

# STRATEGIC ENERGY SAVINGS PROGRAM ENERGY EFFICIENCY AND PROCUREMENT

LOWER MERION TOWNSHIP, PA

JULY 31, 2019

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PROVIDENT  
energy consulting

ics | CONSULTING, INC

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## **Background and Overview**

After a competitive process involving a Request for Qualifications (“RFQ”) and subsequent Request for Proposals (“RFP”) in late 2017 for a qualified energy consulting firm, Lower Merion Township engaged the team of Provident Energy Consulting and ICS Consulting in February 2018 to guide the Township through the development of an energy savings program process that included energy conservation and facility improvement measures (“ECMs”) plus electricity and natural gas procurement. The mission was to provide guidance toward the development of a strategic, cost-effective energy program that could replace aging equipment and address areas where infrastructure could be made more energy efficient. The ECMs to be explored included but were not limited to energy advisory services, energy audits, and the design, acquisition, installation, modification, maintenance and training in the operation of existing and new equipment. The goal was to reduce energy consumption and operational costs associated with Township buildings, other energy-based retrofits, street lighting, park/parking lot lighting, and alternative energy enhancements. Other services considered included savings options which would not specifically reduce consumption but would reduce energy related operational costs, such as utility rate changes or enhanced retail energy market procurement strategies. In addition to the financial impacts of any resultant infrastructure retrofits, the analysis would also address and present the environmental benefits to the Township’s carbon footprint.

Our approach to accomplishing the identified program goals was structured as a multi-phase, step-by-step effort, resulting in a long-range energy strategy. Phase 1 incorporated an investigative review of costs and savings and a recommended approach for implementing a beneficial bundle of ECMs and needed facility improvement measures. A report summarizing Phase 1 activities and findings was presented to the Township on August 31, 2018, which included: viable ECMs, calculations/estimates of potential costs and savings for each ECM investigated, recommendations & options to implement the ECMs, as well as a carbon footprint analysis for a preliminary bundle of potential ECMs. The report indicated that a project could be completed using various potential avenues of approach, including typical government design-bid-build contracts, having Township staff undertake implementation activities, and/or utilizing performance contracting guidelines of the Pennsylvania Guaranteed Energy Savings Act (“GESA”), wherein energy service companies (“ESCOs”) propose effective solutions with savings guarantees to fully fund project costs.

The Pennsylvania Legislature passed specific laws allowing local governments to use guaranteed energy savings contracting rather than the typical, expensive, bureaucratic design-bid process municipal, county and school district contracting normally requires. The Legislature did this for a several reasons:

- encourage municipalities to take on energy savings projects;
- give government entities a way to pay for energy savings projects without having to raise taxes or drain reserves.
- enable governmental units to utilize the expertise of the design-build industry, which is much better suited to energy-efficiency projects than the traditional design-bid-build model.

In addition, the law also provides government entities with a process that allows them to take the energy savings from the project and apply these savings to complete other needed projects

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that do not have to be energy savings related, as long as the identified and guaranteed energy savings will pay for the project within 20 years, i.e., with an overall weighted-average payback of 20 years or less. This has allowed some very financially strapped government entities to complete critical projects they could not have otherwise afforded.

This form of guaranteed energy savings contracting bears no relationship to the type of contracting that was abused in the past where the energy savings contractor was entitled to a percentage of the energy savings, i.e., “shared savings” contracts. Under the GESA approach, the process is streamlined and “turn-key”, with the energy savings/services contractor (“ESCO”) paid for work they complete when finished, just like design-bid-build; but, with a key difference being that, if the savings promised in the project do not materialize after project completion and a rigorous Measurement and Verification (“M&V”) analysis, then the ESCO owes the governmental unit a payment for the shortfall each year the guaranteed savings aren’t realized. From the standpoint of the government entity, the project(s) get completed with no increase to the operating budget, since any debt incurred is paid off over time from the energy savings.

## **Methodology**

In September 2018, the BOC authorized issuance of a directed RFP for ESCOs to implement an energy savings and facilities improvement project for the Township under PA GESA guidelines, focusing mostly on the measures identified by the Provident Energy/ICS Consulting report. Proposals were received in November 2018 from two ESCOs, Energy Systems Group (“ESG”) and Siemens Building Solutions. Following a thorough review of proposals by the Provident/ICS team, including a follow-up round of clarifying Q&A, a subsequent Request for Information (“RFI”) to each ESCO, and an in-person presentation/interview that included members of the Township Administrative team, in February 2019 the BOC authorized execution of a project development agreement with Energy Systems Group (“ESG”). Since that time, ESG has been working with Township staff and Provident Energy/ICS Consulting to complete a comprehensive streetlight inventory, facility inspections and to develop pricing for the proposed project.

ESG performed a thorough Investment Grade Audit (“IGA”) to develop cost and savings numbers to support the critical parameters embedded in prior analyses and their initial proposal. This IGA included all impacts associated with retrofitting the street lighting system and a full reconciliation with the PECO utility bill on fixture counts and energy usage. This IGA includes a full mapping of every Township streetlight, with GPS location map, pole type, lamp type and wattage level, etc., which will be integrated into the Township’s existing TRAISR Asset Tracking system. In addition, a detailed analysis of HVAC options, including boilers, chillers, controls and building envelope measures was completed for pricing and savings.

The GESA approach used by the Township has been competitive throughout, beginning with the RFP to select the team of Provident Energy/ICS Consulting, the subsequent RFP to select the ESCO, ESG, as well as the competitive process ESG has used to help select a material suppliers and installation contractors. ESG invited three leading manufacturers in to review their streetlight offerings, including GE, Phillips and Cooper products, based on the preferences of the Township’s Electrical Division. The suppliers competing on price and the ability to select the exact product desired as opposed to an “or equal” is a real advantage gained by using the GESA process rather than the typical public bid process. Additionally, the team selected five (5)

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professional electrical contractors in this area to solicit pricing from to perform streetlight installation. These electrical contractors represent firms which the Township has used successfully on similar projects as well as firms which ESG and Provident Energy/ICS Consulting feel would capably complete the work. This ability to solicit competitive pricing from contractors with excellent experience and qualifications is another real advantage of using the GESA process versus the public bid process where the Township can be stuck with a low bid contractor who is really not capable of satisfactorily performing the project.

In addition to the proposed facility and infrastructure related ECMs, such as Street Lighting, Controls, etc., another critical energy savings measure, competitive energy procurement in retail markets, was undertaken during this program development effort. Provident Energy Consulting, a Pennsylvania Public Utility Commission Licensed Electricity and Natural Gas Supplier, conducted a competitive pricing solicitation for the Township. After receiving pricing submittals from eight (8) natural gas and eight (8) electricity retail energy suppliers, the Township entered into supplier agreements with Constellation for its Street Lighting accounts, ENGIE for all other electric accounts and Constellation for its natural gas (“NG”) accounts.

The result of this effort is incorporated as a separate ECM, consistent with the GESA process, wherein savings are demonstrated as a pre-post comparison of operating expenditures. This is in alignment with the Measurement and Verification (“M&V”) proof of savings being undertaken for this energy program, which requires a whole facility or principal account comparison, known as Type ‘C’ of the International Performance Measurement and Verification (“IPMVP”) framework. This involves a comparative analysis of utility bills for base year 2017, the first full LMT Fiscal year prior to project implementation versus the first post-implementation period after equipment installation and substantial completion.

The savings computations were undertaken in such a way as to ensure that an accurate, appropriate separation of energy unit savings and rate driven savings were included, as shown in the following formula:

$$\begin{aligned} &[(kWh_{pre} - kWh_{post}) * (Electric Rate_{pre})] + [(DTH_{pre} - DTH_{post}) * (NG Rate_{pre})] \\ &+ \\ &[(Electric Rate_{pre} - Electric Rate_{post}) * (kWh_{post})] + [(NG Rate_{pre} - NG Rate_{post}) * (DTH_{post})] \end{aligned}$$

where:

kWh<sub>pre</sub> & kWh<sub>post</sub> = units of electricity (kilowatt hours, kWh) pre- & post- implementation

DTH<sub>pre</sub> & DTH<sub>post</sub> = units of NG (dekatherms, DTH) pre- & post-implementation

Electric Rate<sub>pre</sub> & Electric Rate<sub>post</sub> = electricity rates (\$/kWh) pre- & post- implementation

NG Rate<sub>pre</sub> & NG Rate<sub>post</sub> = natural gas rates (\$/DTH) pre- & post- implementation

First, the ECM unit savings (i.e., kWh, Dekatherm) were multiplied by the pre-program base rates (2017) used in the RFP. Since the procurement effort had not yet occurred, this approach was used by responding ESCOs in their proposals, wherein their estimated change in usage, i.e., savings, for each ECM within a facility was calculated against rates in place at the time. It should be noted that “Street Lighting” was treated as a ‘facility’. Next, the rate change differentials from the new supplier agreements were applied to the reduced post-implementation usage levels, i.e., after the proposed unit savings were subtracted from the base year usage.

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## **Analysis**

A great deal of time was spent in formulating the mix of ECMs to be explored, refined and finalized for consideration by the Township Board of Commissioners. Multiple meetings, generally once weekly, were held that included members of the Township Manager's office, Public Works staff, ESG, ICS Consulting and Provident Energy Consulting. Consideration was given to such items as grants that have already been attained and where such work has been scheduled, work that is underway or is already planned through the Capital Improvement Program ("CIP"), and work that can be scheduled for completion by the Township Public Works staff. The analysis of options, therefore, remained somewhat fluid in the months following completion of the IGA, leading to a solid set of ECMs for final consideration.

One other item of note is that this report should be viewed as a summary of impacts, since the final ESG/ESCO report will include many of the detailed elements of the ECMs investigated. All information, including Excel Workbooks and credentials to sign-in to the audit-based street lighting portal, will be provided to the Township, along with appropriate training for the street lighting portal and all audit-associated and analysis information.

ECMs identified as possible options were scored and ranked within each facility in refining the expansive set of measures to one most advantageous for the Township's energy savings program. Provident/ICS and ESG employed a decision analysis framework guided by criteria often utilized by the Township's Public Works Department. These criteria and their respective weights are as follows:

<u>Criteria</u>	<u>Weight</u>
Safety/Redundancy	5
Energy/Sustainability	3
Material Condition	4
Breadth of Impact	2

Each ECM was given an initial score for each criterion by Provident, ICS and ESG, with the full list of ECMs then sorted by weighted-average score to permit priority ranking. After the scoring matrix was completed, four (4) clusters of ECMs emerged, as follows:

- Priority 1 (GESA) – Highest scoring measures for near term implementation
- Priority 2 (GESA) – Next tier of high scores with added emphasis on material condition
- Self-Perform – Measures of relatively high importance being done by Township staff
- Deferred/Future – Measures still needed but of lower rank; inclusion in future CIP

After the initial scoring, the combined team of Provident/ICS/ESG met with key Township staff to refine the analysis and ensure alignment with physical needs and budgetary limits. This refinement and re-scoring activity resulted in some ECMs being shifted in priority level, leaving all with a comfort level with the structure of the resultant ECM matrix shown in Exhibits 1 & 2.

Exhibit 1 shows five (5) major ECM groupings being proposed as GESA projects throughout many Township facilities, as summarized below:

- Lighting – Street Lighting/Parking Lots
- Lighting – Interior/Exterior/Parks
- HVAC - Mechanical Systems (Boilers/Chillers/Rooftop Units)
- HVAC – Controls Upgrades
- Recommissioning – Controls reprogramming

Most of the projects identified in this Exhibit are considered Priority 1; the only Priority 2 projects are HVAC Boiler Replacements at the Administration and Public Safety buildings, as well as a HVAC Controls upgrade at Belmont Hills Library.

### **Exhibit 1: Priority 1 & 2 Projects: Performed via the GESA Process**

ECM Type	Facility / Description	P1	P2	SP	DF
01 - Lighting - Street Lighting / Parking Lots	4 Sided Colonial	X			
	Cobra Head	X			
	Tear Drop Pole Painting	X			
	Decorative Fixtures	X			
01 - Lighting Interior / Exterior / Parks	Ardmore Pool Complex	X			
	Bala Avenue Gymnasium	X			
	Belmont Pool Complex	X			
	Koegel Complex	X			
	Parks	X			
	Vernon Park	X			
05 - HVAC Mechanical Systems	Ardmore Public Library- HE Boilers	X			
	Bala Avenue Gymnasium - HE Boilers	X			
	Township Administration Building - Board RM RTU Replacement	X			
	Public Safety Building- HE Boilers		X		
	Township Administration Building- HE Boilers		X		
06 - HVAC Control Upgrades	Ardmore Public Library	X			
	Public Safety Building	X			
	Township Administration Building	X			
	Belmont Hills Library		X		
18 - Recommission Controls	Ardmore Public Library	X			
	Belmont Hills Community Center	X			
	Bryn Mawr Community Center	X			
	Ludington Library	X			
	Public Safety Building	X			
	Township Administration Building	X			

Exhibit 2 shows four (4) major ECM category groupings being proposed as either self-performed (“SP”) or deferred future (“DF”) projects throughout many Township facilities. The Township staff indicate that most of the ECMs marked with an “X” in the SP column are complete or will be performed in the near future, whereas those marked with an “X” in the DF column could be considered in the long-term as immediate action was is not necessary or prudent.

- Lighting – Interior/Exterior/Parks
- HVAC - Mechanical Systems (Boilers/Chillers/Rooftop Units)
- HVAC – Controls Upgrades
- Building Envelope – Insulation, weather stripping, air curtains, etc.

### **Exhibit 2: Self-Perform (In-House) & Deferred Future Projects**

ECM Type	Facility / Description	P1	P2	SP	DF
01 - Lighting Interior / Exterior / Parks	Bala Cynwyd Library			X	
	Belmont Hills Community Center			X	
	Bryn Mawr Community Center			X	
	Ludington Library			X	
	Penn Wynne Library			X	
	Public Safety Building			X	
	Township Administration Building			X	
	Warner Ave (Park)			X	
	Ash Bridge House			X	
05 - HVAC Mechanical Systems	Domestic Animal Detention Center (Koegel Complex)- HE Boilers			X	
	Ludington Library - Chiller			X	
	Ludington Library- HE Boilers			X	
	PALM Building - DX Cooling			X	
	Township Administration Building - RTU Replacements			X	
	Ardmore Ave Pool Complex - DHW				X
	Ardmore Ave Pool Complex - Motors				X
	Belmont Hills Pool Complex - DHW				X
	Bryn Mawr Community Center- HE Boilers				X
06 - HVAC Control Upgrades	Public Safety Building - RTU Replacements				X
	Bala Avenue Gymnasium				X
	Belmont Hills Community Center				X
07 - Building Envelope Upgrades	Bryn Mawr Community Center				X
	Ludington Library			X	
	Public Safety Building			X	
	Ardmore Pool Complex				X
	Belmont Pool Complex				X
	Koegel Complex				X
	Public Safety Building				X
	Township Administration Building				X

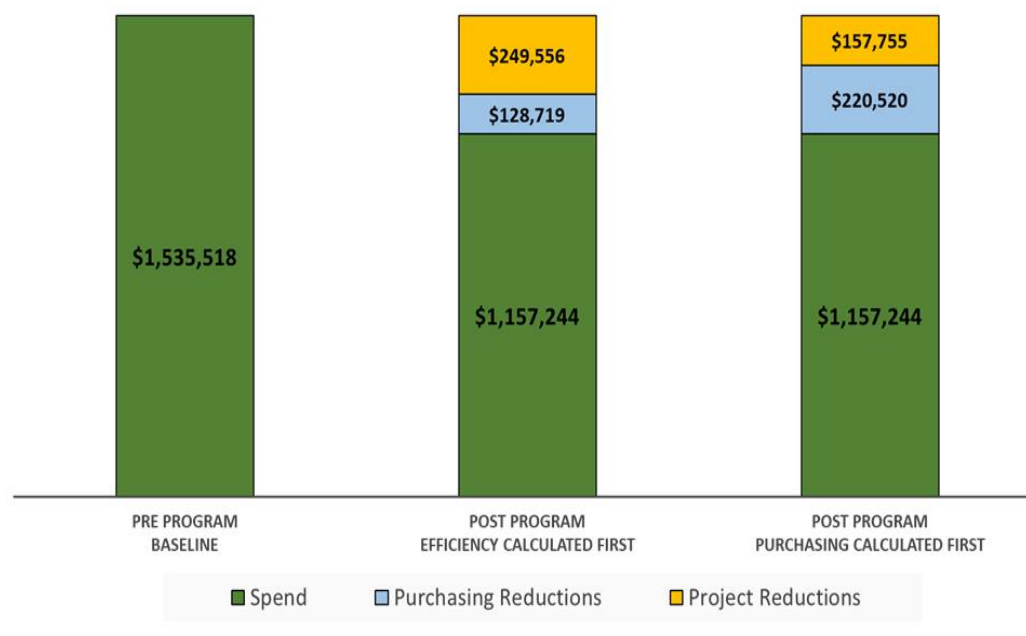
As noted earlier, this Strategic Energy Program included having Provident Energy Consulting assist with a procurement process to reduce the purchase cost of energy supply. As Provident Energy provides energy procurement services for many large governmental, educational and institutional clients, including multiple municipalities, counties and school districts, the Township was able to benefit from our experience, expertise and volume purchasing approach. In the Fall of 2018, using our very competitive ‘request for pricing’ approach, the Township was able to significantly reduce its electricity rates plus lower its rate paid for natural gas.

Exhibit 3 presents cost reductions realized (and/or possible) from this strategic energy initiative, with total program impacts segmented into savings associated with energy usage reductions and from competitive energy procurement. The key take-away from this chart demonstrates that, while impacts from both efficiency and procurement can be calculated in two ways, i.e., efficiency cost reductions first or procurement reductions first, total impacts remain the same.

- The middle bar represents the calculated savings presented by ESG in its RFP response, using pre-program rates, i.e., before the procurement activity occurred. The reduced usage from the proposed ECMs equates to about \$250K, with the procurement effort incrementally adding about \$129K. This is consistent with the formula shown on page 3.
- The right-side bar represents the impacts from procurement savings calculated first, with the efficiency-based savings then calculated against the new, reduced rates. Viewed this way, the three-year rates would save over \$220K per year, *including* the purchase price reflecting 100% green renewable energy, with the efficiency savings incrementally adding \$158K.

In either case, the combined program savings related to efficiency and procurement equates to over \$378K per year, with the added benefit of about \$38K in avoided operational expenses from equipment cost avoidance, as well as ongoing needed repairs and maintenance!

**Exhibit 3: Energy Program Reductions**





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In coordination and consultation with the Township Administration, ESG, and the Provident/ICS team, a set of ECMs consisting of the Priority 1 & 2 ECMs is shown below in Exhibit 4 for your consideration. With this optimal set of ECMs for Priority 1 and 2 measures incorporating measures delivering the greatest amount of savings, long term community benefits, and needed facility improvements, as well as a successful procurement effort in place through the year 2021, these impacts that may be realized reflect the foundation of an impressive cost-effective energy efficiency and facilities improvement strategy.

**Exhibit 4: Energy Savings Program Cost & Savings**

Priority	Final Cost	Annual Savings (Energy & Operational)	Procurement Savings	Payback (Years)	Greenhouse Gas Offset (metric tons)
1	\$ 3,738,825	\$ 278,069	\$ 128,719	9.2	2,214
2	\$ 492,160	\$ 9,067			48
<b>Subtotal: Priority 1 + Priority 2</b>	<b>\$ 4,230,985</b>	<b>\$ 287,136</b>	<b>\$ 128,719</b>	<b>10.2</b>	<b>2,262</b>













About two-thirds (2/3) of the overall Priority 1 ECM costs are related to street lighting system improvements and conversion of older technology High Pressure Sodium and Mercury Vapor lamps to much more efficient LED technology. The Priority 1 measures at \$3.74M would pay back in just over 9 years, while the addition of Priority 2 measures would amount to \$4.23M and pay back in slightly over 10 years. Both Priority 1 and/or Priority 2 measures would provide the Township with much needed infrastructure improvement and energy savings.

Beyond the aforementioned energy and infrastructure benefits, this strategic energy program would add significant environmental benefit to the Lower Merion Township community. Should the Township opt to move forward with ESG in an energy performance contract, the offset from that initiative would yield a reduction of approximately 2,262 metric tons of greenhouse gases. Factoring in the work being undertaken and/or planned by the Township public works department, i.e., measures shown in Exhibit 2 as “SP”, self-performed, the total greenhouse gas offset will increase to 2,380 total metric tons, or the equivalent of taking 505 cars off the road! Other impacts of note are shown in Exhibit 5, Environmental Impacts and Benefits.

This program offers proof that energy efficiency is not only cost-effective but environmentally advantageous. With the addition of the recently executed electricity procurement contracts - which utilize a 100% green electricity component, the Township of Lower Merion is demonstrating leadership in environmental stewardship and fiscal responsibility for its residents and businesses to see firsthand.

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### Exhibit 5: Environmental Impacts and Benefits

Greenhouse Gas Emissions from:	
<div><div></div><div><b>505</b></div></div> <div><div></div><div>Passenger vehicles driven for one year</div></div>	<div><div></div><div><b>267,807</b></div></div> <div><div></div><div>gallons of gasoline consumed</div></div>
CO <sub>2</sub> Emissions from:	
<div><div></div><div><b>285</b></div></div> <div><div></div><div>homes' energy use for one year</div></div>	<div><div></div><div><b>303,479,318</b></div></div> <div><div></div><div>number of smartphones charged</div></div>
Carbon Sequestered by:	
<div><div></div><div><b>39,354</b></div></div> <div><div></div><div>tree seedlings grown for 10 years</div></div>	<div><div></div><div><b>2,801</b></div></div> <div><div></div><div>acres of U.S. forests in one year</div></div>