

C-10-20: WAYNE COUNTY, NY, MUNICIPAL VEHICLE RETROFIT PROJECT - FINAL REPORT

**NYSERDA AGREEMENT NO. 21152
NYSDOT SPR PROJECT NO. C-10-20**

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JULY 2015

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16. Abstract Police Departments struggle with both increasing fuel prices and increasing demands for greater fuel efficiency and lower emissions. According to vehicle manufacturers, an average of one gallon of gasoline is burned every hour that a vehicle’s engine idles. Excessive idling creates increased wear and tear on a vehicle’s engine (between 29 and 33 ghost miles per idle hour), which makes for hidden maintenance costs. Constant dead batteries result from auxiliary equipment power draw and causes many police cruisers to end up in the maintenance shop instead of out on patrol. Running these systems (lights, radios, etc.) requires officers to keep the police cruiser’s gasoline engine turned on when stationery. Municipal truck engines are left idling for hours in order to supply electricity for power tools and construction lights. The goal of this project was to demonstrate that vehicle retrofits with anti-idling power cell battery units can serve as an example of fuel savings technology and reduced vehicle emissions. Data results, which included before and after fuel costs and emissions data, are being shared with the involved project communities, Wayne County, and Communities throughout Upstate NY. It was found from research done in this project that utility truck retrofits can be very streamlined, efficient, and effective – saving communities fuel costs. Research was performed regarding police car vehicle retrofits. Challenges and learning tools were examined.		

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Devin Scott, EnergyXtreme

Chief Bogan, Village of Lyons Police Chief

Sergeant Jeremiah Dresser, Village of Lyons Police Dept.

Michael Salerno, Village of Lyons

Corrine Kleisle, Mayor of the Village of Lyons

Denise Darcangelis, Lyons Village Clerk

William Dobie, Town of Williamson Distribution Foreman

James Hoffman, Town of Williamson Supervisor

Valarie Fowler, Town of Williamson, Secretary to the Supervisor

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I. EXECUTIVE SUMMARY

The goal of the project was to promote energy-saving vehicle retrofit technology to municipalities throughout Wayne County and eventually to other municipalities throughout Upstate NY. The project was proposed as a representative transportation project for Wayne County NY and was intended to serve as an example of fuel savings technology and reduced emissions. It involved a retrofit of one municipal truck and two police cars with a power cell battery. The battery is a power management system that operates a vehicle's full electrical system without engaging the vehicle's engine. The battery retrofit provides an opportunity for fuel savings and reduced Greenhouse Gas (GHG) emissions. Additional power cell battery retrofit benefits include: eliminates dead batteries, the power cell battery charges as you drive, the unit requires no maintenance, it powers the vehicle's electrical system for 4+ hours, and provides emergency backup power. As a result of this retrofit, inhalation of exhaust fumes and greenhouse gas emissions are reduced.

The project data includes fuel savings values and Greenhouse Gas emissions data. This information can be shared with the local communities, Wayne County, and Communities throughout Upstate NY.

Larsen Engineers provided project administration and coordination. Larsen Engineers has worked with the Village of Lyons and the Town of Williamson on several other sustainability projects, including NYSERDA PON0004 community energy studies and federally funded NY State Environmental Facilities Corporation (EFC) Green Infrastructure Grant Program involving energy saving retrofits at municipal wastewater treatment plants. Larsen Engineers is dedicated to helping these communities achieve their energy saving sustainability goals.

EnergyXtreme provided the power cell battery technology equipment. They also provided equipment installation assistance and operation instructions. EnergyXtreme is a company based in Austin Texas. They have retrofitted vehicles across the United States with this technology.

Based upon our experience with this project we recommend that future installations of this kind of power management retrofit equipment be installed directly by the system provider. In addition details about the vehicles mechanics and wiring should be shared with the equipment provider in the beginning of the project and both parties should communicate directly.

We would like to thank NYSERDA and the NYSDOT for the opportunity and the funding to be involved with this kind of project.

II. INTRODUCTION

Police Departments struggle with both increasing fuel prices and increasing demands for greater fuel efficiency and lower emissions. According to vehicle manufacturers, an average of one gallon of gasoline is burned every hour that a vehicle's engine idles. Excessive idling creates increased wear and tear on an engine (between 29 and 33 ghost miles per idle hour), which makes for hidden maintenance costs. Constant dead batteries which result from the power draw required to operate a police cruiser's on-board electrical equipment such as lights, radios, cameras, and computers cause many police cruisers to end up in the maintenance shop instead of out on patrol. Running these systems (lights, radios, etc.) requires officers to keep the police cruiser's gasoline engine turned on when stationary or else they risk being stranded in the field with a dead battery. The goal of this project was to demonstrate that vehicle retrofits can serve as an example of fuel savings technology and reduced vehicle emissions. Another goal was to share data, which included before and after fuel costs and emissions data, with the involved project communities, Wayne County, and Communities throughout Upstate NY.

This project was proposed as a representative transportation project for Wayne County NY. It involved the retrofit of one municipal truck and two police cars with a power cell battery. The battery is a power management system that operates a vehicle's full electrical system without engaging the vehicle's engine. The battery retrofit provides an opportunity for fuel savings and reduced Greenhouse Gas (GHG) emissions. Additional power cell battery retrofit benefits include: eliminates dead batteries, the power cell battery charges as you drive (the system receives and stores excess electrical energy from the vehicle's alternator during normal driving that is then used once the vehicle is stationary.), the unit requires no maintenance, it powers the vehicle's electrical system for 4+ hours, and provides emergency backup power. As a result of this retrofit, inhalation of exhaust fumes and Greenhouse Gas emissions can be reduced.

Espar Hydronic coolant system heaters were also installed in the vehicles. The heaters run on a small amount of fuel and electricity. The heater is able perform its heating capabilities independent of the vehicle engine. The heater regulates the coolant temperature by cycling the heater between heat levels. The heater can be operated from the vehicle cab by an on/off switch. A flame sensor, temperature regulating sensor and overheat sensor are among its safety features.

In order to provide some background, the Village of Lyons, NY had five police cars at the project start (the Village was recently absorbed by the Town of Lyons). The engine of each of these cars idled approximately 8 hours per day, 350 days per year. The Village's total fuel cost for 2009 was



\$16,208.39. The Village of Lyons decided to retrofit two of their police cruisers, a 2010 Chevy Tahoe and 2012 Chevy Tahoe with an EnergyXtreme Independence Package - 2 (IP-2) (See Data Sheet in Attachment A) power cell battery system.

The second community, the Town of Williamson spent a total of \$65,940.06 on fuel for 21 town vehicles and 3 public works vehicles during 2008. The Town of Williamson retrofitted a 2012 International 4700 make T444E Lo-profile model diesel utility public works truck. Distribution Foreman at the Williamson Water Treatment Plant estimated at the outset of the project that the truck idles 3-4 hours a day, 251 days per year. The truck idles so that the Town Public Works Department can operate electric tools and flood lights off of the truck's power supply (battery system). This utility truck was retrofitted with an EnergyXtreme U4 Power Cell Battery (see Data Sheet in Attachment B).

NYS UNDER-UTILIZATION OF THIS TECHNOLOGY

NYS has in place Heavy Duty Vehicle Idling Laws. These laws prohibit heavy duty vehicles from idling for more than 5 minutes at a time (<http://www.dec.ny.gov/chemical/8585.html>). Exceptions to this law are when the vehicle is idling for maintenance purposes. Even though Williamson's utility truck and Lyons Police cars are not regulated by these laws (Williamson's Utility truck idles for maintenance purposes), it is still known that idling trucks and cars emit pollutants, which can impact air quality and may trigger adverse health effects. Based on increasing gas costs, the wear and tear on vehicle engines due to long-term stationary idling, and the drain to batteries due consistent power draws, this study was done to research the implementation of a car retrofit power management system that is fairly new, EnergyXtreme has been in business for 10 years, and is under-utilized in NY State.

III. RESEARCH METHOD

PROJECT STEPS AND CHALLENGES

Next, is a summary of the steps taken for the project. There were several project challenges that occurred during equipment ordering and installation.

- 1) A project kickoff attended by project managers from NYSEDA, NYSDOT and representatives from Larsen Engineers, Williamson, Lyons, Espar Heaters, and Wayne County was held on June 13, 2011. Prior to this meeting, Larsen Engineers was interviewed about this project on April 14, 2011. The interview was broadcast on Channel 8 Evening News.
- 2) A delay in ordering equipment due to the Village of Lyons taking additional time to decide which car/ pickup truck they wanted to install on. The Village decided to install the power cell units on their 2010 and newly purchased 2012 Chevy Tahoe police

vehicles. The Town of Williamson decided they wanted the equipment installed on their new utility truck.

- 3) A delay in ordering due to some equipment updates and changes in costs per EnergyXtreme. This had to be negotiated with EnergyXtreme taking into account grant funding amounts. Equipment was ordered in November 2011 and received in December 2011.
- 4) The equipment shipped to Lyons arrived damaged. This equipment had to be shipped back to EnergyXtreme and be repaired.
- 5) Larsen Engineers attended the National Alternative Vehicle Day Odyssey event held at Monroe Community College in Rochester on October 18, 2012. A representative from Larsen discussed the project and gave out literature to event attendees.
- 6) Involved parties had to collaborate and align their schedules for equipment installation.
- 7) Wayne Finger Lakes BOCES automotive class tried to install one unit in February 2013 and ran into challenges. They stated the installation instructions were not clear.
- 8) EnergyXtreme the power cell battery provider, asked that the Town of Williamson plug in their Utility-series power cell battery one time per week to charge it up. When Bill Dobie in Williamson, plugged it in, the “fan on the back of the unit started smoking like it had been frozen-up”. The controls on the fan were damaged as a result.
- 9) There was a concern that the power cell batteries may not work (due to a rundown weak battery) because they were not installed within 90 days of purchase. The parties involved were not aware that they needed to be installed within this timeframe.
- 10) All of the power cell battery equipment was shipped back to EnergyXtreme in Texas in March 2013. The two IP-2 power cell battery units (for installation in Lyons’ police cars) were tested and repaired accordingly. The U4 power cell battery unit for the Town of Williamson’s utility truck was repaired by EnergyXtreme. The two IP-2 units were shipped back to Lyons in April 2013.
- 11) Wayne Finger Lakes BOCES tried a second time to install the power cell battery equipment on one of the police cars in April 2013 and was not able to complete the installation. We were informed that there is a special procedure for Chevy Tahoe installation(s).
- 12) Technicians from Espar Heaters came to Wayne Finger Lakes BOCES on two separate occasions (March and April 2013) to assist with installing the heater systems in the two police cruisers. Then Espar Heaters came to NY in November 2013, to assist with installation of the third heater in the utility truck. A technician from EnergyXtreme was scheduled to assist with the power battery cell unit installations in late May 2013. He was not able to come due to scheduling issues (he also said that they had a staff shortage). The technician from EnergyXtreme has rescheduled to come to help with the install on Sept 17th – 18th, 2013. EnergyXtreme canceled their technician’s trip on

September 17th – 18th, 2013, 16) EnergyXtreme came to Lyons on October 28-29, 2013 to install the power cell battery units. The utility truck installation was completed quickly. This installation was simple. The EnergyXtreme representative showed the Williamson representative which wires to connect and Williamson completed the installation themselves. In contrast, the police car retrofit was more time consuming. A Village of Lyons Police Sergeant assisted with the police car installation. Only one of the IP-2 power cell battery police car units was fully installed by the time the EnergyXtreme representative left Lyons. The lights and radio in the police cars needed to be rewired in order to be powered by new power cell management system. The representative from EnergyXtreme stated that usually the wiring for the lights, siren, radio is connected to the vehicle's auxiliary electric load and then a single power lead from the auxiliary is connected to the installed power cell battery unit.

- 13) Several questions, troubleshooting requests, and safety concerns were brought up by the Chief of the Village of Lyons Police Department which included: concerns about the safety of the heater units being tied into the cars' fuel lines, need for a blower system with the heater system to defrost the cars' windshields, and problems the Village is having with programming their radios. These questions were addressed in the conference call (see meeting notes in Attachment C). Espar heaters stated that blower modules could be added to the Espar Heaters in order to blow heat into the car and defrost the windscreen(s). Espar offered to provide and install the blower modules at no additional charge. Espar Heaters stated the heaters are 100% safe. They are used on school buses and in trucks all of the time. The EnergyXtreme representative said that he will trouble shoot what is happening with the police radios when he comes back to town. Attached is a letter that Larsen Engineers wrote to the Village of Lyons Chief of Police see Attachment D. The representative from EnergyXtreme was tentatively scheduled to come back to Lyons to do the following: replace the small battery units within the EnergyXtreme power cell unit (box), wire the electric heaters to the EnergyXtreme power cell battery (an alternative to the Espar heaters), finish wiring one of the Chevy Tahoe Police Cruisers, and do some troubleshooting.
- 14) EnergyXtreme planned to return to Lyons in mid July 2014 to install the new power cell batteries in each of the police cars. The Police Chief of the Village of Lyons Police Dept was contacted. Chief Bogan said that he did not want any further work performed on the police cars in regard to this project. In January 2014 an e-mail was received from the Police Chief stating that the wires to the power cell battery unit were being disconnected and the heaters were being disconnected by a car maintenance shop.
- 15) Representatives from Larsen Engineers contacted the CEO of EnergyXtreme to ask if EnergyXtreme is willing to supply a utility truck power cell battery unit for the Town of

Lyons (the Town and Village are currently undergoing consolidation). The CEO of EnergyXtreme said yes, EnergyXtreme will supply a utility truck battery for Lyons to help complete this project.

- 16) Larsen Engineers attended a meeting in late January 2015 in the Town of Lyons. In this meeting he spoke with the Town Supervisor about installing the U4 battery unit on one of the Town's utility trucks. If the Town decides to do this, the unit will be shipped from EnergyXtreme and then installed on the Town's utility truck. The Town Supervisor for Lyons, NY responded that the Town of Lyons does not want to install a battery unit on one of their utility trucks.
- 17) Larsen Engineers also had conversations with the Town of Williamson to determine whether Williamson would like to do a second battery installation on one of their other utility trucks. Per the Town of Williamson, they do not have another truck to retrofit with EnergyXtreme's power cell battery system.
- 18) Feedback received from Williamson's Distribution Foreman, is that he is very happy with his truck retrofit. His department runs power tools and construction lights off of the power cell battery unit regularly. He estimated that he utilizes the unit 740 hours per year. This is 740 hours of engine idling prevented. Please see the fuel savings and emissions saving data in the next section. He also said that they have run the heater a few times and it works well.

IV. FINDINGS AND CONCLUSIONS

The Town of Williamson's utility truck U4 power cell battery unit was successfully installed and is operating well. Williamson, prior to the installation, idled their truck the equivalent of 4 hours per day 185 days per year. This equals 740 idle hours per year (or 2.027397 idle hours per day). Taking into account 0.75 gallons of fuel are consumed per idle hour, approximately 555 gallons per gas were used per year just through truck idling. Estimating the cost of diesel fuel at approximately \$4.05 per gallon, \$2248.00 (555 gal * \$4.20) were spent on truck idling per year. \$2248.00 is the approximate amount that Williamson will save per year as a result of using their anti-idling retrofit, power cell battery unit.

The retrofit power cell battery unit was installed on October 28, 2013, so as of July 31, 2015, the unit has been installed for 641 days. Therefore, 1299.562 idle hours (641days*2.027397 idle hrs/day) have been saved since installation. It is estimated that 0.75 gallons of gas are consumed per idle hr (EnergyXtreme website). Therefore, approximately 974.6712 gallons of gas have been saved since installation. Estimating the cost of diesel fuel at approximately \$4.05 per gallon, \$3947.42 (974.6712 gal * \$4.20) was saved over 641 days of non-idling. The U4 unit

cost \$5995.00. The Town's share of the grant project was \$1500.00. As far as the Town is concerned, this project has already paid for itself.

Greenhouse gas emissions saved per year are 12,420.9 pounds of Carbon Dioxide CO₂ and 34.41 grams or .075861 pounds of Nitrous Oxide (N₂O). See Attachment E for calculations of GHG emissions savings.

These are approximations of savings. EnergyXtreme had a data software program that they were offering at the outset of this project that could be hooked up to the unit to see runtime of the unit and GHG emissions savings. By the time the equipment was ordered they were no longer using this software package. EnergyXtreme said that they would install a meter(s) onto the U4 unit where the left meter would indicate run time of when the engine is running, meanwhile the meter on the right would only give EnergyXtreme unit run time. This meter was never installed on the U4 unit so this exact data was unavailable. Also the Town does not keep individual records of gas used per vehicle and the mileage per each refueling so this made it difficult to determine exact idle hours saved per the retrofit.

A representative calculation of amounts that the Village of Lyons could have potentially saved by utilizing their vehicle retrofits is in Attachment F.

V. STATEMENT ON IMPLEMENTATION

As a result of this project, it was found that overall the utility truck U4 power cell battery installation and technology was beneficial. The Town of Williamson has reported that their retrofit system is working great. The Williamson Distribution Foreman actually said that he did not think he would like it but does. The Town has realized fuel savings above and beyond the initial investment amount. The Town's success with this retrofit will be shared with other municipalities in Wayne County. Each department of public works and water department could benefit from this kind of retrofit.

Several challenges occurred regarding the Village of Lyons retrofit. From project results it was found that a trained technician needs to be there to guide installation of the power cell battery units. EnergyXtreme shared that it is important to wire all of the police car equipment to the vehicle's auxiliary electric load in order to streamline installation. Communication challenges and failed installations created feelings of concern and mistrust between the Police Chief and the project team.

Attachment A: IP-2 Unit Data Sheet

Mobile Electric Power

Idle-Reduction Technology

Independence Package | Law Enforcement Series

A power management system that operates a police cruiser's full electrical system, including lights, camera, computer, and radio, **without** engaging the vehicle's engine.

- Engine off, powers electrical systems 4+ continuous hours*
- Saves fuel
- Recharges while you drive
- Eliminates emissions
- No maintenance
- Dry, solid state, non-hazmat technology
- Eliminates dead batteries
- 5+ year life**
- Emergency backup power

* Based on 30 Amp DC load **Based on depth of discharge above 50%



“The Independence Package has prevented the patrol car from having a dead battery and has allowed the officers to run their equipment without the engine running. It provides officers constant, never-ending power. They can power anything they want to power; they can jumpstart anything they want to jumpstart; they’re never left stranded.”

*- Lt. Dale Barnard
Fleet Manager
Dallas Police Department*

For more information, please visit www.independencepackage.com
or call **877.800.7676**

Independence Package | Law Enforcement Series

Features:

Requires no fuel

Non-hazmat, dry, solid state

No moving parts

No maintenance

Self-auditing, emission reduction, and cost savings tracking/reporting

Highly resilient

- Short circuit, high current
- High temp (130 degrees Fahrenheit)
- Low temp (-30 degrees Fahrenheit)

Excels at 24/7 operations

No emissions

Recyclable

Silent

5+ year life

Emergency backup power

2-year warranty

Abuse tested

Recharges while you drive

Specifications:

Power Cell Capacity 2,000 Whrs

Starting Power 2,500 Amps

Power Output: Continuous 70 Amps

Power Output: Peak 200 Amps

Output Voltage (AC/DC) 12 VDC

Enclosure Steel Box

Dimensions (L x W x H) 34" x 10.5" x 9"

Weight 140 lbs

"Thursday I was stuck for over 7 hours...The Independence Package ran all my car's equipment and my car started up without hesitation. This system really works great."

*-Sgt. Murray
Austin Police Department*

"The remarkable note is that with the Energy Xtreme alternative power source, even in a 'high stress' training environment, a significant fuel savings is notable."

*-Deputy Director Al Liebno, Jr.
Maryland State Police and
Correctional Training Commission*



For more information, please visit www.independencepackage.com
or call **877.800.7676**

Attachment B: U4 Unit Data Sheet

Mobile Electric Power

Idle-Reduction Technology

Independence Package | Utility Series

A power management system that operates a vehicle's full electrical system and provides clean mobile power for tools and equipment **without** engaging the vehicle's engine. The U4 is also capable of running up to 2 gpm hydraulic systems.

- Reduces costs on fuel and maintenance
- Engine off, powers electrical systems and equipment 4+ continuous hours*
- Plug-in rechargeable
- Silent worksite
- Recharges while you drive
- Reduces emissions
- No maintenance
- Dry, solid state, non-hazmat
- Reduces dead batteries
- 5+ year life**
- Increase current asset longevity
- Emergency backup power - driver never stranded
- Replaces inverters and generators
- Worksite green

* Based on 50 Amp AC load **Based on depth of discharge above 50%

**Plug-in
Rechargeable
System**



"I give Energy Xtreme's Utility Series a 4-star rating. I use the system on a daily basis."

*-David Cook
Utility Series Technician
Public Works Dept., City of Irving, TX*

For more information, please visit www.independencepackage.com
or call **877.800.7676**

Independence Package | Utility Series

Features:

Requires no fuel

Non-hazmat, dry, solid state

No moving parts

No maintenance

Smart grid compliant

Highly resilient

- Short circuit, high current
- High temp (130 degrees Fahrenheit)
- Low temp (-30 degrees Fahrenheit)

Excels at 24/7 operations

No emissions

Recyclable

Silent

5+ year life*

Emergency backup power

1-year warranty

Abuse tested

Wireless self-auditing, emission reduction, and cost savings tracking/reporting

Recharges while you drive

Plug-in Rechargeable System

*Based on depth of discharge above 50%

Specifications:

Power Cell Capacity	4,000 Whrs
Starting Power	2,500 Amps
Outlets: Portrait: located on height Landscape: located on width	(2) 20 Amp AC 12 VDC
Output Voltage (RMS +/- 5%)	115 VAC
Output Frequency (+/- .4 Hz)	60 Hz
Power Output: Continuous	5,000 W
Power Output: Peak	10,000 W
Charger Input Voltage	115 VAC
Charger Input Amps	17 Amps Max
Max Charger Output Power	900 Watts
Enclosure	Steel Box
Dimensions (L x W x H) Portrait Landscape	34" x 13.5" x 21.5" 34" x 21.5" x 13.5"
Weight	380 lbs

"It was a pleasure working with Energy Xtreme! Plus, the Utility Series will give extra years of service to our stencil trucks due to less wear and tear on the truck engine!"

*-Scott Givens
Roadline Products, Inc.*



For more information, please visit www.independencepackage.com
or call **877.800.7676**

***Attachment C: Meeting Notes from Conference Call on
November 22, 2013***

Conference Call on November 22, 2013

Regarding: the Wayne County Municipal Vehicle Retrofit Project (NYSERDA PON 2078)

In Attendance: Chief Richard Bogan, Village of Lyons Police Dept.; Sgt. Jeremiah Dresser, Village of Lyons Police Dept.; Carol Zimmerlin, Larsen Engineers; Ram Shrivastava, Larsen Engineers; Lee Wheelbarger, EnergyXtreme; George Lenus, Espar Heaters.

Chief Bogan asked if the Espar Heaters are safe. George Lenus stated that the heaters are 100% safe. They are used on school buses and in trucks all of the time. He said that Espar can provide a type of safety switch that cuts off the fuel feed in the event of a car accident.

Chief Bogan asked about the blower function for the heaters so the police officers can defrost their windows. George said that he will send Chief Bogan a list price for blower modules for the heaters. George said that he could come and install the blower modules in the Chevy Tahoes and this would address this issue.

Lee from EnergyXtreme said that the police department could use either the Espar heaters or the electric heaters he sent to heat the cabs of the police cars. He asked them to try each separately and determine which works best for them.

Chief Bogan asked about the battery life of the EnergyXtreme units. He said that the charge is down to half now for one of the EnergyXtreme units. Lee will come to Lyons in December 2013, and exchange the batteries inside the unit with new batteries. The life expectancy of the units will be 5+ years after the new batteries are installed within the units.

Sgt. Jeremiah Dresser will complete the wiring for the newer Chevy Tahoe before Lee comes to Lyons in December and will hook up the electric heaters.

Next Steps: Per our phone conference today, 11/22/13, Lee is tentatively scheduled to come to Lyons from December 9-11th. He will replace the batteries in the Energy Xtreme units. He will also troubleshoot some problems that the Village of Lyons Police Dept. is having with programming their radios. George Lenus from Espar Heaters will schedule to come while Lee is in Lyons. George may install blower modules onto the Espar heaters if the Village of Lyons Police Dept. approves the quoted cost for these. George is sending an e-mail to Chief Bogan with the pricing information. George and Lee will be able to hook up the blower modules for the heaters to the EnergyXtreme power cell unit. Sgt. Jeremiah Dresser will complete the wiring for the newer Chevy Tahoe before Lee arrives in December and will hook up the electric heaters. George and Lee would like Sgt. Dresser to come and walk through the process after their work is complete. They will provide instruction manuals about the equipment to the Police Department.

***Attachment D: Letter from Larsen Engineers to the Village of Lyons
Police Chief***



ENGINEERS
PLANNERS
SCIENTISTS
SURVEYORS

November 22, 2013

Chief Bogan
Village of Lyons Police Department
72 William Street
Lyons, NY 14489

Dear Chief Bogan:

Thank you for participating in the conference call and sharing your concerns with the group. As mentioned in this phone call our team- Larsen, Energy Xtreme, and Espar Heaters are committed to successful completion of this project. We understand that you were frustrated with different facets of the vehicle retrofit project and delays. It is our goal to provide answers to your questions and make sure the equipment is installed correctly in your cars so you and your officers can perform your duties and benefit from the fuel savings these units can provide. We hope that the conference call today, 11/22, with Lee Wheelbarger from EnergyXtreme and George Lenus from Espar Heaters was beneficial in outlining the final check of the system and training your staff.

Here is some background history and a summary regarding the goals of this project.

1. This project involved the retrofit of two of Lyons' police cars with a power cell batteries and a cab heating units. The battery is a power management system that operates a vehicle's full electrical system without engaging the vehicle's engine. This retrofit system provides an opportunity for fuel savings and reduced Greenhouse Gas (GHG) emissions, through vehicle idling reduction. I have attached a data sheet that gives specifics about the EnergyXtreme law enforcement battery units that you have. Energy Xtreme has retrofitted vehicles across the United States with this technology
2. Application for the Wayne County Municipal Vehicle Retrofit Project was submitted to NYSERDA on August 25, 2010, to apply for funding under Program Opportunity Notice (PON) 2078 – Low Carbon Transportation Alternatives. The funding application was for a *Transportation Efficiency - Demonstration of Underutilized Commercial Technologies in NY State Grant*.
3. A letter of commitment from the Village of Lyons, stating the Village's interest in the project, was submitted along with the application. Prior to submitting the application, an e-mail was received from Mayor Corrine Kleisle of the Village, stating that the Village would like to retrofit two police cars, a 2007 and 2009 Dodge Charger. The e-mail stated that each vehicle idles approximately 8 hours per day, 350 days per year. Based on this idling information and



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estimating the price of gas at \$3.99/gallon and that 1 gallon of gas is consumed per idle hour, this equates to a savings of approximately \$10,725.00 per year per car (please see the attached sheet detailing this information, as well as other savings). Under the grant agreement the Village paid \$3000.00 for the battery equipment (\$1500.00 per each unit) plus \$869.58 for shipping equipment from Upstate NY to Texas for recharge and updates. The Village paid a total of \$2,369.58 towards the project. We acknowledge that you and your police department have also contributed in-kind man hours to the project. Thank you for all of your efforts.

4. The grant was awarded for the project in April 2011. A kickoff meeting was held on 5/12/11, and then a preliminary installation meeting was held on 6/14/11 at Wayne Finger Lakes BOCES. Mike Salerno from the Village and Bill Dobie from the Town of Williamson were in attendance.
5. The following circumstances had caused delays in the project schedule. There was a delay in ordering equipment due to deciding which car to install the battery equipment on and the timing of Lyons purchasing a new police cruiser. When the equipment arrived in Lyons it had been damaged in shipping and had to be repaired and shipped back to Lyons.
6. Wayne Finger Lakes BOCES agreed to work with their students to install the equipment, which aligned with the educational component of the grant requirement. Therefore, the grant did not include any funding for installation of the equipment. Espar Heaters had committed to sending a technician to guide the students through the heater installation process. Meanwhile, representatives from EnergyXtreme assured us that installation of the batteries was a simple process. As you aware, BOCES attempted to install the battery unit on one of your cars two different times in 2013, and were not able to complete the process with the available student resources and instructions provided by EnergyXtreme.
7. Larsen Engineers engaged in conversations with representatives from EnergyXtreme several times throughout this process. EnergyXtreme informed Carol Zimmerlin and Ram Shrivastava at Larsen Engineers that there was a concern that the power cell batteries may not work because they were not installed within 90 days of purchase. Larsen Engineers was not aware that they needed to be installed within this timeframe. Due to this factor, all of the power cell battery equipment was shipped back to Energy Xtreme in Texas. The two IP-2 power cell battery units for installation in Lyons' police cars were tested and repaired accordingly.
8. EnergyXtreme committed to come to Upstate NY to assist with the install. Trips were coordinated and then canceled, first for May 2013 and then for September 2013. Then Lee from EnergyXtreme did come to Lyons in October 2013 to assist with the install. He and Sgt. Jeremiah Dresser worked together on this.



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Next Steps: Per our phone conference today, 11/22/13, Lee is tentatively scheduled to come to Lyons from December 9-11th. He will replace the batteries in the Energy Xtreme units. George Lenus from Espar Heaters will schedule to come while Lee is in Lyons. George may install blower modules onto the Espar heaters if the Village of Lyons Police Dept. approves the quoted cost for these. George is sending an e-mail to you with this information. Sgt. Jeremiah Dresser will complete the wiring for the newer Chevy Tahoe before Lee arrives in December and will hook up the electric heaters. George and Lee would like Sgt. Dresser to come and walk through the process after their work is complete. They will provide instruction manuals about the equipment to the Police Department.

Chief Bogan we wanted to detail this history of things in order to explain that this grant has been a learning experience. We are aware that you and your staff have committed time and effort to this project and we appreciate this. This project is intended to be an example for other communities to show how significant fuel cost savings are possible while protecting the environment. An idling car does create poor air quality environment near the vehicle for the driver and others. We are asking you to give the equipment a chance to prove its capabilities in your police cruisers after all questions, installation updates, and training has been addressed and completed. The power cell batteries and heaters that have been installed in your police cruisers are being used around the country, in police cars, utility trucks, ambulances, and school buses.

Sincerely,

Ram Shrivastava
President, Larsen Engineers

Cc: Sergeant Jeremiah Dresser
Mayor Corrine Kleisle

Attachment E: Greenhouse Gas (GHG) Emissions Savings Calculations

GHG Emission Savings

740 idle hours saved

Equivalence	Unit	Total
31 "ghost miles"/idle hour		22940 "ghost miles" saved
0.75 gallons/idle hour		555 gallons diesel fuel saved

CO₂:

22.38 pounds of CO₂/gallon diesel fuel

N₂O:

0.0015 grams N₂O/mile

Total Saved:

555 gallons x 22.38 pounds CO₂/gallon diesel fuel

12420.9 pounds of CO₂

22940 miles x 0.0015 grams N₂O/mile

34.41 grams N₂O

0.075861 pounds of N₂O

1 gram = 0.00220462 pounds

Source:

U.S. Energy Information Administration

<http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11>

<http://www.eia.gov/oiaf/1605/coefficients.html#tbl5>

Attachment F: Potential Retrofit Fuel Savings for the Village of Lyons

The **Village of Lyons** will retrofit 2 of their 5 car police fleet. The cars are 2010 and 2012 Chevy Tahoes.

Fuel Saved Annually by using Energy Xtreme

Simply add your data into the blue boxes and let us show you Xtreme Savings!

Vehicle/Truck

Gas Price/Gallon	3.99
Gallons Consumed/Idle Hour	1
Idle Hours Reduced (Daily)	8
Number of Units in Fleet	5
Name of Mobile EX Product	LE

1 Vehicle

Price of Unit	\$3,950.00
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Monthly Fuel Savings	\$893.76
Annual Fuel Savings	\$10,725.12
Est. 5 YR Fuel Savings	\$53,625.60
Monthly Miles Eliminated on Engine	7840
Estimated Annual Miles Eliminated on Engine	94080
Estimated Annual Tons of NOx Reduced	0.29184
Estimated Annual Pounds of CO2 Reduced	52147.2

Please Note: this information was obtained from the EnergyXtreme Website.

- *Actual results will vary based upon engine type, age of engine, type and octane of fuel used, outdoor conditions and idle time reduced
- *Equivalent of 35 to 50 miles drive time on engine (for wear and tear purposes) for every idle hour
- *Estimated NOx Reduction Estimate per Texas Commission of Environmental Quality
- *Estimated 19.4 lbs of CO2 per gallon of gas burned, per EPA
- *Life of Product Assumed at 5 years (Average Life 5 to 10 years)
- *ADDITIONAL SAVINGS DUE TO REDUCED ENGINE WEAR AND TEAR NOT INCLUDED IN ANALYSIS

*ADDITIONAL SAVINGS DUE TO REDUCED MAINTENANCE COST NOT INCLUDED

*Based on 28 work days a month, 336 work days per year