Coordinated Procurement of High Efficiency, Low-Emitting Vehicles in State Fleets in the Northeast: A Discussion Paper

Prepared for:
The April 25, 2002 Meeting on Coordinated Green Fleet Procurement in the Northeast: Opportunities and Challenges

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Introduction

This Discussion Paper seeks to identify and discuss the range of issues related to collaboration among state fleet procurement offices in the Northeast for a coordinated procurement strategy for high efficiency, low-emitting light duty vehicles for its state fleets. For the purposes of this paper the Northeast region is comprised of the states of Vermont, New Hampshire, Maine, Massachusetts, Connecticut, Rhode Island, New York, and New Jersey. This paper has been prepared as part of background materials to be distributed at the April 25, 2002 Meeting on Coordinated Green Fleet Procurement in the Northeast: Opportunities and Challenges.

The twin objectives of enhanced environmental quality and accelerated penetration of advanced technologies are motivating factors for a coordinated procurement strategy for the Northeast. The impacts that on-road vehicles impose on the integrity of local and regional ecosystems, water supplies, public health and amenity, and on economic activity itself are well known. At the global level, vehicles are major contributors to the increasing emissions and atmospheric concentrations of greenhouse gases, which are likely to cause disruption of the earth's climate. The light duty vehicle fleet represents around one fifth of national on-road energy consumption, represents a critical intervention point for the use of clean vehicles that improve urban air quality and protect the global climate.

During the 1990's, there have been several efforts to encourage the introduction of alternative technologies by focusing on federal and state purchases of fleet vehicles to lead the way in the development of clean vehicle markets. Title V of the Energy Policy Act, in response to energy security concerns, suggested tentative targets in the use of alternative fueled vehicle technology. The EPA's Clean Fuel Fleet Program requires fleets in cities with significant air quality problems to incorporate vehicles that meet clean-fuel emissions standards. Other programs such as the US Department of Energy's Clean Cities initiative promotes voluntary commitments and coordinated action by stakeholder groups within participating cities for alternative fueled vehicle procurement and installation of alternative fuel infrastructure.

Unfortunately, these efforts have not resulted in the development of the markets anticipated. For alternative fueled vehicles (AFVs), fleet managers typically complain, among other factors, about the lack of adequate real-time information, inadequate vehicle/parts supply, unstandardized warranty conditions, too many choices, and poor resale potential. Car manufacturers have been slow to commit resources to developing advanced technologies for clean and efficient vehicles because of what they perceive to be small market segments and unpredictable sales.

Into this context, hybrid electric vehicles (HEVs) have become a technology of growing interest to publicly managed vehicle fleets, with over 100 currently in service in state fleets throughout the Northeast. Hybrid electric vehicles (HEVs) combine the internal combustion engine of a conventional vehicle with the battery and electric motor of an electric vehicle, resulting in twice the fuel economy of conventional vehicles. Manufactures tout HEVs as a “no-tradeoff” vehicle technology, which offers the range, rapid refueling, and performance expected from conventional vehicles, with a significant portion of the energy and environmental benefits of an electric vehicle. HEVs are a potentially attractive transitional advanced technology because they have sharply better fuel economy and lower criteria air pollutant emissions compared to conventional and some AFVs. Together with fuel cell vehicles, HEVs have moved to the forefront of transportation technology development.
This Discussion paper discusses the opportunity for Northeast states to move ahead with the introduction of advanced vehicle technology through a coordinated procurement approach. Section 1 addresses the motivation and key questions regarding coordinated procurement. The section that follows lays out the issues related to establishing vehicle procurement standards to achieve environmental benefits and fuel savings. In Section 3, the range of benefits associated with “greening” state fleets in the Northeast is described. Section 4 lays out some of the major challenges facing the implementation of a coordinated procurement strategy. Finally, Section 5 outlines some of the specific questions and issues that will need to be addressed for moving forward with a coordinated procurement strategy in the northeast states.

1. Motivation and Key Questions

Light duty vehicle sales in some Northeast state are already subject to both California and U.S. EPA (federal) emissions standards. Four states – Massachusetts, New York, Vermont, and Maine have enacted a Low Emission Vehicle (LEV) law that requires that all new passenger vehicles sold and registered meet cleaner California motor vehicle emission standards. Moreover, there have been a variety of “green vehicle” procurement initiatives – by either Legislative or Executive action - that aim to reduce the environmental impacts of vehicles and have had implications for vehicle procurement by state agencies. An overview of these initiatives, together with a description of each of the eight state fleet profiles is provided in Annex A.

Why Focus on State Fleet Vehicles?

As mentioned earlier, the transportation sector accounts for a large fraction of criteria air pollutant and greenhouse gas emissions. The Northeast States’ inventories of greenhouse gas emissions (mainly carbon dioxide, or CO2) shows that transportation accounted for about one third of emissions in 1990, and for roughly two-thirds of the increase between 1990 and 2000. Most of this is due to more motor vehicles and worsening fuel efficiency of vehicles. Although state fleet vehicles are only a small fraction of those used, the region can still make significant cuts to its CO2 emissions, and can help lead its residents and businesses to purchase more fuel efficient cars and trucks.

What State Action is Envisioned under a Coordinated Procurement Strategy?

To examine the benefits and challenges of the eight northeast states cooperating in an effort to coordinate their light duty vehicle procurement decisions. The aim of the strategy is to introduce some form of cooperation across state lines in the selection of advanced technology vehicles in order to influence manufacturer production lines, and to get the best deal on low-emitting, high efficiency vehicles (hereafter called “green vehicles”).

What is the Rationale for Pursuing a Coordinated Procurement Strategy?

The rationale for pursuing a coordinated procurement effort is several fold namely, to achieve local/global environmental benefits, to reduce the purchase price of the vehicles, to reduce annual fuel costs, open the market for zero and low emission vehicles, develop the required infrastructure, and reduce the technical and economic risks for state procurement offices. Moreover, by increasing energy efficiency and reducing greenhouse gas emissions from its fleet operations in a coordinated fashion, the Northeast States can demonstrate a leadership role and send an important signal to other regions.
Have Other Jurisdictions Done This?

There has been much momentum achieved over the past ten years in the development of purchasing specifications for green vehicles. Today, about 100 municipalities across the United States are participating in the Cities for Climate Protection, including many in the northeast states region, and in many of them vehicle fuel efficiency is one of the strategies for cutting emissions. Advanced vehicle technologies offer the best opportunities for achieving superior fuel economy.

What Could The Northeast Region Gain From This Strategy?

A coordinated procurement of advanced light duty vehicles rather than a continued reliance on conventional vehicles, or even on AFVs, would bring several benefits to the region such as a) enhancing the purchasing power of fleet managers thereby achieving cost reductions, b) contribute to spurring the national market for advanced technologies, c) achieve significant lifetime fuel savings, d) reduce lifetime carbon dioxide emission reductions, and d) reduce lifetime emissions of nitrogen oxides, carbon monoxide, and volatile organic compounds.

What Actions Could be Taken to Establish Coordinated Procurement in the Northeast?

There are several types of actions envisioned. Action could include a) rewriting purchasing specifications to allow for the purchase of emerging technologies (e.g., hybrid electric light duty vehicles), b) incorporating minimum fuel efficiency standards for new state vehicles in the region, c) incorporating minimum emissions standards for new state vehicles in the region, d) rewriting purchasing guidelines to accommodate action at the regional level, and e) coordinate review purchase requests and "downsize" vehicles or engines when feasible. Other coordinated actions could include a) eliminating high emission vehicles from the fleets as soon as possible, b) implement anti-idling guidelines for state employees, implement employee training programs for efficient driving and routing, and implementing employee trip reduction plans promoting mass transit, biking and alternative methods of transportation to the car.

2. Defining the Characteristics of an Eligible Vehicle

The aim of this section is to identify the selection criteria, technology options, and management measures needed to lay out the elements of a strategy for coordinated procurement in the 8-state region.

A suitable context to consider would be California’s Zero Emission Vehicle (ZEV) Program. The state of California has been the leader in the development of programs designed to reduce emissions from mobile sources. California’s “ZEV Mandate” requires automakers to put small demonstration fleets of ZEVs on the road in the 1990s and then begin major ZEV marketing efforts no later than 2003.

The motivation behind the ZEV program was the realization that there would be a need to move beyond conventional technologies such as the internal combustion engine to achieve long-term clean air objectives. The ZEV program has been acknowledged as a catalyst in the research and development of a variety of technologies including fuel cell, electric, and hybrid-electric technologies.

In anticipation of the move toward advanced technologies in state fleets in the northeast, a simple proposition is offered as a possible approach to defining the characteristics of an eligible vehicle. State fleet managers could define a green vehicle under coordinated procurement strategy in the following ways:
• Advanced technology vehicle that is currently available at car dealerships within the region,
• No additional infrastructure, fuel or operation and maintenance, required at present,
• Meets, at a minimum, the Super Ultra Low Emission Vehicle (SULEV) standard,
• Has a high fuel economy as rated by the EPA, and
• Can be viewed as a transitional technology to fuel cell vehicles that are expected to be commercially available later in this decade.

The rest of this section reviews criteria and programs that have been considered/adopted in other states, considers models currently available that meet the above criteria, and outlines various implementation issues.

What Kinds of Performance Criteria Have Other Jurisdictions Adopted for their Fleet Vehicles?

In Texas, a program has been established - The Texas Clean Fleets Program – which covers all local government fleets with over 15 vehicles (and private fleet with over 25 vehicles) that are operated in non-attainment areas. Vehicles that meet the LEV standard, which includes some gasoline and diesel fueled vehicles, are sufficient to demonstrate compliance. Vehicles required by law enforcement officials, emergency workers, vehicles greater than 26,000 lbs and some others are exempt from this law. The schedule of adoption requires that 10% of state and local fleets must meet LEV standards by 1998, 30% after 1998, 50% after 2000, and 70% of LDVs and 50% of HDVs after 2002. After 1996, 50% of all mass transit vehicles must also comply with the program. Credits can also be accumulated within the program – by purchasing a higher percentage of LEV vehicles, or by purchasing vehicles that meet more stringent standards like SULEV or ZEV. These credits are tradable within a single non-attainment area or can be banked for future use. Rigorous documentation of fleet compliance and credit exchanges is required.

In Europe, there has recently been a major initiative to introduce coordinate procurement across several jurisdictions for fleet vehicle The Zero and Low Emission Vehicles in Urban Society (ZEUS) Project is a European initiative that targeted large fleet operators to achieve environmental benefits, reduce vehicle procurement costs, and help accelerate market transformation for high efficiency, low-emitting vehicles. Case study information about this program is provided in Annex B.

What Kinds of Performance Criteria Have Cities Adopted for Fleet Vehicles?

There are many examples of municipalities taking aggressive action for establishing fuel economy and/or environmental performance criteria for vehicle purchases for their local fleets. Highlights appear in Table 1.

Are there Significant Green Vehicle Options Available in Today’s Market?

There are several vehicle models currently available on the market that would meet criteria for high fuel economy and high environmental performance standards. Some of these models meet the criteria outline above while others represent a significant improvement over the fuel economy and environmental performance of current fleet vehicle. Table 2 summarizes a subset of the models available.
What might a proposed Green Fleet Program for the Northeast look like?

The criteria and initiatives outlined above provide a basis for thinking about what a green fleet resolution in the Northeast might consist of. For the sake of discussion in this White Paper, the following two potential criteria – either a standard-based approach or a technology-based approach -- are proposed as possible approaches for defining an eligible vehicle under a coordinated procurement strategy for cars and light duty trucks in the eight northeast states:

There could be some flexibility on the implementation schedule, to be decided upon after states confer on a workable target. These targets are essentially technology-based. Another option would be to have emissions-based targets but these are harder to monitor and enforce. States have to plan ahead for vehicle procurement and it is easier to pick a technology type rather than calculate a fleet-wide emissions inventory and then adjust purchases of vehicles to match some target emission level.

### Table 1: Examples of Municipal and County Criteria

<table>
<thead>
<tr>
<th>City/County</th>
<th>Program Name</th>
<th>Program Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denver, CO</td>
<td>&quot;Green Fleets&quot; Executive Order</td>
<td>• 10% AFV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1% annual average reductions in fuel expenditures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1.5% annual average reduction in CO₂</td>
</tr>
<tr>
<td>Alachua County, FL</td>
<td>&quot;Green Fleets&quot; Fleet Management Policy</td>
<td>• No specific numerical targets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Guidelines for lower fuel use and emissions, maintaining appropriate-sized fleets.</td>
</tr>
<tr>
<td>Ann Arbor, MI</td>
<td>Resolution in Support of Clean Car Campaign and establishment of a City Green Fleets Policy</td>
<td>• Fuel efficiency of 1.5 times the average for that vehicle’s class,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• meet California’s most stringent tailpipe emissions standards (SULEV)</td>
</tr>
<tr>
<td>Arcata, CA</td>
<td>&quot;Green Fleets&quot; Proclamation</td>
<td>• Still in initial planning stage.</td>
</tr>
<tr>
<td>Fort Collins, CO</td>
<td>Fleet Services ULEV City Policy:</td>
<td>• By 2008, 75% of LDVs in the city fleet will exceed the 1998 ULEV standard.</td>
</tr>
<tr>
<td>Los Angeles, CA</td>
<td>Council Order to Improve Fleet Efficiency (and other actions):</td>
<td>• By 2010, 25% improvement in new vehicle fuel efficiency compared with today</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improvements in AFV fuel efficiency of 5-15% based on vehicle class.</td>
</tr>
<tr>
<td>Madison, WI</td>
<td>Green Fleets Resolution</td>
<td>• No numerical targets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A “Green Fleet” Review Subcommittee to oversee green procurement/management</td>
</tr>
<tr>
<td>Sacramento, CA</td>
<td>&quot;Heavy-duty Low Emission Vehicle Acquisition Policy&quot;:</td>
<td>• 20% of replacements of HDVs in 2001 will be certified low emission 30% in 2002, 40% on 2003 and 50% in 2004 and after.</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>&quot;Healthy Air and Smog Prevention&quot; Ordinance:</td>
<td>• Purchase/lease only ULEV/ZLEV vehicles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Starting in July 2001, at least 10% of all LDVs purchased/leased shall be ZLEVs</td>
</tr>
<tr>
<td>Santa Monica, CA</td>
<td>&quot;Vehicle Management Program&quot; City Policy:</td>
<td>• By 2000, 75% of the City’s fleet to be powered by Reduced-Emissions Fuels.</td>
</tr>
<tr>
<td>Seattle, Washington</td>
<td>&quot;Fleet Management&quot; City Policy:</td>
<td>• No explicit numerical goals.</td>
</tr>
</tbody>
</table>

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1 Excluding law enforcement vehicles and emergency vehicles.
Table 2: Selection of today’s options for efficient and low-emitting cars and light trucks

<table>
<thead>
<tr>
<th>Make</th>
<th>Model</th>
<th>Specs (engine size, cylinder, type)</th>
<th>Technology</th>
<th>Emission Standard</th>
<th>Fuel Economy (mpg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honda</td>
<td>Insight</td>
<td>1.0L 3, car</td>
<td>Hybrid electric</td>
<td>SULEV</td>
<td>57 56</td>
</tr>
<tr>
<td>Honda</td>
<td>Civic Gx</td>
<td>1.7L 4, car</td>
<td>AFV</td>
<td>SULEV</td>
<td>30 34</td>
</tr>
<tr>
<td>Nissan</td>
<td>Sentra Ca</td>
<td>1.8L 4, car</td>
<td>Conventional</td>
<td>SULEV</td>
<td>27 33</td>
</tr>
<tr>
<td>Toyota</td>
<td>Prius</td>
<td>1.5L 4, car</td>
<td>Hybrid electric</td>
<td>SULEV</td>
<td>52 45</td>
</tr>
<tr>
<td>Honda</td>
<td>Accord</td>
<td>2.3L 4, car</td>
<td>Conventional</td>
<td>SULEV</td>
<td>23 30</td>
</tr>
<tr>
<td>Honda</td>
<td>Civic</td>
<td>1.3L 4, car</td>
<td>Hybrid electric</td>
<td>ULEV</td>
<td>46 51</td>
</tr>
<tr>
<td>Dodge</td>
<td>Ram Van 2500</td>
<td>5.2L 8, light truck</td>
<td>AFV</td>
<td>SULEV</td>
<td>13 15</td>
</tr>
<tr>
<td>Dodge</td>
<td>Ram Wagon 2500</td>
<td>5.2L 8, light truck</td>
<td>AFV</td>
<td>SULEV</td>
<td>13 15</td>
</tr>
<tr>
<td>Ford</td>
<td>E-250 Econoline</td>
<td>5.4L 8, light truck</td>
<td>AFV</td>
<td>SULEV</td>
<td>11 14</td>
</tr>
<tr>
<td>Ford</td>
<td>F-150</td>
<td>5.4L 8, light truck</td>
<td>AFV</td>
<td>SULEV</td>
<td>12 16</td>
</tr>
</tbody>
</table>

How Might Vehicle Procurement be Coordinated in the Northeast?

A coordinated procurement process could streamline vehicle acquisition and garner the most favorable prices and service/maintenance contracts. If states can agree on a uniform definition of a green fleet and decide on targets for clean vehicle procurement, then the next step would be to organize a plan for coordinated procurement. There are several considerations and important elements as follows:

- **Procurement Committee.** States could set up a Procurement committee consisting of representatives from each state. This committee would be charged with setting targets and coordinating the procurement process and their decisions would be binding upon the states.

- **New Vehicle Inventory.** Agreeing on and circulate a complete up-to-date list of green vehicles to all states. The list should also include performance specifications so that states can make informed decisions about which vehicles are most appropriate for their purposes. Agreement would also have to be reached on whether to include foreign makes or not.

- **Timing of procurement.** To maximize the benefit from coordinated procurement, it might be strategic to consider the timing of purchases. This could be an annual or semi-annual process.

- **Bidding Process.** The procurement order would then be opened to manufacturers in a bidding process. As far as possible, it would make sense to choose suppliers that have local dealerships in all states so that delivery and after-sale services are prompt and easily accessible.

- **Evaluation.** Once bids are tendered, they could be considered on several grounds: price, performance, service contracts, provision of training in maintenance. States would decide in advance on a process of weighing each of these criteria and making the optimal choice.

- **Contracting.** The winning bids could then proceed to making a contractual agreement that could either be drawn up by a Procurement Committee or by each state individually.
• **Documentation.** Record keeping, as per standard state procedures could be adapted so that this information can inform decisions in future years.

All this seems to imply a major change in procurement practices. The major change would be a shift from a procurement process that is diffused and uncoordinated to one that is centralized around the purchase of a certain number of vehicles that meet certain environmental and efficiency criteria. Care would need to be taken to ensure that the system retains flexibility and transparency.

3. **Benefits of “Greening” Fleets in the Northeast**

A well-designed ‘Green fleets’ initiative can have many benefits. These are best accomplished in a framework of a public-private partnership, such as the Clean Cities Coalitions, but states can play a major role in setting an example for the private sector. State fleet managers can improve awareness of the incentives for acquiring advanced technology vehicles, as well as all the potential benefits.

The costs of adopting a strategy of fleet “greening” could be reduced if states were also to adopt coordinated vehicle procurement policies. Through coordination, they might be able to negotiate better deals with car manufacturers interested in high volume sales. Also, the process of identifying and applying for funding for these programs could become more streamlined. A “Green Fleets” initiative should be seen as part of a broader range of policies aimed at improving overall environmental performance.

The range of benefits that could be achieved from a coordinated procurement initiative in the northeast states include:

• **Reduced emissions of criteria air pollutants.** Lower emissions of criteria air pollutants, leading to improved air quality, which is especially important for non-attainment areas. This improved air quality can have several health and environmental benefits, including avoidance of respiratory illnesses, asthma and cancers, improved visibility, improved crop yields and reduced damage to exteriors of buildings and structures. In urban areas, exhaust from gasoline and diesel-burning vehicles accounts for 60 to 90 per cent of total air emissions. A graphical representation of emission standards is shown in Figure 1.

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**Figure 1: Lifetime Average In-Use Tailpipe Emissions for Cars**

![Graph showing emissions rates for different categories of vehicles](image)

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• **Fuel Savings.** Procurement of high efficiency vehicles can contribute to substantial annual fuel savings. While the total fuel saving benefit depends on a baseline condition (i.e., what would be the fuel consumption in the absence of a coordinated procurement policy), one can gain a sense of the magnitude of the savings from the Table below which shows the annual savings per vehicle, under a fuel price range between $1.00 to $2.60 per gallon, assuming 15,000 vehicle miles traveled per year and an average baseline fuel economy of new vehicles equal to 20 mpg.

<table>
<thead>
<tr>
<th>Fuel Price ($/gallon)</th>
<th>mpg 70</th>
<th>mpg 65</th>
<th>mpg 60</th>
<th>mpg 55</th>
<th>mpg 50</th>
<th>mpg 45</th>
<th>mpg 40</th>
<th>mpg 35</th>
<th>mpg 30</th>
<th>mpg 25</th>
<th>mpg 20</th>
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<td>$2.60</td>
<td>$1,393</td>
<td>$1,286</td>
<td>$1,179</td>
<td>$1,071</td>
<td>$964</td>
<td>$857</td>
<td>$750</td>
<td>$643</td>
<td>$536</td>
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<td>$2.40</td>
<td>$1,350</td>
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<td>$1,038</td>
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<td>$2.20</td>
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<td>$2.00</td>
<td>$1,241</td>
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• **Energy Security.** Contribution to energy security by reducing dependence on imports. The transportation sector currently accounts for about two-thirds of all U.S. petroleum use, and consumption in this sector alone exceeds U.S. petroleum production by 5.9 million barrels per day. This gap between domestic transportation consumption and domestic production has been growing steadily since 1975 and is projected to be 12.8 million barrels per day by 2020. This situation creates a growing vulnerability to international oil market conditions.

• **Petroleum Displacement.** Reduced petroleum demand (due to displacement by alternative fuels) can hold down world oil prices and reduce the possibility of oil price shocks caused by short-term shortages in supply. Even moderate use of alternative fuels can lead to measurable benefits to the U.S. economy, and to the economy of states. Since the passage of EPAct in 1992 until today, the cumulative savings due to the use of alternative and replacement fuels are estimated to be $9 billion. Increasing non-petroleum fuel use to 10% of motor fuel use by 2010 is estimated to increase oil market benefits to $6 billion per year, for a 2000-2010 cumulative savings of $35 billion.³

• **Market transformation.** Possible stimulation of the national market for green vehicles as manufacturers respond to demand. Stimulation to the development and deployment of new highly efficient and clean technologies such as fuel cell cars. Creation of a critical mass of AFVs that would improve the economics of developing AFV infrastructure such as refueling stations.

• **Climate Benefits.** Contribution towards greenhouse gas mitigation, which can lower the threat of global warming. The United States generates about a quarter of worldwide carbon dioxide emissions, with transportation fuels accounting for over 30% of that total.

4. Some Challenges Facing “Greening” State Fleets In The Northeast

As discussed earlier, coordination among the Northeast states to procure green vehicles is intended to further several goals. Cooperation in purchasing should create the kind of significant demand for vehicles that yields volume discounts from suppliers. At the same time, these transactions would help the region gain experience and comfort with advanced technology vehicles, and result in reduced technical and economic risks for state governments and an expanding market in the Northeast. If a decision is made to proceed with e HEV strategy, there are no fuel infrastructure issues to consider, as there continue to be with AFVs. Resultant environmental benefits would also grow with the market, helping the Northeast states meet energy consumption, and air and water quality goals.

There may be, however, some potential issues to consider in coordinating green fleet procurement among the Northeast states. States may find it difficult to purchase green vehicles in cooperation with other states, whether because of established practices and relationships or the fact that green vehicle technology is relatively new and unfamiliar to many. It may be challenging to supply vehicles due to historical roles and relationships, or due to the technology. Finally, some aspects of the market, particularly in its initial stages, may make green vehicle procurement even less desirable. Potential challenges falling into each of these categories are discussed below.

What are Some of the Potential Procurement Challenges?

Statutes, regulations, and convention each dictate or influence how a state may approach procurement of vehicles, regardless of whether they attempt to do so in cooperation with another state or not. Coordination among states compounds the challenges as each state must resolve internal issues and come to an agreement with other states that each have unique internal barriers, standard practices, and criteria for vehicles.

• **States may be limited by statute from making binding commitments.** This would preclude them from making the kind of written agreement for a larger production run that auto manufacturers need to offer lower costs. It may also minimize their ability to formally cooperate with other states.

• **Existing commitments.** State agencies may already have commitments to existing vehicle lease agreements, and may be contracting for vehicles separately from each other. This lack of coordination within a state would divide the buying power of a single state and increase the challenge of coordinating among different states.

• **Every state is different.** Each state has an established way of doing business, as well as unique economic, geographic, and cultural circumstances. Choosing to cooperate in vehicle procurement with other states will require deviation from the status quo. Even if each is agreeable, the pace at which they can move to accept such change is likely to differ and complicate coordination.

• **Competing criteria.** Purchasing green vehicles may conflict with or compromise other commitments, such as purchasing American made vehicles, or safety and performance standards. Limiting the pool of potential models purchased to those produced in the United States may remove the most appropriate vehicle from contention and minimize competition among automakers for the states’ business. Safety and performance standards differ from application to application within a state, as police cruisers must meet very different criteria than a state agency car or day care van. They may well differ from state to state, too, requiring reconciliation for multi-state procurement to be possible.
Vehicle as status symbol. Regardless of the state policy, it is state employees who would be using the green vehicles purchased. If larger, more powerful cars are associated with job status, employees may be reluctant to accept an alternative. Low user support such as this would only undermine an effort to integrate green vehicles into the state fleet.

What Are Some of the Potential Supply Challenges?

Should the Northeast states be able to surmount the challenges and cooperate in green vehicle procurement, there are supply-side issues that would need to be addressed. Existing relationships, agreements, and standard practices do not provide the automaker with much latitude to enter into an agreement that would meet the needs of coordinated state government customers.

The role of the local dealer. In the United States, auto manufacturers sell vehicles to state and local governments only through their local dealers. This convention (often formalized in agreements with the distributors) complements the general preference (often codified) of state governments to purchase from local dealers in order to support the state economy and local communities. However, the need to go through a local dealer may further complicate an effort to coordinate procurement and/or to purchase a relatively large number of vehicles.

Automaker resistance. Historically dominant in the market, automakers may be reluctant to accept the contract terms and format needed by purchasers for coordinated procurement. Even if their customers are able to amass the clout needed to influence terms, existing agreements between auto manufacturers and their dealerships may preclude deviation from standard operating procedures.

Vehicle service and maintenance. Relatively unfamiliar or new technology could pose a difficult challenge for fleet maintenance staff, making service and maintenance more time consuming and expensive. This may also be the case if staff must maintain cars made by more than one manufacturer. Spare parts may not be locally available or easily obtained. In some previous instances of green vehicle procurement managed through the ZEUS Procurement Consortium in Europe, manufacturers supplied maintenance as per contract terms. However, this was only possible when a particular automaker’s cars reached a critical mass in an area, and its replication in the Northeast US may be further complicated by the traditional relationship between manufacturers, dealers, and service provision.

What Are Some of the Potential Technology Challenges

The very nature of this endeavor reflects the fact that green vehicle technology and support infrastructure is not in widespread use in the Northeast. Its newness and the general lack of familiarity with green vehicles, creates additional challenges for a procurement effort. Perceptions of green vehicles complicate the issue, as do broader questions on the appropriate allocation of limited state resources.

New technologies. Alternative fueled, and electric vehicles represent emerging and to some degree unproven technologies. This may complicate service and maintenance of state fleets (as described above), may confuse users (potentially creating a greater need for service), and would discourage the participation of risk-adverse state governments and insurance companies. The hybrid electric option, on the other hand, is only volume-limited at present.
• **Fueling infrastructure.** Alternatively fuelled vehicles require fueling infrastructure that may not be widespread. Although availability of a particular fuel would develop along with the market for the vehicles it serves, a base level of infrastructure is needed for a given technology to gain a foothold in the first place. The job of creating this base infrastructure may fall to the state government purchasing such infrastructure-dependant vehicles, thus adding cost and complication to the venture. It would seem preferable to select one technology or fuel in which to invest, but that choice is complicated by the fact that vehicles powered by different fuels are suited to different, but common, tasks.

• **Reputation as unreliable.** Some green vehicle technologies, particularly electric vehicles, have in the past earned a reputation as unreliable and limited in their use. This reputation may cloud current perceptions of green vehicles, electric and others, and lead to reluctance to give advanced technology vehicles, including hybrid electric, a try.

• **Big effort for modest results.** The aggregate emission reductions of changing over the state fleet may not be significant relative to the overall vehicle fleet, or indeed relative to other investments that might be made in conserving energy or cleaning the environment. A state with limited staff and monetary resources may choose to invest them in other initiatives that appear to offer more “bang for the buck.”

### What Are Some of the Potential Market Challenges

As with several of the technological challenges, the relative immaturity of the green vehicle market creates additional challenges. In particular, this creates added short- and long-term costs for state governments that would probably not exist in a more fully-developed market.

• **Potentially greater initial investment.** There often are higher capital costs for green vehicles. Long-term savings in maintenance and fuel consumption may more than counteract these, but unclear long-term environmental benefits cloud the issue.

• **Insurance.** Insurance companies are inherently risk-sensitive. It is critical that they be willing to insure the green vehicles purchased by a state (with which they may have a standing agreement), but that insurance may come at a higher price, as costs tend to be higher for relatively new and unproven technologies.

• **Reduced residual values.** There is some indication that the residual and resale value of a vehicle can be depressed if the initial sale has been discounted. Residual value may also be impacted if the vehicle uses a relatively new and/or poorly supported technology, such as for AFVs, which would likely affect the aftermarket for it. For the hybrid electric option, it is too soon to tell.

Although the effort to coordinate state procurement of green vehicles within a region is a unique undertaking, all of the challenges described above have been surmounted in previous green fleet procurement initiatives. A selection of examples is described in the following section.

### 5. Toward a Coordinated Procurement Strategy for the Northeast

The discussion in the previous sections has laid out some of the issues, benefits, challenges associated with a coordinated strategy to procure high efficient, low-emitting light duty vehicles. Pursuing such a strategy for the northeast states implies resolving some issues involving the choice of an appropriate standard, identifying and addressing potential barriers, and devising implementation modalities. As step toward defining the parameters for a
coordinated procurement policy, the following specific questions will require policy and analytical attention

*What is the appropriate way to define a “Green Vehicle?”*

The definition issue is a key starting point that folds in issues of technology, environmental target and customer needs. The following are some of the key questions that will need to be resolved.

- Should it be environmentally defined: e.g., apply the SULEV standard to new purchases?
- Should it be technologically defined: e.g., a hybrid electric vehicle?
- Should it be established with flexibility in mind: e.g., meeting a fleet wide fuel economy or emissions standard by a certain year?

*What are the potential barriers for the Northeast States?*

There may be jurisdictional and other barriers that would inhibit the coordination across state and agency boundaries for vehicle procurement. The following is a list of some of the questions that would need to be resolved.

- Where will the financial resources come from if switching to green fleets involves higher short-term capital costs?
- Would individual agencies within states potentially need to yield authority/oversight of their vehicles to another state agency?
- Will there be any insurance concerns if it involves a switch to the use of lighter vehicles?
- If hybrid vehicles are introduced, will there be the resources to upgrade the skills of maintenance staff?
- Will vehicle resale value be adversely affected, given that there may be low demand for some types of green vehicles?

*How should a Green Fleets Program be implemented in the Northeast States?*

Implementing a coordinated procurement system raises a set of additional questions to the ones identified above. Some of these are as follows:

- Should the policy be voluntary, or would it only be successful in mandated by legislative or executive action?
- Would the states need to implement a new coordinated state-wide program to acquire, manage, track, and maintain vehicles?
- Would the states need to introduce new accounting techniques (i.e., life cycle costing) to justify purchases of green vehicles?
- How will the performance of the program be monitored?
- How will compliance with existing alternative fuel requirements be affected?
- Would the states need to terminate current leasing commitments?
- How will customer service be affected?
- Are there any vehicle lifetime issues?
Annex A: Overview of Existing State Fleet Characteristics in the Northeast

**Vermont**

Green vehicle procurement initiatives in Vermont have progressed steadily within the past eight years so that vehicle procurement has come to be recognized as a management issue requiring close attention. While state vehicle fleets are reported to be well managed in some state agencies, they are known to be lacking in sufficient management in other state agencies. Historically, there has been no control authority of fleet assets in state government; creating the potential for uneconomical use of equipment, materials and maintenance.

The total number of state-owned vehicles in Vermont totals over 700 vehicles. An estimate of the light duty vehicle fleet profile is shown in the Table below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>700</td>
</tr>
<tr>
<td>Hybrid electric</td>
<td>10</td>
</tr>
<tr>
<td>Electric</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>735</strong></td>
</tr>
</tbody>
</table>

In 1994, there was a major environmental initiative in Vermont that has had implications for vehicle procurement by state agencies. Executive Order #06-94 established a Clean State Program for state agencies. This program was to be managed by the Vermont Clean State Council, which includes members of the cabinet and coordinated by the Department of Environmental Conservation. The Council’s responsibilities include the development of programs, plans and policies that promote pollution prevention and resource conservation throughout state government, including vehicles.

An Implementation Plan for the Clean State Program was developed by the Council in consultation with the State's Purchasing Advisory Council containing a number of goals that were incorporated into a 5-year plan. One of these goals was to institute fleet management practices that improve pollution prevention and energy efficiency. Specific actions include a) expanding the usage of the existing contracts for recycled automotive products including retread tires, automotive batteries, re-refined oil and rebuilt automotive parts through increased education and b) update Administrative Bulletin to reflect environmental considerations about how fleet should be managed.

The Vermont Clean Cities/Clean State Coalition was established in January 2000 to identify and expand the AFV market for the state of Vermont. The Vermont program encompasses the entire state, rather than a single city or metropolitan area. An electric vehicle demonstration program was set up in 1993 under the name EVermont and this was expanded to include all AFVs in 1998. EVermont manages 18 AFVs for the State of Vermont and by 2005 this number is expected to be 38. By 2005 other state agencies are projected to have another 45 AFVs between them.

**New York**

New York has one of the most successful AFV programs in the country, with strong backing from the state government.

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4 This action applies to Purchasing, Department Recycling Coordinators.
5 This action applies to the Fleet Management Committee.
The total number of state-owned vehicles in New York totals almost 13,000. An estimate of the light duty vehicle fleet profile is shown in the Table below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>10,919</td>
</tr>
<tr>
<td>CNG</td>
<td>1275</td>
</tr>
<tr>
<td>Ethanol</td>
<td>294</td>
</tr>
<tr>
<td>Propane</td>
<td>86</td>
</tr>
<tr>
<td>Electric</td>
<td>155</td>
</tr>
<tr>
<td>Hybrid electric</td>
<td>24</td>
</tr>
<tr>
<td>Methanol</td>
<td>70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12,823</strong></td>
</tr>
</tbody>
</table>

Governor Pataki’s Executive Order No. 111, “Green and Clean State Buildings and Vehicles”, issued in June 2001, set AFV acquisition goals for the state which exceed those required under EPAct. The Order states that by 2005 at least 50% of new LDVs acquired by state agencies shall be AFVs, and by 2010 100% of new LDVs will be AFVs. In 2001, New York state acquired 644 EPAct eligible vehicles, of which 522 were AFVs. In addition, agencies not covered by EPAct acquired an additional 77 AFVs, bringing the state total to 599. The overall number of EPAct-legible AFVs acquired in the state between 1998 and 2001 was 3,627.

**New Jersey**

New Jersey is in compliance with the Federal EPAct mandate, and in addition has in place a state mandate for further acquisition of AFVs. Vehicle procurement is carried out through a centralized procurement procedure that allows the state to obtain favorable contract agreements due to the high volume of purchases.

The total number of state-owned vehicles in New Jersey totals about 9,900 vehicles, of which about 1904 are Alternative Fuel Vehicles. An estimate of the light duty vehicle fleet profile is shown in the Table below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>8,000</td>
</tr>
<tr>
<td>Bi-fuel CNG</td>
<td>1,635</td>
</tr>
<tr>
<td>Dedicated CNG</td>
<td>110</td>
</tr>
<tr>
<td>Propane</td>
<td>99</td>
</tr>
<tr>
<td>Hybrid electric</td>
<td>60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,904</strong></td>
</tr>
</tbody>
</table>

New Jersey began a demonstration program for AFVs in 1991, which was then converted into the EPAct program in 1997. In 1999, Governor Whitman announced several initiatives to expand the New Jersey AFV fleet (see, for example, Executive Order 94), including a commitment to acquire more vehicle than required under EPAct (5% more, starting in 1999), ensuring that these vehicles met low emission vehicle (LEV) standards in 1999 and 2000 and ULEV standards in 2001 and after, creating an expanded refueling infrastructure.

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6 Estimate provided by George Krumenacker in a phone conversation on April 19, 2002.
Massachusetts

Massachusetts has one of the nation’s largest electric vehicle demonstration programs, a project of the Massachusetts Division of Energy Resources (DOER) that was started in 1994. It is home to the Boston Clean Cities Coalition.

The total number of state-owned vehicles in Massachusetts totals about 9,000\(^7\), of which 405 are AFVs. An estimate of the light duty vehicle fleet profile is shown in the Table below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>8,595</td>
</tr>
<tr>
<td>Dedicated CNG</td>
<td>132</td>
</tr>
<tr>
<td>Bifuel (Gas/CNG)</td>
<td>136</td>
</tr>
<tr>
<td>Bifuel (Gas/Propane)</td>
<td>4</td>
</tr>
<tr>
<td>Electric</td>
<td>54</td>
</tr>
<tr>
<td>Hybrid electric</td>
<td>5</td>
</tr>
<tr>
<td>Flex fuel</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>9,000</td>
</tr>
</tbody>
</table>

In 1996, the Weld administration issued an executive order (Executive Order #388) requiring state fleet managers to comply with EPAct AFV purchase requirements (i.e. 10% of its fleet as AFVs beginning in Fiscal Year 1997, increasing to 75% of the fleet by 2001). The Order further requires the Operational Service Division (OSD) to begin purchasing electric vehicles in 1998 at a rate of 5% of fleet purchases, reaching a maximum of 10% in Fiscal Year 2000.

Connecticut

Connecticut was one of the first states to put in place incentives for the purchase of alternative fueled vehicles, but it has had mixed success in obtaining results. Most of the activity is occurring at the state and municipal level. The state has acquired 25 natural gas powered police cars. Connecticut is home to six Clean Cities Coalitions.

The total number of state-owned vehicles in Connecticut totals 4000 vehicles. An estimate of the light duty vehicle fleet profile is shown in the Table below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>3,148</td>
</tr>
<tr>
<td>CNG</td>
<td>600</td>
</tr>
<tr>
<td>Flex-fuel</td>
<td>250</td>
</tr>
<tr>
<td>Hybrid electric</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>4,000</td>
</tr>
</tbody>
</table>

There are several legislative initiatives affecting the purchase of Alternative Fuel Vehicles such as C.G.S. Sec 12-217i that allows for tax credits for expenses related to the purchase and

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\(^7\) The Clean Cities Coordinator is David Rand, who can be reached at (617) 727-4732 ext. 138, or via email at david.rand@state.ma.us.

\(^8\) These are the total number of vehicles purchased or leased by the Office of Vehicle Management on behalf of the Executive Branch departments in Massachusetts.
use of AFVs, C.G.S. 12-412-67,68,69 that exempts such purchases from sales tax, and various Public Laws.

**Maine**

Maine has adopted the California vehicle exhaust emissions requirements, excluding the zero emission vehicle mandate. (Reference New Motor Vehicle Emission Standards, Department of Environmental Regulation, Chapter 127). The Finance Authority of Maine manages the Clean Fuel Vehicle Fund, a non-lapsing revolving loan fund that may be used to purchase alternative fuel vehicles (AFVs) and to develop infrastructure to support the use of AFVs. (Reference Statute Title 10, Section 1023K)

Maine provides a partial tax exemption for the purchase of clean-fuel vehicles. For original equipment manufacturer (OEM) vehicles, the incremental cost of the sale or lease of a clean-fuel vehicle as compared to an identical vehicle powered by gasoline is tax-exempt. When there is not an identical vehicle powered by gasoline, the exemption is for 30% of the price of internal combustion engine vehicles, and 50% of the price of electric and fuel cell vehicles. The tax exemption expires January 1, 2006. (Reference Statute Title 36 Section 1760)

**New Hampshire**

In New Hampshire, the AFV Project began in the early 1990s through the establishment of an interagency working group. The New Hampshire state fleet currently has 75 alternative fueled vehicles (including 16 electric vehicles, 41 flexible fuel vehicles, 16 natural gas vehicles and 1 propane van and 1 bi-fuel vehicle), and is mandated to make AFVs 75% of their vehicle purchases as a result of EPAct. This however, does not tell the whole story. Many of the vehicles purchased are exempt from EPAct because Concord, the state capital, is not in a non-attainment area. This means NH has been amassing credits for EPAct since reporting began. This year's inclusion of the University of New Hampshire fleet has brought those credits down sharply, but there is reason for the state to be excited. Legislative or Executive Initiatives

As far as its state fleets go, New Hampshire is in a bit of a transition. The state has offered a generous incentive to all agencies in the past, but because of the current CMAQ budget, and the lack of future funds until 2005, it will need to lower its incentives to the agencies in an effort to stretch this money out. This is not perceived to be a problem as the expectation is that agencies who have purchased these vehicles with state help in the past, will continue to do so because of their past experiences with the vehicles. The focus is to get the remaining CMAQ money out to Agencies who haven't purchased any yet to expose them to the idea of AFVs.

The University of New Hampshire (UNH) has received a Congressional Earmark of $1 million from the Federal Transit Administration to construct a fast-fill Compressed Natural Gas (CNG) refueling station as well as the acquisition of several CNG Transit busses. This funding was secured by Senator Smith.

UNH is also requesting $500,000 in CMAQ money to fund the "public" portion of the CNG station as well as money to cover the incremental costs of CNG passenger vehicles. This station will create another center for CNG vehicles and allow not only the state's fleet, but private fleets as well to travel further in their CNG vehicles. Currently, the only fast-fill

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9 For more information, please contact Ron Severance of the Department of Environmental Protection at (207) 287-2437.
station in NH is in Concord, but without adequate infrastructure in other parts of the state, the CNG fleet has been forced to strategic travel around Concord or near other infrastructure outside of the state. This new station will make it easier for anyone with a CNG car to visit NH.

Rhode Island

The state of Rhode Island currently operates a fleet of 227 alternative fueled vehicles. In 2000 the state of awarded $4.5 million in Congestion Mitigation and Air Quality Improvement Plan (CMAQ) funds to the Ocean State Clean Cities Coalition for a comprehensive statewide alternative fuel market development project, which is already under way. The coalition expects to build or upgrade four of the state's CNG stations by this fall. Targeted stations are located in Providence; Cranston; Warwick; Green Airport (one of the fastest growing airports in the country); and Middletown/Newport. The stations will support several of the region's niche fleets, including Rhode Island Public Transit Authority buses and state fleet AFVs. The Ocean State coalition will also use the CMAQ money to fund the incremental cost of 250 AFVs and to support training and public outreach activities.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>30</td>
</tr>
<tr>
<td>CNG</td>
<td>66</td>
</tr>
<tr>
<td>Electric</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
</tr>
</tbody>
</table>

For tax years beginning on or after January 1, 2001, a taxpayer entitled to the federal qualified electric vehicle (EV) tax credit shall be entitled to a credit against the tax imposed under Rhode Island Code §44-30-2.6. The credit shall be 25.5% of the federal qualified EV tax credit for tax year 2001 and 25% of the federal qualified EV tax credit for tax year 2002 and thereafter. (Reference Rhode Island Code §44-30-2.6)

The sale, storage, use, or other consumption of alternative fuels (as defined by the Energy Policy Act of 1992) are exempt from the sales and use taxes imposed under Rhode Island Code §44-18-30. Additionally, the incremental cost associated with the purchase of a new dedicated AFV, costs associated with the conversion of a gasoline or diesel-fueled motor vehicle to run on an alternative fuel, and all costs associated with the construction of alternative fuel refueling/recharging stations are exempt from sales and use taxes. 'Incremental cost' means the increase to the sale price of an AFV, above the sale price of a comparable motor vehicle, which increased sale price is attributed to the vehicle being equipped to render it an AFV. These tax exemptions are effective from January 1, 1998, to December 31, 2002. (Reference Rhode Island Code §44-18-30)
Annex B: Lessons from a Recent Coordinated Procurement Initiative

Started in 1996, the ZEUS project is a unique coordinated procurement effort, undertaken across national boundaries by eight European cities (see Figure 2). Each of these cities have made formal commitments to promote zero and low emission vehicles as an important element of sustainable urban mobility.

The explicit goals of the ZEUS project are to help remove market obstacles to the widespread use of these vehicles, such as high costs of vehicles, lack of infrastructure and lack of incentives for early market penetration, with the recognition that city administrators can play a key visible role in the process. But what truly differentiates this project is the ambitious coordinated procurement plan that, in three years, put over a thousand zero and low emission vehicles into use in Athens, Bremen, Copenhagen, Helsinki, London/Coventry, Luxembourg, Palermo and Stockholm. The plan was also supplemented by other initiatives to lower the environmental of transportation choices such as encouraging the use of public transit, car pooling, biking, walking and educating the public about sustainability issues.

How Did the ZEUS Coordinated Procurement Process Function?

The ZEUS Procurement Consortium (ZPC) was formed in late 1996 with representatives from each of the eight cities, and took up the task of organizing the purchase of electric and natural gas cars. The budget provided for the period 1997-2000 was 60 million EURO, of which about 9% (i.e., 5.5 million EURO) was a subsidy from the European Union.

ZPC representatives drew up a list of performance and use requirements, decided on a procurement process, and decided on a tender invitation (Box 1 describes the procurement process for electric cars). After bids were received, they were evaluated relative to agreed-upon criteria. The ZPC then chose from among preferred tenders, negotiated Framework agreements and supply, and drew up contracts with preferred tenders. A novel feature of the Draft Framework Agreement was the inclusion of an option right transfer, which would allow third parties, outside the ZPC, to take advantage of pre-negotiated purchase conditions to maximize the total number of vehicles bought and thus reduce price. During the period 1997-2000, over 1,200 vehicles were procured. The purchase goals across the eight cities and the various technology types are as summarized in the Table below.

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10 Biogas vehicles were on the original list, but were dropped due lack of common criteria.
Table 14: ZEUS Vehicle Purchases (1997-2000)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Cars and small vans</th>
<th>Medium size Vans</th>
<th>Large vans and light trucks</th>
<th>Buses</th>
<th>Heavy trucks and special purpose vehicles</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>271</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>278</td>
</tr>
<tr>
<td>Hybrid electric</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>CNG</td>
<td>308</td>
<td>5</td>
<td>75</td>
<td>24</td>
<td>12</td>
<td>424</td>
</tr>
<tr>
<td>Biogas</td>
<td>175</td>
<td>45</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>223</td>
</tr>
<tr>
<td>LPG</td>
<td>71</td>
<td>4</td>
<td>167</td>
<td>5</td>
<td>0</td>
<td>247</td>
</tr>
<tr>
<td>RME</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>45</td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>Ethanol</td>
<td>23</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>849</td>
<td>54</td>
<td>242</td>
<td>82</td>
<td>22</td>
<td>1249</td>
</tr>
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What Were some of the Results of the Coordinated Procurement Process?

According to representatives of the ZEUS project, the coordinated procurement procedure turned out to be quite successful. There are several results that support this conclusion as summarized below:

- **Lower Procurement Costs.** Prices achieved were lower than those paid for comparable vehicles bought individually. For example, FIAT agreed to supply electric cars at a 25% markdown, and Peugeot and Citroën agreed to supply electric vehicles at prices competitive with conventional vehicles.

- **Contribution to Market Transformation.** Suppliers on the verge of launching new products appreciated the boost brought about by coordinated procurement.

- **Greater Purchasing Power.** The negotiating strength of purchasers was increased, as demonstrated by the fact that suppliers accepted certain unusual contract conditions such as an acceptance of an upper limit of prices on spare parts, commitment to maintenance over a period of time.

What Challenges Emerged with the ZEUS Coordinated Procurement Process?

There were several challenges and problems that emerged at the coordinated procurement process unfolded. These are outlined below.

- **Harmonization across jurisdictions.** Some tenders received were valid for some but not all ZPC member countries since some suppliers could not provide after-sales service in all the ZEUS markets or could supply right-hand drive vehicles required in the UK.

- **Supplier resistance.** Some manufacturers were resistant to the contract requirements because of the traditional dominant role of suppliers in the auto market. Also, many manufacturers have agreements with their distributors that limit their freedom to negotiate contracts on a central coordinated level.
- **Limited vehicle options.** There is a limited number of vehicles and suppliers for AFVs. However, this did not turn out to be a limiting factor on finding vehicles adequate to fit all the necessary purposes, and the available options are constantly expanding.

- **Vehicle performance.** There were some initial performance problems with the Fiat 600 Elettra, which was based on a new technology with ZEUS being the first purchasers of the cars, but this was quickly rectified by the supplier under the warranty agreements.

- **Delivery delays.** Delivery delays were common. However, this was not considered to be a problem unique to the coordinated procurement system.

- **Operation and maintenance.** Fleet managers were unsure about running and maintaining vehicles they had so little experience with, and also did not like short driving range of some of the vehicles. Many of these problems can be overcome with time. It is useful to negotiate some on-site training in maintenance and repairs in the original contract with suppliers. The use of AFVs can be combined with traditional low emission vehicles so that they are put to their most suitable use. In Europe it was found that most city fleet cars drove 35-50 km or less per day and very few drive over 200 km. Yet the perception was that an AFV had a “range problem” if it could not be driven for at least 250 km without refueling. In fact, commercially available electric cars can be expected to run at least 70 km between charges and would be more than adequate for most city uses.

**Did the Process Achieve Tangible Environmental Benefits?**

Each of the cities in the ZEUS project is different, facing different transportation and environmental issues. Some cities like Palermo, have serious air pollution problems, so there was a very favorable perception about electric cars. However, in cities like Bremen where congestion is the main problem, electric cars did not provide a solution. To increase the purchase of AFVs, the cities experimented with incentives such as free parking, access to special traffic lanes, free electricity for refueling and providing rental AFVs to familiarize the public with these vehicles.

Almost all ZEUS cities achieved reduced exhaust emissions of CO, NOx and HC, a majority of cities also achieved CO₂ savings. Electricity generated from solar, wind or hydroelectric sources could be an additional source of fuel for electric cars. In Palermo, for example, 35% of electricity for the fleet of electric cars is generated from solar energy, leading to particularly low emission levels.

**What Recommendations have emerged from the ZEUS Project**

The experience of ZEUS has shown that it is possible, and indeed desirable, to undertake green fleets programs with coordinated procurement. In this case, such coordinated procurement was achieved across national boundaries even. Beyond procurement, there might also be benefits in pooling resources to build infrastructure for AFVs. Other results and recommendations to fleet managers include the following:

- **Technology issues.** Use fairly mature alternative fuel technologies, reserving prototypes and experimental vehicles for testing, perhaps with the help of a local university.

- **Testing issues.** Test vehicles in “real world” settings. Bi-fuel vehicles often show a disappointing performance since the tendency is to simply run them on conventional fuels instead of alternative fuels. It is essential to conduct surveys to better monitor performance of new vehicles and maintain good service records.

- **Fuel issues.** Introduce one type of fuel at a time to avoid complications.
• **Supply issues.** Consider single-supplier contracts to simplify service and maintenance, and ensure that good service contracts are negotiated at the time of purchase.

• **Service issues.** It took time to build up a good service network. Most manufacturers require stipulated sale volumes to make local service guarantees feasible, which is yet another reason why coordinated procurement is a good idea.

• **Repair issues.** Mechanics interviewed in all ZEUS cities reported that maintenance of AFVs was more time-consuming and difficult than conventional vehicles, but this was only true for RME, CNG and LPG vehicles not electric vehicles. This might have been due to better support and training provided by suppliers of electric vehicles.

• **Coordination issues.** Get political commitment for the program and keep political leaders informed about progress.

• **Infrastructure issues.** Public authorities must be prepared to invest in infrastructure for AFVs. In many ZEUS cities it was necessary for municipalities or cities to take an active role in providing the infrastructure. Investing in fast fueling stations for CNG and fast charging stations for electric vehicles can make AFVs more attractive to consumers.