



Alternative Compliance

Guidelines for Preparing and Submitting a Waiver Request Application and Other Documentation Requirements

10 CFR Part 490 Subpart I



Table of Contents

Introduction	1
Alternative Compliance Overview.....	2
Advantages of Alternative Compliance.....	3
Participation Requirements.....	3
Intent To Apply for a Waiver	4
Waiver Application Process	4
Elements of a Waiver Application	8
Department of Energy Waiver Approval Process.....	9
Implementation of a Petroleum Reduction Plan	10
Annual Report	10
Alternative Compliance Timeline	10
Use of Purchased or Previously Earned Alternative Fuel Vehicle-Acquisition Credits	10
Rollover of Excess Petroleum-Use Reductions	11
Exemptions.....	11
Enforcement Authority.....	11
Records Retention	12
Appeals.....	12
Appendix A: Acronyms	12
Appendix B: Frequently Asked Questions	13
Appendix C: Documentation Checklists	18
Appendix D: Conversion Factors to GGE.....	20
Appendix E: Petroleum Reduction Calculation Methodology.....	20
Appendix F: Alternative Compliance Example Calculations.....	29
Appendix G: Alternative Compliance Case Studies.....	37
Appendix H: Helpful Links	43

Introduction

On March 20, 2007, the U.S. Department of Energy (DOE) issued its final rule (72 FR 12958) implementing an additional method—which Congress created in Section 703 of the Energy Policy Act of 2005—by which fleets covered under the Alternative Fuel Transportation Program (10 CFR Part 490) may achieve compliance with the program's requirements. The final rule and its associated regulations (Subpart I) enable covered state and alternative fuel provider fleets to obtain waivers from the alternative fuel vehicle (AFV)-acquisition requirements of Standard Compliance (subparts C and D). Under this additional compliance method, known as Alternative Compliance, covered fleets instead meet a petroleum-use reduction requirement.

To assist covered fleets interested in taking advantage of this more flexible compliance option and facilitate

the transition from Standard Compliance to Alternative Compliance, DOE has developed this guidance document and several interactive planning tools (available at eere.energy.gov/vehiclesandfuels/epact/alt_comp_resources.html#tools). Together, these resources are designed to help fleets better understand the Alternative Compliance option and successfully complete the waiver application process.

This guidance document is organized into the following sections:

- Alternative Compliance Overview
- Advantages of Alternative Compliance
- Participation Requirements

GLOSSARY

Alternative Compliance

This compliance option enables covered state and alternative fuel provider fleets to obtain a waiver from the AFV-acquisition requirements of Standard Compliance and instead implement petroleum-use reduction measures.

Standard Compliance

The AFV-acquisition requirements imposed on state (75% of covered LDVs) and alternative fuel provider (90% of covered LDVs) fleets under the Alternative Fuel Transportation Program (10 CFR Part 490, subparts C and D, respectively).

Alternative Fuel Vehicle

The Energy Policy Act (EPAct) of 1992 defines an AFV as any dedicated or dual-fueled vehicle (i.e., a vehicle designed to operate solely on alternative fuel or on at least one alternative fuel).

Alternative Fuels

Fuels that EPAct defines as alternative fuels are:

- Methanol, ethanol, and other alcohols

- Blends of 85% or more of alcohol with gasoline
- Natural gas and liquid fuels domestically produced from natural gas
- Liquefied petroleum gas (propane)
- Coal-derived liquid fuels
- Hydrogen
- Electricity
- Fuels (other than alcohol) derived from biological materials (including pure biodiesel (B100))¹
- P-Series.²

¹ In its March 1996 final rule establishing the program regulations, DOE concluded that neat/pure biodiesel (B100) is derived from biological materials and therefore is an “alternative fuel.” In January 2001, the Biodiesel Final Rule (eere.energy.gov/afdc/pdfs/FedRegBioFinal.pdf) made it possible for fleets to earn EPAct credits for using biodiesel blends of at least 20%. This rule does not make B20 (a 20% blend of biodiesel with diesel) an alternative fuel but gives one credit for every 450 gallons of pure biodiesel used in biodiesel blends of B20 or higher.

² In a May 1999 final rule, DOE classified three P-Series fuels as “alternative fuel.”



Photo by Pat Corkery, NREL 18165

GLOSSARY

Fleet

State entities or alternative fuel providers covered under the Alternative Fuel Transportation Program (10 CFR Part 490).

Alternative Compliance Vehicle

A vehicle (or required AFV) that must be included in calculations of a fleet's petroleum-use reduction requirement under the Alternative Compliance option. ACVs are:

- **AFVs acquired in previous model years** in compliance with Standard Compliance requirements (minus retirements and excluded vehicles)
- **LDVs (conventional or AFV) planned to be acquired in the upcoming waiver model year** in lieu of the AFV requirements that otherwise would be met under Standard Compliance
- **LDVs (conventional or AFV) acquired in previous waiver model years** in lieu of the AFV requirements that otherwise would be met under Standard Compliance (minus retirements).

Alternative Compliance Vehicle Inventory

The ACVs in a fleet for the upcoming waiver model year. ACVs retired from the fleet before the start of the model year are not included in the ACV inventory.

- Intent To Apply for a Waiver
- Waiver Application Process
- Elements of a Waiver Application
- Department of Energy Waiver Approval Process
- Implementation of a Petroleum Reduction Plan
- Annual Report
- Alternative Compliance Timeline
- Use of Purchased or Previously Earned Alternative Fuel Vehicle-Acquisition Credits
- Rollover of Excess Petroleum-Use Reductions
- Exemptions
- Enforcement Authority
- Records Retention
- Appeals.

Alternative Compliance Overview

Subpart I of 10 CFR Part 490 offers covered state and alternative fuel provider fleets (hereafter "fleets") the ability to plan and implement petroleum-use reduction measures in lieu of complying with the AFV-acquisition requirements associated with Standard Compliance.

To participate in the Alternative Compliance option during a particular model year, a fleet first must register its preliminary intent to participate by submitting to DOE an Intent To Apply for a Waiver and then apply for and obtain a waiver from Standard Compliance. To qualify for a waiver, a fleet must demonstrate to DOE that it will achieve during the model year a petroleum-use reduction equal to the amount of alternative fuel that would have been used if the following AFVs were operated on alternative fuel all the time:

- Previously required AFVs in the fleet's inventory at the start of the model year
- AFVs that the fleet would have been required to acquire in the absence of a waiver, including any in a previous year for which a waiver was granted.

The petroleum reduction plan in which the above demonstration is set forth includes:

- The fleet's alternative compliance vehicle (ACV) inventory (see the definition in the glossary box)
- Either the average annual amount of fuel, expressed in gasoline gallon equivalent (GGE), consumed in the fleet's covered light-duty vehicles (LDVs) or a reasonable estimate of this value.

At a minimum, the fleet's application must proffer data on:

- Fleet AFVs acquired to comply with Standard Compliance requirements
- All LDVs (including light-duty AFVs) acquired in prior years in lieu of waived AFVs if the fleet participated in Alternative Compliance in prior model years
- The average fuel use of the fleet's covered LDVs.

All the data submitted in a waiver application must be verifiable. DOE reviews the waiver application and determines whether it appropriately estimates and presents a reasonable and verifiable approach for achieving the petroleum-use reduction.

Participating fleets must submit an annual report to certify the actual petroleum-use reduction achieved. Fleets must keep records for a minimum of three years.

If a fleet opts into Alternative Compliance, it must comply with this option for a full model year and for its entire fleet. DOE approval to participate in the Alternative Compliance option is required annually.

Advantages of Alternative Compliance

Alternative Compliance offers fleets more flexibility than Standard Compliance. Some fleets may find alternative fuels and/or AFVs unavailable, and for these fleets, pursuing petroleum-use reductions through Alternative Compliance may make more sense. Other fleets may find complying with their EPAct (Energy Policy Act) obligations through other Alternative Compliance approaches, including pursuing higher levels of fuel blends (including biodiesel), purchasing hybrids and other advanced technology vehicles, increasing fleet fuel efficiency, and reducing vehicle miles traveled (VMT), simpler than adhering to Standard Compliance approaches.

In addition, fleets operating under Alternative Compliance may rely on fuel-use reductions from vehicles not covered under Standard Compliance. For example, participating fleets may count petroleum-use reductions achieved by vehicles with more than 8,500 lbs gross vehicle weight rating and excluded LDVs.



Photo by Keith Wipke, NREL 15708

For other fleets that use a great deal of alternative fuel (e.g., biodiesel), experience has shown that Alternative Compliance makes sense.

Participation Requirements

A fleet that wishes to participate in Alternative Compliance must submit to DOE in writing its preliminary intent to apply for a waiver. The intent is a simple notification that can be drafted and submitted electronically. The intent form is due by March 31 preceding the model year for which the waiver is sought. Fleets may submit their intent electronically on the EPAct Web site at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/waiver_app.cgi. A fleet that submits an intent to apply for a waiver is not obligated to follow through with a waiver application; rather, the fleet may stay with the Standard Compliance method merely by not submitting a waiver application.

As with Standard Compliance, two or more fleets (i.e., several state agencies, or a corporate parent and one or more of its subsidiaries) may participate in Alternative Compliance as a single group. Without a governmental or corporate relationship between the respective fleets, however, only a single fleet may submit an Alternative Compliance waiver application. Where such a relationship between two or more fleets is clear and they participate in Alternative Compliance as one, the fleets will be consolidated into a single fleet for all annual reporting purposes. Even if the respective entities revert to Standard Compliance in a future model year, they will be required to submit a single Standard Compliance annual report that aggregates their vehicle acquisitions.

After filing an intent to apply for a waiver, a fleet then prepares a waiver application, which DOE must receive by

July 31. A waiver application covers a single model year, with a model year running from Sept. 1 to Aug. 31.

The waiver application must include a petroleum-use reduction amount (as calculated by the fleet, preferably using available and easy-to-use online tools) and a clear plan for achieving that reduction. A fleet may include in its plan any combination of petroleum-use reduction approaches, including:

- Alternative fuel use in AFVs (see the Alternative Fuel Vehicle glossary listing on Page 1 for a list of alternative fuels)
- Hybrid vehicles or other energy-efficient vehicles
- Fuel blends (biodiesel-diesel)
- Fuel economy measures in on-road light-, medium-, and heavy-duty vehicles
- Idle reduction.

Although available tools make the calculation easy, see appendices E and F for details on calculating by hand the petroleum-use reductions that may be achieved using these methods.

DOE will review the waiver application. If DOE has questions, it may contact the fleet for additional data or clarification. Within 45 days of receipt of a complete application, DOE will inform the fleet whether the waiver has been granted or if additional information is required before it can render a decision.

While under a waiver for a particular model year, a fleet implements its petroleum-use reduction plan and tracks/ measures its petroleum consumption. By Dec. 31 following the end of the subject model year, the fleet must submit an annual report to DOE. The report must include actual fleet petroleum-use data.

Intent To Apply for a Waiver

Fleets must register their preliminary intent to apply for an Alternative Compliance waiver by March 31 preceding the model year for which the waiver is sought. An intent notification should include:

- The name and address of the fleet
- The fleet ID number
- The name and contact information of the fleet's point of contact



Steps to Alternative Compliance

Submit an intent to apply for a waiver to DOE by March 31 preceding the model year for which the waiver is being requested. A fleet that submits an intent to apply for a waiver may decide to stay with Standard Compliance and simply not submit a waiver application.

Submit a detailed waiver application to DOE so that DOE receives it by July 31 preceding the model year for which the waiver is sought. The request must include:

- A required petroleum-use reduction amount based on the fleet's current ACV inventory and average-per-LDV fuel use
- A detailed plan for achieving that reduction requirement.

Implement the petroleum reduction plan over the course of the model year.

Submit an annual report to DOE by Dec. 31 following the model year for which the waiver was granted. This report must document the fleet's actual petroleum-use data for all vehicles included in the plan for that model year and may request the rollover of any petroleum-use reduction in excess of the fleet's requirement.

- The name and title of the responsible official (if different from the point of contact)
- The model year for which the waiver will be requested
- The names and addresses of all included fleets (if the fleet seeking to participate is a group).

Information about submitting an intent to apply for a waiver online is available on the EPAct Web site at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/waiver_app0.cgi.

A fleet that submits an intent to apply for a waiver is not bound to follow through with an application. A fleet that decides to stay with Standard Compliance after filing an intent to apply for a waiver may do so simply by not submitting a waiver application by the July 31 application deadline.



Photo by Paper Transport, Inc., NREL 22257

Waiver Application Process

Assuming it wishes to proceed with an application, a fleet that files an intent to submit an Alternative Compliance waiver application must then develop its waiver application for DOE review and approval. The waiver application must apply to the entire fleet for the full model year and include:

- A petroleum-use reduction requirement calculation for the waiver model year
- A petroleum-use reduction plan for meeting the entire calculated requirement. A plan that will not meet the requirement will be denied.

► These items can be prepared through an interactive planning tool available at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/. This tool helps users determine their annual petroleum-use reduction requirement and allows fleets to generate petroleum-use reduction plans based on a variety of fuel displacement methods. The tool offers side-by-side comparisons of petroleum-use reduction methods to help fleets decide which combination will be most effective.

Information about how to develop a waiver application is provided in Appendix E or via DOE at 202-586-9171 or via e-mail at regulatory.info@nrel.gov.

Step 1: Calculate the Petroleum-Use Reduction Requirement

A fleet applying for a waiver must estimate the petroleum reduction it would have to achieve in the model year for which the waiver is sought. This amount is based on the fleet's inventory of ACVs during the waiver model year. As described in the Alternative Compliance Vehicle glossary listing on Page 2, the ACV inventory is composed of:

- **AFVs acquired in previous model years** to comply with the AFV-acquisition requirements of Standard Compliance. AFVs **not** included in this category are:
 - Those AFVs acquired but not used to comply with the Standard Compliance requirements (e.g., AFVs for which acquisition credit was not sought by the fleet)
 - AFVs acquired in excess of the number of AFVs necessary to comply for that year (resulting in banked credits)
 - AFVs retired before the start of the waiver model year
- **LDVs (conventional or AFV) planned to be acquired in the upcoming waiver model year** instead of the AFVs that otherwise would have to be acquired to meet the Standard Compliance requirements. The number of vehicles is determined the same way it is for Standard Compliance requirements (75% or 90% of planned LDV acquisitions for state or alternative fuel provider fleets, respectively)
- **LDVs (conventional or AFV)** acquired during previous model years in which the fleet participated in Alternative Compliance, minus retirements. (For fleets that did not participate in Alternative Compliance previously, this does not apply.)

Fleets can access, submit, and amend information about the vehicles in their ACV inventory at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi.

These vehicles comprise the fleet's ACV inventory for the Alternative Compliance model year. The ACV inventory (i.e., the total of these vehicles) is multiplied by the average amount of fuel the vehicles are estimated to use during the

waiver model year, and this value is the fleet's **estimated petroleum-use reduction requirement**. (See Figure 1.)

For determinations of the average fuel use per vehicle—a key factor in determining the petroleum-use reduction requirement—DOE will accept fuel-use data collected from covered (i.e., non-excluded) LDVs or estimates based on reasonable methodologies, such as extrapolations of fuel use from actual mileage data and published fuel economy values. Alternatively, a fleet may use general fleet or industry statistics, along with a sampling of its fleet if it is large enough to determine average fuel use per vehicle. DOE will consider waiver applications based on a statistical methodology but may require the applicant to improve its data collection efforts to encompass the entire covered portion of its fleet in future years (i.e., in subsequent waiver applications). All fleets should verify their actual petroleum-use reductions versus the estimates in their waiver application calculations using actual data collection measurements (e.g., purchase orders, receipts, and fuel use records).

Tracking Alternative Compliance Vehicles, Light-Duty Vehicle Acquisitions, and Retired Vehicles

Over time, a fleet's ACV inventory changes. ACV inventories include LDVs planned to be acquired in the waiver model year, AFVs acquired pre-waiver, and covered LDVs acquired during prior years, including those retired during the relevant waiver year. Retired vehicles, however, are not counted in years after they are retired. In addition, the type of vehicles in the inventory may change. The vehicles actually acquired as part of the petroleum reduction plan and in lieu of meeting the Alternative Compliance waiver year AFV requirements could be petroleum-fueled LDVs or AFVs.

Although a waiver application covers only one year, Figure 1 provides an example of a fleet's estimated petroleum-use reduction requirements over several years of participation in the Alternative Compliance option and shows how new covered vehicle acquisitions and retired vehicles affect the ACV inventory on an annual basis.

To ensure DOE can track actual acquisitions and retirements accurately, fleets must submit data that accurately depict the actual required AFVs existing in the



Photo by Dennis Schroeder, NREL 22794

fleet plus the fleet's annual requirements on a cumulative basis. Fleets are to submit identifying information for all ACVs in their inventory during Alternative Compliance years electronically on the EPAct Web site at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi. Required data are similar to those required for AFVs reported under the Standard Compliance annual reporting requirement on Form DOE/FCVT/101 (eere.energy.gov/vehiclesandfuels/epact/docs/fleet_report_07_2009.xls). Fleets enter information that includes vehicle make and model and vehicle identification number.

Tracking is particularly important in the context of vehicle retirements. When calculating its petroleum-use reduction requirement for an Alternative Compliance waiver application, a fleet needs to consider the point during the model year at which it will retire vehicles. For calculation purposes, vehicles in the fleet at the beginning of the model year (Sept. 1) will be considered part of the fleet for the entire model year, even if they are retired over the course of the year.

Vehicles for which planned vehicle retirements do not take place should be included in the ACV inventory and reflected on the annual report the fleet submits following the model year. Although changes in the number of planned and actual vehicle retirements or acquisitions (both of which affect fleet size) could alter the calculated petroleum-use reduction amount, the petroleum-use reduction requirement established at the time of the waiver application's approval is fixed and may not be changed for that waiver model year. Changes to the ACV inventory and corresponding discrepancies must be discussed in the fleet's annual report submitted to DOE.

Likewise, LDVs acquired at any time during the model year are included as acquisitions for the entire year and must be

» Figure 1**Example of an Estimated Petroleum Reduction Requirement for an Alternative Fuel Provider Fleet****Year 1** (The first year the fleet applies for a waiver)

- 25 pre-waiver required AFVs in the fleet previously reported to DOE in an annual report (DOE/FCVT/101) and still in the fleet
- 9 requirements (90% of 10 planned LDV acquisitions)*
- ACV inventory: 34 ($25 + 9 = 34$)
- Average annual fuel use per LDV: 500 GGE
- Petroleum reduction requirement amount: 17,000 GGE (500 GGE x 34 vehicles)

Year 2

- 15 pre-waiver required AFVs remaining in the fleet (10 were retired and no longer included)
- 9 requirements (90% of 10 planned LDV acquisitions in Year 2)*
- 9 requirements in the first year
- ACV inventory: 33 ($15 + 9 + 9 = 33$)
- Average annual fuel use per LDV: 500 GGE
- Petroleum reduction requirement amount: 16,500 GGE (500 GGE x 33 AFVs)

Year 3

- 5 pre-waiver required AFVs in the fleet (10 more were retired from the previous year)
- 9 requirements (90% of 10 planned LDV acquisitions in Year 3)*
- 18 requirements from previous 2 Alternative Compliance years (9 from first year plus 9 from second year)
- ACV inventory: 32 ($5 + 9 + 9 + 9 = 32$)
- Average annual fuel use per LDV: 500 GGE
- Petroleum reduction requirement amount: 16,000 GGE (500 GGE x 32 AFVs)

Year 4

- 0 pre-waiver required AFVs in the fleet (remaining 5 were retired)
- 9 requirements (90% of 10 planned LDV acquisitions in Year 4)*
- 27 requirements from previous 3 Alternative Compliance years (9 each from years 1, 2, and 3)
- ACV inventory: 36 ($9 + 9 + 9 + 9 = 36$)
- Average annual alternative fuel use per AFV: 500 GGE
- Petroleum reduction requirement amount: 18,000 GGE (500 GGE x 36 AFVs)

Year 5

- 0 pre-waiver required AFVs
- 9 requirements (90% of 10 planned LDV acquisitions in Year 5)*
- 27 requirements from previous 3 Alternative Compliance years (9 each from years 2, 3 and 4)
- 9 LDV retirements from Year 1
- ACV inventory: 36 ($9 + 9 + 9 + 9 = 36$)
- Average annual alternative fuel use per AFV: 500 GGE
- Petroleum reduction requirement amount: 18,000 GGE (500 GGE x 36 AFVs)

* Identifying data on LDVs representing requirements acquired during a waiver year should be reported in the online ACV inventory.

Fleets can access and submit information about the vehicles included in their ACV inventory at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi.

included in the ACV inventory, even if they will not affect the fixed petroleum-use reduction requirement.

Step 2: Develop a Plan for Achieving the Annual Petroleum-Use Reduction Requirement

After a fleet calculates its annual petroleum-use reduction requirement, it may use the DOE tool at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/ to develop a plan for achieving that requirement. Using this simple tool, or other methods, the fleet examines its composition and determines where petroleum savings may be achieved most easily.

Fleets can reduce petroleum use through a number of strategies. Examples include:

- Alternative fuel or fuel-efficient technologies in any size on-road vehicle, including light-, medium-, and heavy-duty vehicles
- Biodiesel blends in diesel vehicles (only the biodiesel portion of the blend counts toward compliance)
- Hybrid or other fuel-efficient vehicles instead of low-miles-per-gallon vehicles
- Fleet management practices that result in reduced VMT
- Use of other vehicles.

Reductions in petroleum use must be:

- Attributable to motor vehicles or qualified non-road vehicles (i.e., neighborhood electric vehicles [NEVs] or alternative fuel non-road equipment) owned, operated, leased, or otherwise controlled by the fleet
- Based on verifiable data submitted through the annual waiver application and sufficient for DOE to determine whether the petroleum-use reductions are achievable
- Demonstrable through annual reporting submissions.

Petroleum-use reductions must **not** include reductions attributable to:

- Reduction of petroleum use by third parties
- Non-qualified, non-road vehicles.



Photo from Charles Bensinger and Renewable Energy Partners of New Mexico, NREL 13531

Non-Road Vehicles

Under Alternative Compliance, a fleet may count petroleum-use reductions attributable to the use of NEVs or alternative fuel non-road equipment owned, operated, leased, or otherwise controlled by the fleet.

Elements of a Waiver Application

A waiver application must include verifiable data sufficient to enable DOE to evaluate whether a fleet's strategy is likely to achieve the required petroleum-use reduction.

A waiver application must include:

- **Information about the proposing fleet** (including name, address, point of contact information, and name and title of the responsible official)
- **The model year** for which the waiver is requested

- ***The petroleum-use reduction requirement,*** based on:
 - Total ACV inventory and the details of how this value was developed
 - Average-per-LDV fuel use (in GGE) in the covered fleet LDVs

NOTE: DOE recommends that applicant fleets plan to exceed their petroleum-use reduction requirement by at least 15% to account for possible problems in implementing the plan or any changes being made mid-model year related to, for example, AFV acquisitions or fuel availability.

- ***A petroleum reduction plan*** that establishes the intended strategies and the petroleum-use reduction amount anticipated from each approach (i.e., how each intended strategy contributes to reaching this amount). This includes a printout of the results from the Alternative Compliance Planning Tool. A plan that will not meet the petroleum reduction requirement will be denied
- ***Certification by a senior official*** that the applicant fleet is in compliance with all applicable U.S. Environmental Protection Agency (EPA) vehicle emission standards promulgated under the Clean Air Act.

Much of this information can be generated and organized for submission using DOE tools available to all fleets participating in Alternative Compliance. Particularly helpful is the Petroleum REduction Planning (PREP) Tool available to *all* fleets at afdc.energy.gov/afdc/prep.

DOE may request additional documentation from the waiver applicant.

Appendix C provides a checklist of information that should be included in a waiver application. All applications must be submitted on letterhead, signed, and mailed along with two copies to DOE (see the Contact Information box) and received by DOE by July 31. To ensure DOE receives the application in a timely manner, a copy also should be e-mailed to the Alternative Fuel Transportation Program's regulatory manager at regulatory.info@nrel.gov.

Department of Energy Waiver Approval Process

Once DOE receives a complete waiver application, it has 45 business days to issue a written decision. If DOE determines that the information provided is not sufficient to process



Photo by Dean Armstrong, NREL 14073

the waiver application, it will notify the fleet and indicate the additional information that must be submitted. The 45-day review period starts from the time DOE has all the information it needs to conduct its review. Therefore, if DOE requests additional information, the review period starts on the date DOE receives the additional information. An applicant should provide information and data as early as possible to allow adequate time for fleet planning in the event DOE denies the fleet's waiver application.

Implementation of a Petroleum Reduction Plan

During the waiver model year, the fleet implements the various elements of the DOE-approved petroleum-use reduction plan. The fleet should carefully track and keep records of the acquisition of alternative fuel and advanced technology vehicles, alternative fuel use, fuel economy measures, and other data to ensure accurate reporting on the success and impact of each component of the plan.



Contact Information

Regulatory Manager
U.S. Department of Energy
EE-2G/Forrestal Building
1000 Independence Avenue, S.W.
Washington, DC 20585
202-586-8063
regulatory.info@nrel.gov

Annual Report

A fleet participating in the Alternative Compliance option must submit to DOE an annual report that certifies the actual petroleum-use reduction it achieved during the Alternative Compliance year and explains how the data were collected. DOE is authorized to request additional documentation to verify the claimed petroleum-use reduction. Examples of documents that verify petroleum-use reductions include:

- Pumping or other records that show the quantity of alternative fuel/biodiesel blends actually used
- Retail fuel purchase receipts or logs together with pumping or other records
- Bulk fuel-use purchase/delivery records (for fleets with their own refueling sites) together with pumping or other records
- Fuel-use logs maintained by vehicle operators.

The annual report must be sent to DOE on company letterhead, signed by a senior official, and submitted by Dec. 31 following the waiver model year. DOE guidance on annual reporting can be found at eere.energy.gov/vehiclesandfuels/epact/pdfs/alternative_compliance_annual_reporting.pdf.

» Figure 2

Alternative Compliance Timeline

Prior to Start of Model Year

Prior to Start of Model Year						Model Year	After End of the Model Year			
Feb	Mar	Apr	May	Jun	Jul		Sep	Oct	Nov	Dec
March 31						July 31	September 1	December 31		
<i>Deadline</i> for registering intent to apply for a waiver with DOE						<i>Deadline</i> for DOE's receipt of a waiver application	through	<i>Deadline</i> for submitting annual report and documentation on actual petroleum reduced during the Alternative Compliance year		

Alternative Compliance Timeline

Fleets that are considering opting into the Alternative Compliance option must submit information as follows:

- Prior to the start of the model year (which runs Sept. 1 through Aug. 31):
 - March 31: Deadline for submitting an intent to apply for a waiver (eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/waiver_app0.cgi) to DOE
 - July 31: Deadline for DOE's receipt of a waiver application
- After the end of the model year:
 - Dec. 31: Deadline for submitting an annual report that certifies the petroleum-use reduction achieved. Fleets may electronically supply information at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi for tracking acquisitions and retirements of LDVs acquired during years when waivers were in force.

Use of Purchased or Previously Earned Alternative Fuel Vehicle-Acquisition Credits

DOE recognizes that in a given Alternative Compliance model year, a participating fleet, despite the good-faith implementation of its petroleum-use reduction plan, may not achieve its required petroleum-use reduction, as reflected in its waiver application. DOE therefore allows fleets to request the application of banked AFV-acquisition credits earned through Standard Compliance in prior model years and also may allow a fleet to purchase AFV-acquisition credits to make up for its shortfall.

If a fleet wants to rely on credits to account for a shortfall in its actual petroleum-use reduction, it must submit a written request to DOE as part of its annual report. The request

must detail the circumstances that led to the shortfall. If DOE grants the request, it will inform the fleet of the credit needed to offset the shortfall, with the credit amount based on the fleet's historical fuel use data. For example, if a fleet typically uses 500 GGE per year in each of its LDVs and came up 5,000 GGE short in its petroleum-use reduction requirement, DOE would indicate that 10 AFV-acquisition credits are needed to cover the fleet's shortfall. DOE may ask for additional fuel-use information before making a determination on the request.

Rollover of Excess Petroleum-Use Reductions

To provide additional flexibility to fleets that exceed their petroleum-use reduction requirement under Alternative Compliance, DOE allows excess petroleum-use reductions to be used in future model years in which a shortfall occurs. For example, if a fleet reduces its petroleum use by 65,000 GGE but was required under the terms of its waiver to reduce by 60,000 GGE, the excess 5,000 GGE may be rolled over to help satisfy petroleum-use reduction requirements in future Alternative Compliance waiver model years in which there is a shortfall. However, accumulated rollover amounts may not be traded to other fleets or converted to AFV-acquisition credits if a fleet returns to Standard Compliance.

To roll over excess petroleum-use reduction amounts for use in a future model year, a fleet must request in writing, as part of its annual report for the model year in which the excess petroleum-use reduction was achieved, that the excess be rolled over. If the fleet is unable to meet its petroleum-use reduction requirement in any subsequent model year, it may request in its annual report for that year that DOE approve the application of some of its accumulated rollover. Generally, DOE allows the application of rollover only in circumstances beyond a fleet's control (e.g., technology failures, excessive vehicle delivery delays, weather-related disasters, emergencies, and other serious

or highly unusual circumstances as determined by DOE) and will not approve application of rollover amounts more than 25% of a fleet's annual petroleum-use reduction requirement. In extreme cases, DOE may consider allowing the application of a higher percentage, but it will only do so if a fleet establishes that it had no other option to achieve the required petroleum-use reduction requirement during that model year.

Waiver application plans should not rely on previous years' excess petroleum-use reduction achievements.

Exemptions

The exemption provisions incorporated under the Alternative Fuel Transportation Program (10 CFR Part 490) are specific to the AFV-acquisition requirements of the Standard Compliance option. Exemptions are based on a lack of available alternative fuels and/or AFVs and are not related to Alternative Compliance. A fleet that requests and receives an Alternative Compliance waiver may not request an exemption from its petroleum-use reduction requirement, as no exemptions to that requirement exist. In addition, if DOE revokes a fleet's waiver, that fleet is precluded from requesting an exemption under subparts C or D from the AFV-acquisition mandate for the model year of the revoked waiver.

Enforcement Authority

Fleets participating in Alternative Compliance must comply with the DOE-approved petroleum-use reduction requirements. If a fleet fails to achieve its required petroleum-use reduction, DOE will revoke its waiver and return the fleet to Standard Compliance—meaning the fleet will have to file a Standard Compliance annual report and make up for any shortfall in AFV acquisitions during the applicable model year through the purchase or use of credits. If necessary, DOE may impose penalties, as described in 10 CFR Section 490.604.



Photo by Pat Corkery, NREL 18094

Records Retention

Fleets must retain, for a period of 3 years, all documentation needed to demonstrate compliance under the Alternative Compliance option. Records include alternative fuel/biodiesel blend pumping records and purchase receipts/invoices and vehicle inventory records (e.g., vehicle acquisition receipts/invoices and vehicle retirement dates). This record-retention requirement is consistent with the documentation requirements for Standard Compliance annual reporting (10 CFR Sections 490.205 and 490.309).

Appeals

If DOE denies a fleet's Alternative Compliance waiver application, the fleet may appeal the decision by filing an appeal directly with the Office of Hearings and Appeals using the procedure set forth in 10 CFR Section 490.806(c). Appeals must be filed within 30 days of notification of DOE's denial of the waiver application.

Appendix A: Acronyms

ACV	Alternative Compliance vehicle
AFV	alternative fuel vehicle
APU	auxiliary power unit
BR	blend required
CF	conventional fuel
CFB	conventional fuel in blend
DOE	Department of Energy
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
FE	fuel economy
GCF	GGE conversion factor
GGE	gasoline gallon equivalent
HEV	hybrid electric vehicle
LDV	light-duty vehicle
NEV	neighborhood electric vehicle
PREP	Petroleum REduction Planning Tool
VMT	vehicle miles traveled

iStock 23242572

Appendix B: Frequently Asked Questions

Questions and answers are grouped into these six areas:

- General Interest
- Intent To Apply for a Waiver
- Waiver Applications and Petroleum Reduction Plans
- Annual Report
- Over-Compliance and Under-Compliance
- Records and Appeals.

General Interest

Q. What is Alternative Compliance?

A. Alternative Compliance (Subpart I) is one of two compliance methods for covered state and alternative fuel provider fleets under DOE's Alternative Fuel Transportation Program (10 CFR Part 490). This method enables fleets to obtain a waiver from the Standard Compliance AFV-acquisition requirements of subparts C and D. Fleets opting into Alternative Compliance implement petroleum-use reduction measures in lieu of AFV acquisitions.

Q. What is the basis for the Alternative Compliance option?

A. Under Alternative Compliance, a covered state or alternative fuel provider fleet must demonstrate an annual petroleum-use reduction equal to the petroleum-use reduction it would have achieved in both the AFVs it would have acquired under Standard Compliance and the AFVs for which a waiver is requested, with both of these sets of vehicles operated on alternative fuel 100% of the time.

Q. What types of fleets should choose the Alternative Compliance option?

A. Although Alternative Compliance can provide financial incentives and greenhouse gas emission-reduction benefits to all participating fleets, it is a good option for fleets in areas where alternative fuels or AFVs are not readily available. It is also a good option for fleets that can maximize the amount of biodiesel they use. This option also allows fleets the flexibility to pursue other innovative approaches to reduce petroleum use in lieu of acquiring AFVs. These approaches include purchasing

hybrids, increasing fleet fuel efficiency, increasing the use of blends, reducing VMT, and deploying certain qualified non-road vehicles. Using alternative fuels in AFVs is also an option.

Q. How do fleets participate in the Alternative Compliance option?

A. To participate in Alternative Compliance, a fleet must take three steps. First, the fleet must submit to DOE, via a simple online process by March 31 before the model year for which the waiver is sought, a notice of its intent to apply for a waiver. Next, the fleet must submit a waiver application to DOE. The waiver application must be received by DOE by July 31. If the fleet is granted a waiver, it must submit an annual report to DOE by Dec. 31 after the model year for which the waiver was granted.

Q. May a fleet file an intent to participate in the Alternative Compliance option and then indicate its decision not to participate by not filing a waiver application by July 31?

A. Yes.

Q. May a fleet return to the Standard Compliance option after participating in the Alternative Compliance option?

A. Yes. However, any excess petroleum-use reductions the fleet achieved while under Alternative Compliance may not be converted to credits for use under Standard Compliance.

Q. May fleets participate in Alternative Compliance as a grouped fleet?

A. Multiple fleets (e.g., several state agencies) may participate as a group under the Alternative Compliance option. Once a grouping is established, however, it may not be modified while the entire group is participating in Alternative Compliance.

Q. What is an Alternative Compliance vehicle?

A. An ACV is a vehicle that is included in the Alternative Compliance vehicle inventory, which is the basis for calculation of a fleet's petroleum-use reduction requirement under the Alternative Compliance option. ACVs are:

- AFVs acquired in previous model years in compliance with Standard Compliance requirements (minus retirements and excluded vehicles)
- LDVs (conventional or AFV) planned to be acquired in the upcoming waiver model year under Alternative Compliance in lieu of those that would have been acquired under the Standard Compliance AFV-acquisition requirements
- LDVs (conventional or AFV) acquired in previous waiver model years in lieu of those that would have been acquired under Standard Compliance to meet the AFV-acquisition requirements.

Fleets may access and submit information about the vehicles included in their ACV inventory at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi.

Q. What is the Alternative Compliance vehicle inventory?

A. A fleet's ACV inventory consists of the ACVs in the fleet for the upcoming waiver model year. ACVs retired from the fleet before the start of the model year are not included in the ACV inventory. Vehicles in the fleet at the start of the model year (i.e., Sept. 1) will be considered part of the fleet for the entire model year, even if they are retired during the course of the model year.

Q. How do fleets participating in Alternative Compliance track their ACV inventories?

A. To track their ACV inventories, fleets may access and submit information about the vehicles at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi. Fleets participating in Alternative Compliance should provide online identifying information about LDVs (alternative and petroleum-fueled) acquired during Alternative Compliance model years. Details should include make, model, and vehicle identification number. With this information, fleets (and DOE) will be able to track vehicles better when they are retired.

Q. What if a fleet plans to retire a vehicle before the start of the model year but does not?

A. Any vehicle that is part of a fleet for any part of a model year is included in the ACV inventory. Planned vehicle retirements that do not take place should be included in the ACV inventory and reflected on the fleet's annual report submitted to DOE following the model year.

Although changes of the number of planned and actual vehicle retirements or acquisitions (both of which affect fleet size) could alter the calculated petroleum-use reduction amount, the petroleum-use reduction requirement established at the time of waiver plan approval is fixed and may not be changed in the waiver model year. Changes to the ACV inventory and corresponding discrepancies must be discussed in the fleet's annual report submitted to DOE.

Likewise, LDVs acquired at any time during the model year are included as acquisitions for the entire year and must be included in the ACV inventory, even if they will not affect the fixed petroleum-use reduction requirement.

Q. How are AFVs that were acquired in excess of the Standard Compliance AFV-acquisition requirements in prior years handled in the ACV inventory?

A. Any AFVs that a fleet acquired in excess of its AFV-acquisition requirements are excluded from the ACV inventory. This includes AFVs acquired before 1997, AFVs acquired but not intended for compliance, and those acquired above the number necessary to meet the fleet's requirement for that year, resulting in banked credits under Standard Compliance.

Intent To Apply for a Waiver

Q. How is DOE notified of a fleet's intent to apply for a waiver?

A. A fleet must submit a notice of intent to apply for a waiver from Standard Compliance online (at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/waiver_app0.cgi) by March 31 preceding the model year for which the waiver is sought.

Q. What must a notice of intent to apply for a waiver include?

A. A notice of intent to apply for a waiver must include:

- The name and address of the fleet
- The fleet ID number
- The name and contact information (i.e., phone number, e-mail, and street address) of the fleet's point of contact
- The name and title of the responsible official (if different from the point of contact)

- The model year for which the waiver will be requested
- The names and addresses of all included fleets (if the fleet seeking to participate is a group).

Waiver Applications and Petroleum Reduction Plans

Q. What must a waiver application and petroleum reduction plan include?

A. Waiver applications must include:

- The fleet's ACV inventory
- The petroleum-use reduction requirement (and how it was calculated, preferably using the Alternative Compliance Planning Tool)
- The strategies the fleet anticipates implementing and the petroleum-use reduction amount anticipated from each strategy
- Information about how each intended strategy contributes toward reaching the petroleum-use reduction requirement
- Certification by a senior official that the proposing fleet is in compliance with all applicable vehicle emissions standards under the Clean Air Act.

The petroleum reduction plan allows a fleet to meet its petroleum-use reduction requirement using on-road light-, medium-, or heavy-duty vehicles as well as NEVs and alternative fuel non-road equipment. A fleet may include any number of petroleum-use reduction approaches—including alternative fuels in AFVs, biodiesel blends in diesel vehicles, hybrid or other energy-efficient vehicles, and modified fleet management practices—in any combination. The waiver application must be applicable to the entire fleet for the full model year. A plan that will not meet the reduction requirement will be denied.

Q. How do fleets calculate their petroleum reduction requirement?

A. The petroleum-use reduction requirement is based on the ACV inventory and the annual average fuel use per covered LDV. The ACV inventory multiplied by the fleet's annual average fuel use determines the petroleum-use reduction requirement. The simplest way to determine a petroleum reduction requirement is to use the Alternative Compliance Planning Tool at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/.

Q. How do I determine average fuel use per covered LDV in my fleet?

A. If the fleet has data to calculate the average fuel use in the fleet's covered LDVs over the past several (such as three) model years, this is the best approach. Using a three-year or similar multi-year average tends to provide a more accurate, longer-term average and smoothes out individual year fluctuations, easing future planning activities. Therefore, fleets should use data from the past year only when previous years' data do not exist.

To calculate a three-year average, the fleet adds the total GGEs of fuel used in its covered LDV fleet over the past three years and divides that number by the number of covered LDVs in operation during those model years. Fleets should avoid simply determining the average fuel used in each covered LDV for each of several previous years and then adding these together and dividing by the number of years. This will not provide a true average because it does not accurately reflect possible changes in the number of covered LDVs each year.

In the absence of fleet-specific data, average covered LDV fuel use data may be acceptable. DOE will accept data collected from covered LDVs or allow applicants to submit estimates based on reasonable methodologies such as extrapolating fuel use from actual mileage data and published fuel economy values. Another example is use of general fleet or industry statistics along with a sampling of part of a fleet, if it is large. In these cases, DOE will examine the information sources and will require the covered fleet to explain its decision to submit a certain statistical sample.

Q. Will the average fuel use per covered LDV in my fleet change?

A. Once the average-fuel-use-per-covered-LDV value is developed in the first year of participation in Alternative Compliance, it remains constant throughout all subsequent Alternative Compliance waiver request years, unless the fleet submits a rationale to change the value and DOE approves of the change. Changes to this value cannot be made due to petroleum-use reduction measures (e.g., fuel economy improvements, including HEVs or VMT reductions) in previous Alternative Compliance years to avoid double-counting petroleum savings. For example, if a fleet purchases and uses HEVs to meet its requirements, the average fuel use per covered LDV will decrease. This new average fuel use per covered LDV cannot be used to calculate the following year's requirement, as this fuel use already includes a compliance method (i.e., HEVs). The savings from the HEVs, however, will

continue to be counted toward compliance each year that the vehicles are in service.

Q. Can a fleet include petroleum-use reductions from non-fleet vehicles using fleet equipment? For example, if a non-fleet vehicle uses the fleet's truck stop electrification bay, can that petroleum-use reduction be included?

A. No. Reductions in petroleum use from third-party vehicles cannot be counted toward the petroleum-use reduction requirement, even if outside of the ACV inventory. Only petroleum-use reductions from vehicles under the control of the fleet may be counted.

Q. What methods can be used to reduce petroleum consumption under Alternative Compliance?

A. Numerous approaches can be used to reduce petroleum. These include but are not limited to:

- Alternative fuel or fuel-efficient technologies in any size on-road vehicle, including light-, medium-, and heavy-duty vehicles
- Biodiesel blends in diesel vehicles (only the biodiesel portion of the blend counts toward compliance)
- Hybrid or other fuel-efficient vehicles (instead of low-miles-per-gallon vehicles)
- Fleet management practices that result in reduced VMT.

Any strategy must comply with all applicable vehicle emission standards established by the EPA under the Clean Air Act.

Significantly, a fleet may not rely in its waiver application on excess petroleum-use reductions achieved in prior years.

Q. Are there any restrictions on petroleum-use reductions from low-level blends under Alternative Compliance?

A. Biodiesel amounts used in blends of any percentage may be counted toward compliance.

Q. May a fleet under Alternative Compliance include petroleum-use reductions achieved in non-road vehicles?

A. A fleet may include petroleum reductions achieved through the use of NEVs owned, operated, leased, or otherwise controlled by the fleet, as well as through

alternative fuels used in alternative fuel non-road equipment that is owned, operated, leased, or otherwise controlled by the fleet.

Q. Where can I find guidance on how to estimate the different petroleum reduction options?

A. DOE developed the Alternative Compliance Planning Tool for this purpose. It is available at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/.

Q. Do waiver requests require any company or fleet official certification?

A. Yes. All waiver applications must be certified by a senior official to ensure the proposing fleet is in compliance with all applicable vehicle emission standards the EPA administrator establishes under the Clean Air Act.

Q. Where should fleets submit a waiver application?

A. All waiver applications must be submitted on letterhead, signed, and mailed with two copies to: Mr. Dana O'Hara, Regulatory Manager, U.S. Department of Energy, EE-2G/Forrestal Building, 1000 Independence Ave., S.W., Washington, DC 20585. To ensure DOE receives your request in a timely manner, it also should be e-mailed, if possible, to the Alternative Fuel Transportation Program's regulatory manager at regulatory.info@nrel.gov.

Q. On what basis is a waiver application granted?

A. DOE will review the waiver application to determine if it appropriately estimates the petroleum reduction requirement and presents a reasonable and verifiable approach to reducing petroleum use. If DOE has questions, it may contact the applicant for additional data or clarification. DOE will inform the applicant whether the waiver was granted, denied, or requires additional information.

Q. How long does it take DOE to issue a waiver?

A. Once DOE receives complete information and data, it has 45 business days to issue a written decision. Requesting fleets should provide information and data as early as possible to allow adequate time for fleet planning in the event DOE denies a waiver application. If DOE determines the information provided is not sufficient to process the request, it will notify the fleet and indicate the type of information that should be submitted. The

45-day review period starts from the time DOE has all the information it needs to complete the review. Therefore, if DOE requests additional information, the 45-day review period will start when DOE receives the additional information.

Q. May a fleet submit one waiver application for multiple years, or must it submit a waiver application for each year it wants a waiver?

A. A fleet must submit a new waiver application each model year because conditions frequently change in businesses and agencies, and the annual updating of information ensures more accurate requirements and better compliance.

Annual Report

Q. When is the Alternative Compliance annual report due to DOE?

A. Dec. 31 following the waiver model year.

Q. What is required in the Annual Compliance report?

A. The annual report must include:

- A statement certifying the actual amount of petroleum motor fuel consumption the fleet reduced in the Alternative Compliance year through Alternative Compliance strategies
- Statements regarding how the data supporting compliance were collected
- Supporting data and information
- A request, if desired, for approval to roll over any excess petroleum-use reduction to future Alternative Compliance model years
- An explanation of why the petroleum-use reduction requirement was not met, if this is the case
- A request to apply previously earned AFV-acquisition credits and/or rollover amounts in the event the petroleum-use reduction requirement specific to that Alternative Compliance model year was not met.

Q. What if a fleet misses the Dec. 31 deadline?

A. A fleet that fails to submit its annual report by the

Dec. 31 deadline will be in violation of the requirements of the Alternative Fuel Transportation Program (10 CFR Part 490).

Over-Compliance and Under-Compliance

Q. If a fleet earned AFV-acquisition credits under Standard Compliance before joining Alternative Compliance, may it access these credits in the event it falls short in reaching its petroleum-use reduction requirement during a model year?

A. Fleets opting into Alternative Compliance may retain their balance of AFV-acquisition credits and continue to sell credits to other fleets. They also may apply these credits to petroleum-reduction shortfalls in limited instances (see Page 10 for more information). Under Alternative Compliance, a fleet that does not achieve its petroleum-use reduction requirement may have the opportunity to purchase credits or use credits earned previously under the Standard Compliance AFV-acquisition requirements. The fleet first must obtain DOE approval to use credits to make up for a petroleum-use reduction shortfall, and to do so, it must provide DOE with details about the circumstances that led to the shortfall and documentation that shows a good-faith effort was made to meet the petroleum reduction requirement. The fleet must document the amount of the shortfall, the average fuel use per LDV in the fleet, and the number of credits requested to be transferred from the fleet's Standard Compliance credit account to meet the shortfall.

Conversion of credits earned under the AFV-acquisition requirement to GGE under the Alternative Compliance option is determined based on the amount of fuel one of the fleet's LDV uses on average each year. This is the same amount that is used to calculate the petroleum-use reduction requirement in the fleet's waiver request. DOE will allow the fleet until March 31 following the waiver model year to acquire the number of credits required for compliance.

In each instance, the request must be made in the annual report, with complete explanations and documentation. The final determination of what credits may be applied is within DOE's discretion.

Q. If, in prior years under Alternative Compliance, a fleet achieved petroleum-use reductions in excess of its DOE-approved requirement, may it access these rollover amounts in the event it falls short in reaching its petroleum-use reduction requirement during a model year?

A. A fleet may request from DOE that it be allowed to apply excess petroleum-use reduction amounts earned in prior Alternative Compliance years to its current shortfall.

With DOE's approval, a fleet may roll over, or bank, excess petroleum reductions for application to future years when an Alternative Compliance waiver is in effect. Excess petroleum reduction amounts can be banked as insurance against under-compliance in subsequent years. A fleet must request in its annual report that excess petroleum-use reductions achieved in the prior model year be banked and must request in a subsequent annual report that some of the excess amount be applicable to a shortfall in that prior model year.

Up to 25% of excess petroleum-use reductions achieved in prior Alternative Compliance years may be applied to a shortfall, pending DOE approval. DOE may consider allowing the application of a higher percentage but only under extreme circumstances. When submitting this request, a fleet must include the amount of petroleum in excess in a previous waiver year, or waiver years, and the amount it wishes to apply, with limitations, as part of the plan to meet the petroleum reduction amount in the waiver year.

In each instance, the request must be made in the annual report, with complete explanations and documentation. The final determination of what rollover amounts may be applied is within DOE's discretion.

Q. If a fleet decides to return to the Standard Compliance option, may it convert excess petroleum-use reductions to AFV-acquisition credits?

A. No. The excess petroleum-use reductions achieved may be used only under the Alternative Compliance option.

Q. May a fleet trade its excess petroleum-use reductions to another fleet?

A. No. The rollover provisions are solely to provide additional flexibility to the fleet that achieved the excess petroleum reduction.

Records and Appeals

Q. How long must fleets retain records for Alternative Compliance?

A. DOE requires fleets to retain for a period of three years all necessary documentation to support certified petroleum-use reductions. This requirement is consistent with the documentation requirements for Standard Compliance annual reporting.

Q. May a fleet appeal DOE's denial of a waiver application?

A. Yes. Fleets may appeal the decision to the Office of Hearings and Appeals using the procedure set forth in 10 CFR Section 490.806(c). Appeals must be filed within 30 days of notification that DOE rejected the waiver request.

Appendix C: Documentation Checklists

The following checklists detail the information that fleets should provide as part of the Alternative Compliance option. All information, including information about fuel economy and efficiency, submitted to DOE must be verifiable and derived from credible sources.

Intent To Apply for a Waiver

The intent to apply for a waiver should include:

- The name and address of the fleet
- The fleet ID number
- The name and contact information of the fleet's point of contact
- The name and title of the responsible official (if different from the point of contact)
- The model year for which the waiver will be requested
- The names and addresses of all included fleets (if the fleet seeking to participate is a group).

Waiver Request

The waiver request should include the information listed above as well as the additional data listed below—much of which can be generated using the tools DOE has developed for fleets to use to participate in the Alternative Compliance option.

The waiver request should also include:

- A detailed plan of the measures the fleet intends to take to reduce petroleum, including:
 - A general description of the strategy or strategies to be implemented*
 - The number of vehicles affected by the strategy*
 - The expected petroleum reduction of each strategy*
- The fleet's ACV inventory*
- The calculated total annual petroleum requirement*
- Certification by a senior official.

**Satisfied using the Alternative Compliance Planning Tool*

Annual Report

The annual report should include:

- The fleet's petroleum-use reduction requirement for the Alternative Compliance model year (submitted earlier)
- The total number of petroleum gallons and/or alternative fuel (in GGE) the fleet used in its covered LDVs during the Alternative Compliance model year
- The petroleum-use reduction that each of the elements in the fleet's plan achieved
- A request for approval from DOE to bank excess reductions for use in future years, if the fleet achieved petroleum-use reductions in excess of its requirements and it desires this option
- A request for approval from DOE to apply banked credits to meet the petroleum-use reduction requirement, if there is a petroleum-use reduction shortfall and the fleet desires this option.

Appendix D: Conversion Factors to GGE

Fuel Type	Fuel Measurement Unit	Conversion Factor	GGE Calculation
B100	Gallons	1.066	$GGE = B100 \text{ gal} \times 1.066$
CNG @ 2400 psi	Gallons @ 2400 psi	0.191	$GGE = \text{CNG gal} @ 2400 \text{ psi} \times 0.191$
CNG @ 3600 psi	Gallons @ 3600 psi	0.287	$GGE = \text{CNG gal} @ 3600 \text{ psi} \times 0.287$
CNG @ 3000 psi	Gallons @ 3000 psi	0.239	$GGE = \text{CNG gal} @ 3000 \text{ psi} \times 0.239$
CNG	Hundred cubic feet	0.877	$GGE = \text{CNG ccf} \times 0.877$
Diesel	Gallons	1.155	$GGE = \text{Diesel gal} \times 1.155$
E85	Gallons	0.734	$GGE = E85 \text{ gal} \times 0.734$
Electricity	kWh	0.031	$GGE = \text{Electricity kWh} \times 0.031$
Gasoline	Gallons	No conversion needed	$GGE = \text{Gasoline gal}$
Hydrogen (kg)	kg	1.019	$GGE = H_2 \text{ kg} \times 1.019$
Hydrogen (gallons)	Gallons	0.256	$GGE = H_2 \text{ gal} \times 0.256$
LNG	Gallons @ 14.7 psi and -234°F	0.666	$GGE = \text{LNG gal} \times 0.666$
LPG	Gallons	0.758	$GGE = \text{LPG gal} \times 0.758$

Appendix E: Petroleum Reduction Calculation Methodology

This section outlines how fleets can calculate potential petroleum reductions for on-road vehicles. Methods not included in this document (e.g., using off-road vehicles) will be addressed on a case-by-case basis.

The variables in the calculation methodologies are denoted in *italics*. Each variable is described, including possible sources, and the variable name is shown in parentheses. Acceptable sources of information for the variables are also provided. In all cases, the preferred source is provided first.

Calculating the Petroleum Reduction Requirement

The first step in the Alternative Compliance process is to determine the petroleum reduction requirement. This requirement is based on the fleet's expected ACV inventory. The following section outlines the calculation methodology for determining the petroleum reduction goal.

► **An interactive** Alternative Compliance tool that assists fleets in making the calculations outlined in this appendix is available online at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/. This tool helps users determine their annual petroleum reduction requirement and generate plans based on a variety of fuel-

displacement methods.

The following outlines the petroleum reduction requirement calculation methodology.

- Determine the cumulative ACV inventory
 - ACVs currently in the fleet (Fleet_ACVs)
 - AFVs required in the Alternative Compliance waiver year (Req_AFVs)
- Subtract ACVs that will be retired before the start of the Alternative Compliance waiver year (Ret_LDVs)

$$ACVs = \text{Fleet_ACVs} + \text{Req_AFVs} - \text{Ret_ACVs}$$

- Calculate petroleum that would be reduced (Petrol_Red)
 - Number of cumulative AFV requirements multiplied by the average fuel use per LDV in the fleet in GGE (Avg_Fuel)

$$\text{Petrol_Red} = (ACVs) * (\text{Avg_Fuel})$$

Potential Petroleum Reduction Methods

The potential petroleum reduction strategies are grouped into eight technology categories: AFVs, HEVs, blends, fuel economy, VMT reduction, truck stop electrification, onboard idle reduction, and idling time reduction. Within each category, there are several methods for reducing petroleum.

- Alternative fuels
 - Fuels: B100, compressed natural gas, E85, electricity, hydrogen, liquefied natural gas, liquefied petroleum gas
 - Vehicles: Light-duty, medium-duty, heavy-duty
- HEVs
 - Light-duty
 - Medium-duty
 - Heavy-duty
- Blends
 - Biodiesel/diesel: B2, B5, B10, B20, B40, B50
- Fuel economy
 - Smaller vehicles
 - Improved maintenance
 - More efficient vehicles
- VMT reduction
 - Ride sharing
 - Telecommuting
- Truck stop electrification
- Onboard equipment
 - Auxiliary power unit (APU)
 - Direct-fired heating
 - Direct heating and cooling
- Idling time reduction

The amount of petroleum reduced for each method is calculated based on projected fleet use patterns and specific assumptions for each technology. Default values were developed to help fleets estimate their consumption patterns. It is strongly recommended, however, that fleets use data specific to their fleets as these default values are based on general data and may differ significantly from a fleet's performance. Assumptions specific to a single technology are outlined within the pertinent section. Default values that are used in more than one technology are summarized in Table 1.

The methodology for calculating the petroleum reduced for each technology is outlined below. In addition, for AFVs and blends, the amount of alternative fuel or blend required is calculated.

Alternative Fuels

Several alternative fuels may be used to displace petroleum. The most common alternative fuels for AFVs are E85, compressed natural gas, liquefied natural gas, liquefied petroleum gas, and electricity. In addition, several alternative fuels, such as B100, can be used in conventional vehicles. The following section outlines the methodology for calculating petroleum reduction using alternative fuels. *Please note: one gallon of E85 is assumed equal to one gallon of alternative fuel.*

Alternative Fuels Calculation Methodology

- Determine the fuel GGE conversion factor (GCF) (lower heating value fuel/lower heating value gasoline) for the vehicles being replaced. If the vehicles are gasoline-powered, the GCF is 1; if they are diesel, the GCF is 1.155.
- Determine the number of vehicles that will use the alternative fuel (Num_vehicles).
- Estimate the average annual fuel use of each vehicle.
 - Obtain the average fuel economy (FE) of each vehicle make and model using conventional fuel (e.g., gasoline or diesel) from current fleet records or fueleconomy.gov. Default values based on the vehicle type are available in Table 1 (Avg_FE). Because default values are based on nationwide statistics, however, they can vary considerably from actual fleet data. Therefore, fleet-specific data should be used when available.
 - Estimate the number of miles that each vehicle will travel from the annual average VMT for the light-duty fleet. If these data are not available, default values are provided in Table 1 (Avg_VMT).
- Estimate the amount of time the vehicles will use the alternative fuel (Frac).
- Determine the GGE conversion factor from Table 1 for the alternative fuel (GCF_AF).

Table 1. Basic Conversion Factors and Default Values

Parameter	Value	Source	
Fuel GGE Conversion Factors			
B100	1.066 GGE/gal B100	Federal Automotive Statistical Tool (FAST)	
CNG @ 2400 psi	0.191 GGE/gal CNG		
CNG @ 3600 psi	0.287 GGE/gal CNG		
CNG @ 3000 psi	0.239 GGE/gal CNG		
Diesel	1.155 GGE/gal diesel		
E85	0.734 GGE/gal E85		
Electricity	0.031 GGE/kWh		
Gasoline	1 GGE/gal gasoline		
Hydrogen (kg)	1.019 GGE/kg H ₂		
LNG @ 14.7 psi and -234 °F	0.666 GGE/gal LNG		
LPG	0.758 GGE/gal LPG		
Blend Factors (GCF_BL)			
B2	1.153 GGE/gal B2	Derived from biodiesel, diesel, and gasoline lower heating values (LHVs) in the Alternative Fuels Data Center and FAST	
B5	1.151 GGE/gal B5		
B10	1.146 GGE/gal B10		
B20	1.137 GGE/gal B20		
B40	1.120 GGE/gal B40		
B50	1.111 GGE/gal B50		
Gross Vehicle Weight (GVW)			
Light-duty (LD)	<= 8,500 lbs	Davis et al. 2006	
Medium-duty (MD)	8,500-26,000 lbs		
Heavy-duty (HD)	> 26,000 lbs		
Fuel Economy (FE) (in mpg)			
Gasoline cars			
Subcompact	25.3	AEO 2006 (Table 59) new car values, adjusted by the car degradation factor (Table 51)	
Compact	27.0		
Midsize	24.6		
Large	23.4		
Diesel cars			
Compact	35.5	Same as above	
Midsize	32.6		
Gasoline light-duty trucks			
Small pickup or van	19.5	AEO 2006 (Table 59) new car values, adjusted by LDT degradation factor (Table 51)	
Large pickup or sport utility vehicle (SUV)	16.9		
Large van	21.6		
Small utility	20.7		

Table 1 continued on next page

Table 1 - cont. Basic Conversion Factors and Default Values

Parameter	Value	Source
<i>Fuel Economy (FE) (in mpg) (cont.)</i>		
Diesel light-duty trucks		
Large pickup or SUV	22.7	Same as above
Large van	25.5	
Small utility	27.6	
Gasoline medium-duty trucks		
MD truck < 14,000 lbs	7.6	Davis et al. 2008, Table 5.4; class 3 adjusted for spark ignition and LHV gasoline
Diesel medium-duty trucks		
MD truck < 14,000 lbs	10.5	Davis et al. 2008, Table 5.4
MD truck < 26,000 lbs	7.3	
Heavy-duty truck	5.8	
VMT		
Car	12,427	Davis et al. 2008, Table 4.1
LD truck	10,986	Davis et al. 2008, Table 4.2
MD truck < 14,000 lbs	14,094	Davis et al. 2008, Table 5.4
MD truck 14,000-26,0000 lbs	12,964	Davis et al. 2008, Table 5.4, wtd. avg. of class 4, 5, 6
HD truck	7,890	Davis et al. 2008, Fig. 7.2

Calculations

$$GGE_{Reduced} = (Num_vehicles) * (Avg_VMT) * (Frac) * (GCF) / (Avg_FE)$$

$$Total\ AF\ Required = (GGE_{Reduced}) / (GCF_AF)$$

Example: AFV Calculation

To use E85 in three mid-size vehicles 50% of the time:

$$Average\ VMT = 12,242\ miles$$

$$Average\ fuel\ economy = 28.04\ mpg$$

$$Num_vehicles = 3$$

$$Avg_VMT = 12,242\ miles$$

$$Avg_FE = 28.04\ mpg$$

$$Frac = 0.50$$

$$GCF = 1.0\ GGE/gallon\ gasoline$$

$$GGE_{Reduced} = 3 * (12,242 / 28.04) * 0.5 * 1 \\ = 655\ GGE$$

$$Total\ E85\ required = 655\ GGE / 0.734 \\ = 892\ gallons$$

Hybrid Electric Vehicles

HEVs combine a conventional gasoline-powered engine with a battery-powered electric motor. Because they have no appreciable range on the battery alone, they are not considered AFVs. The estimation of savings from these vehicles is based on the fuel economy of the current vehicles and that of the proposed HEVs, along with the VMT.

Any technologies, including plug-in hybrids, must comply with the Clean Air Act certification that is required with a fleet's application for a waiver. For specific details about the certification, see 10 CFR §490.805(c)(5).

Hybrid Electric Vehicle Calculation Methodology

Gather baseline information.

- Determine the fuel GGE conversion factor (GCF) (lower heating value fuel/lower heating value gasoline) for the vehicles being replaced. If the vehicles are gasoline-powered, the GCF is 1; if they are diesel, the GCF is 1.155.

- Determine the number of vehicles to be replaced with HEVs (Num_vehicles).
- Estimate the average annual fuel use of each vehicle.
 - Obtain the average fuel economy of each conventional vehicle make and model from current fleet records or from fueleconomy.gov. Default values based on the vehicle type are available in Table 1 (FE_{conv}). However, because default values are based on nationwide statistics, they can vary considerably from actual fleet data. Therefore, it is strongly recommended that fleet-specific data are used when possible.
 - Estimate the number of miles that each vehicle will drive from the annual average VMT for the light-duty fleet. Or the default value based on the type of vehicle from Table 1 (Avg_VMT) may be used.
- Estimate the average annual fuel use for each HEV.
 - Obtain the average fuel economy (FE) of each HEV from fleet records or from fueleconomy.gov (FE_{HEV}).

Calculation

$$GGE_{Reduced} = (Num_vehicles) * (Avg_VMT) * (GCF) * (1/FE_{conv} - 1/FE_{HEV})$$

Example: HEV Calculation

To replace five large sedans with Toyota Prius vehicles:

Avg VMT of the large sedans = 15,233 miles

Avg FE of large sedans = 23.6 mpg

FE of Toyota Prius = 55 mpg

$$GGE_{Saved} = 5 * 15,233 * (1/23.6 - 1/55) \\ = 1,843 \text{ GGE}$$

Blends

Numerous blends of alternative fuels are available. In general, these blends are made up of low levels of ethanol with gasoline or biodiesel with diesel. The most common blends of biodiesel are B2 (2% biodiesel), B5, B10, B20, B40, and B50. For virtually all cases of ethanol blends, the base fuel contains ethanol and thus cannot be counted for compliance.

Blends Calculation Methodology

- Determine the GGE conversion factor for the type of vehicles using the fuel; GCF = 1 for gasoline vehicles, and GCF = 1.155 for diesel vehicles (GCF).
- Determine the number of vehicles to use the blend (Num_vehicles).
- Estimate the average annual fuel use for each vehicle.
 - Obtain the average fuel economy of each vehicle make and model from current fleet records or from fueleconomy.gov. Default values based on the vehicle type are available in Table 1 (Avg_FE). However, because default values are based on nationwide statistics, they can vary considerably from actual fleet data. Therefore, it is strongly recommended fleet-specific data be used.
 - Estimate the number of miles each vehicle will travel from the annual average VMT for the light-duty fleet or use the default value based on the vehicle type from Table 1 (Avg_VMT).
- Determine the conventional fuel content of the blend (CF_content).
- Determine the GGE conversion factor for the blend (GCF_BL) from Table 1.
- Estimate the fraction of time the vehicles will use the blend (Frac).

Calculations

To calculate conventional fuel (CF) that would be required in GGE:

$$CF = (Num_vehicles) * (Avg_VMT) * (Frac) * (GCF) / (Avg_FE)$$

To convert the conventional fuel requirement to an equivalent amount of the blend (BR) in gallons:

$$BR = CF / GCF_BL$$

To calculate conventional fuel in blend (CFB) in GGE:

$$CFB = (BR) * (CF_content) * GCF$$

To calculate fuel saved:

$$GGE_{Saved} = CF - CFB$$

Example: Blend Calculation

To use B20 in five diesel-powered heavy-duty vehicles 90% of the year:

Average VMT for the vehicles is 25,655 miles

Average FE for the vehicles is 7.8 mpg

$$CF = 5 * 25,655 * 0.9 * 1.155 / 7.8 \\ = 17,095 \text{ GGE}$$

$$BR = 17,095 / 1.137 \\ = 15,035$$

$$CFB = 15,035 * 0.8 * 1.155 \\ = 13,892 \text{ GGE}$$

$$GGE_Saved = 17,095 - 13,892 \\ = 3,203 \text{ GGE}$$

Calculation

$$GGE_Reduced = (\text{Num_vehicles}) * \\ (VMT_{old} - VMT_{new}) * (1/FE) * (GCF)$$

Fuel Economy Improvement

Numerous methodologies are available to improve the fuel economy of a fleet. Methods in this category include the substitution of more efficient vehicles and increased maintenance (such as ensuring proper tire inflation).

Fuel Economy Calculation Methodology

- Determine if the vehicles targeted for FE improvement are diesel or gasoline and look up the GGE conversion factor in Table 1 (GCF).
- Identify the number of vehicles targeted for FE improvement by vehicle make and model (Num_vehicles).
- Determine the average current fuel economy of each vehicle make and model from current fleet records or from fueleconomy.gov. Default values based on the vehicle type are available in Table 1 (FE_{old}). However, because default values are based on nationwide statistics, they can vary considerably from actual fleet data. Therefore, it is strongly recommended that fleet-specific data be used.
- Determine the average current VMT for each vehicle make and model from fleet records or use default values from Table 1 based on the vehicle type (VMT).
- Project the improved FE for each vehicle type or class from fueleconomy.gov (FE_{new}).

Calculation

$$GGE_Reduced = \\ (\text{Num_vehicles}) * (VMT) * (1/FE_{old} - 1/FE_{new}) * (GCF)$$

Truck Stop Electrification

This idle reduction method allows drivers to plug their vehicles into truck stop stalls that power necessary systems without engine idling.

Table 2: Example VMT Reduction Input and Results

Vehicle Name	Number of Vehicles	Fuel Economy (mpg)	Old VMT	New VMT	Projected Petroleum Savings per Vehicle (GGE)
2005 Ford Taurus	12	22	12,547	8,500	2,207 GGE
2003 Chevy Tahoe	10	13	15,477	10,000	4,213 GGE

Table 3: Example FE Improvement Input and Results

Scenario	Number of Vehicles	Old Fuel Economy (mpg)	New Fuel Economy (mpg)	VMT	Projected Petroleum Savings per Vehicle (GGE)
Replace three maintenance vehicles with low-speed vehicles	3	22	65	8,500	767
Replace Chevrolet Tahoes with Honda Civics	5	13	35	10,000	2,418

Table 4: Default Values for Truck Stop Electrification

Parameter	Value	Source
Fuel used during idling (Idle_Fuel)	1 gal/hour/vehicle	Stodolsky, et al. 2000
Time each bay is used	2400 hour/year	Bubbosh, 2004

Table 5: Default Values for Other Idle Reduction

Parameter	Value	Source
Fuel Used during Idling (Idle_Fuel)		
HD truck	1 gal diesel/hour/vehicle	Stodolsky et al. 2000
Bus	.5 gal diesel/hour/vehicle	
LDV or MDV	No default available	
Idling Days per Year (Days)		
HD truck	365 days/year	Assumption: Number of school days/year
Bus	180 days/year	
LDV or MDV	No default available	

Truck Stop Electrification Calculation Methodology

- Determine if vehicles using a truck stop electrification facility are diesel or gasoline. (It is likely they are diesel.) Find the GGE conversion factor from Table 1 (GCF). Only the fleet's vehicles can be counted for compliance. Use of the facility by other vehicles cannot be counted.
- Identify the number of bays in the idle reduction facility (Num_bays).

- Estimate the average time in hours/year each bay will be used based on current fleet records or use the default value from Table 4 (Hours). Because default values are based on nationwide statistics, they can vary considerably from actual fleet data. Therefore, it is strongly recommended that fleet-specific data be used when possible.
- Estimate the average amount of fuel the fleet's trucks use while idling in gallons/hour from current fleet records, or use the default value for truck stop electrification from Table 4 (Idle_Fuel).

Table 6: Default Values for Onboard Idle Reduction

Parameter	Value	Source
Fuel Used Idling (Idle_Fuel)		
HD truck	1 gal diesel/hour/vehicle	Stodolsky et al. 2000
Bus	0.5 gal diesel/hour/vehicle	EPA idle cost calculator
LDV and MDV	No default available	
Average idling time per year per vehicle (Hours_Used)	1830 hour/year	Stodolsky et al. 2000
Equipment Savings (Equip_Save)		
APU	0.82	Gaines 2004
Direct-fired heater (heating for cab/sleeper and/or engine)	0.40	
Direct heat with thermal storage cooling (heating and A/C for cab/sleeper and heat for engine)	0.90	

Calculation

$$\begin{aligned} GGE_{Reduced} = \\ (Num_bays)*(Hours)*(Idle_Fuel)*(GCF) \end{aligned}$$

Example: Truck Stop Electrification Calculation

$$\begin{aligned} GGE_{Saved} = (10)*(2,132)*(1.155) \\ = 24,625 \text{ GGE} \end{aligned}$$

Idling Time Reduction

This idle reduction method refers to times that the truck engine is turned off instead of left idling.

Idling Time Reduction Calculation Methodology

- Determine if vehicles with reduced idling time are diesel or gasoline, and determine the GGE conversion factor from Table 1 (GCF).
- Determine the number of vehicles that will reduce idling (Num_vehicles).
- Estimate the average time in hours per day that the idling time for the vehicle will be reduced from fleet records (Time).
- Estimate the number of days per year that the vehicles operate from fleet records or use a default value from Table 5, if available, based on the type of vehicle (Days). Because default values are based on nationwide statistics, they can vary considerably from actual fleet data.

Therefore, it is strongly recommended that fleet-specific data be used when possible.

- Estimate the amount of fuel the truck uses while idling from fleet records, or use a default value from Table 5, if available, based on the type of vehicle (Idle_Fuel).

Calculation

$$\begin{aligned} GGE_{Reduced} = \\ (Num_vehicles)*(Time)*(Idle_Fuel)*(Days)*(GCF) \end{aligned}$$

Example: Idling Time Limit Calculation

Four buses reduce their idling by 35 minutes per day. The buses operate 250 days per year.

$$\begin{aligned} GGE_{Reduced} = \\ (4)*(35/60)*(1)*(250)*(1.155) = 674 \text{ GGE} \end{aligned}$$

Onboard Idle Reduction

This idle reduction method includes APUs and other onboard power sources that can heat, cool, or provide electricity to a truck cab without engine idling.

Calculation Methodology

- Determine if the vehicles using onboard idle reduction are diesel or gasoline. (It is likely they are diesel.) Find the GGE conversion factor in Table 1 (GCF).

- Determine the number of vehicles with onboard equipment (Num_vehicles).
- Determine the fraction of idling fuel use saved by the proposed equipment from vendor guarantees, or use the default value based on the type of equipment from Table 6 (Equip_Save). Because default values are based on nationwide statistics, they can vary considerably from actual fleet data. Therefore, it is strongly recommended that fleet-specific data be used when available.
- Estimate the average time in hours/vehicle the equipment will be used from fleet records or use the default value from Table 6 (Hours).
- Estimate the amount of fuel in gallons/hour the truck uses while idling from fleet records or use a default value, if available, based on the type of vehicle from Table 6 (Idle_Fuel).

Calculation

$$\begin{aligned}
 GGE_{Reduced} = \\
 (Num_vehicles) * (Hours) * (Idle_Fuel) * \\
 (Equip_Save) * (GCF)
 \end{aligned}$$

Example: Onboard Idle Reduction Savings Calculation

Install APUs in 11 diesel-powered vehicles, assuming the average idling time per year.

$$\begin{aligned}
 GGE_{Reduced} &= 11 * 1830 * 1 * 0.82 * 1.155 \\
 &= 19,065 \text{ GGE}
 \end{aligned}$$

Sources

Bubbosh, P., EPA. 2004. E-mail to P. Bergeron of NREL, December 20.

Davis, S., S. Diegel. 2006. Transportation Energy Data Book, 25th edition, ORNL-6974.

Gaines, L. 2004. Heavy Vehicle Idling: Implications and Solutions, 2004 Northeast Region Clean Cities Coordinator Meeting, November 3-5.

Stodolsky, F., L. Gaines, A. Vyas. 2000. Analysis of Technology Options to Reduce the Fuel Consumption of Idling Trucks, ANL/ESD-43.

DOE. 2006. Annual Energy Outlook 2006 with Projections to 2030.

fueleconomy.gov

Appendix F: Alternative Compliance Example Calculations

To participate in the Alternative Compliance option, fleets must develop a waiver request that is approved by DOE. The waiver request includes a petroleum reduction requirement for the waiver model year and a plan for achieving the required petroleum reduction amount. There are two steps to apply for a waiver:

Step 1: Calculate the petroleum reduction requirement.

Step 2: Develop a plan for achieving the annual petroleum reduction requirement calculated in Step 1.

This document offers sample calculations for each step as well as case studies on compliance strategies over multi-year periods.

Step 1: Calculate the Petroleum Reduction Requirement

Each participating fleet must estimate the amount of petroleum it is required to reduce. The steps involved in making this determination are listed below.

► ***In addition***, an interactive Alternative Compliance tool that assists fleets in making the calculations outlined here is available at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/. This automated tool helps users determine their annual petroleum reduction requirement and generate plans based on a variety of petroleum reduction methods.

1. Calculate the annual AFV acquisition requirement for the model year for which a waiver is sought. Do this the same way as is done to figure the LDV count and AFV acquisition requirement for reporting form DOE/FCVT/101 (eere.energy.gov/vehiclesandfuels/epact/docs/fleet_report_07_2009.xls)
2. Determine the number of AFVs currently in the fleet that were acquired and reported to DOE (on form DOE/FCVT 101) in previous model years for Standard Compliance requirements. AFVs not included in this category are AFVs acquired but not used to comply with Standard Compliance and AFVs acquired above the number necessary to meet the requirement for that year (resulting in banked credits).
3. Add numbers 1 and 2.
4. Because the requirement is cumulative, if a waiver was previously granted, determine the number of LDVs (conventional or AFV) still in the fleet that were acquired in previous waiver model years instead of the AFV requirements that otherwise would be met under Standard Compliance.
5. Add numbers 4 and 3. This is the ACV inventory at this time.
6. Determine if any of the ACVs will be retired before the subject model year.
7. Subtract 6 from 5. This is the ACV inventory for the waiver model year.
8. Calculate the amount of petroleum an average covered LDV in the fleet uses annually. Use data collected by the fleet or show a reasonable methodology to arrive at such a number.
9. Multiply 8 by 7. The result is the requirement.

Figure 3 shows this calculation for 3 years. Note: ACV inventories are kept for fleets and DOE at eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi. Fleets should keep their inventories updated.

» Figure 3**Example Calculation Over a 3-Year Period for a State Fleet****Year 1**

(The first year the fleet applies for a waiver)

- 55 pre-waiver required AFVs in the fleet previously reported to DOE in an annual report (DOE/FCVT/101)
- 18 requirements (75% of 24 planned LDV acquisitions)
- ACV inventory: 73 vehicles ($55 + 18 = 73$)
- Average annual fuel use per LDV: 500 GGE
- Target petroleum reduction amount: 36,500 GGE (500 GGE x 73 vehicles)

Year 2

- 50 pre-waiver required AFVs in the fleet previously reported to DOE in an annual report (DOE/FCVT/101), as 5 were retired
- 15 requirements (75% of 20 planned LDV acquisitions)
- 18 requirements from Year 1
- Total requirement: 83 vehicles ($50 + 15 + 18 = 83$)
- Average annual fuel use per LDV: 500 GGE
- Target petroleum reduction amount: 41,500 GGE (500 GGE x 83 vehicles)

Year 3

- 40 pre-waiver required AFVs in the fleet previously reported to DOE in an annual report (DOE/FCVT/101), as 10 more were retired
- 21 requirements (75% of 28 planned LDV acquisitions)
- 15 requirements from Year 2
- 18 requirements from Year 1
- Total requirement: 94 vehicles ($40 + 21 + 15 + 18 = 94$)
- Average annual fuel use per LDV: 500 GGE
- Target petroleum reduction amount: 47,000 GGE (500 GGE x 94 vehicles)

Step 2: Develop a Plan for Achieving the Annual Petroleum Reduction Requirement Calculated in Step 1

After the annual petroleum reduction requirement is calculated, a plan for meeting it must be developed. For this, the fleet needs to examine its situation and determine where petroleum savings may be achieved most easily. Entities can reduce petroleum through a number of methods. These methods, along with sample calculations, are detailed in this section.

Alternative Fuels

A fleet is replacing petroleum through the use of E85 in five of its large vans. It has the data on VMT and fuel economy for these vans. The fleet estimates that the vans will use E85 about 75% of the time.

Equations

Two equations are used for this method: GGE of petroleum reduced and the amount of alternative fuel required.

Petroleum Reduced:

$$GGE_{Reduced} = (Num_vehicles) * \frac{(Avg_VMT)}{(Avg_FE)} * (Frac) * (GCF)$$

Alternative Fuel Required:

$$Total_AF_Required = \frac{(GGE_{Reduced})}{(CF_AF)}$$

Where:

Num_vehicles: Number of vehicles = 5

Avg_VMT: Average VMT = 15,500 miles per year per vehicle

Avg_FE: Average fuel efficiency of a van using gasoline = 20.5 mpg

Frac: Fraction of the time these vans will be using E85 = 0.75

GCF: GGE conversion factor for gasoline = 1 GGE/gal gasoline

CF_AF: Conversion factor for alternative fuel = 0.734 GGE/gal E85

Calculations

Petroleum Reduced:

$$GGE_{Reduced} = (Num_vehicles) * \frac{(Avg_VMT)}{(Avg_FE)} * (Frac) * (GCF)$$

$$GGE_{Reduced} = (5 \text{ vehicles}) * \frac{(15,500 \text{ miles/vehicle})}{(20.5 \text{ miles/gal})} * (0.75) * (1 \text{ GGE/gal})$$

$$GGE_{Reduced} = 2,835 \text{ GGE}$$

Total Alternative Fuel Required:

$$Total_AF_Required = \frac{(GGE_{Reduced})}{(CF_AF)}$$

$$Total_AF_Required = \frac{(2,835 \text{ GGE})}{(0.734 \text{ GGE/gal E85})} = 3,862 \text{ gallons of E85}$$

HEVs

A fleet is displacing petroleum by adding six Ford Escape hybrids to its fleet instead of non-hybrid SUVs.

Equation

There is one equation used for this method.

Petroleum Reduced:

$$GGE_{Reduced} = (Num_vehicles) * (Avg_VMT) * GCF * \left(\frac{1}{FE_{conv}} - \frac{1}{FE_{HEV}} \right)$$

Where:

Num_vehicles: Number of vehicles = 6

Avg_VMT: Average VMT = 12,200 miles per year

GCF: GGE conversion factor for gasoline = 1 GGE/gal gasoline

FE_{HEV}: Fuel economy of a new Hybrid Ford Escape = 33 mpg (Source: [fueleconomy.gov](#))

FE_{conv}: Fuel economy of a conventional Ford Escape = 23.4 mpg (Source: [fueleconomy.gov](#))

Calculation

Petroleum Reduced:

$$\text{GGE}_\text{Reduced} = (\text{Num}_\text{vehicles}) * (\text{Avg}_\text{VMT}) * \text{GCF} * \left(\frac{1}{\text{FE}_\text{conv}} - \frac{1}{\text{FE}_\text{HEV}} \right)$$

$$\text{GGE}_\text{Reduced} = (6 \text{ vehicles}) * (12,200 \text{ mi/vehicle}) * (1 \text{ GGE/gal}) * \left(\frac{1}{23.4 \text{ miles/gal}} - \frac{1}{33 \text{ miles/gal}} \right)$$

$$\text{GGE}_\text{Reduced} = 910 \text{ GGE of gasoline}$$

Blending B2

A fleet is reducing petroleum by replacing all of its diesel fuel with B2; the entire amount of biodiesel can be considered a displacement.

Equations

Four equations are used for this method: the conventional fuel that would be required, the blend equivalent of the conventional fuel, the amount of conventional fuel in the blend, and the conventional fuel reduced.

Conventional Fuel (CF) Required:

$$\text{CF} = (\text{Num}_\text{vehicles}) * (\text{Avg}_\text{VMT}) * (\text{Frac}) * \left(\frac{\text{GCF}}{\text{Avg}_\text{FE}} \right)$$

Blend Required (BR) to Replace Conventional Fuel (in gallons):

$$\text{BR} = \left(\frac{\text{CF}}{\text{GCF}_\text{BL}} \right)$$

Amount of Conventional Fuel in Blend (CFB) in GGE:

$$\text{CFB} = (\text{BR}) * (\text{CF}_\text{content}) * \text{GCF}$$

Conventional Fuel Reduced (in GGE):

$$\text{GGE}_\text{Reduced} = \text{CF} - \text{CFB}$$

Where:

Num_vehicles: Number of vehicles to use B2 = 42

Avg_VMT: Average VMT = 13,687 miles per year

Frac: Fraction of the time these vans will be using B2 = 0.66

GCF: GGE conversion factor for the diesel that they were previously running on is 1.155 GGE/gal (GCF)

Avg_FE: Average fuel efficiency of a medium-duty truck = 7.3 mpg (Source: Table 1, Appendix E)

GCE_BL = GGE conversion factor of the B2 blend = 1.153 GGE

(Source: Table 1, Appendix E)

CF_cont = Conventional fuel content of the blend = 98% for B2

Calculations

Conventional Fuel (CF) Required:

$$CF = (Num_vehicles) * (Avg_VMT) * (Frac) * \left(\frac{GCF}{Avg_FE} \right)$$

$$CF = (42 \text{ vehicles}) * (13,687 \text{ miles/vehicle}) * (0.66) * \left(\frac{1.155 \text{ GGE/gal}}{7.3 \text{ miles/gal}} \right)$$

$$CF = 60,029 \text{ GGE of conventional fuel}$$

Blend Required (BR) to Replace Conventional Fuel (in gallons):

$$BR = \left(\frac{CF}{GCF_BL} \right)$$

$$BR = \left(\frac{60,029 \text{ GGE}}{1.153 \text{ GGE/gal}} \right)$$

$$BR = 52,063 \text{ gallons of blend}$$

Amount of Conventional Fuel in Blend (CFB) in GGE:

$$CFB = (BR) * (CF_content) * (GCF)$$

$$CFB = (52,063 \text{ gal.}) * (0.98) * (1.155 \text{ GGE/gal diesel})$$

$$CFB = 58,930 \text{ GGE}$$

Conventional Fuel Reduced (in GGE):

$$GGE_Reduced = CF - CFB$$

$$GGE_Reduced = (60,029 \text{ GGE}) - (58,930 \text{ GGE})$$

$$GGE_Reduced = 1,099 \text{ GGE}$$

Fuel Economy Improvement

A fleet plans to reduce petroleum use by substituting small pickup trucks for large ones.

Equation

There is one equation used for this method.

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (Avg_VMT) * GCF * \left(\frac{1}{FE_{old}} - \frac{1}{FE_{new}} \right)$$

Where:

Num_vehicles: Number of vehicles = 42 vehicles

Avg_VMT: Average VMT = 11,467 miles per year (Source: Appendix E, Table 1)

GCF: GGE conversion factor for gasoline = 1 GGE/gal gasoline

FEnew: Average fuel economy of a new small pickup truck = 25.37 mpg (Source: Appendix E, Table 1)

FEold: Average fuel economy of a large pickup truck (like those being replaced) = 19.41 mpg

Calculation

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (Avg_VMT) * GCF * \left(\frac{1}{FE_{old}} - \frac{1}{FE_{new}} \right)$$

$$GGE_{Reduced} = (42 \text{ vehicles}) * (11,467 \text{ mile/vehicle}) * (1 \text{ GGE/gal}) * \left(\frac{1}{19.41 \text{ mile/gal}} - \frac{1}{25.37 \text{ mile/gal}} \right)$$

$$(GGE_{Reduced}) = 5,829 \text{ GGE}$$

VMT Reduction

A fleet has established a ride-sharing program from its headquarters to a work site that reduces the number of miles driven. (Note that ride-sharing programs for employees to reduce petroleum use in commuting to work are not covered under this program and are not valid petroleum reduction strategies.) As part of the program, the fleet conducts a survey that estimates the total VMT before and after the program, the average fuel economy of the vehicles, and the total VMT once the program is in operation.

Equation

There is one equation used for this method.

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (VMT_{old} - VMT_{new}) * \left(\frac{1}{FE} \right) * GCF$$

Where:

Num_vehicles: Number of cars that are targeted for VMT reduction through the program = 120

VMTold: Average commuter miles for participating vehicles before the program = 7,600 miles

VMTnew: Average commuter miles for participating vehicles during the program = 4,800 miles

FE: Average fuel economy of a vehicle participating in the program = 25.8 mpg

GCF: All participants drive gasoline-powered vehicles with a conversion factor of 1 GGE/gal

Calculation

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (VMT_{old} - VMT_{new}) * \left(\frac{1}{FE} \right) * (GCF)$$

$$GGE_{Reduced} = (120 \text{ vehicle}) * (7,600 \text{ mile/year} - 4,800 \text{ mile/year}) * \left(\frac{1}{25.8 \text{ mi/gal}} \right) * (1 \text{ GGE/gal})$$

$$GGE_{Reduced} = 13,023 \text{ GGE}$$

Truck Stop Electrification

A fleet plans to install an electric truck stop to reduce diesel fuel use in its trucks. Based on fleet patterns, it decides to include 12 bays and estimates how many hours each bay will be used. The fleet already has data on how many gallons its average truck consumes while idling.

Equation

There is one equation used for this method.

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_bays) * (Hours) * (Idle_Fuel) * (GCF)$$

Where:

Num_bays: Number of bays where trucks can be plugged in = 12

Hours: Average number of hours a bay is used per year = 1,980

Idle_Fuel: Average amount of diesel fuel one of the trucks uses per hour of idling = 1.2 gal

GCF: Conversion factor for diesel fuel = 1.155 GGE/gal

Calculation

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_bays) * (Hours) * (Idle_Fuel) * (GCF)$$

$$GGE_{Reduced} = (12 \text{ bays}) * (1980 \text{ hours/bay}) * (1.2 \text{ gal/hour}) * (1.155 \text{ GGE/gal})$$

$$GGE_{Reduced} = 32,931 \text{ GGE}$$

Onboard Idle-Reduction Equipment

A fleet installs APUs onboard its trucks to reduce the diesel fuel used in trucks while idling.

Equation

There is one equation used for this method.

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (Hours) * (Idle_Fuel) * (Equip_Save) * (GCF)$$

Where:

Num_vehicles: Number of trucks that are equipped with APUs = 35

Hours: Average number of hours the equipment will be used = 1,900 hour/year

Idle_Fuel: Average amount of diesel fuel one of the trucks uses per hour of idling = 1 gal/hour

Equip_Save = Average fractional reduction in idling fuel use for the APUs = 0.82 (Source: Appendix E, Table 4)

GCF = Conversion factor for diesel fuel = 1.155 GGE/gallon

Calculation

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (Hours) * (Idle_Fuel) * (Equip_Save) * (GCF)$$

$$GGE_{Reduced} = (35 \text{ vehicles}) * (1900 \text{ hour/vehicle}) * (1 \text{ gal/hour}) * (0.82) * (1.155 \text{ GGE/gal})$$

$$GGE_{Reduced} = 62,982 \text{ GGE}$$

Idling Time Reduction

A fleet mandates idling time reductions to reduce the diesel fuel used in trucks while idling.

Equation

There is one equation used for this method.

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (Time) * (Idle_Fuel) * (Days) * (GCF)$$

Where:

Num_vehicles: Number of trucks required to reduce idling time = 75

Time: Number of hours that the requirement will reduce the average truck's idling time by = 8 hours per day

Idle_Fuel = Average amount of diesel fuel one truck uses per hour of idling = 0.9 gallons per hour

Days = Average truck idles 260 nights/year

GCF = Conversion factor for diesel fuel = 1.155 GGE/gal

Calculation

Petroleum Reduced (in GGE):

$$GGE_{Reduced} = (Num_vehicles) * (Time) * (Idle_Fuel) * (Days) * (GCF)$$

$$GGE_{Reduced} = (75 \text{ vehicles}) * (8 \text{ hour/day}) * (0.9 \text{ gal/hour}) * (260 \text{ days/year}) * (1.155 \text{ GGE/gal})$$

$$GGE_{Reduced} = 162,162 \text{ GGE/year}$$

Appendix G: Alternative Compliance Case Studies

This section features two case studies to illustrate the relationship between the Standard Compliance requirements and Alternative Compliance option and the special considerations fleets face if they over- or under-comply. In the first case, the fleet participates in the Alternative Compliance option for five years. Some years it over-complies and others it under-complies. In the second case, a fleet switches between the Standard and Alternative Compliance options.

Case Study 1: Alternative Compliance Option With Over- and Under-Compliance

Year 1: MY 2008

This fuel provider fleet anticipated starting MY 2008 with 18 pre-waiver required AFVs and acquiring 10 LDVs during the model year, resulting in 9 AFV requirements. Accordingly, the fleet's ACV inventory for MY 2008 is 27 (18 + 9). The fleet's fuel use records for MY 2006 showed that the vehicles in its LDV fleet use an average of 700 GGE of fuel per year. This becomes the fleet's baseline fuel use for MY 2008 and for future years the fleet chooses the Alternative Compliance option. Thus, its petroleum reduction requirement is 18,900 GGE ($27 \times 700 = 18,900$).

The fleet developed a plan to reduce its petroleum consumption by 19,000 GGE through a combination of E85 (10,000 GGE), HEVs (4,000 GGE), and B20 (5,000 GGE). Planned reductions using E85 and HEVs were achieved. However, because of the high demand for biodiesel, the fleet was able to acquire only enough to run B2 in its vehicles. Therefore the fleet used only 550 GGE of biodiesel for a total petroleum reduction of 14,550 GGE—a shortfall of 4,350 GGE.

Because this is the fleet's first year in the program, it has no rollover petroleum reductions banked, but it does have eight banked credits available from the Standard Compliance requirements. The number of credits required is calculated as follows:

$$\text{Credits required} = \frac{(\text{GGE reduction required} - \text{GGE reduction achieved} - \text{rollovers})}{\text{Annual average GGE use per LDV}}$$

$$\text{Credits required} = (18,900 - 14,550)/700$$

$$\text{Credits required} = 6.2$$

Table 1. Year 1: MY 2008 Summary

ACV inventory	27 vehicles
Average annual fuel use per LDV	700 GGE
Petroleum reduction requirement	18,900 GGE
Actual petroleum reduction achieved	14,550 GGE
Deficit/excess	-4,350 GGE
Compliance status	Under comply
Credits required/applied	6
Credits remaining in Standard Compliance	2

Table 2. Year 2: MY 2009 Summary

ACV inventory	33 vehicles
Average annual fuel use per LDV	700 GGE
Petroleum reduction requirement	23,100 GGE
Actual petroleum reduction achieved	24,400 GGE
Deficit/excess	+1,300 GGE
Compliance status	Over comply
Credits required/applied	0
Credits remaining in Standard Compliance	2
Rollovers banked	1,300 GGE

Credits required = 6 after rounding to the nearest whole number

Applying the six credits left its banked credit total at two. Table 1 summarizes Year 1.

Year 2: MY 2009

The fleet anticipated starting the year with 24 ACVs because 3 were retired during Year 1. For MY 2009, 10 LDV acquisitions are planned, leading to an AFV acquisition requirement of 9 for the year. The resulting total ACV inventory for Year 2 is 33 ACVs ($24 + 9 = 33$). Using the MY 2006 value of 700 GGE used per vehicle in its LDV fleet, its petroleum reduction requirement is 23,100 GGE ($33 \times 700 = 23,100$).

Table 3. Year 3: MY 2010 Summary

ACV inventory	32 vehicles
Average annual fuel use per LDV	700 GGE
Petroleum reduction requirement	22,400 GGE
Actual petroleum reduction achieved	24,400 GGE
Deficit/excess	+2,000 GGE
Compliance status	Over comply
Credits required/applied	0
Credits remaining in Standard Compliance	2
Rollovers banked in 2010	2,000 GGE
Rollover balance	3,300 GGE

Table 4. Year 4: MY 2011 Summary

ACV inventory	36 vehicles
Average annual fuel use per LDV	700 GGE
Petroleum reduction requirement	25,200 GGE
Actual petroleum reduction achieved	25,200 GGE
Deficit/excess	0
Compliance status	Comply
Credits required/applied	0
Credits remaining in Standard Compliance	2
Rollovers banked in 2010	0
Rollover balance	3,300 GGE

The fleet developed a plan to reduce its petroleum consumption by 23,100 GGE through a combination of E85 (10,000 GGE), HEVs (4,000 GGE), and B5 (9,100 GGE).

The fleet's total actual petroleum reduction turned out to be 24,400 GGE, resulting in an over-compliance of 1,300 GGE.

The fleet was able to bank 1,300 GGE as rollover. It also has two remaining banked credits from the Standard Compliance requirements.

Year 3: MY 2010

For MY 2010, the fleet anticipates its ACV inventory to start at 23 because 10 will be retired before the start of MY 2010. The fleet further plans to add 10 LDVs, leading to an AFV acquisition requirement of 9 (90% of 10 planned LDV acquisitions for Year 3). Therefore, the total ACV inventory for Year 3 is 32 ACVs ($23 + 9 = 32$). Using the baseline value of 700 GGE of fuel per vehicle per year, its petroleum reduction requirement is 22,400 GGE ($32 \times 700 = 22,400$).

The fleet developed a plan to reduce its petroleum consumption by 22,400 GGE through a combination of E85 (12,000 GGE), HEVs (6,000 GGE), and B5 (4,400 GGE). The plan was based on using B5 rather than B20, which remained unavailable. The fleet's total actual petroleum reduction of 24,400 GGE was an over-compliance of 2,000 GGE.

Table 5. Year 5: MY 2012 Summary

ACV inventory	36 vehicles
Average annual fuel use per LDV	700 GGE
Petroleum reduction requirement	25,200 GGE
Actual petroleum reduction achieved	21,400 GGE
Deficit/excess	-3,800 GGE
Compliance status	Under comply
Credits required/applied	1
Credits remaining in Standard Compliance	1
Rollover balance	3,300 GGE
Rollovers applied	3,300 GGE
Remaining under-compliance	500 GGE

The fleet was able to bank 2,000 GGE as rollover, which brought the balance of banked rollovers to 3,300 GGE. It also has three remaining banked credits from the Standard Compliance requirements.

Table 6. Case 1: Compliance Summary

	MY 2008	MY 2009	MY 2010	MY 2011	MY 2012
Actual ACV inventory	27	33	32	36	36
Average annual fuel use per LDV	700	700	700	700	700
Petroleum reduction requirement	18,900	23,100	22,400	25,200	25,200
Actual reduction achieved	14,550	24,400	24,400	25,200	21,400
Over/(under)-compliance	(4,350)	1,300	2,000	0	-3,800 ²
Credits required	6 ¹	0	0	0	1
Banked credits available	8	2	2	2	2
Credits applied	6	0	0	0	1
Rollovers banked	0	1,300	2,000	0	0
Rollovers available	0	1,300	3,300	3,300	3,300
Rollovers applied	0	0	0	0	3,300

¹Standard compliance credits must be used to meet petroleum reduction shortfalls in Year 1 because there is no rollover balance available.

²Rollover credits are applied before Standard Compliance credits.

Year 4: MY 2011

For Year 4, the fleet will start with 27 ACVs because 5 will be retired before the start of the year. The fleet will again add 10 LDVs during Year 4, increasing the ACV inventory by 9 to 36 (90% of 10 planned LDV acquisitions for Year 4). Using the baseline fuel use of 700 GGE per vehicle per year, its petroleum reduction requirement is 25,200 GGE ($36 \times 700 = 25,200$).

The fleet developed a plan to reduce its petroleum consumption by 25,200 GGE through a combination of E85 (15,000 GGE), HEVs (6,000 GGE), and B20 (4,200 GGE), which is now available in its area. The fleet's total actual petroleum reduction for Year 4 was 25,200—exactly on target.

The fleet continued to maintain a rollover balance of 3,300 GGE and two remaining banked credits from the Standard Compliance program.

Year 5: MY 2012

The total ACV inventory for Year 5 is projected to be 36 ACVs—36 ACVs from Year 4 minus 9 retirements prior to the start of MY 2012 plus 9 AFV requirements during MY 2012. Using the baseline fuel use of 700 GGE per vehicle per year, its petroleum reduction requirement is 19,800 GGE ($36 \times 700 = 25,200$).

The fleet developed a plan to reduce its petroleum consumption by 25,200 GGE through a combination of E85 (15,000 GGE), HEVs (6,000 GGE), and B20 (4,200 GGE), which is still available in its area. Lack of availability of B20 resulted in the fleet's total actual petroleum reduction for Year 5 of 21,400. This was an under-compliance of 3,800 GGE.

The fleet used its rollover balance of 3,300 GGE, leaving a negative balance of 500 GGE. It needed one of its two remaining banked credits from the Standard Compliance program as calculated by the following equation:

$$\text{Credits required} = \frac{(\text{GGE reduction required} - \text{GGE reduction achieved} - \text{rollovers})}{\text{Annual average GGE use per LDV}}$$

$$\text{Credits required} = (25,200 - 21,400 - 3,300)/700$$

$$\text{Credits required} = 0.71$$

$$\text{Credits required} = 1 \text{ after rounding to the nearest whole number}$$

Table 6 summarizes the various scenarios under Case 1.

Case Study 2: Standard and Alternative Compliance Options

Year 1: MY 2008

This alternative fuel provider fleet applied for and received a waiver to enter the Alternative Compliance option for the first time. The fleet anticipated starting the year with 52 pre-waiver AFVs and adding 20 LDVs during MY 2008, leading to an AFV requirement of 18 (90% of 20 planned LDV acquisitions). This resulted in a total of 70 vehicles in the fleet's MY 2008 ACV inventory. Its fuel use records show that each vehicle in its LDV fleet used an average of 800 GGE of fuel per year in MY 2006. Thus, its petroleum reduction requirement is 56,000 GGE ($70 \times 800 = 56,000$).

The fleet developed a plan to reduce its petroleum consumption by 56,000 GGE through a combination of E85 (30,000 GGE), HEVs (18,000 GGE), and VMT reduction (8,000 GGE). Its actual petroleum reduction amount for Year 1 was 54,500 GGE, an under-compliance of 1,500 GGE.

Because this was the fleet's first year in the program, it has no rollover petroleum reductions banked, but it does have two banked credits available from the Standard Compliance requirements. The number of credits required is calculated as follows:

$$\text{Credits required} = \frac{(\text{GGE reduction requirement} - \text{GGE reduction achieved} - \text{rollovers})}{\text{Annual average GGE use per LDV}}$$

$$\text{Credits required} = (56,000 - 54,500 - 0)/800$$

$$\text{Credits required} = 1.875$$

$$\text{Credits required} = 2$$

Year 2: MY 2009

The fleet remained in the Alternative Compliance option for Year 2. It planned to start the year with 66 ACVs (because 4 ACVs were scheduled to be retired before MY 2009 began) and add 18 ACVs (90% of 20 planned LDV acquisitions for Year 2). The total ACV inventory for Year 2 is 84 AFVs ($66 + 18 = 84$). Using the baseline fuel use of 800 GGE of fuel per vehicle per year, its petroleum reduction requirement for MY 2009 is 67,200 GGE ($84 \times 800 = 67,200$).

Table 7. Year 1: MY 2008 Summary

ACV inventory	70 vehicles
Average annual fuel use per LDV	800 GGE
Petroleum reduction requirement	56,000 GGE
Actual petroleum reduction achieved	54,500 GGE
Deficit/excess	-1,500 GGE
Compliance status	Under comply
Credits required/applied	2
Credits remaining in Standard Compliance	0

Table 8. Year 2: MY 2009 Summary

ACV inventory	84 vehicles
Average annual fuel use per LDV	800 GGE
Petroleum reduction requirement	67,200 GGE
Actual petroleum reduction achieved	64,500 GGE
Deficit/excess	-2,700 GGE
Compliance status	Under comply
Credits remaining in Standard Compliance	0
Rollovers banked	0
Credits required to be purchased	3

The fleet developed a plan to reduce its petroleum consumption by 67,200 GGE through a combination of E85 (35,000 GGE), HEVs (22,000 GGE), and VMT reduction (10,200 GGE). The fleet's total actual petroleum reduction was 64,500 GGE, an under-compliance of 2,700 GGE.

Because the fleet had used its credits from Standard Compliance, it was required to purchase Standard Compliance credits to offset its deficit of 2,700 GGE.

$$\text{Credits required} = \frac{(\text{GGE reduction requirement} - \text{GGE reduction achieved} - \text{rollovers})}{\text{Annual average GGE use per LDV}}$$

$$\text{Credits required} = (67,200 - 64,500 - 0)/800$$

$$\text{Credits required} = 3.375$$

$$\text{Credit purchases required} = 3$$

Table 9. Year 3: MY 2010 Summary

ACV inventory	97 vehicles
Average annual fuel use per LDV	800 GGE
Petroleum reduction requirement	77,600 GGE
Actual petroleum reduction achieved	78,100 GGE
Deficit/excess	+500 GGE
Compliance status	Over comply
Credits remaining in Standard Compliance	0
Rollovers banked	500

Table 10. Year 4: MY 2011 Summary

ACV inventory	92 vehicles
Average annual fuel use per LDV	NA
Petroleum reduction requirement	0
Actual petroleum reduction achieved	N/A
Credits required	18
Biodiesel purchased	4,500 gallons
Biodiesel credits earned	9
AFVs purchased	12
Total credits earned	21
Excess credits	3
Compliance status	Over comply
Credits remaining in Standard Compliance	3
Rollovers banked	500

Year 3: MY 2010

The fleet remained in the Alternative Compliance option for Year 3. It started the year with 79 ACVs after 5 were retired and added 18 ACVs based on its AFV requirement for Year 3 (90% of 20 planned LDV acquisitions for Year 3). The total ACV inventory for Year 3 is 97 AFVs ($79 + 18 = 97$). Based on its average fuel use of 800 GGE of fuel per vehicle per year, its petroleum reduction requirement is 77,600 GGE ($97 \times 800 = 77,600$).

The fleet developed a plan to reduce its petroleum consumption by 77,600 GGE through a combination of E85 (36,900 GGE), HEVs (22,000 GGE), VMT reduction (8,500 GGE), and idle reduction (10,200 GGE). The fleet's total

Table 11. Year 5: MY 2012 Summary

ACV inventory	111 vehicles
Average annual fuel use per LDV	800 GGE
Petroleum reduction requirement	88,800 GGE
Actual petroleum reduction achieved	88,000 GGE
Deficit/excess	-800 GGE
Compliance status	Under comply
Credits remaining in Standard Compliance	3
Rollovers banked	500
Rollovers used to meet petroleum reduction requirement	500
Rollover balance	0

actual petroleum reduction was 78,100 GGE, an over-compliance of 500 GGE.

The fleet was able to roll over the 500 GGE.

Year 4: MY 2011

The fleet decided to return to the Standard Compliance requirements for Year 4. It started the year with a total of 92 ACVs in its ACV inventory. However, because the fleet did not choose the Alternative Compliance option for this year, it has no petroleum reduction requirements for the year. It only has AFV acquisition requirements under Standard Compliance.

Because it wanted to buy 20 LDVs this year, the fleet has an AFV acquisition requirement of 18 (90% of 20 planned LDV acquisitions for Year 4). The fleet exceeded its requirements by purchasing 4,500 gallons of B100 and purchasing 12 AFVs. Thus, the fleet earned 21 credits—50% of its requirements were met with biodiesel (with 450 gallons not receiving credit), and 12 additional credits were earned based on the acquisition of the 12 AFVs. The three excess credits earned by the fleet above its requirement were banked for future use.

Year 5: MY 2012

The fleet returned to the Alternative Compliance option for Year 5. Its ACV inventory had the following composition: 84 ACVs of the 92 with which it started Year 4 (8 scheduled for retirement before MY 2012), 9 AFVs acquired for credit

under the Standard Compliance requirements in Year 4 (the 3 that earned banked credits are not included), and 18 AFV requirements for Year 5 (90% of 20 planned LDV acquisitions for Year 5). Thus, the total ACV inventory for Year 5 was 111 ACVs ($84 + 9 + 18 = 111$). Using the fleet's average fuel use of 800 GGE per vehicle per year, its petroleum reduction requirement is 88,800 GGE ($111 \times 800 = 88,800$).

The fleet developed a plan to reduce its petroleum consumption by 88,800 GGE through a combination of E85 (38,000 GGE), HEVs (22,000 GGE), VMT reduction (12,500 GGE), and B20 (12,000 GGE). The fleet also planned to use idle reduction (4,300 GGE). The fleet's total actual petroleum reduction was 88,000 GGE, an under-compliance of 800 GGE. The fleet requires 800 rollovers but only has 500 available from Year 3. After these are applied, the fleet still has a deficit of 300 GGE and may require banked credits. However, as shown above, because the banked credits required are fewer than 0.5, the fleet does not have to apply any of its banked credits.

$$\text{Credits required} = \frac{(GGE \text{ reduction requirement} - GGE \text{ reduction achieved} - \text{rollovers})}{\text{Annual average GGE use per LDV}}$$

$$\text{Credits required} = (88,800 - 88,000 - 500)/800$$

$$\text{Credits required} = 0.375$$

$$\text{Credits purchases required} = 0$$

Table 12 summarizes the various scenarios in Case 2.

Table 12. Case 2: Compliance Summary

	MY 2008	MY 2009	MY 2010	MY 2011	MY 2012
Actual ACV inventory	70	84	97	92	111
Average annual fuel use per LDV	800	800	800	N/A	800
Petroleum reduction requirement	56,000	67,200	77,600	0	88,800
Actual reduction achieved	54,500	64,500	78,100	N/A	88,000
Over/(under)-compliance	(1,500)	(2,700)	500	+3 credits	(800)
Credits required	2	0	0	18	0
Credits earned	0	0	0	21	0
Banked credits available	2	0	0	3	3
Credits applied	2	0	0	0	0
Rollovers banked	0	0	500	N/A	500
Rollovers applied	0	0	0	N/A	500
Credits purchased	0	3t	0	0	0

Appendix H: Helpful Links

EPAct Transportation Regulatory Activities

eere.energy.gov/vehiclesandfuels/epact

- Standard Compliance
 - Alternative Fuel Transportation Program Final Rule
eere.energy.gov/vehiclesandfuels/epact/pdfs/fed_reg.pdf
 - AFV Acquisition Requirements Final Rule
eere.energy.gov/afdc/pdfs/fprovrule.pdf
 - Reporting Form DOE/FCVT/101
eere.energy.gov/vehiclesandfuels/epact/docs/fleet_report_07_2009.xls
- Alternative Compliance
 - Alternative Compliance Final Rule
eere.energy.gov/vehiclesandfuels/epact/pdfs/alt_compliance_rule.pdf
 - Alternative Compliance Planning Tool
eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/
 - ACV Inventory
eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/view_acv.cgi
 - Intent To Apply for a Waiver
eere.energy.gov/vehiclesandfuels/epact/state/acp_tool/waiver_app0.cgi

Alternative Fuels and Advanced Vehicles Data Center

eere.energy.gov/afdc

- Alternative Fueling Station Locator
afdc.energy.gov/afdc/locator/stations/
- E85 Fleet Toolkit
eere.energy.gov/afdc/e85toolkit

Clean Fleet Guide

afdc.energy.gov/afdc/fleets

- Flexible Fuel Vehicle Cost Calculator
afdc.energy.gov/afdc/progs/cost_anal.php?0/E85/
- Natural Gas Vehicle Cost Calculator
afdc.energy.gov/afdc/vehicles/natural_gas_calculator.html
- Truck Stop Electrification Locator
afdc.energy.gov/afdc/locator/tse/

Fuel Economy Guide

fueleconomy.gov/feg/feg2000.htm

Transportation Energy Data Book

cta.ornl.gov/data/index.shtml

DISCLAIMER

This publication is intended to familiarize interested parties with the requirements of the U.S. Department of Energy's Alternative Fuel Transportation Program, 10 CFR Part 490. It is not intended as a complete representation of the regulation, nor does it contain the complete information necessary for compliance with the regulation. In the event of any discrepancy, real or perceived, between the language of this publication and that of the regulation, the language of the regulation should be considered as governing.



Prepared by the National Renewable Energy Laboratory (NREL), a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy; NREL is operated by the Alliance for Sustainable Energy, LLC.

DOE/GO-102014-4408 • June 2014

Photo credits: (cover, clockwise from top) NREL 16745, NREL 18095, iStock 1314267, iStock 750486; (page i, left to right) NREL 18252, NREL 18083, NREL 18127