

August 27, 2004

Greg Kerr
Propane Education and Research Council
1140 Connecticut Ave. NW
Suite 1075
Washington, DC 20036

RE: Revised Final Report for Docket Number 10026/DE-FG01-99EE50603

Dear Greg:

The following is Sustainable Energy Strategies, Inc.'s (SESI) final report summarizing the twelve projects contained under *Docket 10026: Propane Vehicle Demonstration Grants*. PERC's investment of \$350,000 raised more than \$3.7 millions for propane vehicle demonstration projects. This is almost an \$11 match for every dollar spent by the Council. The US Department of Energy, our initial partner under this grant program, provide \$250,000. DOE's investment returned almost \$15 for every dollar spent. Details on each grant can be found in the subgrantees' final reports submitted to PERC as they were received.

This project impacted more than 10 different states, 179 vehicles and 15 new propane fueling facilities. Based on estimates provided, this project will generate a minimum of 1,441,000 new gallons of propane sold for the vehicle market annually. These numbers certainly speak to the success of this demonstration effort. Additionally, two new off-road engines were brought to the market.

The following provides a brief description of the subgrant projects, their successes and failures.

City of Portland, Maine (\$67,500) Cancelled

The objective of the City of Portland's grant was to establish a propane-powered shuttle bus system to serve the ports of Portland by connecting the Portland International Jetport, the New Amtrak Station, the Casco Bay Island Ferry, International Marine Terminals and the METRO Pulse. The project had many set-backs over the course of the years, and because of this the project has been cancelled. City to Portland returned the funds in June to the Council.

Early in the grant process, the City sent out a request for proposal (RFP), but did not receive any bids. Next, the City underwent a restructuring of its transportation scheme, and the project was put on hold so that grant funding would be used appropriately under the new scheme. When the City was prepared to orders buses, there were no propane buses on the market to order. PERC granted them an extension while they waited for Bluebird to come out with their new bus.

By October 2003, PERC requested a grant extension from DOE, but after two years DOE was not able to grant the request. At this time, the City wishes to purchase one propane bus for a trial project, but having only one propane bus is not visible. Expenses incurred for training and upkeep of just one vehicle is not cost effective. Grant funds will be returned to PERC.

Ferrellgas/Colorado (\$50,000)

In 1999, Thermogas was awarded a grant to assist in providing two new propane refueling sites in the Denver, CO area. These funds were transferred to the Ferrellgas/Kansas City project (see below). The transfer occurred when Thermogas was purchased by Ferrellgas and the project manager left the company. All historical knowledge, with the exception of our quarterly reports, regarding this project has been lost.

Ferrellgas/Kansas (\$50,000)

The objective of the Ferrellgas/Kansas grant program was to more favorably position propane in the national fleet market while demonstrating the benefits of propane. Kansas City Power and Light purchased 20 propane-powered vehicles under this grant program and funds were used to offset additional costs of engine modifications.

Ferrellgas assisted in building an alternative fuels refueling infrastructure in Topeka, Kansas. The total cost for the conversion was \$43,122. The total cost for the infrastructure was \$6,878.00. This amount included the electrical work and labor for the infrastructure.

The lack of E350 conversion kits caused Ferrellgas to miss ideal opportunities with various companies. There were many issued conversion kits being approved at the time, but not enough variety in alternative fuel vehicles. There were only two available, so it was hard to sell certain companies on the idea. Propane was very difficult to market, and Ferrellgas did not know whether to convert the vehicles or build the infrastructures.

IMPCO (\$70,000)

Through the cooperative funding agreement between PERC/DOE & IMPCO Technologies Inc., IMPCO developed a “2004 CARB/EPA Certified Engine Platform” (GM 5.7L.). This engine package was commercialized October 2001, but only two engines have been sold to date. This certified engine exhibits the latest gaseous fuel technology producing ultra low emissions. The prime market for these engines is in the irrigation and industrial marketplace.

At the onset of this project, IMPCO believed that the GM5.7L engine, certified for Industrial applications in California, would have great sales potential and represent a great fuel load for the propane industry. IMPCO believes that because neither IMPCO nor the propane industry actively marketed the engine after its certification, the project was not a success. The engine had (has) great potential, but without marketing, this engine project has not achieved its goal.

Regarding fuel load, IMPCO has no information, and cannot locate the engines to determine their usage. However, they are being used in agricultural applications.

New Jersey (\$27,600) Cancelled

The purpose of this project was to provide funding for the installation of a propane refueling facility. However, New Jersey encountered many problems with the logistics of, and manning for, the propane station. Ellen Bourbon, grant coordinator, was told by Central Motor Pool that the Calhoun Street fueling location where the propane station was supposed to be installed would not be manned and the state would not allow a self-serve facility.

PERC grant funds were returned to the Council by a check in February 2003.

Jasper Engines (\$60,000)

This project brought about a California Air Resource Board (CARB) certified LPG agricultural irrigation pump engine that is available commercially. The certified engine is now a viable option to meet air quality mandates once various agricultural pump engine emissions regulations are enacted. The project takes advantage of a public sector grant issuance opportunity window.

In California, it is estimated that there are in excess of 45,000 engines driving various forms of agricultural irrigation pumps. Such engines are commonly called "ag pump" engines. The power range varies from 50 to 400 HP. The majority of these engines run on diesel and are over 20 years old. In Sacramento and Yolo Counties, some of these old engines have been switched for new diesel engines, electric motors, or for CNG powered engines.

Air quality regulators throughout California are actively looking to regulate ag pump engines, until such regulations are enacted, various air quality districts where ag pump engines are prevalent have begun programs to induce voluntary replacement of old diesel engines with cleaner technologies. Farmers are also actively switching out costly to operate electric motor driven pumps. Existing public sector incentives include grants and programs to "buy" emissions (e.g. NO_x PM).

The test procedures that were followed for the exhaust emission testing of the heavy-duty engine are outlined in the California Exhaust Emission and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines Part I and Part II as adopted September 1, 1999 and the International Standard ISO 8178 parts 1 through 4. The calculations of exhaust emissions were performed in accordance with the US EPA Code of Federal Regulation, Schedule 40, Part 86. During each of the test days the engine was brought to operating temperature by gradually increasing the engine speed and load until the parameters for mode 1 were achieved. Each test mode was maintained for a minimum of ten minutes with the initial seven minutes acting as a stabilization period and the remaining three minutes making up the gaseous sampling portion of the test mode as per the ISO 8178-4 procedure.

An exhaust emission test program was conducted on the Jasper 460 LPG engine in order to provide data for a certification application to the Air Resources Board in California. The duty cycle used was the ISO 8178-4 C2, for heavy-duty, off-road mobile and stationary engine applications.

Typically these engines operate between 2000 and 2500 hours a season and have a life cycle of 5 years. On average each engine uses between 15,000 to 18,000 gallon of propane a season. Jasper currently has 24 engines in operation. This equates to 2,160,000 gallons of propane over the life of the engine (18,000 gallons x 24 engines = 432,000 gallons/engine x 5 years).

Maricopa County-(\$45,900)

Maricopa County's project objective was to introduce propane-fueled vehicles into the county fleet thereby creating a niche market for trucks traveling daily to and from the outskirts of the county. This was to be the first use of propane fuel for the county on-road vehicles. Maricopa

County would participate in the project by procuring 11 OEM pickup trucks and the grant funding would be used to cover the costs of propane-fuel option. The pickup trucks were assigned to Environmental Health, Department of Transportation (MCDOT), and Flood Control Department.

Maricopa County provided cost share in the project by providing the funding to procure the basic vehicle and the grant funding covered the incremental cost of the propane-fuel option.

At the start of the project Maricopa County did not have on-road vehicles fueled by propane. Procurement of 11 project pickup trucks was initiated in December 1999 but delivery was delayed because of the OEM's manufacturing schedule. The first pickups were received in May 2000 and the remaining vehicles were received in October, more than 10 months from date of order.

The project served as a catalyst for the introduction of additional propane-fueled vehicles into the county fleet. In addition to the 11 project vehicles, 10 additional vehicles were procured from an OEM and 61 existing vehicles were converted to propane. The total Maricopa County participation in the project was \$2,443,877.

Maricopa County established a propane-fueling infrastructure to serve the fleet. Ten fuel stations were established, 4 at Equipment Services Facilities and 6 at County Park locations. It is estimated that the 82 vehicles will use 445,201 gallons of propane per year.

As of this report, the ten propane stations that reported back in 2001 are still operating and the forecast quantity for a fiscal year was of 67,753 gallons. The current fiscal YTD quantity is 50,815 with an average month usage of 5,646 gallons.

Mutual Propane (\$26,000)

This project financed the upgrade of a propane dispenser and automated fleet cardreader system at the Los Angeles World Airports Ontario International Airport in Ontario, CA. The project included the installation of a 30,000 gallon propane tank and the automated 24-hour fuel system and card reader.

This project was unique in that it was the first Clean Fuel USA site in Southern California. The project brought the industry to a higher, more user-friendly fueling standard. This was the catalyst for other sites planned for the months after the project.

As of the completion date of the project, October 2001, Mutual was trying to get a long-term lease from the airport. There was a definite customer interest in the site. With the new propane vehicles becoming available along with aftermarket systems, this site was projected to be very successful. Project delays were beyond the control of Mutual and due to regulatory agency and three changes in companies operating bus contracts.

Below are the estimated volumes by year for the Ontario International Airport. Mutual is projecting volumes will continue to increase up to and beyond 2008. The estimated average volume over the seven years listed below is 450,646 gallons/year.

2002	285,000 Gallons Per Year
2003	288,000 Gallons Per Year
2004	420,000 Gallons Per Year
2005	432,000 Gallons Per Year
2006	475,000 Gallons Per Year
2007	570,240 Gallons Per Year
2008	684,288 Gallons Per Year

Port of Houston (\$23,100)

In early 2000, the Port of Houston Authority (PHA) initiated a proactive program at its facilities for air quality improvement. Through a careful evaluation of its daily operations and economic development, PHA developed an initiative to purchase alternative fueled vehicles for its' on-road fleet. Once the decision was made to use propane as the alternative fuel choice for the on-road fleet and a few pieces of equipment in the off-road fleet, PHA accepted a Propane Education & Research Council grant for the installation of a propane fueling station at a Port Facility.

PHA chose the Barbours Cut Container Terminal (BCT) in Morgans Point, Texas as the location for the fueling station, and hired several consulting firms to assist in developing installation specifications for the new station. PHA evaluated propane use and future needs, and determined that only one propane fueling station was needed, and that fueling station would be located at BCT.

In November 2002, the Port purchased a Propane Tank from Amerigas for their forklifts and on-road work trucks in the container yard. A 1,000-gallon tank was filled with propane fuel in early October 2003. The original grant request was for a 1900 gallon tank, but due to the decrease in demand the 1000 gallon tank was purchased and installed.

This project was Phase I of a three phase project. Phase II of the project consisted of the purchase of propane light-duty vehicles and off-road yard tractors. The PHA went forward without CMAQ or PERC funds and purchased 28 on-road vehicles by 2002. The PHA elected to not purchase propane yard tractors due to unfavorable experiences in California and refueling issues. The PHA is operating its' yard tractor fleet on diesel emulsion fuel funded in part by the Texas Emissions Reduction Plan Grants for SIP NOx Credits.

The PHA's environmental outreach program incorporates its propane use in on-road vehicles. The program is directed at employees, tenants, port users and other ports nationwide. Through training, brochures, and seminar speeches, the PHA communicates the importance of air quality programs and the PHA's air quality initiatives.

As of May 2004, the PHA owns 29 propane vehicles, but only 11 regularly fuel with propane at the BCT propane tank (8 BCT trucks and 3 field inspector trucks). They also have 4 propane forklifts at BCT refueling making a total of 15 pieces of equipment that fuels on propane at the BCT tank. Since January 2004, PHA has used 1,360 gallons of propane (approximately 272 gallons/month).

Salt Lake City Newspaper (\$25,000)

The Salt Lake City Newspaper grant allowed the Newspaper Agency Corp. (NAC) to begin replacing its gasoline and diesel fueled trucks with propane fueled ones. Vehicles made daily newspaper deliveries in remote, difficult-to-reach areas in the Wasatch Mountains of Utah. Running an average of 3,000 miles a month, the delivery trucks were high-mileage, high-fuel-usage vehicles.

As of February 1, 2001, Newspaper Agency Corp. (NAC) had received and put into operation all five of the Ford F-Series bi-fuel SuperDuty propane trucks, delivered by Utah Auto Collection, Truckland Division. Using PERC grant funds, the company has been reimbursed for \$25,000 worth of expenses including the incremental cost for the five trucks and other itemized expenses.

With the addition of the fifth truck and the signage on the five trucks, the PERC project with NAC/Salt Lake Clean Cities/Utah LP Gas was completed. All the “deliverables” were completed, including: the successful inclusion, of five bi-fuel propane trucks into NAC’s fleet; thorough training of drivers and technicians; installation of an LPG refueling site for convenient fueling for this Park City-based fleet; and the cooperation with Ford, Utah LP Gas and Clean Cities, on the mounting alternative fuel messages on front and side of each truck

Suburban/U-haul (\$50,000)

This project was developed to construct two propane gas refueling stations in the greater metropolitan Atlanta. The two refueling stations were constructed at U-Haul centers in Decatur and Snellville, GA. Partners in the project were U-Haul International and Suburban Propane.

The Decatur site was completed in June of 2002, and the Snellville site was completed in April 2003. Both sites are open to the public and the volume of propane sold through the two stations is approximately 15,000 gallons since their opening dates through the end of September 2003. Ninety-five percent of the gallons were sold at the Decatur site which has been open for more than a year. The Snellville location is a new U-Haul site and will take time to develop customer awareness. U-Haul International estimates that approximately 10% of sales are attributable to motor fuel market. Their development of the motor fuel sector has been hindered by an adverse economic climate, but they hope to see conditions improve.

PERC funded the grant for \$50,000. It was matched with \$56,364 making the total project cost \$106,364. This equates to approximately 53% of total project cost.

With the current economic climate, the move to alternative fuels has been slowed. As the situation improves, Suburban hopes to see a renewed focus on the benefits afforded by alternative fuel use.

The county of DeKalb currently has a significant fleet of propane powered light and medium duty vehicles and is expecting to increase this fleet in the coming years. The State of Georgia Department of Transportation currently has approximately 25 to 30 propane vehicles. The private sector has been slower to make similar moves, but a number are either looking closely at the issue or have made some small purchases, e.g. Blue Circle Aggregates have purchased half a dozen propane powered Ford F-150's.

The State of Georgia has been supportive of the alternative fuels arena by offering tax credits, excise tax exemptions and HOV lanes during peak travel times. In addition, U-Haul is currently involved in a number of marketing initiatives, mostly at the local level and Suburban hopes to see significant developments in the use of propane for motor fuel in the coming years.

The expected life of the project is 10 years. Suburban estimates that this project will generate a minimum 179,000 new gallons of propane over the life of the project. However, if the alternative fuel vehicle market improves, this figure may be much higher.

STATION	2003 Propane Consumption	2004 Propane Consumption	Average Propane Consumption per year	10 Year Estimate
U-Haul of Covington 4360 Covington Highway, Decatur, GA.	13,437 gallons	13,730 gallons	13,584 gallons	135,840 Gallons
U-Haul 2040 Scenic Highway Snellville, GA	1,428 gallons	1,733 gallons	1,580 gallons actual (future 5,000 gallons*)	15,800 gallons or 43,160 gallons*, (years 3-10 averaging 5,000@ year)
TOTAL	14,865 gallons for 2003	15,463 gallons for 2004	15,164 gallons for 2003 and 2004 (Estimated future 18,584 gallons/year)	
Combined 10 Year Life of Project Estimated Propane Usage				179,000 Gallons

*Based on station manager comments, contacted on 05.21.04, there have been several mechanical/service issues at this location and perhaps this is why the consumption factor has not meet expectations. The actual number of 1,580 should be adjusted upward to reflect the projected annual consumption average that is anticipated to increase as sales increase with less down time. Suburban believes a reasonable estimate of 5,000 gallons per year would be appropriate based on similar U-Haul operations in Central Georgia.

Ted Johnson (\$4,900)

The purpose of this grant was to install an electronic fuel controller and a catalytic converter on 6 to 7 ice-resurfacing machines. Ted Johnson contacted over 10 customers that would benefit from the installation of emissions enhancement equipment on their ice-resurfacing machine. One customer agreed to purchase the equipment immediately and others showed interested but needed approval before they could make a purchase. In the end, Ted Johnson successfully installed the equipment on two units – one in Ice Town (Riverside, CA) and one in Ontario Ice Center (Ontario, Canada). Before the fuel controlling device 2.68ppm of carbon monoxide was being emitted into the air. With the new equipment only 0.02ppm were emitted.

The original equipment for the 6 machines was purchased in 2000 based on research that showed that ice rink owners were interested in having emissions enhancement equipment installed on their machines. If the equipment had been put into use, each machine was projected to use 12,000 gallons of propane a year.

In March 2000, Ted Johnson submitted a press release to the Ice Skating Institute to be included in their May/June issue. The press release publicized the two finished units and their emissions reductions. Managers and owners of ice skating rinks nationally read this trade journal. The company spent over \$300 on advertising the equipment.

Ice rinks were approached with the offer to purchase the equipment at cost, but in the end they would not allow Ted Johnson to install the emission enhancement equipment on their ice resurfacers. The reasons ranged from economics to they just didn't want to be bothered. In California there are such onerous legal requirements on business owners it was hard for them to keep up and still run a successful operation. At the time of the project, energy bills were at all time highs and the ice rinks were hurting financially.

Ted Johnson employees spent more than 200 hours on this project plus considerable funds on advertising materials. Ted Johnson offered to give the equipment to another propane marketer that would be interested in offering the equipment to ice rinks in their market area, but did not believe more time and energy should be placed in the Southern California area.

For information on projects listed above, please refer to previously submitted quarterly reports. If you have any questions or need additional information, please contact us at 703-322-4484 or email jill.sesi@cox.net.

Sincerely,

Jill Hamilton
President

Attachment: Appendix A

Appendix A – Matching Funding

Below is a chart documenting the amount of PERC funding and matching funds spent on each subgrant, along with the estimated propane consumption in gallons per year.

Grantee	PERC/DOE Funding	Match	Estimated Propane Consumption (Gallons/Year)
City of Portland	\$67,500	\$10,000 CANCELLED	N/A
Ferrellgas/Thermogas – Colorado (Funds transferred to Ferrellgas, KS)	\$50,000	\$17,200* COMPLETED	23,379 gallons/year
Ferrellgas – Kansas City	\$50,000	\$464,000 COMPLETED	16,000 gallons/year
IMPCO Technologies	\$70,000	\$200,200 COMPLETED	20,000 gallons/year
Jasper Engines	\$60,000	\$167,785 COMPLETED	432,000 gallons/year
Maricopa County	\$45,900	\$2,443,877 COMPLETED	445,000 gallons/year
Mutual Liquid Propane	\$26,000	\$48,000 COMPLETED	450,647 gallons/year
New Jersey State	\$27,600	\$4,208 CANCELLED	N/A
Port of Houston	\$23,100	\$35,475 COMPLETED	7,200 gallons/year
S. Lake City Newspaper	\$25,000	\$128,118 COMPLETED	4,200 gallons/year
Suburban Propane	\$50,000	\$56,365 COMPLETED	18,584 gallons/year
Ted Johnson	\$4,900	\$50,000 COMPLETED	24,000 gallons/year
SUBTOTAL	\$500,000**	\$ 3,625,228	1,422,363 gallons/year
PERC ADMINISTRATION		\$100,000	
TOTAL		\$3,725,228	1,441,010 gallons/year

*This total does not reflect an accurate account of total matching funds spent on this grant. During the acquisition process grant files were misplaced and Ferrellgas has no data on Thermogas' matching funds.

** \$250,000 PERC plus \$250,000 DOE