



fleets for the future

Fleet Transition Planning
for Alternative Fuel Vehicles

Preface

Funded by the U.S. Department of Energy (U.S. DOE) Clean Cities Program, the Aggregated Alternative Technology Alliance, known as “Fleets for the Future” (F4F), seeks to achieve nationwide economies of scale for alternative fuel vehicles (AFVs) through aggregated procurement initiatives. F4F plans to accomplish these economies of scale through a coordinated strategy designed to increase knowledge, lower the transaction costs of procurement, achieve better pricing, and address potential challenges arising from large-scale procurement initiatives, thereby increasing the deployment of alternative fuel vehicles in public and private sector fleets. The F4F team is comprised of national and regional partners with extended networks and relationships that can increase and aggregate the demand for alternative fuels and advanced vehicles. The project includes a regional procurement initiative spearheaded by each of the team’s five participating regional councils, as well as a national procurement effort.

F4F will enable fleets to obtain vehicles that will both reduce emissions and operate at a low total cost of ownership. AFVs that use electricity, propane autogas, and natural gas all have desirable benefits, including less reliance on foreign petroleum, reduced fuel costs, reduced maintenance costs, and contributions to local air quality improvement. In order to achieve these savings, fleet managers must justify the higher upfront cost of investing in AFVs. By harnessing the power of cooperative procurement to reduce transaction costs and to obtain bulk pricing, F4F aims to reduce the upfront cost premium and make an even stronger case for investing in AFVs.

F4F does not detail purchase and use of ethanol, renewable diesel, or biodiesel, which are beneficial for many of the same reasons mentioned above. However, biofuels can be introduced into a fleet with little or no additional cost and require little or no additional technology upgrades to deploy. Hydrogen is not treated herein because the technology does not have a mature market and is not positioned for bulk purchasing.

In order to prepare stakeholders to successfully deploy AFVs in their fleets, the F4F team has compiled fleet management and procurement best practices specifically relevant to alternate fuels. These best practices build upon both the extensive information provided by the U.S. DOE and a number of recent successful case studies. The specific goal of these best practice guides is to educate procurement officers, fleet managers, and other interested stakeholders to plan for a large scale deployment of AFVs.

This document, *Fleet Transition Planning for Alternative Fuel Vehicles*, presents general fuel-neutral guidelines on planning a coordinated bulk procurement of AFVs. It discusses stakeholder engagement efforts, goal setting, prioritization of vehicle procurements, and planning for implementation of a successful procurement. The F4F companion documents in this series include the:

1. *Guide to Financing Alternative Fuel Vehicle Procurement*
2. *Electric Vehicle Procurement Best Practices Guide*
3. *Gaseous Fuel Vehicle Procurement Best Practices Guide*

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Introduction

While technical knowledge and financial analysis are necessary to the successful deployment of alternative fuel vehicles (AFVs), the process of preparing a fleet for a transition to more sustainable and lower cost vehicles requires more than technical proficiency. The process should also involve a robust stakeholder identification and engagement effort, strategic planning, optimization of fleet operations, and ongoing project management. Financing strategies, also of critical importance, are addressed in *Fleets for the Future* companion document, *Guide to Financing Alternative Fuel Vehicle Procurement*.

This guide lays out the skills and steps that will ensure the success of AFV initiatives.

Initial Stakeholder Engagement and Organizational Buy-in

Sustainability initiatives in fleet management require collaboration between a variety of stakeholders with unique interests, personalities, skills, and financial resources. Therefore, the earliest stages of an AFV procurement should involve mapping out stakeholders and reaching out to them for input. A well-designed stakeholder engagement process will result in clearly defined objectives and a set of prioritized actions to be taken to achieve them.¹

Stakeholder engagement for public agencies and private sector fleets can be framed around first identifying stakeholders and then analyzing and learning about their interests. To identify who to include, the following questions are useful:

- What groups and individuals will be impacted by AFV procurement, and in what ways?
- Who can contribute knowledge, skills, and resources?
- Who has influence on decision-making, and in what ways?
- What external groups have similar interests in AFVs and how can they contribute to the project?²

Generating an expansive list of stakeholders from the outset of the project enables transparency and communications that will avoid surprising anyone whose input is critical to project success. Broad engagement also reduces the chances that additional AFV opportunities are missed. At a minimum, stakeholders will include elected officials, upper level management, the sustainability team, fleet management personnel, procurement officers, facilities and maintenance staff, vehicle operators, representatives from other local fleets, and representatives from dealers and/or industry partners.

Once the stakeholders are identified, their interests should be anticipated and explored. This process can involve both brainstorming and conducting listening tours or other methods of gathering insights about the stakeholders and their needs and priorities. The outcome of this exploration should be a thorough understanding of how each stakeholder can contribute, how willing they are to engage, how much influence they have on procurement and fleet operations, and how necessary their buy-in is. This knowledge will help identify the high priority stakeholders and a strategy for engaging each stakeholder.

At this stage it is also important to identify the relationships between stakeholders and how their processes interact. For instance, elected officials may be reluctant to commit to goals and targets if they do not know if their staff has the technical knowledge, time, and financial resources to achieve those goals.

¹ A useful guide to stakeholder engagement is provided by the nonprofit [Business for Social Responsibility](#).

² For instance, other fleets in the region may be interested in participating in cooperative procurement. Coordination with other fleets may also enable the right-sizing of refueling infrastructure by identifying additional customers for potential fueling stations.

Fleet managers and procurement staff may need clear signals from leadership that AFV procurement is a priority of the agency. Therefore, stakeholder engagement efforts should include both bottom-up and top-down efforts.

The outcome of a stakeholder identification and mapping exercise will likely be the formation of a working group to explore potential AFV goals, objectives, and methods to achieve them. This working group will identify the organizational learning steps that will enable successful project management. The focus should be producing constructive dialogue and providing an open forum to share ideas and concerns, in order to build consensus on goals and strategies. Ultimately the organization's best interest should be pursued while ensuring that employees at all levels of the organization feel as if they are having a positive contribution to fulfilling those interests.

The working group should identify data requirements to ensure that the group is able to employ data-driven decision making and to ensure that AFV procurement is optimized to provide real benefits to stakeholders. Additionally, this working group should identify foreseeable needs for knowledge and capacity during an AFV deployment, including (but not limited to) procurement best practices, capacity to perform maintenance on the new vehicles, understanding of the codes and regulations associated with AFVs, and understanding how to plan for availability and possible expansion of refueling infrastructure. Finally, the working group's members may each have their own preconceived notions about AFVs and their suitability for various applications. These notions may be informed by decades of experience or may be the result of a poorly planned deployment of AFVs in the distant past. The working group can explore the existing prior knowledge of its members and embark on fact-finding efforts to determine which of the lessons from past experience are still applicable and which may be misconceptions.

Best Practice
Reach out to all stakeholders, from top officials to drivers, early and often. Invest in educating and communicating frequently to build consensus and provide a forum to share ideas and concerns. Find out what myths and misconceptions are prevalent among stakeholders and create a plan to dispel them.

As a result of the wide variety of backgrounds and experiences of an AFV stakeholder group, the facilitator of this group should be mindful that active management of the group may be necessary. If the tone becomes too focused on barriers too early, decision-makers may be discouraged from aiming for visionary goals and the group may lose its inspiration. Listening tours and a knowledge of the backstory of influential stakeholders may help the facilitator anticipate triggers to conversations that can derail the group or set a pessimistic tone. This knowledge can also help the facilitator bring the group to a productive discussion of the particular challenges that these stakeholders may bring up.

The F4F companion documents explore in more detail the types of stakeholders who should be engaged in a procurement of electric vehicles and a procurement of gaseous fuel vehicles. These documents also provide background information that can bring all of the stakeholders to the same understanding of the available vehicles and technical expertise that is needed to successfully manage an AFV deployment.

Setting Goals and Timelines

As the stakeholder group becomes more knowledgeable of the opportunities associated with AFVs and the steps required to produce the most successful deployment, goals and timelines should be developed with a focus on consensus building. Individuals in the stakeholder group may be motivated by different AFV benefits. The F4F companion documents on electric vehicles and gaseous fuel vehicles outline the benefits of these technologies as a way of helping facilitators motivate their stakeholder groups.

Furthermore, the facilitator can help motivate many of these stakeholders by focusing on the outcomes and opportunities for leadership, as well as the recognition this project will provide for the team.

An important goal that the facilitator should encourage is to plan for sustaining the effort. If the exercise is framed as setting goals for a long-term clean technology transition plan, the stakeholders are more likely to engage more thoroughly with the organizational barriers that may be slowing progress towards clean technologies. If it is not framed in this way, stakeholders may end up planning a one-time procurement. A sustained commitment to fleet transition will help fleets justify some of the upfront costs associated with the first deployment of AFVs. For instance, fleet managers may consider their future plans when considering whether refueling infrastructure investment is worthwhile. They may be more likely to see the value in providing training to their maintenance staff to build capacity to do AFV maintenance in-house. The risk of starting too small is that the organization may not take the necessary steps to ensure success. On the other hand, the plan should spread the acquisition of new vehicles across a number of years, like any fleet modernization effort. This will help avoid any major backlog in vehicle replacements in future years and spread the cost of an AFV deployment over the same time period.

Internal/External Mandates and Regulations

A variety of local, state, and/or federal regulations apply to fleets, particularly as related to sustainability and the deployment of alternative fuel vehicles. Many municipal governments have their own sustainability requirements. Federal legislation, such as the *Energy Policy Act* (EPAct) of 1992 and 2005, applies to a wide range of federal and state fleets, including state universities. In addition to understanding the various regulatory requirements and mandates that apply to one's own fleet, it can be useful to know which requirements apply to neighboring fleets so that opportunities to collaborate regionally can be explored and accounted for in goal setting.

The U.S. DOE compiled additional resources related to federal law:

- AFDC Laws and Incentives database: <http://www.afdc.energy.gov/laws>
- State & Alternative Fuel Providers Fleets: <https://epact.energy.gov/>
- Sustainable Federal Fleets: <https://federalfleets.energy.gov/>

However, additional research will be required to find out the state and local mandates that apply to one's own fleet and nearby fleets.

Baseline Fleet Evaluation

A critical component of setting goals and timelines is a high-level baseline evaluation of the potential of each type of AFV to fill specific needs for the fleet. The goal of this first step is to identify an initial pool of candidate vehicles for further evaluation. At the outset, consider which vehicles weight classes are ready for a transition to which fuels.

A proper baseline evaluation of the fleet's AFV opportunities includes data collection and analysis down to the individual vehicle level. This could include age, mileage, acquisition/fuel/ maintenance costs, duty cycle, and/or any other operational metrics that would influence the decision of what AFV type is the most promising for any particular replacement. A baseline evaluation should include a cost comparison of the existing fleet with the potential incoming fleet of AFVs. The best practice for enabling cost comparisons should focus on calculating the total cost of ownership (TCO). TCO calculations should account for the appropriate time value of money for the

Best Practice

Start with a high-level baseline evaluation of opportunities to procure AFVs with lower total cost of ownership than existing vehicles in order to identify an initial pool of candidate vehicles for further evaluation.

organization, and should include the acquisition cost of the vehicle, fuel³, maintenance, depreciation, and other ancillary services (e.g. telematics costs). Dividing the TCO for each individual vehicle by the number of miles that vehicle travels will establish a cost per mile that makes for easy comparison across vehicles and technologies. U.S. DOE Clean Cities Coalition members can provide assistance with such evaluations and guidance for getting started.

While the TCO analysis can give a useful initial picture of candidate replacement vehicles, individual vehicle compatibility also depends on operational and functional needs associated with the driving patterns of each vehicle. Vehicle telematics data can be used to establish an AFV suitability profile for selected candidate vehicles. Many fleets already have access to underused telematics data that can be mined for this purpose. Fleets with telematics data can establish an AFV compatibility score based on historical driving data. Fleets without telematics data should weigh the available options.

Financing and Budgeting

Once stakeholders have begun to establish goals and identify fleet-wide AFV opportunities, the stakeholders should begin to consider how AFV goals can be financed or funded. This process will involve a review of the organization's existing procurement rules and policies, and whether they are well-suited for the deployment of a self-sustaining AFV program. If there are procedural roadblocks, alternative strategies will need to be developed to overcome them. F4F's *Guide to Financing Alternative Fuel Vehicle Procurement* discusses many such strategies.

Due to low maintenance and fuel costs, many AFVs have competitive TCO relative to the conventional gasoline or diesel vehicles they replace. However, many fleets are not equipped to take advantage of the long-term savings generated by AFVs due to the way their budgets are structured. For instance, it is common for facility budgets to be separate from vehicle procurement and fleet operation budgets so the department that would need to pay for investing in AFV refueling infrastructure would not receive the operational savings from the usage of AFVs. Even within the fleet budget, capital purchases of vehicles may be entirely separate from the operating budget used for fuel and maintenance.

Therefore, a key component of establishing a successful AFV program is to secure a strong organizational commitment based on a thorough understanding of the interplay between and among various budgetary line items. Long-term structural changes to procurement policies and procedures may be necessary to facilitate the integration of newer technologies. Agencies or private fleets may need to use tools such as third-party financing, leasing, or revolving loan funds to overcome the upfront cost hurdle of AFV procurement. These strategies and when to apply them are discussed in F4F's companion document on financing.

Best Practice

Explore financing and funding opportunities and strategies early in the process. Secure commitment from stakeholders to explore ways to overcome possible organizational budgeting barriers.

The financial analysis necessary to create a justifiable budget for AFV procurement requires an understanding of the costs and financial benefits of the decision to procure these vehicles. This analysis will include equipment, fuel, maintenance, and potential costs associated with refueling infrastructure (including site planning, construction and installation, and operations costs), as well as the anticipated residual value when the fleet no longer needs the vehicle. The F4F companion documents on procuring

³ It is important to educate stakeholders to compare fuel costs in an apples to apples manner. The total cost of fuel to achieve the mission of the fleet is more important than the relative cost per gallon or kilowatt-hour of each fuel, since different fuel types have different energy content and different efficiencies of powering the vehicle.

gaseous fuel vehicles and electric vehicles address the cost premiums and long-term savings associated with each type of fuel.

Prioritizing Vehicles for Replacement with AFVs

The process of identifying the initial target vehicles to be replaced with AFVs will also be driven by stakeholder engagement efforts. While this section will explain best practices and important considerations for prioritizing AFV procurement efforts, it is essential to note that stakeholders will have valuable input and that identification of the appropriate vehicle targets can be supplemented with surveys and interviews of fleet managers. For instance, fleet managers can identify logical replacement vehicles based on knowledge of which fleet vehicles are near the end of their useful life. An example survey, which was used for the Fleets for the Future project, is attached as *Appendix A*.

There are many valid ways that vehicles can be prioritized for replacement, and the outcome may vary depending on the goals of the AFV initiative. Some AFV initiatives may be based around externally-imposed mandates such as state requirements, while others may be motivated by adherence to a publicly announced goal or achieving operational cost savings across the fleet. Mandates and goals could come in the form of percentage of vehicles that are fueled with specific types of alternative fuels, total number of alternative fuel vehicles, the amount of conventional fuels displaced, or the reduction in both local pollutants and greenhouse gas emissions. The strategies to achieve each of these goals will likely be similar, but specific initiatives may be ranked differently depending on the specific goal.

Financial metrics are an important consideration for prioritizing AFV procurement. The upfront capital available to fund AFV investments may not cover all of the financially desirable AFV deployments, so replacement of specific vehicles can be ranked by the return on investment (ROI), allowing the most financially desirable projects to be implemented first. If your organization allows it, projects with high ROIs can subsidize the cost of projects with lower ROIs or projects that do not generate a full financial payback during the lifetime of the vehicle.⁴ Another useful metric is the net present value per unit of emissions reduced. For projects with negative net present value but high emissions reductions or other benefits, it may be especially desirable to explore bundling the ROI with a higher ROI project.

Typically for identifying vehicles with the best ROI, it is useful to first look at the vehicles in a fleet that have the highest fuel use and the highest maintenance expenses. The vehicles with the highest fuel use tend to be the ones with low fuel economy, heavy vehicle weight, and shared use across multiple shifts per day, and many of these also tend to have higher maintenance expenses.

Factors beyond fuel utilization and maintenance expenses may also impact the ROI. One of the biggest factors is the availability of convenient refueling infrastructure. If unavailable, infrastructure investments will be required, contributing to the TCO of a fleet of AFVs, regardless of whether it is paid for upfront or factored into future fuel contracts.⁵ Furthermore, any detours that fleet drivers must make in order to refuel their vehicles cost time and waste fuel, reducing the ROI. Another factor that may influence the ROI is the availability of time-limited incentive programs applicable to specific vehicle types. These financial considerations are described in more depth in the F4F companion documents on electric vehicles and gaseous fuel vehicles.

In addition to considering ROI and financial metrics, another major consideration in identifying the initial high-priority vehicle replacements is the willingness of stakeholders to consider AFVs for certain applications. Fleet managers may be hesitant to commit to the bulk procurement of any specific type of AFV for a number of reasons. They may feel that their needs are too specific; they may fear there are not

⁴ A good example of this concept is Kansas City, MO fleet run by Sam Swearngin. He measures ROI across his entire fleet so that high ROI vehicles like refuse trucks are effectively “subsidizing” low ROI/no-ROI vehicles like small sedans.

⁵ However, collaboration with other fleets in the region may make infrastructure investment highly cost-effective.

ample opportunities to receive drivers' buy-in; they may feel that fueling infrastructure is inconvenient or absent; or they may have operational or maintenance concerns. Therefore, it is important to figure out which applications generate the most enthusiasm in addition to suggesting vehicles with the highest ROI.

The F4F companion documents on electric vehicles and gaseous fuel vehicles describe some of the ideal applications for AFVs, including those that tend to have the best ROI and those for which fleet managers tend to have more interest. These documents also include estimates of current (2016) upfront cost premiums for several specific AFV applications.

Planning for Implementation

Successfully integrating AFVs into a fleet involves appropriate preparation, even before the vehicles have been procured. The previous sections of this report discussed how a facilitator might convene stakeholders to set goals and prioritize opportunities for AFV integration into fleets. This section will discuss the additional steps that should be taken once a procurement is being planned, including publicizing the RFP, identifying appropriate common specifications for AFVs, planning for infrastructure, setting vehicle utilization standards, educating drivers and maintenance staff, and engaging in ongoing program management.

RFP Communications Plan

In preparing to request AFV proposals, it is important to establish a plan for quickly spreading the word to the most qualified respondents. As discussed in the F4F companion documents, the delivery of AFVs to a fleet involves the coordination of many entities. It is important that the original equipment manufacturers (OEMs), the aftermarket retrofit system manufacturers, the installers of retrofit systems, and the dealers have sufficient time to put together a response. Particularly for the gaseous fuel vehicles, many of the entities that are best positioned to respond to requests for AFVs operate at a national scale and may not be scanning local RFP listings. As a result, the stakeholder group may wish to develop a communications plan that spreads the word far and wide. Local U.S. DOE Clean Cities Coalition representatives may be particularly good resources to draw upon when developing this outreach plan.⁶ They may be able to spread the word within their networks. An additional important step is to know the publications that industry professionals tend to read and know the opportunities for publicizing the bid within them. The F4F companion documents provide a short list of current publications that are worth considering.

Common Specifications

Given a typical organization's limitations and the infeasibility of attempting to procure AFVs of all makes and models simultaneously, it is recommended that fleets focus on a limited number of vehicles and platforms with pre-determined specifications that are most likely to attract the greatest buy-in. There are several reasons that a fleet should start with a limited number of vehicle platforms for an AFV procurement. First, coordinating the necessary stakeholders will take significant staff capacity and attention. Second, the prioritization process described above will undoubtedly produce some high priority opportunities. And third, the ROI of an AFV procurement can be improved by obtaining bulk pricing through coordination of the collective purchasing power of multiple departments and organizations.

Common specifications that are agreeable to many potential cooperative purchasers will be important in order to achieve bulk savings. There are numerous

Best Practice

Focus on common uses for fleet vehicles that may better lend themselves to bulk procurement – minimizing the need for specialization.

⁶ This website shows the current Clean Cities programs: <https://cleancities.energy.gov/coalitions/locations/>

ways in which vehicles can be specialized, from custom modifications to the cab, custom toolsets, body modifications, and fuel and drive-train specifications. Purchasers who wish to unlock bulk pricing should consider non-negotiable needs, so they may make the appropriate decision to whether to participate in the cooperative procurement of a less specialized vehicle.

Infrastructure Development

A successful AFV deployment program depends heavily on access to the associated infrastructure to refuel those vehicles. As noted above, the state of existing infrastructure can be a useful criterion to identify AFV opportunities that should be prioritized. In many cases, either public infrastructure will already be available, or the cost of the infrastructure will be small when amortized across energy demand by the fleet and other customers (e.g. dollars per gasoline gallon equivalent). The decision whether to site additional infrastructure will hinge on the following questions:

- Where can vehicles refuel?
- At what time do they refuel?
- How long does it take them to refuel?
- How far from the fleet’s routes is the existing refueling infrastructure?
- Can the fleet negotiate access to private fueling infrastructure owned by another fleet? If so, how reliable is that access?
- Can inter-local agreements be entered that enable the sharing of infrastructure?
- Is there sufficient local demand for the fuel to achieve economies of scale that would make new infrastructure cost-effective?

The F4F companion documents on electric vehicles and gaseous fuel vehicles discuss the considerations for each specific fuel in more depth and provide additional questions that should be considered when evaluating fueling needs and siting fueling infrastructure to support AFV deployment.

Vehicle Utilization Standards

As noted above, the ROI of an AFV deployment is dependent on fuel and maintenance savings, both of which are proportional to the mileage driven by the vehicle. Therefore, it is important to establish minimum vehicle utilization standards to avoid purchasing unnecessary vehicles and increase the miles per vehicle, maximizing the benefits that can be obtained by investing in AFVs.

Consolidating miles onto a lesser number of new vehicles is a good way to reduce costs, streamline the fleet, and improve the AFV deployment economics. By using data on the times at which vehicles are needed

and the functions they must perform, an organization can develop a strategy for sharing pool vehicles across multiple times – this is known as fleet right-sizing.

As part of pre-deployment due diligence, the fleet should determine the baseline miles per year per vehicle and what mileage per year is necessary to justify an AFV investment.

Best Practice

Factor in the costs of infrastructure procurement and refueling practices in total cost of ownership calculations, if necessary. Use infrastructure availability as another criterion to establish high-priority AFVs.

Best Practice

Ensure that the fleet is right-sized to improve the ROI of AFV deployment, e.g. that bi-fuel vehicles are used with the intended fuel and that plug-in hybrids are routinely charged in order to maximize the ROI.

Another standard that should be considered is a fuel utilization policy. Many AFVs can be configured as bi-fuel, where the operator may choose to refuel with conventional gasoline, diesel, or the alternate fuel that was intended for the vehicle.⁷ In the absence of clear policy guidance, drivers may opt to refuel wherever it is most convenient or they may forget to plug in a plug-in hybrid vehicle, damaging the economics of the AFV procurement. Generally, the more gasoline miles transitioned to alternate fuel miles, the faster the fleet can expect to see a return on the investment.

Driver Training and Incentives

Engaging employees early and often is important in a successful AFV deployment plan. In addition, providing the appropriate level of training will ensure correct and safe operations. It is a best practice to consider what training will be necessary from the beginning to ensure safe, effective, and efficient use of AFVs and make plans for providing the training before the vehicles are purchased, either internally or through a dealer or manufacturer. Fleets may wish to insert language into AFV RFPs to determine what training options can be provided by the respondents. Some vehicle manufacturers offer training programs to dealerships and may also offer training to fleet customers. Incentives for drivers encouraging the efficient use of AFVs can be a low-cost way to increase the payback of an AFV deployment, since driving habits can significantly impact fuel use. Additionally, fuel utilization policies, as discussed above, should be included in driver training to ensure that AFVs are optimally using the intended fuel. Specific topics of interest for electric vehicles and gaseous fuel vehicles are discussed in F4F's companion documents.

Best Practice
Train key personnel to perform AFV diagnostics, maintenance, and repairs. Ensure that training is provided to more than one technician to provide for redundant coverage, and implement a plan to maintain training for staff turnover.

Providing for Maintenance

It is important to plan for the service provision during the procurement process even though AFVs often do not require the same level of maintenance compared with conventional vehicles. Service can be handled by one of three parties: 1) the fleet's own technical staff; 2) the local OEM dealer; 3) the aftermarket retrofit system installer, if applicable. Whichever entity performs the service, it is important for fleets to understand that for many AFVs, the upfitting process has the potential to affect the vehicle's OEM warranty and multiple parties will be providing warranties on different components of the same vehicle. For more detail, see F4F's companion document on gaseous fuel vehicles.

If the fleet management decides to handle maintenance through a third party, the procurement documents should specify what types of service are required by the fleet so that respondents can specify the costs and terms associated with services. Therefore, it is important for the procurement official and fleet manager to educate themselves on the specific types of service that are most likely to be needed for each type of AFV they intend to procure.

Best Practice
Include provisions for driver training and maintenance in procurement documents to ensure the safe, effective, and efficient use of AFVs.

If the fleet management decides to handle maintenance through its own internal technical staff, key personnel should be trained to perform diagnostics, maintenance, and repairs. Specific arrangements should be made to ensure training for technicians that will be responsible

⁷ This will be discussed in more detail in F4F's gaseous fuel procurement guide.

for each type of AFVs in use. Along with OEM training, in-depth courses are offered through both private AFV education organizations and the National Alternative Fuels Training Consortium (NAFTC).⁸ Over time, the trained and experienced fleet technicians will be positioned to train and mentor others, enabling other proximate fleets to scale up in capabilities to provide needed service.

Additional Training

In addition to training drivers and maintenance technicians, it is a common best practice to prepare emergency responder (fire, police, EMS) personnel on the specificities of the new technologies. This step will ensure proper handling of vehicles during first responder scenarios. Organizations that have well-established training programs include NAFTC and the National Fire Protection Association.⁹

Best Practice
Establish ongoing data-driven program management that tracks vehicle use/performance.

Disposal of Old Vehicles

A bulk procurement of AFVs will likely render a significant number of existing fleet vehicles obsolete. Fleets may wish to sell or dispose of any replaced vehicles on a timely basis. If vehicles are being sold for reuse, they must be inspected and logos and paint may need to be stripped. If vehicles are disposed of, it should be done in an environmentally responsible manner and should follow all applicable regulations. For example, when disposing of natural gas vehicles, it's imperative that fleets properly defuel CNG cylinders according to industry established protocols; this may include rendering the cylinders unusable if they are at or near the end of their certified useful life.

When the AFV procurement is funded by the U.S. Environmental Protection Agency's (EPA) *Diesel Emission Reduction Act* (DERA) grants, specific steps are required to ensure that the vehicle is scrapped and not reused. This includes drilling a hole in the engine block and cutting the chassis in half. If these procedures are not followed precisely, the grant money may be forfeited. More details on DERA are available on the EPA website.¹⁰

Fleets can either handle vehicle disposal in-house or contract a company to do it for them. If done in-house, it may involve significant staff time diverted from key functional responsibilities.

Ongoing Program Management

Because performance measurement is an important tool for managing fleets, fleet managers should implement a fleet management information system (FMIS).¹¹ These systems manage the overall data related to the fleet inventory but can also capture usage data including mileage, fuel use, costs, and other data necessary for optimal management. Many commercial service providers offer software packages and/or turnkey fleet management services to enable easier information control. These systems may need to be slightly modified to accommodate AFV-specific data.

Best Practice
Become familiar with disposal requirements for decommissioned vehicles.

⁸ <http://naftc.wvu.edu>

⁹ <http://www.nfpa.org/training-and-events/by-type/online/alternative-fuel-vehicle-safety-training>

¹⁰ <https://www.epa.gov/cleandiesel> and <https://www.epa.gov/sites/production/files/2015-09/documents/420r12029.pdf>

¹¹ A helpful description of useful fleet management data to track was created for federal agencies, and the implementation conducted by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics can be found here: http://www.acq.osd.mil/pepolicy/fleet/fleet_FMIS.html

Additionally, many fleets use telematics and GPS devices to monitor the location, movements, status, and behavior of fleet vehicles. Most often these devices plug-in to a vehicle's on-board diagnostics (OBD) port to access the vehicle's engine control unit (ECU) and capture data on engine performance. Some providers may offer smartphone-based telematics that do not require access to the OBD/ECU. Telematics services are available from dozens of commercial vendors for a variety of fleet applications and varying price points.

Whatever the chosen technology solution, the goal is ongoing data-driven program management that tracks vehicle use/performance. This data should be used to establish baseline performance, establish metrics for improvement, and monitor progress regularly.

Summary

Successful AFV bulk procurements depend on the coordination of a larger group of stakeholders than procurement of conventional vehicles. Upfront education and knowledge sharing between stakeholders can have tremendous value for generating buy-in and constructive contributions to deployment planning. The remaining documents in this series aim to help bring stakeholders of varying levels of AFV expertise to a common understanding of how to specify and procure specific types of AFVs, including electric vehicles, propane vehicles, and natural gas vehicles. Following the suggested guidelines in these documents will enable fleet managers to obtain the lowest possible cost while procuring clean vehicles with fuel and maintenance savings and emissions reductions. There are substantial rewards in achieving collaboration between neighboring fleets through thoughtful preparation, facilitation, and stakeholder coordination.

Best Practices Summary Table

The following table highlights the best practices described in the above document.

Table 1. Best Practices Summary

Best Practice	Summary
Executive and Organizational Buy-in	Reach out to all stakeholders, from top officials to drivers, early and often. Invest in educating and communicating frequently to build consensus and provide a forum to share ideas and concerns. Find out what myths and misconceptions are prevalent among stakeholders and create a plan to dispel them.
Baseline Fleet Evaluation	Start with a high-level baseline evaluation of opportunities to procure AFVs with lower total cost of ownership than existing vehicles in order to identify an initial pool of candidate vehicles for further evaluation.
Financing and Budgeting	Explore financing and funding opportunities and strategies early in the process. Secure commitments from stakeholders to explore ways to overcome possible organizational budgeting barriers.
Common Specifications	Focus on common uses for fleet vehicles that may better lend themselves to bulk procurement – minimizing the need for specialization.
Refueling Infrastructure	Factor in the costs of infrastructure procurement and refueling practices in total cost of ownership calculations, if necessary. Use infrastructure availability as another criterion to establish high-priority AFVs.
Vehicle Utilization Standards	Ensure that the fleet is right-sized to improve AFV deployment ROI (e.g. bi-fuel vehicles need to use their intended fuel type; plug-in hybrids need to be routinely charged).
Added Provisions in Procurement Documents	Include provisions for driver training and maintenance in procurement documents to ensure the safe, effective, and efficient use of AFVs.
Disposal of Decommissioned Vehicles	Become familiar with disposal requirements for decommissioned vehicles.
Driver Training and Incentives	Engage employees early and often in the plans to deploy AFVs and ensure proper training to operate the vehicles correctly and safely.
Maintenance and Safety Training	Train key personnel to perform AFV diagnostics, maintenance, and repairs. Ensure that training is provided to more than one technician to provide for redundant coverage, and implement a plan to maintain training for staff turnover.
Ongoing Program Management	Establish ongoing data-driven program management that tracks vehicle use/performance.

Appendix A

FLEETS FOR THE FUTURE: ALTERNATIVE FUEL VEHICLE FLEET SURVEY

Note: For the purposes of this survey, please consider the following alternative fuels/technologies: Ethanol 85%, Biodiesel, Dedicated Electric, Plug-In Hybrid Electric, Compressed Natural Gas, Liquefied Natural Gas, and Propane.

CONTACT INFORMATION:

Name: _____
Title: _____
Organization: _____
Email: _____
Phone: _____

FLEET PROFILE

1. How many on-road vehicles does your fleet operate/maintain in each of the following classes:
 - Check here if the following numbers are estimates
 - Light duty vehicles (Up to 8,500 lbs. GVW): _____
 - Medium duty vehicles (8501 – 26,000 lbs. GVW): _____
(E.g. ranging from F-250/GMC 2500 to F-650/GMC C6500)
 - Heavy duty vehicles (Over 26,000 lbs. GVW): _____
 - Motorized commercial mowers (excluding tractor attachments) _____
2. Roughly how many vehicles of each of the following classes will your organization need to replace within the next 2-3 years?
 - Light duty vehicles (Up to 8,500 lbs. GVW): _____
 - Medium duty vehicles (8501 – 26,000 lbs. GVW): _____
 - Heavy duty vehicles (Over 26,000 lbs. GVW): _____
 - Please note any specific vehicle models that are particularly important to your upcoming replacement needs: _____
3. Does your organization have any of the following alternative fuel vehicles in your fleet? Check all that apply and specify what types of vehicles (e.g. school buses, pickup trucks, etc.) are using the alternative fuel:
 - Ethanol 85%: _____
 - Biodiesel: _____
 - Dedicated Electric: _____
 - Plug-In Hybrid: _____
 - Compressed Natural Gas: _____
 - Liquefied Natural Gas: _____
 - Propane: _____

4. For the alternative fuel vehicle type you expect your fleet is most likely to adopt in the next 2-3 years, what changes would need to happen in order to accelerate the fleet's adoption of these vehicles? If you are considering adopting more than one alternative fuel, describe the one you expect more difficulty with.

Circle the most likely type:

Ethanol 85%	Bio- diesel	Dedicated Electric	Plug-in Hybrid Electric	Compressed Natural Gas	Liquefied Natural Gas	Propane
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Rate the changes in conditions that would be most helpful: Very Important, Important, Somewhat Important, Indifferent, or Not Important.

- Better availability of alternative fuel packages for specialty vehicles _____
- Better fleet evaluation tools _____
- Change in driver attitudes _____
- Change in local political climate _____
- Improvement of public charging/refueling infrastructure _____
- More data on maintenance savings, fuel savings, and/or reliability _____
- Reduction in cost of the vehicle

5. Does your fleet have one or more of the following mandates or requirements? Check all that apply.

- Mandates or requirements to acquire alternative fuel vehicles? If yes, describe: _____
- Mandates or requirements to use alternative fuel? If yes, describe: _____
- Mandates or requirements to reduce the use of petroleum based fuels and/or reduce fleet based greenhouse gas emissions? If yes, describe: _____

FLEET INFRASTRUCTURE & MAINTENANCE SUPPORT

6. If you handle maintenance onsite at a maintenance facility, does your organization currently have capacity and expertise to maintain the following alternative fuel vehicles? Check all that apply.

- Ethanol 85%
- Biodiesel
- Dedicated Electric
- Plug-In Hybrid Electric
- Compressed Natural Gas
- Liquefied Natural Gas
- Propane
- Do not have capacity and expertise to maintain AFVs
- No onsite maintenance

7. What types of alternative fuel infrastructure does your fleet currently own or use? (enter Y/N in each cell)

Alternative Fuel/Technologies	Own and/or Operate	Use (public infrastructure)	Would like to expand in next 2-3 years
Electric vehicle charging stations (Level 2)			
Electric vehicle charging stations (DC fast chargers)			
Propane fueling station			
CNG fueling station			
LNG fueling station			
Ethanol blends			
Biodiesel blends			

8. How readily available are each of the following alternate fuels are in your area? Select one of the following for each fuel type: I Don't Know, Not Available, Available but Inconvenient, Available, or Other. If other, please specify.

- Ethanol 85 _____
- Biodiesel _____
- Public EV charging stations _____
- Compressed Natural Gas _____
- Liquefied Natural Gas _____
- Propane _____

9. For alternative fuel vehicles, does your fleet have experience bundling the procurement of the vehicle with the procurement of fueling infrastructure and/or fuel?

- Yes, for electric vehicles
- Yes, for propane vehicles
- Yes, for natural gas vehicles
- Yes, for ethanol vehicles
- Yes, for biodiesel vehicles
- No, but we would be interested in exploring such an approach
- No, and our policies prohibit such procurement strategies

FLEET FINANCING

10. Within your organization, what payback period of cost savings (fuel, maintenance, and life-cycle savings) would be enough to justify the up-front investment in alternative fuel vehicles?

- 1-2 Years
- 2-3 Years
- 3-5 Years
- 5-7 Years
- 7+ Years
- I Don't Know
- N/A: we have no way of justifying higher capital expenses through savings in fuel and maintenance.

11. Rate the following financing mechanisms by how commonly they are used within your fleet for AFVs and for conventional vehicles: Never, Uncommon, Common, or Very Common.

Financing mechanisms	For conventional vehicles	For AFVs
Direct upfront purchase		
Commercial leases		
3 rd party financing		
US General Services Administration		
State bid list		
National cooperative procurement contracts (E.g. HGAC Buy, NJPA, National IPA, US Communities, NASPO ValuePoint, etc.)		
Other (specify): _____		

- If your organization feels strongly about not using one of the financing mechanisms listed above please comment: _____

12. If Fleets for the Future could reduce the cost of **one type of alternative fuel vehicle** for your procurement needs, which vehicle would you want it to be? (Indicate the vehicle fuel type and function. E.g. CNG transit bus, propane school bus, electric pool vehicle, etc.)

Vehicle function: _____

Vehicle fuel(s): _____

Comments: _____

AFV FLEET BEST PRACTICES

13. Fleets for the Future is writing best practice guidelines to aid fleet managers and procurement specialists in procuring AFVs. What topic areas would be most useful to you and your organizations? Specify: High, Medium, or Low interest for each area below.

Topic Area	Electric vehicles	Propane vehicles	Natural gas vehicles	Ethanol vehicles	Biodiesel vehicles
Vehicle procurement decision support (e.g. suitability analysis, vehicle specs, etc.)					
Fueling infrastructure procurement decision support (e.g. siting and needs assessment, usage of public/private stations, setting up payment systems, etc.)					
Vehicle financing methods and incentives					
Infrastructure financing methods and incentives					
Additional requirements to consider for inclusion in procurement documents (e.g. warranty, training, maintenance, and service agreements)					
Operations best practices (e.g. driver training, vehicle dispatching, optimization for fleet needs, etc.)					
Maintenance best practices					
Other: _____					

14. Comments:
