuel blends that we have, like high blends of Biodiesel plus ULSD?

The DEQ results are estimates, so users are advised to select the option that gives most closely approximates their real-world application.

Would an engine replacement produce CO₂ (carbon dioxide) emission reductions?

There is a potential for CO₂ reductions with an engine replacement. At this time, CO₂ reductions are not calculated by the DEQ, but this may be included in the future.

Can the DEQ separate Particulate Matter (PM) by 2.5 and (PM) 10?

No. The DEQ only calculates PM_{2.5}.

Does the DEQ calculate fuel and emissions savings as a result of vehicle replacement or repower?

No, not at this time.

Questions on the Health Benefits Module

What does the Health Benefits Module provide?

This module provides information on the health benefits of reducing exposure to diesel emissions. This new component of the DEQ, allows users to estimate diesel emission reductions and the resulting health benefits.

The DEQ requires users to input detailed information regarding the emission sources they are controlling, the types of controls being applied, the number of sources being replaced, retrofitted or otherwise controlled, and the year in which the controls will take effect. The DEQ then calculates the emission reductions for particulate matter (PM), nitrogen oxides (NO_x), hydrocarbons (HC), carbon monoxide (CO), and carbon dioxide (CO₂).

The Health Benefits Module allows users to identify the counties where the emission reductions are taking place and to estimate the monetary impact of the resulting health benefits. These estimates are based solely on the change in fine particle concentrations and do not reflect changes in exposure to any other pollutants, including ozone or hazardous air pollutants. Users can save and export files summarizing the emissions and health effects estimates. There is also a web-based user's guide and methodology document that explains the methodology used to estimate the health benefits and the limitations of the estimates.

Does the DEQ provide actual fuel savings or estimates?

The DEQ does not provide information on fuel savings. Based on the user's input of the amount of fuel used, the DEQ will calculate CO₂ emissions reductions for select technology types.

How are benefits of reducing diesel particulate matter calculated?

The Health Benefits Module uses a county-scale "look-up table" within the larger DEQ tool. The look-up table includes estimates of monetary benefits per unit of reduction in emissions (benefit-per-ton) for each county in the United States. The user answers a set of questions about the type of engine being controlled, the emission control(s) used, and the location of the emission reductions. Once the DEQ estimates the emission changes, users can choose to have the Health Benefits Module estimate the health benefits of reductions in fine particulate (PM_{2.5}) emissions. Those results are found in the look-up table and the combined monetary values of avoided mortality and morbidity (i.e. non-fatal illness) are presented in tabular format for the counties the user identified.

EPA has developed look-up tables for total diesel PM sources, as well as for on-road diesel sources and non-road diesel sources. The look-up table for total diesel PM sources was developed as part of the Quality Assurance for this module and are the sum of the on-road and non-road look-up tables.

Is diesel particulate matter the only pollutant considered in the Health Benefits Module?

This module estimates the benefits from reducing only the portion of diesel particulate matter that is fine particulate matter (PM_{2.5}). There are likely benefits from reducing other pollutants, such as ozone and air toxics that the DEQ is not able to quantify these benefits at this time.

Does the DEQ provide reductions in total particulate matter (PM) or fine particulate matter (PM_{2.5}), since the Health Benefits Module aspect of the DEQ uses only PM_{2.5} in its calculation?

The DEQ estimates reductions in emissions of diesel particulate matter. The Health Benefits Module converts these emission reductions to estimated reductions in fine particulate matter PM_{2.5} using a conversion factor of 96% (i.e. 96% of diesel particulate matter is considered fine particulate matter). For additional information about this conversion, please refer to the methodology document at: www.epa.gov/cleandiesel/documents/420b10034.pdf

What health effects of diesel PM are included in the monetary calculation of Health Benefits Module?

The monetary values for the benefits of reducing diesel emissions are based on avoided incidences of the following health effects:

- Premature mortality
- Chronic bronchitis
- Acute bronchitis
- Upper and lower respiratory symptoms
- Asthma exacerbation
- Nonfatal heart attacks
- Hospital admissions
- Emergency room visits
- Work loss days
- Minor restricted-activity days

How accurate are the Health Benefits Module estimates?

The benefits generated by this module reflect only reductions in fine particulate matter. They do not include benefits from the reduction of other pollutants, including air toxics.

The results also do not include the impact of emissions sources from neighboring countries (i.e., Canada or Mexico), so the results for states bordering either of these countries do not reflect these potentially significant sources of transported emissions.

The methodology used to estimate the health benefits for this project was peer reviewed both inside and outside EPA and incorporates many suggestions by the peer reviewers. It includes data and modeling from several existing EPA tools: the National Emissions Inventory (NEI), the National Air Toxics Assessment (NATA), and the Environmental Benefits Mapping and Analysis Program (BenMap).

The methodology is most accurate in a relative sense, such as when comparing benefits among different locations or retrofit projects. The estimates are based primarily on county-level data and do not capture smaller-scale variability in air quality, exposure, or benefits, such as living very near a retrofitted diesel source or regularly riding a retrofitted school bus.

For a complete discussion of the accuracy of these estimates, please see the chapter in the methodology document titled “Uncertainties, Limitations, and Quality Assurance.”

What can this information be used for?

The Health Benefits Module is intended as a helpful tool in preparing and understanding estimates for specific emission diesel reduction projects. It can be used to make informed decisions about the benefits of various diesel retrofit options, provide an estimate of benefits for EPA grant applications, and build public support for such projects. However, it should not be used in the calculation of emission reductions for State Implementation Plan (SIP) or conformity determination.

Why can't the DEQ be used for State Implementation Plans (SIP) calculations?

The DEQ is intended to help in preparing estimated results from retrofit projects. Certain data which can affect emissions, such as temperature and humidity, are entered as default values in the DEQ. Specific inputs are required for the more sophisticated modeling tools approved for SIP and conformity calculations.

Where can I get more information about the health benefits of reducing diesel emissions?

For information particulate matter, visit www.epa.gov/air/particlepollution/.

What if I don't have all of the information required to use the DEQ?

The DEQ offers some default values for various equipment and retrofit technologies, which can be found at www.epa.gov/cleandiesel/documents/420b10035.pdf. You can also make estimates using different scenarios if certain data (e.g., gallons of fuel used annually) are not readily available.

Why are there no costs in the "Results" table of the Health Benefits Module?

The Health Benefits Module estimates the annualized costs from the unit cost (equipment) and installation costs of the project. These values are entered at the bottom of the DEQ input section titled "Apply a Technology." If the user does not enter the cost information, no cost information will appear in the benefits results table.

In addition, funding information may be entered in the section titled "Click Here to Enter Funding Information". These are assumed to be total project costs, including overhead, and are not used to estimate annual costs.

How do I choose the counties in which the emission reductions take place?

The DEQ requires users to pick a single county where the retrofits take place for the purposes of calculating the effectiveness of each emission reduction strategy. For engines used in multiple counties, such as long-haul trucks, the user should specify the county where the majority of the emissions are located.

The Health Benefits Module, however, allows the user to allocate emission reductions among up to five counties for the purpose of estimating monetary benefits. Users should use their best judgment, based on their understanding of where the emission reductions will take place, to

determine which counties should be included in the benefits estimates. Note that the Health Benefits Module is not asking whether pollution from one county is drifting into another; it's asking where the vehicles that are reducing their emissions are located.

My county is “flagged.” What does that mean?

The Health Benefits Module will flag results for counties where there may be an underestimate or an overestimate of benefits due to the transport of emissions into or out of the county. In order to acknowledge this uncertainty, the diesel benefits calculator calculates an import/export factor. This factor is calculated as: $\Delta c_i / (\Delta e_i / a_i)$, where c_i , e_i , and a_i are the concentration, emissions, and area of county i . Counties that are highest in $\Delta c_i / (\Delta e_i / a_i)$ are most likely to import a relatively large portion of diesel PM, while counties that are lowest in $\Delta c_i / (\Delta e_i / a_i)$ are most likely to export a relatively large portion of diesel PM.

For counties with import/export factors in the highest 5th percentile – for either on-road or non-road sources, depending on the query – the results are flagged with the following message:

Benefits estimates are “flagged” for this county, indicating that we have less confidence in these results due to a large amount of inter-county transport of emissions. The impacts estimation tool may be overestimating the benefits for emissions reduction projects in this county, because it has relatively few emissions compared to surrounding areas. As a result, this county is likely to be a net importer of diesel emissions, and air quality is significantly affected by emissions in upwind counties. Please take this increased uncertainty into account when interpreting your results.

For counties with import/export factors in the lowest 5th percentile – for either on-road or non-road sources, depending on the query – the results are flagged with the following message:

Benefits estimates are “flagged” for this county, indicating that we have less confidence in these results due to a large amount of inter-county transport of emissions. The impacts estimation tool may be underestimating benefits for emissions reduction projects in this county, because it has a relatively high density of emissions compared to surrounding areas. As a result, this county is likely to be a net exporter of diesel emissions, and many of the benefits of reducing these emissions are likely to take place in downwind counties. Please take this increased uncertainty into account when interpreting your results.

Why does the Health Benefits Module use annual costs and benefits?

Diesel retrofit projects tend to be capital-intensive in the first year with the purchase and installation of new equipment or parts. The benefits, however, are spread out over many years as people receive health benefits from the reduced emissions from the new or retrofitted engine. In order to adequately compare costs and benefits, this difference timeframes must be accounted for.

We annualize the costs and the benefits so the user can tell at a glance whether the benefits outweigh the costs on an annual basis. These annualized costs and annual benefits provide an indication of the scale and magnitude of the expected costs and benefits over the lifetime of the project.

Annualized costs are not the out-of-pocket costs in the first year, but are what would be paid each year if the out-of-pocket costs were distributed the over the life of the engine. This is similar to the way a mortgage distributes costs over 30 years. If you took out a loan to purchase the retrofit technologies, the annualized costs are roughly what the loan payments might look like.

Lifetime costs and benefits can be estimated by multiplying the annual costs or benefits by the number of remaining years in the lifetime of the retrofitted engine. While the lifetime estimate does not take into account a number of factors such as discount rates for benefits in future years, population or income growth, and others, it does provide a rough estimate.

When I enter the same data for vehicles and retrofit projects in different counties, I get different benefits. Why?

One of the main factors determining magnitude of health benefits associated with a given emissions reduction is the proximity of the emissions to people. If a certain emissions level is assigned to a larger census tract, it will result in a lower ambient concentration as the pollution is being spread over a larger area. The opposite is true as well. Assigning emissions to a smaller census tract will result in higher average concentrations.

In addition, if emissions are assigned to a less populated census tract, fewer people will be exposed to the resulting concentration of air pollution and the population-weighting at the county scale will predict a lower concentration, and thus, a lower ratio. Again, the opposite is true -emissions assigned to higher-populated tracts leads to a higher concentration and ratio.