



**AVON**  
CONNECTICUT

# ACEC Performance Analysis

Prepared by Titan Energy New  
England

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## INTRODUCTION

The Town Council adopted a Comprehensive Energy Management Plan on October 4, 2012 (Plan). The Plan was prepared by the Avon Clean Energy Commission (ACEC). The purpose of the Plan is to guide the Town and Board of Education (BOE) in making decisions that affect the community's energy future. The Plan identifies various energy related goals.

The goals recommended by the ACEC were pro-active and challenged the status quo. The Plan noted that progress toward achieving the goals should be measurable, measured, and reported.

### **Recommended Energy Goals for Municipal and School Operations:**

The ACEC recommended that Town officials formally adopt the following performance goals for energy management in Town operations and, further, direct all employees to consider the energy implications of their decisions and actions in light of these goals.

- Establish a system to track and benchmark all Town energy use against quantifiable goals
- Reduce Town and BOE energy used in operations by 15% of total kBtu/SF by 2015, against a 2008 baseline. Specifically,
  - Improve the energy efficiency of Town and BOE buildings
  - Increase the measured fuel efficiency of the Town's vehicle fleet
  - Reduce the number and wattage of street lights and other outside lighting, where possible, and establish a program to convert this lighting to more efficient technologies
- Reduce the Town's "carbon footprint" by 20% by 2020, through an integrated strategy of efficiency improvements and substituting clean alternatives for fossil fuels and fossil fuel generated electricity

### **Suggested Energy Goals Affecting the Community as a Whole:**

Beyond municipal and school operations, the ACEC suggested the following additional goals be pursued by the Town to facilitate increased energy efficiency and use of renewable technology town-wide:

- Educate the community about energy use reduction strategies and energy supply options and the benefits and costs associated with each
- Encourage community members to establish their own personal energy plans
- Increase local participation in utility and state sponsored programs that help improve energy efficiency and reduce greenhouse gas emissions associated with fossil fuel use
- Explore the feasibility of improving building codes for new construction and major renovations to require higher energy efficiency standards
- Encourage the use of renewable energy technology and the adoption of sustainable practices, such as recycling, by Town residents
- Support the use and expansion of mass transit and non-motorized transportation

The Plan notes that the Town should establish quantifiable goals for energy reduction and the Town should measure progress towards meeting these goals. The Plan also notes that the Town's Energy Plan should be a living document that is periodically updated to reflect new opportunities and goals that emerge, changes in perspectives and accomplishments to date.

The purpose of this report is to quantify the results of the Plan and review measures taken by the Town and BOE to achieve these goals. This report identifies actions taken since July 1, 2012. Results are compared against a baseline year of FY 08 as identified in the Plan.

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## RECOMMENDED ENERGY GOALS FOR MUNICIPAL AND SCHOOL OPERATIONS

The recommended energy goals for municipal and school operations are noted in the introduction and can be found on page 7 of the Plan.

### BENCHMARKING

The Department of Public Works maintains an energy-specific database via software called "Facility Dude," which also serves as a general management software package for DPW operations. The program allows DPW staff to gain easy access to all utility billing information, including water, natural gas, propane, oil and electricity, as well as the ability to generate a series of reports based on location, time period (billing and meter read), carbon emissions/avoidance and other task-specific reports. Similar options should be explored at the BOE based on need, ease of use and compatibility with the BOE's energy management goals.

### TOWN & BOE ENERGY USE REDUCTION

The Plan aimed to reduce energy used in municipal and school buildings and operations by 15% by FY 15, against a FY 08 baseline. The best measurement for this exercise is known as the Energy Use Index calculation- a common tool used to compare energy consumption across a variety of native units (kWh, ccf, gallons) relative to a facility's square footage, on a kBtu/SF basis. The EUI score also allows for easy comparison of Avon facilities with those in other communities. This report will examine native units, common units and a square-footage based analysis so as to provide diverse perspectives of Town-wide energy use.

## HELPFUL DEFINITIONS

**British Thermal Unit (Btu):** Scientific term for the amount of heat energy needed to raise the temperature of one pound of water by one degree Fahrenheit

**Energy Use Index:** Measures the Btu equivalent of combined annual electricity, natural gas and oil use, divided by building square footage, divided by 1,000, and is expressed in kBtu per square foot, or thousand British thermal units per square foot

**MMBtu:** Designation for Million British thermal units

### Btu Content of Common Energy Units (1 thousand Btus equals 1 kBtu)

- 1 kilowatt hour of electricity = 3.412 kBtu
- 1 therm = 100 kBtu
- 1 ccf of natural gas = 102.8 kBtu
- 1 gallon of heating oil = 138.69 kBtu
- 1 gallon of propane = 91.65 kBtu
- 1 gallon of gasoline = 124.24 kBtu
- 1 gallon of diesel fuel = 138.69 kBtu

## TOWN RESULTS

### DATA TABLES

The tables below provide energy (electricity, natural gas and oil) consumption data from FY 08 as compared against FY 15. For more information, additional years' data is available in Appendix B of this report.

### ELECTRICITY PERFORMANCE

Electricity consumption is higher than the baseline year by 24.4%, though these results need to be taken in context. A primary driver of this increase is electricity usage at the Avon Free Public Library, which has increased by 85% since the baseline year.

This increase is partially due to the expansion of the building from 18,000 to 40,000 sq. ft. This expansion was completed in the spring of 2012. Along with doubling the size of the building, the project included the installation of an electricity driven geothermal system. This system has effectively removed the gas and oil load used by the building. It should also be noted that the system is currently experiencing operational issues and is likely not operating at maximum efficiency. It is anticipated that kilowatt-hour readings will decrease once the system is repaired.

Town buildings 3, 4, 5, 6 and 7 represent the largest proportionate increase in kilowatt-hour consumption as compared to FY 08. Further study of these buildings should be pursued as there has been no change in the total square footage of these buildings.

Buildings 1, 2, 8, Company 2 and the buildings at the landfill/transfer station all demonstrate significant reductions in electricity use. These reductions are likely the result of lighting and control upgrade measures taken prior to FY 12.

In FY 13, a new American Standard 10 ton, dual-circuited condensing unit and air handler was installed in Town Hall BLDG 1. It is likely that the installation of this unit, funded through a \$10,000 Bright Ideas Grant, has resulted in increased efficiency. It should also be noted that a 65.8 kW Solar Array has been installed at the Public Works Annex. It is estimated that this array will generate 90,000 kWh annually, further offsetting electricity usage. This system became operational in October 2015, which is subsequent to the scope of this report. Also, while beyond the time period covered by this report, it should be noted that funding in the amount of \$20,000 is included in the FY 17 Capital Budget for Town Wide Energy Efficiency Improvements.

Facility	FY 08 (kWh)	Base	FY 15 (kWh)	% Change
<b>Animal Shelter</b>	5,229	100.00%	6,518	24.65%
<b>Building 1, 2</b>	81,200	100.00%	64,480	-20.59%
<b>Building 5, 6, 7</b>	92,120	100.00%	129,360	40.43%
<b>Building 3, 4 (Police)</b>	262,723	100.00%	309,866	17.94%
<b>Building 8 (Gym)</b>	45,745	100.00%	38,891	-14.98%
<b>Company 1</b>	79,520	100.00%	88,218	10.94%
<b>Company 2</b>	19,091	100.00%	12,131	-36.46%
<b>Company 3</b>	37,704	100.00%	33,097	-12.22%
<b>Company 4</b>	17,161	100.00%	17,321	0.93%
<b>Countryside Park</b>	4,826	100.00%	6,807	41.05%
<b>Public Works Facility</b>	80,946	100.00%	96,729	19.50%
<b>Recycling Center</b>	22,524	100.00%	11,423	-49.29%
<b>Senior Center</b>	71,720	100.00%	85,080	18.63%
<b>Public Library</b>	200,640	100.00%	370,352	84.59%
<i>Total</i>	<i>1,021,149</i>	<i>100.00%</i>	<i>1,270,273</i>	<i>24.40%</i>

## NATURAL GAS PERFORMANCE

Natural gas consumption decreased by 8.23%- The Public Works Annex and Senior Center demonstrated reductions of 40.13% and 69.33%, respectively. Buildings 5, 6 and 7 increased by 12.27% and buildings 1 and 2 increased by 37.18%. Cold temperatures may explain 5, 6 and 7, but buildings 1 and 2 are more likely a controls, hardware or operational issue that should be investigated further.

Facility	FY 08 (CCF)	Base	FY 15 (CCF)	% Change
<b>Animal Shelter</b>	1,115	100.00%	1,183	6.10%
<b>Building 1, 2</b>	2,458	100.00%	3,372	37.18%

<b>Building 5, 6, 7</b>	3,284		3,687	12.27%
<b>Building 3, 4 (Police)</b>	9,757	100.00%	9,699	-0.59%
<b>Building 8 (Gym)</b>	726	100.00%	808	11.29%
<b>Company 1</b>	5,491	100.00%	5,706	3.92%
<b>Company 3</b>	3,613	100.00%	3,412	-5.56%
<b>Public Works Facility</b>	12,970	100.00%	7,765	-40.13%
<b>Senior Center</b>	4,053	100.00%	1,243	-69.33%
<i>Total</i>	<i>40,183</i>	<i>100.00%</i>	<i>36,875</i>	<i>-8.23%</i>

## OIL PERFORMANCE

Avon municipal buildings have been effective at displacing oil use with other fuels. The Library now relies exclusively on the geothermal heat pump, which is the major driver of the 50.41% decrease as compared to FY 08. The significant increases in oil consumption at Company 4 and the Recycling Center should be further investigated. These increases may be weather related or the result of operational decisions.

Facility	FY 08 (Gal.)	Base	FY 15 (Gal.)	% Change
<b>Company 2</b>	1,586	100.00%	1,619	2.08%
<b>Company 4</b>	1,916	100.00%	2,442	27.45%
<b>Countryside Park</b>	937	100.00%	781	-16.65%
<b>Recycling Center</b>	239	100.00%	289	20.92%
<b>Avon Free Public Library</b>	5,668		0	100.00%
<i>Total</i>	<i>10,346</i>		<i>5,131</i>	<i>-50.41%</i>

## BOE RESULTS

### DATA TABLES

The tables below provide energy (electricity, natural gas, oil) consumption data from FY 08 as compared against FY 15. Additional years' data is available in Appendix B of this report

### ELECTRICITY PERFORMANCE

All facilities have experienced a reduction in the usage of electricity. It should be noted that solar arrays have been installed at the High School and the Middle School. These systems became operational in July of 2015, which is subsequent to the time period covered by this report. It is anticipated that the installation of these systems will further offset utility-sourced electricity demand at these facilities.

Facility	FY 08 (kWh)	Base	FY 15 (kWh)	% Change
<b>Avon High School</b>	2,251,648	100.00%	1,764,000	-21.66%
<b>Avon Middle School</b>	1,003,776	100.00%	630,576	-37.18%
<b>Central Office</b>	101,920	100.00%	77,259	-24.20%
<b>Pine Grove School</b>	814,080	100.00%	537,613	-33.96%
<b>Roaring Brook School</b>	639,744	100.00%	414,013	-35.28%
<b>Thompson Brook School</b>	1,299,072	100.00%	799,512	-38.46%
<b>Total</b>	<b>6,110,240</b>	<b>100.00%</b>	<b>4,222,973</b>	<b>-30.89%</b>

#### NATURAL GAS PERFORMANCE

Natural gas performance has improved. This is likely due to a number of upgrades that have been made to BOE facilities since FY 08. In addition, while outside the scope of this reporting period, it should be noted that the FY 16 and 17 capital budgets included funding for the replacement of roof top units at Roaring Brook and Pine Grove Schools.

Facility	FY 08 (CCF)	Base	FY 15 (CCF)	% Change
<b>Avon High School</b>	96,764	100.00%	88,329	-8.72%
<b>Avon Middle School</b>	52,408	100.00%	35,719	-31.84%
<b>Pine Grove School</b>	46,492	100.00%	28,866	-37.91%
<b>Roaring Brook School</b>	36,234	100.00%	29,775	-17.83%
<b>Thompson Brook School</b>	30,239	100.00%	30,657	1.38%
<b>Total</b>	<b>262,137</b>	<b>100.00%</b>	<b>213,346</b>	<b>-18.61%</b>

#### OIL PERFORMANCE

The Central Office is the remaining facility using oil within the BOE. Use has trended down by a slight margin. When the boiler reaches the end of its useful life, consideration should be given to converting the heating system to natural gas.

Facility	FY 08 (Gal.)	Base	FY 15 (Gal.)	% Change
<b>Central Office</b>	5000	100.00%	4806.9	-3.86%
<b>Total</b>	<b>5000</b>	<b>100.00%</b>	<b>4806.9</b>	<b>-3.86%</b>

## COMPREHENSIVE MMBTU ANALYSIS

Converting native units (kWh, CCF, Gallons) into a common unit like the MMBtu, (million British Thermal Units) provides an easily interpreted understanding of total net energy consumption across the Town and BOE, reflecting the energy value that each native unit represents by British thermal unit. This allows for the easy interpretation of energy consumption data for instances in which fuel sources change over time, i.e. oil-to-gas conversions and/or when assigning one value to multiple, diverse energy units. This measurement does not take square feet into account, but rather looks at the absolute energy demand picture without factoring in building size.

### BTU Content of Energy Units (1 million Btus equals 1 MMBtu)

- 1 kilowatt hour of electricity = 0.003412 MMBtu
- 1 therm = 0.1 MMBtu
- 1 ccf (100 cu. ft.) of natural gas = 0.1028 MMBtu
- 1 gallon of heating oil = 0.139 MMBtu
- 1 gallon of propane = 0.091 MMBtu
- 1 gallon of gasoline = 0.125 MMBtu
- 1 gallon of diesel fuel = 0.139 MMBtu

### TOWN RESULTS

The Town combined MMBtu use is slightly lower on an absolute basis, though the reason for the modest improvement is due primarily to the expansion of the library from 18,000 to 40,000 square feet and the corresponding increase in electricity consumed. Again, It should also be noted that the system is currently experiencing operational issues and is likely not operating at maximum efficiency.

Total vehicle MMBtu use has decreased over time, despite more total miles traveled than the benchmark year. This is due primarily to improved operational standards (no idling) and updated fleet vehicles with higher mpg ratings.

### BOE RESULTS

The combined MMBtu use by the BOE has dropped significantly and is nearly sufficient to meet the requirements set forth in the original ACEC plan and Clean Energy Communities pledge. However, the original goal was not set on a net-Btu basis, but rather by kBtu/SF. Remember, the town BOE-wide footprint has grown by 18% during the time period between FY 08 and 15, yet net energy consumption has decreased by 23.76%. These figures do not take the solar arrays into account, which will send the cumulative MMBtu reduction amount above 20%.

### VEHICLE RESULTS

In spite of additional miles traveled in FY 15 increasing by 5% as compared to the baseline year, fuel efficiency has increased by almost 8%.

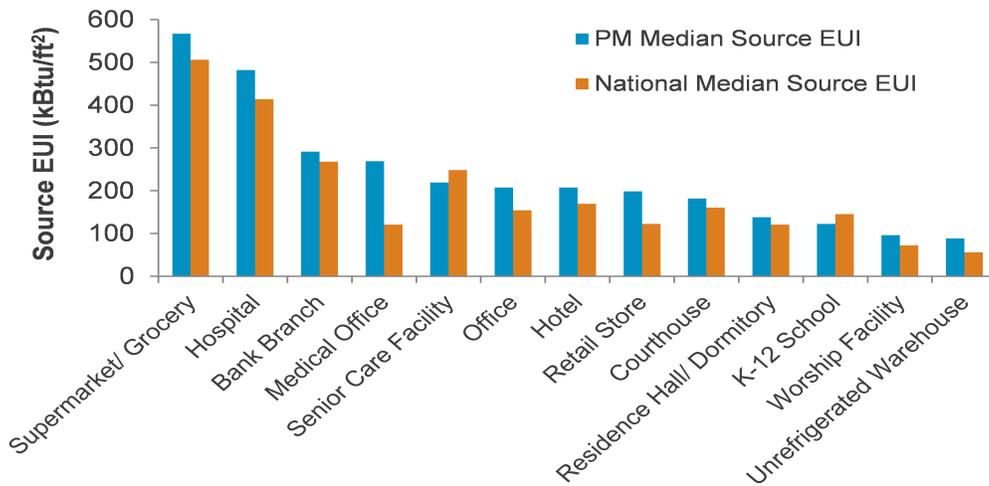
## COMPREHENSIVE RESULTS

	FY 08 (MMBtu)	FY 15 (MMBtu)	% Change
<b>Municipal Buildings</b>			
Electricity	3,484.16	4,334.17	<b>24.40%</b>
Natural gas	4,130.81	3,790.75	<b>-8.23%</b>
Oil	1,438.09	713.209	<b>-50.41%</b>
<b>Muni. Total</b>	<b>9,053.07</b>	<b>8,838.13</b>	<b>-2.37%</b>
<b>School Buildings</b>			
Electricity	20,903.13	14,446.79	<b>-30.89%</b>
Natural gas	26,947.68	21,931.99	<b>-18.61%</b>
Oil	695	668.1591	<b>-3.86%</b>
<b>BOE Total</b>	<b>48,545.81</b>	<b>37,046.94</b>	<b>-23.69%</b>
<b>Vehicles</b>	<b>10,138.41</b>	<b>9,332.00</b>	<b>-7.95%</b>
<b>Net Total</b>	<b>67,737.29</b>	<b>55,217.06</b>	<b>-18.48%</b>

## ENERGY USE INDEX (EUI)

Energy Use Index calculations are the best, most complete way to compare the intensiveness of energy use for individual buildings, as an EUI measurement analyzes the amount of energy a building consumes per square foot of floor area, which a simple MMBtu (or kBtu) comparison does not do. The conversion from native units to a common unit (eg. kWh or CCF to kBtu) allows different types of energy used for different purposes to be added together and compared relative to size, building type and geography.

The US Environmental Protection Agency's ENERGYSTAR program reports that EUI values for buildings can range from 30 kBtu/SF to 340 kBtu/SF. An efficient commercial office building in the Northeast should perform at around 80 kBtu/SF.



Some building types excluded due to inadequate data and/or EUI values beyond this range

1

That said, an accurate understanding of performance differences between buildings and opportunities for reductions in individual buildings requires knowledge of when and how a building is used, what types of systems are installed, levels of occupancy, and other factors.

For the purpose of this report, “Source Energy” calculations, as opposed to “Site Energy,” are used, which are considered more accurate representations of total energy consumed both on site and imported from the utility for the simple reason that Source Energy represents the total amount of raw fuel that is required to operate the building and incorporates all transmission, delivery, and production losses.

## FY 15 TOWN BUILDING EUI SUMMARY

The overall FY 15 EUI has decreased by 20.94% against the baseline year. The primary positive driver for this measurement is a reduction of the consumption of natural gas and oil, despite the colder-than-average winter of 2014-15 and a doubling of the library’s square footage. Although increasing the total kilowatt-hours consumed by a significant amount, the library has abandoned the use of natural gas and oil as a heat source and reduced the EUI by 60.77% against the baseline year. Other noteworthy properties include the Senior Center, Public Works Facility and Recycling Center. Lighting and controls are the likely drivers of this reduction.

However, Avon facility managers should investigate EUI increases at Buildings 3, 4, 5, 6, 7 and Company 4. While it is expected that police and fire stations will have a higher-than-average EUI due to constant activity within the buildings, the general increase against the baseline year should be investigated. The most likely explanation may prove to be related to a higher number of electronic devices being used and/or charged on site. This is a common theme when comparing these two time periods.

<sup>1</sup> From EnergyStar.gov

Facility	Sq. Ft.	Electricity (kWh)	Gas (CCF)	Oil (Gal.)	EUI kBtu/SF	% Change
Animal Shelter	800	6,518	1,183		179.59	8.61%
Building 1, 2	9,941	64,480	3,372		56.99	6.90%
Building 5, 6, 7	17,194	129,360	3,687		47.74	25.88%
Building 3, 4 (Police)	9,627	309,866	9,699		213.48	8.18%
Building 8 (Gym)	1,675	38,891	808		128.92	-6.51%
Company 1	10,078	88,218	5,706		88.04	6.20%
Company 2	5,000	12,131		1619	53.31	-6.73%
Company 3	5,425	33,097	3,412		85.40	-7.28%
Company 4	3,730	17,321		2442	106.89	22.66%
Countryside Park	2,784	6,807		781	47.36	-10.16%
Public Works Facility	18,652	96,729	7,765		60.45	-29.86%
Recycling Center	780	11,423		289	101.60	-28.14%
Senior Center	8,400	85,080	1,243		49.83	-36.69%
Library	39,369	370,352			32.18	-60.77%
<b>Total</b>	<b>133,455</b>	<b>1,270,273</b>	<b>36,875</b>	<b>5,131</b>	<b>66.26</b>	<b>-20.94%</b>

## FY 15 BOE BUILDING EUI SUMMARY

The BOE has been successful with regards to reducing energy consumption relative to square footage. This progress is likely the result of lighting improvements, retiring outdated RTUs with more efficient models, high efficiency boiler installations and controls adjustments.

Facility	Sq. Ft.	Electricity (kWh)	Gas (CCF)	Oil (Gal.)	EUI kBtu/SF	% Change
Avon High School	229,979	1,764,000	88,329		65.65	-51.60%
Avon Middle School	109,529	630,576	35,719		53.15	-33.94%
Central Office	11,000	77,259		4,807	84.77	-10.66%
Pine Grove School	85,090	537,613	28,866		56.42	-36.45%
Roaring Brook School	75,000	414,013	29,775		59.62	-24.30%
Thompson Brook School	95,017	799,512	30,657		61.89	-22.09%
<b>Total</b>	<b>596,600</b>	<b>4,222,973</b>	<b>213,346</b>	<b>4,807</b>	<b>62.03</b>	<b>-35.33%</b>

## REDUCE NON-BUILDING ENERGY USE

The Plan notes that “vehicles and street lighting are the other major energy users of the Town of Avon. Strategies should be put in place and opportunities identified for reducing the energy required for both, including adopting alternative operations and maintenance practices, life cycle costing in purchasing decisions, and replacement of aging and failed equipment with new models using more energy efficient technologies.”<sup>2</sup>

## TOWN VEHICLE FLEET

“As noted above, the Town vehicle fleet includes automobiles, light trucks, and special purpose vehicles used for highway and property maintenance and public safety purposes. The ACEC recommended that the Town increase the measured fuel efficiency of the Town’s vehicle fleet by 15% by 2015, and that they continue to implement programs and make purchases to increase the work completed for every gallon of fuel consumed.”<sup>3</sup>

<sup>2</sup> Comprehensive Energy Management Plan, October 2012, page 31

<sup>3</sup> Comprehensive Energy Management Plan, October 2012, page 31

## ACTIONS TAKEN

The Department of Public Works “implemented a range of procedures and programs to improve vehicle performance and to track and control the use of transportation fuel that the Town is purchasing:

- In an effort to monitor and control fuel usage, the Town of Avon installed a Fuel Management System approximately five years ago to monitor fuel utilization. This system prevents fuel from being dispensed into anything but the vehicle that it is activated for by using an electronic ring on the vehicle and the gas pump nozzle. Once the connection is broken, the pump shuts off, preventing dispensing into additional unauthorized vehicles or gas cans. This measure was put into effect prior to the original ACEC report and remains in effect to this day.
- The same system also monitors the engines computer and alerts the DPW if there is an engine malfunction that could result in the use of additional fuel usage because of poor performance. This measure was put into effect prior to the original ACEC report and remains in effect to this day.
- In addition to the Fuel Management System, the DPW has a Fleet Management System to track repairs and preventative maintenance costs. This system uses mileage reports from the Fuel Management System and alerts the Machinery and Equipment staff when preventative maintenance services are due based on a predetermined mileage and time schedule by class of vehicle. This measure was put into effect prior to the original ACEC report and remains in effect to this day.
- Part of the preventative maintenance schedule is to closely monitor tire air pressures. Poorly filled tires contribute to excessive fuel consumption and poor tire life cycles. This measure was put into effect prior to the original ACEC report and remains in effect to this day.
- Four years ago, the DPW switched from a conventional motor, transmission and hydraulic oil to 100% synthetic oil products. They anticipate that this change is reducing fuel consumption by 2%, consistent with national studies. In addition, by using these oil products, they have also reduced the number of oil changes they perform annually, with a commensurate reduction in associated oil expense, labor, and disposal of the waste product. This oil is also expected to reduce wear over the life cycle of the unit. This measure was put into effect prior to the original ACEC report and remains in effect to this day.
- Waste oil that is collected is burned through a waste oil heating system, which heats the Machinery and Equipment shop as well as the maintenance building at the Landfill, offsetting the need for other heating fuel purchases. This measure was put into effect prior to the original ACEC report and remains in effect to this day. In the fall of 2014, the waste oil furnace was replaced.
- The Department of Public Works also instituted a no idle policy that its employees follow in an effort to reduce pollution and unnecessary fuel consumption. This measure was put into effect prior to the original ACEC report and remains in effect to this day.
- Any and all new equipment and vehicle purchases are being matched to the operation vehicles are intended to do. This means not purchasing undersized or underpowered units that will not hold up to the demands and needs of the operations or not buying an oversized or over powered unit that will not be an efficient unit. To that end, the DPW focuses on developing individual equipment specifications that secure a vehicle or equipment that performs the operations it is intended to do as

efficiently as possible, with the best prolonged life cycle. This measure was put into effect prior to the original ACEC report and remains in effect to this day.

## VEHICLE REPLACEMENTS

- A total of four (4) 2008 Crown Victoria police vehicles were replaced with Ford Explorer Police Interceptors: (2) in FY 13, (1) in FY '14, one (1) in FY '15
- (5) Diesel light duty dump trucks replaced 1992-1996 F150s and 1500 series GM vehicles
- 2004 Ford F-550 replaced with a 2014 diesel dump truck
- Replaced (2) 1990s International dump trucks with 2013 and 2015 Freightliners
- Added Police radio truck for the purpose of mobile communications but is not frequently deployed
- Added additional 2014 Caterpillar front-loader and retained, but effectively retired it's predecessor

## RESULTS

The results of the Town and BOE efforts to reduce fuel consumption have proven successful. Despite total miles driven having increased by 4.6%, fuel use is down by 21.9% as compared to FY 08, and down an overall average of 24.18%. This is the result of the addition of fleet units with higher fuel efficiency and a strong ethic of conservation and preventative maintenance. We suggest investigating why FY 12-14 represents the pinnacle of fuel efficiency, though it's likely due to possible deteriorating efficiency of newer vehicles. Note: the increase of diesel gallons consumed is a function of the Town's increased use of diesel vehicles and still represents a net decrease in total fuel consumption.

Year	Annual Miles Traveled	Gasoline (Gallons)	Diesel (Gallons)	Miles Traveled per Gallon	% Reduction
<b>FY 08</b>	497,814	54,149	24,243	6.35	0
<b>FY 09</b>	498,833	52,537	24,112	6.5	2.4%
<b>FY 10</b>	470,561	46,590	22,021	6.86	8.0%
<b>FY 11</b>	515,228	42,736	24,551	7.66	20.6%
<b>FY 12</b>	537,802	39,538	22,123	8.72	37.3%
<b>FY 13</b>	524,723	37,959	25,319	8.29	30.6%
<b>FY 14</b>	598,892	32,380	31,130	9.43	48.5%
<b>FY 15</b>	521,747	34,245	33,130	7.74	21.9%
<b>Average</b>	<b>520,700</b>	<b>42,517</b>	<b>25,829</b>	<b>7.69</b>	<b>24.18%</b>

## REDUCE AVON'S CARBON FOOTPRINT BY 20% BY 2020

All energy conservation measures have a positive impact on Avon's total carbon emissions, yet often, the best, most direct way to reduce environmental impact is to create power, on site, with non-carbon emitting alternatives to fossil fuels.

"The ACEC has suggested that Avon adopt a goal of lowering the Town's carbon footprint by 20% by the year 2020 through an integrated program of energy conservation, energy efficiency improvement, transitioning to non-carbon dioxide generating energy supply, and substituting clean alternatives to fossil fuels and fossil fuel generated electricity, whenever practical and economically feasible to meet our remaining energy needs."<sup>4</sup>

### TOWN & BOE ACTIONS TAKEN

- A geothermal heating and cooling system has been installed at the Avon Free Public Library, replacing the conventional boiler and chiller units.
- Avon joined the State of Connecticut's 20% by 2010 initiative and recently also signed up for the 30% by 2015 campaign. Under the successful 20% by 2010 effort, Avon purchased enough renewable energy certificates ("RECs") to green 10% of the total Town and BOE electricity purchases. These certificates were purchased in the REC market from certified projects. The remainder of the 20% was achieved through the State's own requirements that utilities secure 10% of the electricity they supply from Class 1 renewable generators.
- ACEC has encouraged residents to sign up for clean energy on their Eversource bills. Choosing clean energy helps the Town qualify for solar arrays through the Connecticut Clean Energy Fund (1 kWh for every 100 residents to sign up).
- Through a Request for Proposals Process and a significant amount of due diligence, the Town and BOE ultimately entered into agreements with Solar City to install solar panels on the Middle and High School Roofs. An array was also located on the roof of the Public Works Annex. Power Purchase Agreements were executed with Solar City for each location. It is anticipated that these solar arrays will result in further reducing fossil fuel consumption and the related cost.

System sizes for each are as follows: Department of Public Works (65.8 kW), High School (234.6 kW) and Middle School (163.2 kW). All systems are currently functional and offsetting kWh consumption at their respective properties. Titan Energy estimates these systems will produce approximately 585,000 kWh/year.

### TOWN RESULTS

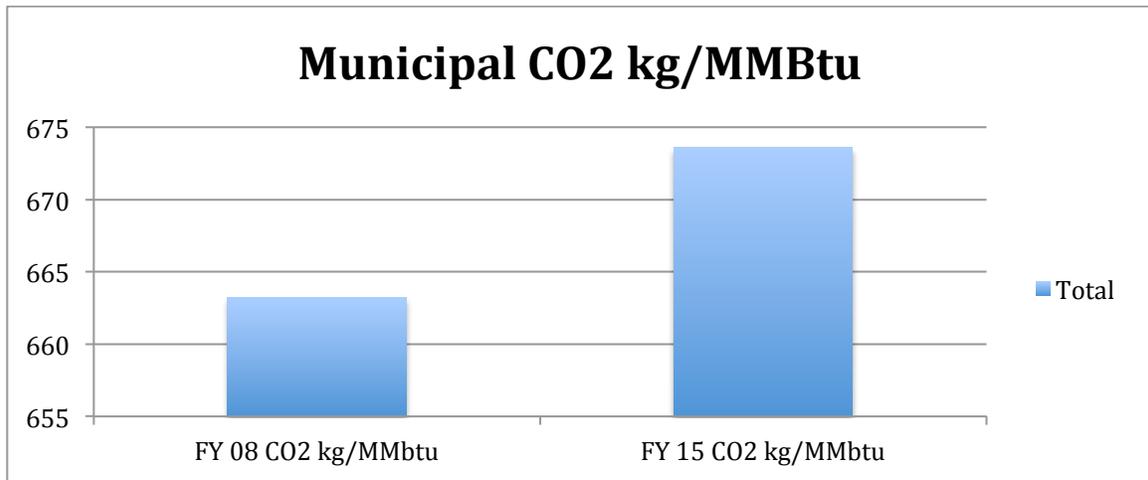
Although it may seem paradoxical in light of the MMBtu and EUI reduction, the Town has actually increased CO<sub>2</sub> emissions against the FY 08 baseline by 1.65% because of the increase of kWh consumption. This is the result of doubling the square-footage of the library and installing the geothermal system.

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<sup>4</sup> Comprehensive Energy Management Plan, October 2012, page 34

The 65.8 kW (DC) solar array at the DPW headquarters, although commissioned at the start of FY 16, will have a positive future impact on the Town's carbon emissions, and the anticipated kWh production has been factored into the FY 16 estimates.

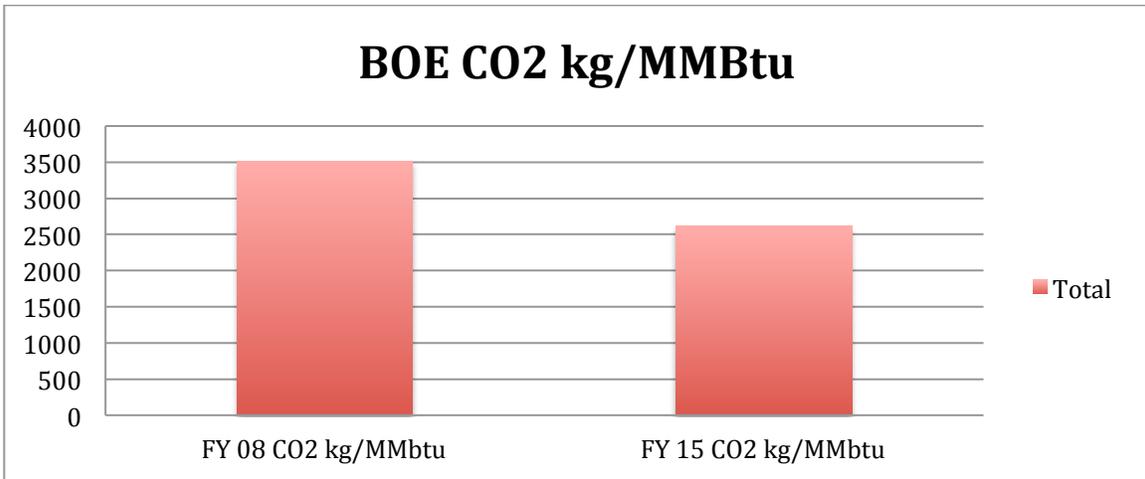
Municipal Buildings	FY 08 CO2 kg/MMbtu	FY 15 CO2 kg/MMbtu	% Change	FY 16 CO2 kg/MMbtu (est.)	% Change (est.)
Electricity	337	419	24.40%	391	15.88%
Natural Gas	219	201	-8.23%	201	-8.23%
Oil	107	53	-50.41%	53	-50.39%
<b>Total</b>	<b>663</b>	<b>674</b>	<b>1.57%</b>	<b>645</b>	<b>-2.76%</b>



## BOE RESULTS

The BOE has reduced total CO2 emissions by 25.55% as compared to the baseline year. The solar arrays at AHS and AMS, although commissioned in October 2015, will have a positive future impact on the Town's carbon emissions, and the anticipated kWh production has been factored into the FY 16 estimates.

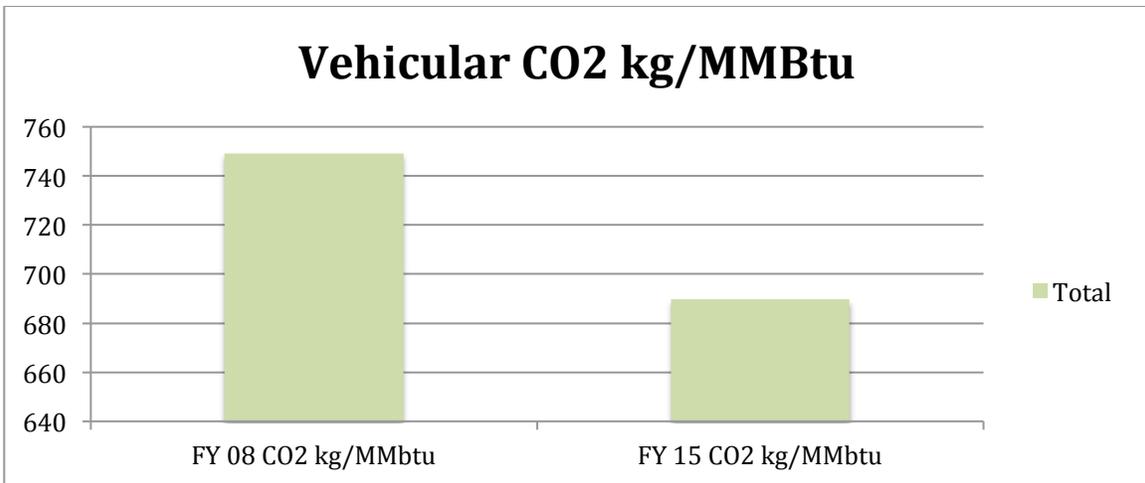
School Buildings	FY 08 CO2 kg/MMbtu	FY 15 CO2 kg/MMbtu	% Change	FY 16 CO2 kg/MMbtu (est.)	% Change (est.)
Electricity	2022	1398	-30.89%	1224	-39.48%
Natural gas	1431	1165	-18.61%	1165	-18.61%
Oil	52	50	-3.86%	50	-3.86%
<b>Total</b>	<b>3505</b>	<b>2612</b>	<b>-25.48%</b>	<b>2438</b>	<b>-30.44%</b>



## VEHICLE RESULTS

At the time of this writing, Titan Energy is unaware of any existing plan to replace a fleet unit with a more efficient model, so we anticipate this number will likely remain flat through FY 16.

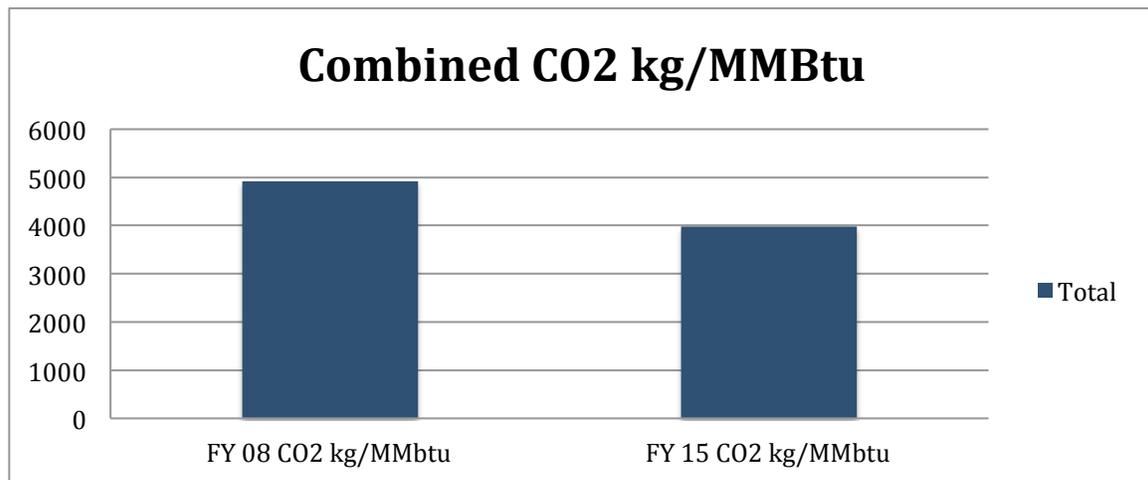
Vehicles	FY 08 CO2 kg/MMbtu	FY 15 CO2 kg/MMbtu	% Change	FY 16 CO2 kg/MMbtu (est.)	% Change (est.)
<b>Total</b>	<b>749</b>	<b>690</b>	<b>-7.95%</b>	<b>690</b>	<b>-7.95%</b>



## TOTAL COMBINED RESULTS

Avon is currently less than 1% away from meeting the town-wide carbon emission reduction goal of 20%, but should meet that goal during FY 16 as the positive impacts accrue from the implementation of solar power at DPW, AHS and AMS.

All	FY 08 CO2 kg/MMbtu	FY 15 CO2 kg/MMbtu	% Change	FY 16 CO2 kg/MMbtu (est.)	% Change (est.)
<b>Total</b>	<b>4918</b>	<b>3975</b>	<b>-19.16%</b>	<b>3773</b>	<b>-23.28%</b>



## RENEWABLE ENERGY CERTIFICATES (REC) PURCHASES

Dating back to 2008, the Town of Avon has engaged with Sterling Planet, INC, for the procurement of Renewable Energy Certificates (RECs) under the 20% by FY 18 Campaign. On September 15, 2011, Avon agreed to purchase RECs at a blended rate of \$.96/REC, for a total cost of \$2,107.20. On February 13<sup>th</sup>, 2013, the Town accepted a proposal from Sterling Planet to purchase additional RECs at the blended rate of \$.94 per REC, for a total cost of \$3,681.98, split 33/66 between the Town and Board of Education. The total over time is listed below.

Certification	Term Year	MWh Volume	CO2 Avoidance (lbs)	Price/MWh	Total Cost
Green-E	2008	365	567,747	<b>\$0.75</b>	<b>\$273.75</b>
Green-E	2009	664	1,032,832	<b>\$0.88</b>	<b>\$581.00</b>
Green-E	2010	969	1,507,250	<b>\$1.00</b>	<b>\$969.00</b>
Green-E	2011	1,055	1,641,021	<b>\$0.93</b>	<b>\$981.15</b>
Green-E	2012	1,140	1,773,236	<b>\$1.04</b>	<b>\$1,185.60</b>

Green-E	2013	1,228	1,910,129	\$0.91	\$1,117.48
Green-E	2014	1,318	2,050,123	\$0.99	\$1,304.82
Green-E	2015	1,371	2,132,563	\$1.14	\$1,562.94
<b>Total</b>		<b>8,110.00</b>	<b>12,614,901</b>		<b>\$7,975.74</b>

It is recommended that Avon take future solar production into account when making additional REC purchases. If the town abides by the 30% goal, including solar production, the total MWh purchase should not exceed 1,100.

## SUGGESTED ENERGY GOALS AFFECTING THE COMMUNITY AS A WHOLE

The energy goals affecting the community as a whole are noted in the introduction and can be found on page 8 of the Plan.

### AVON PARTICIPATION IN EVERSOURCE “CLEAN ENERGY COMMUNITIES” PLEDGE

In 2013, the Town of Avon joined the Clean Energy Communities pledge to reduce town-wide energy consumption by 20% by 2018, purchase 20% of electricity requirements from clean, renewable sources, and promote energy efficiency and the adoption of renewable energy use among town residents. In return, Avon would earn Bright Idea Grants through the EnergizeCT program, including residential energy efficiency program participation, residential solar adoption, and business/municipal energy efficiency program participation. With every 100 points accrued, a \$10,000.00 Bright Idea Grant is made available to be used toward an energy conservation measure or measures within the Town or Board of Education. On August 29, 2013, Avon was awarded \$10,000.00 and the funds were used toward the air conditioning unit replacement at the Town Hall.

At the time of this writing, Avon is only 8 points from an additional \$10,000.00 grant, and every effort should be made to secure those funds. Titan recommends pursuing Special Project points, whereby the Town may submit a community awareness project for Eversource approval, then execute the project to secure the points and subsequent dollar award if approved. Projects examples include: detailed social media post, article in the newspaper, Town-sponsored energy efficiency workshop, hosting of an information table at Avon Day, et cetera. Each project is eligible for an award between 1-10 points, and Avon can earn up to 25 points per year through this mechanism. Titan is also investigating the possibility of including already-completed projects toward the current point count.

A copy of the original pledge is attached to Appendix A of this report.

## ACTIONS TAKEN

“The ACEC has sponsored an information table at Avon Day for the past two years. Public education focused on residential energy conservation measures and on signing up residents as clean energy users through the state Connecticut Clean Energy Option program.

ACEC also sponsored a School Energy Competition among Avon schools to promote adoption of behaviors to reduce energy consumption, decrease the school's carbon footprint, and save taxpayer money. The Avon schools competed in the contest between February 22, 2010 and April 23, 2010, to see which school could achieve the largest percent reduction in energy consumption (both kWh of electricity and cubic feet of natural gas) compared with the same time period in 2009.

The ACEC has also been working with Avon High School Green Energy Club, and has two Club members serving as liaisons between the ACEC and the High School and participating in monthly ACEC meetings as non-voting representatives.”<sup>5</sup>

Avon participated in Phase V of the Solarize CT Program beginning in November 2014. Several workshops were held and the Town provided support to a vendor that was selected through a competitive RFP Process.

These efforts resulted in 28 solar installations with a total installed capacity of 256 kW. These efforts also helped Avon earn additional points toward the “Bright Ideas” grant mentioned at the beginning of this report.

The BOE has undertaken a series of ongoing steps to increase conservation efforts, including:

- School staff modeling conservation behaviors for students
- Enlist the help of student groups to assist with collection of recycling and conservation efforts
- Reminders sent to all staff regarding energy conservation, recycling efforts and other miscellaneous ways to help protect the environment
- Periodic reminders sent to all parents regarding energy conservation and recycling efforts
- Installed water bottle filling stations at Avon High School
- All schools now compost waste from school kitchens. Compost is used in raised bed gardens at each school

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<sup>5</sup> Comprehensive Energy Management Plan, October 2012, pages 24-5

## CONCLUSION

The Town of Avon and Board of Education have been effective at achieving the goals set forth in the original ACEC plan.

- Establish a system to track and benchmark all Town energy use against quantifiable goals
- Reduce Town and BOE energy used in operations by 15% of total kBtu/SF by 2015, against a 2008 baseline. Specifically,
  - Improve the energy efficiency of Town and BOE buildings
  - Increase the measured fuel efficiency of the Town’s vehicle fleet
  - Reduce the number and wattage of street lights and other outside lighting, where possible, and establish a program to convert this lighting to more efficient technologies
- Reduce the Town’s “carbon footprint” by 20% by 2020 through an integrated strategy of efficiency improvement and substituting clean alternatives for fossil fuels and fossil fuel generated electricity
- Engage with the community at large to advance the goals set forth in this plan beyond the Town and BOE operations

It is Titan Energy’s recommendation that Avon continue to set rigorous energy efficiency and cost reduction goals, take full advantage of current resources, grants and financing options available today and use this report as a public awareness tool to increase town-wide access to and knowledge of energy conservation benefits.

ACEC Goals	Status
Establish Data Tracking System for Town and BOE	50% complete
Reduce Town-Wide Energy Use by 15% by 2015 Against FY 08 Baseline	100% Complete
Improve Energy Efficiency of Town Buildings	On-Going
Increase Vehicle Fuel Efficiency	On-Going
Reduce Streetlight Energy Use	Incomplete
20% Town-Wide Carbon Reduction by 2020	Nearly Complete, On-Going
Engage with Community to Advance Goals Set Forth in The Plan	On-Going

Clean Energy Communities Goals	Status
Reduce Town-Wide Energy Use by 20% by 2018 Against FY 08 Baseline	Complete
Purchase 20% RECs by 2018	Complete, On-Going
Promote Energy Efficiency and Renewable Energy Technology Throughout the Community at Large	On-Going

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## ADDITIONAL RESOURCES

### C-PACE

The Avon Town Council adopted a resolution to engage Avon in the Commercial Property Assessed Clean Energy program (C-PACE) program that allows commercial, industrial and multi-family property owners to receive 100% upfront, low-cost, long-term financing for clean energy upgrades to their properties. C-PACE is administered by the Connecticut Green Bank as part of the State’s Energize Connecticut initiative, which is intended to help consumers save money and use clean, renewable sources of energy.

C-PACE allows building owners to access capital to finance qualifying energy efficiency and clean energy improvements by placing a voluntary assessment on their property, which is assessed annually alongside their property tax bills. Property owners pay for the improvements over time through this additional charge without having to use their own capital. The repayment obligation transfers automatically to the next owner if the property is sold.

A complete list of Connecticut projects can be found at: <http://www.cpace.com/projects>

### THE GREEN BANK

The Green Bank is a first-of-its-kind public/private partnership whereby private capital is leveraged to finance clean energy projects for towns, households, private businesses and non-profits. This resource should be used to implement energy efficiency measures across Town and leveraged to help residents and business owners realize the benefits of energy conservation measures.

## SMALL BUSINESS ENERGY ADVANTAGE PROGRAM

Energize Connecticut offers Small Business Energy Advantage program that provides low interest financing for small commercial and industrial customers to make energy improvement. The program offers combination of rebates and loans.

Small business customers of Eversource and United Illuminating Company (UI) with an average 12-month peak demand between 10 kilowatts (kW) and 200 kW are eligible to participate. Natural gas customers of CNG, SGC, or Eversource can also participate for natural gas energy efficiency measures. Examples of small business, but not limited to include restaurants, car washes, churches/meeting centers, retail stores, offices, and others.

After the utility determines qualification for the program, the authorized contractor will perform an energy assessment of the facility at no cost to the participant. A utility contractor will submit a proposal of possible energy-efficiency measures, estimated energy savings, customer incentives, and financing options. Once approved by Eversource or UI the contractor will complete installation. In addition to the rebate, the remaining cost of the project can be paid off in the form of a zero interest loan directly from the utility. The loan is provided interest free and can be repaid through the customer's monthly electric bill.

## LREC/ZREC (RENEWABLE ENERGY CREDIT) PROGRAM

The Low and Zero Emissions Renewable Energy Credit Program (LREC/ZREC) requires Eversource and The United Illuminating Company to procure Class I renewable energy credits under 15-year contracts with owners or developers of renewable energy projects in Connecticut pursuant to state law. The LREC/ZREC programs are the main drivers of the proliferation of solar power in Connecticut, and were crucial for the development of solar projects across Avon. Should Avon consider additional solar, it would be sensible to pay close attention to the following schedule of ZREC program openings.

Project Size	Category
≤ 100 kW (AC)	Small ZREC
> 100 kW (AC) and < 250 kW (AC)	Medium ZREC
≥ 250 kW (AC) and ≤ 1,000 kW (AC)	Large ZREC
Up to 2,000 kW (AC)	LREC

Year	Category	Event Date
5	Large ZREC	Anticipated Opening: by the end of April 2016
	Medium ZREC	Anticipated Opening: by the end of April 2016
	Small ZREC	Anticipated Opening: Q1 2017
6	Large ZREC	Anticipated Opening: by the end of April 2017
	Medium ZREC	Anticipated Opening: by the end of April 2017
	Small ZREC	Anticipated Opening: Q1 2018

## Appendix A: CLEAN ENERGY COMMUNITIES MUNICIPAL PLEDGE

The Clean Energy Communities program is an initiative funded by both the Clean Energy Finance and Investment Authority (CEFIA-formerly known as the Connecticut Clean Energy Fund) and the Connecticut Energy Efficiency Fund. CEFIA and the Energy Efficiency Fund develop programs which collectively seek to have Connecticut cities and towns both reduce energy use and increase support for clean, renewable energy for municipal facilities. The Energy Efficiency Fund programs are administered by The Connecticut Light and Power Company, The United Illuminating Company, Yankee Gas Services Company, The Southern Connecticut Gas Company, and/or Connecticut Natural Gas Corporation (collectively, "the Companies")

By applying currently available energy efficiency and clean, renewable energy technologies the Town of Avon can save money, create a healthier environment and strengthen local economies; and **accordingly, the Town of Avon makes the following Clean Energy Communities Municipal Pledge:**

1. The Town of Avon pledges to reduce its municipal building energy consumption by 20% by 2018. Building energy consumption shall be determined by benchmarking municipal building energy consumption to a baseline fiscal year. The Town of Avon can elect from the following fiscal years to determine its energy baseline year: 2008-2009, 2009-2010, 2010-2011, or 2011-2012.
  - a. The Town of Avon will seek to reduce its municipal building energy consumption for municipal facilities by at least 20% by 2018. The schedule follows:
    - i. Fiscal Year 2012-2013: 5% Reduction
    - ii. Fiscal Year 2013-2014: 8% Reduction
    - iii. Fiscal Year 2014-2015: 11% Reduction
    - iv. Fiscal Year 2015-2016: 14% Reduction
    - v. Fiscal Year 2016-2017: 17% Reduction
    - vi. Fiscal Year 2017-2018: 20% Reduction
  - b. The Town of Avon will work with the Companies, contractors or other entities to benchmark all of its municipal buildings (including board of education buildings) to determine all municipal building energy usage.
  - c. Beginning July 1, 2015, the Town of Avon agrees to provide documentation of its municipal building energy consumption on an annual basis by the end of the first quarter of the following fiscal year.
  - d. The Town of Avon pledges to create its own Municipal Action Plan (MAP) to determine its path in reducing its energy consumption. The Town of Avon may satisfy this requirement by submitting a pre-existing municipal energy plan, sustainability plan, climate change action plan or similar document.
  - e. There is no penalty if the Town of Avon fails to meet the reduction amounts set forth in the schedule above. However if these reduction targets are not met starting July 1, 2015, the Town of Avon will not be eligible to receive Bright Ideas Grants from the Connecticut Energy Efficiency Fund and Companies under the Clean Energy Communities program.
2. The Town of Avon pledges to purchase 20% of its municipal building electricity from clean, renewable energy sources by 2018.
  - a. The Town of Avon will seek to make a voluntary purchase of at least 20% of the electricity for municipal facilities from clean, renewable energy sources by annual CEC program requirements. The schedule follows:
    - i. Fiscal Year 2012-2013: 15% Purchase
    - ii. Fiscal Year 2013-2014: 16% Purchase
    - iii. Fiscal Year 2014-2015: 17% Purchase
    - iv. Fiscal Year 2015-2016: 18% Purchase

- v. Fiscal Year 2016-2017: 19% Purchase
- vi. Fiscal Year 2017-2018: 20% Purchase

b. The Town of Avon agrees to provide CEFIA documentation of its municipal clean energy purchases on an annual basis by the end of the first quarter of the following fiscal year. CEFIA intends to request documentation of municipal clean energy purchases for FY2011-2012 in July 2012.

c. The Town of Avon acknowledges that clean, renewable sources are those defined in section 16-1 of the general statutes as Connecticut Class I renewable energy sources or meeting Green-e® Energy certification standards.

d. The Town of Avon may satisfy the voluntary purchase requirement by purchasing Green-e® Energy certified Renewable Energy Credits (RECs), enrolling one or more municipal facilities in the CTCleanEnergyOptions<sup>sm</sup> program, installing renewable energy systems (provided that the RECs associated with such system(s) are quantifiable and not held by a third-party) or any combination thereof.

e. There is no penalty if the Town of Avon fails to meet the items set forth in the schedule above; however, the Town of Avon will not be eligible to receive incentive rewards from CEFIA under the Clean Energy Communities program.

3. The Town of Avon agrees to promote energy efficiency and clean, renewable technologies in its community. The Town of Avon is encouraged to establish a Clean Energy Task Force, or comparable body. This entity will assist the municipality in meeting the Clean Energy Communities Municipal Pledge and to perform education and outreach among residents, businesses and institutions within the community concerning energy efficiency and clean, renewable energy programs.

By taking the pledge and meeting the Clean Energy Community Program requirements outlined by CEFIA and the Connecticut Energy Efficiency Fund, the Town of Avon may qualify, subject to the terms of separate formal contracts, for the following grants:

- a. CEFIA. For every 100 points, the Town of Avon may earn a 1 kilowatt (or equivalent) clean energy system.
- b. Energy Efficiency Fund. For every 100 points, the Town of Avon may earn a Bright Idea Grant that can be used for energy-saving projects. The Town of Avon is eligible for two Bright Idea Grants per fiscal year.

  
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Brandon Robertson \*

Town Manager

Town of Avon

6/7/13  
Date:

\* The Town of Avon understands that the Clean Energy Communities Municipal Pledge is not a contract, and that CEFIA, the Energy Efficiency Fund, and the Companies have not contracted, committed, agreed or promised, to perform or incur any obligations, in any manner, hereunder.

# Titan Energy-Avon Energy Report, Appendix B

## Muni. Electricity Use by Facility

Facility	FY 08	Base	FY 09	% Reduction	FY 10	% Reduction	FY 11	% Reduction	FY 12	% Reduction	FY 13	% Reduction	FY 14	% Reduction	FY 15	% Reduction
Animal Shelter	5,229	100.00%	4,752	9.12%	6,000	-14.74%	6,993	-33.73%	7,210	-37.88%	6,527	-24.82%	5,509	-5.35%	6,518	-24.65%
Building 1, 2	81,200	100.00%	72,560	10.64%	71,000	12.56%	63,760	21.48%	69,680	14.19%	66,640	17.93%	71,120	12.41%	64,480	20.59%
Building 5, 6, 7	92,120	100.00%	13,279	85.59%	137,000	-48.72%	122,040	-32.48%	134,351	-45.84%	127,320	-38.21%	120,360	-30.66%	129,360	-40.43%
Building 3, 4 (Police)	262,723	100.00%	271,112	-3.19%	287,000	-9.24%	295,439	-12.45%	298,033	-13.44%	315,313	-20.02%	281,174	-7.02%	309,866	-17.94%
Building 8 (Gym)	45,745	100.00%	39,084	14.56%	38,000	16.93%	44,291	3.18%	32,902	28.08%	36,083	21.12%	34,124	25.40%	38,891	14.98%
Company 1	79,520	100.00%	72,280	9.10%	75,000	5.68%	73,960	6.99%	77,720	2.26%	80,555	-1.30%	85,445	-7.45%	88,218	-10.94%
Company 2	19,091	100.00%	17,314	9.31%	18,000	5.71%	18,512	3.03%	15,085	20.98%	14,248	25.37%	12,868	32.60%	12,131	36.46%
Company 3	37,704	100.00%	37,671	0.09%	35,000	7.17%	36,438	3.36%	34,073	9.63%	28,189	25.24%	32,015	15.09%	33,097	12.22%
Company 4	17,161	100.00%	20,403	-18.89%	20,000	-16.54%	32,619	-90.08%	15,404	10.24%	16,819	1.99%	16,344	4.76%	17,321	-0.93%
Countryside Park	4,826	100.00%	4,660	3.44%	5,000	-3.61%	6,428	-33.20%	8,192	-69.75%	9,064	-87.82%	6,889	-42.75%	6,807	-41.05%
Public Works Facility	80,946	100.00%	83,720	-3.43%	80,000	1.17%	91,898	-13.53%	92,932	-14.81%	98,684	-21.91%	94,656	-16.94%	96,729	-19.50%
Recycling Center	22,524	100.00%	20,899	7.21%	23,000	-2.11%	22,655	-0.58%	15,535	31.03%	17,760	21.15%	14,406	36.04%	11,423	49.29%
Senior Center	71,720	100.00%	68,959	3.85%	76,000	-5.97%	84,640	-18.01%	86,400	-20.47%	90,120	-25.66%	77,600	-8.20%	85,080	-18.63%
Avon Free Public Library	200,640	100.00%	189,280	5.66%	193,280	3.67%	174,712	12.92%	414,667	-106.67%	411,680	-105.18%	423,220	-110.94%	370,352	-84.59%
<b>Total</b>	<b>1,021,149</b>	<b>100.00%</b>	<b>915,973</b>	<b>10.30%</b>	<b>1,064,280</b>	<b>-4.22%</b>	<b>1,074,385</b>	<b>-5.21%</b>	<b>1,302,184</b>	<b>-27.52%</b>	<b>1,319,002</b>	<b>-29.17%</b>	<b>1,275,730</b>	<b>-24.93%</b>	<b>1,270,273</b>	<b>-24.40%</b>

## Muni. Natural Gas Use by Facility

Facility	FY 08	Base	FY 09	% Reduction	FY 10	% Reduction	FY 11	% Reduction	FY 12	% Reduction	FY 13	% Reduction	FY 14	% Reduction	FY 15	% Reduction
Animal Shelter	1,115	100.00%	1,133	-1.61%	1,300	-16.59%	1,295	-16.14%	909.5	18.43%	990	11.21%	1,173	-5.20%	1,183	-6.10%
Building 1, 2	2,458	100.00%	3,101	-26.16%	2,900	-17.98%	2,740	-11.47%	2135.2	13.13%	2,848	-15.87%	3,230	-31.41%	3,372	-37.18%
Building 5, 6, 7			3,284	100.00%	2,400	26.92%	3,121	4.96%	1801.7	45.14%	3,931	-19.70%	3,726	-13.46%	3,687	-12.27%
Building 3, 4 (Police)	9,757	100.00%	11,794	-20.88%	8,300	-16.59%	9,745	0.12%	8070.3	17.29%	10,307	-5.64%	9,379	3.87%	9,699	0.59%
Building 8 (Gym)	726	100.00%	734	-1.10%	500	-16.59%	293	59.64%	624.2	14.02%	543	25.21%	830	-14.33%	808	-11.29%
Company 1	5,491	100.00%	5,737	-4.48%	5,600	-16.59%	5,036	8.29%	4010.8	26.96%	4,915	10.49%	5,521	-0.55%	5,706	-3.92%
Company 3	3,613	100.00%	3,761	-4.10%	3,300	-16.59%	3,922	-8.55%	2129.1	41.07%	2,920	19.18%	3,358	7.06%	3,412	5.56%
Public Works Facility	12,970	100.00%	8,168	37.02%	7,000	-16.59%	6,545	49.54%	4760.7	63.29%					7,765	40.13%
Senior Center	4,053	100.00%	4,424	-9.15%	3,800	-16.59%	4,097	-1.09%	3166.2	21.88%	292	92.80%	4,543	-12.09%	1,243	69.33%
Avon Free Public Library			9,689		9,098	6.10%	7,472	22.88%								
<b>Total</b>	<b>40,183</b>	<b>100.00%</b>	<b>42,136</b>	<b>-4.86%</b>	<b>35,100</b>	<b>-16.59%</b>	<b>36,794</b>	<b>8.43%</b>	<b>27607.7</b>	<b>31.30%</b>	<b>26,746</b>	<b>33.44%</b>	<b>31,760</b>	<b>20.96%</b>	<b>36,875</b>	<b>8.23%</b>

## Muni. Oil Use by Facility

Facility	FY 08	Base	FY 09	% Reduction	FY 10	% Reduction	FY 11	% Reduction	FY 12	% Reduction	FY 13	% Reduction	FY 14	% Reduction	FY 15	% Reduction
Company 2	1,586	100.00%	1,389	12.42%	1,800	-13.49%	1,762	-11.10%	1110.1	30.01%	1,286	18.92%	1,429	9.90%	1,619	-2.08%
Company 4	1,916	100.00%	1,742	9.08%	1,300	32.15%	1,272	33.61%	1548.3	19.19%	2,212	-15.45%	1,711	10.70%	2,442	-27.45%
Countryside Park	937	100.00%	685	26.89%	700	25.29%	713	23.91%	534.2	42.99%	715	23.69%	772	17.61%	781	16.65%
Recycling Center	239	100.00%	331	-38.49%	400	-67.36%	432	-80.75%	220.9	7.57%	317	-32.64%	294	-23.01%	289	-20.92%
Avon Free Public Library	5,668		1,182	79.15%											0	100.00%
<b>Total</b>	<b>10,346</b>		<b>5,329</b>		<b>4200</b>	<b>59.40%</b>	<b>4179</b>	<b>59.61%</b>	<b>3413.5</b>	<b>67.01%</b>	<b>4,530</b>	<b>56.21%</b>	<b>4,206</b>	<b>59.35%</b>	<b>5,131</b>	<b>50.41%</b>

Titan Energy-Avon Energy Report, Appendix B

Town kWh Use by Facility

Facility	FY 08	Base	FY 09	% Reduction	FY 10	Base	FY 11	% Reduction	FY 15	% Reduction
Avon High School	2,251,648	100.00%	1,984,000	11.89%	2,436,000	-8.19%	2,234,879	0.74%	1,764,000	21.66%
Avon Middle School	1,003,776	100.00%	1,119,000	-11.48%	848,000	15.52%	903,120	10.03%	630,576	37.18%
Cental Office	101,920	100.00%	93,400	8.36%	91,000	10.71%	95,120	6.67%	77,259	24.20%
Pine Grove School	814,080	100.00%	949,000	-16.57%	735,000	9.71%	709,248	12.88%	537,613	33.96%
Roaring Brook School	639,744	100.00%	726,000	-13.48%	636,000	0.59%	582,144	9.00%	414,013	35.28%
Thompson Brook School	1,299,072	100.00%	1,376,000	-5.92%	1,097,000	15.56%	854,457	34.23%	799,512	38.46%
<i>Total</i>	<i>6,110,240</i>	<i>100.00%</i>	<i>6,247,400</i>	<i>-2.24%</i>	<i>5,843,000</i>	<i>4.37%</i>	<i>5,378,968</i>	<i>11.97%</i>	<i>4,222,973</i>	<i>30.89%</i>

BOE Gas Use by Facility

Facility	FY 08	Base	FY 09	% Reduction	FY 10	Base	FY 11	% Reduction	FY 15	% Reduction
Avon High School	96,764	100.00%	195,667	-102.21%	118,000	-21.95%	105,710	-9.25%	88,329	8.72%
Avon Middle School	52,408	100.00%	84,614	-61.45%	50,000	4.59%	26,900	48.67%	35,719	31.84%
Pine Grove School	46,492	100.00%	53,398	-14.85%	43,000	7.51%	36,580	21.32%	28,866	37.91%
Roaring Brook School	36,234	100.00%	66,166	-82.61%	34,000	6.17%	33,701	6.99%	29,775	17.83%
Thompson Brook School	30,239	100.00%	42,802	-41.55%	49,000	-62.04%	37,231	-23.12%	30,657	-1.38%
<i>Total</i>	<i>262,137</i>	<i>100.00%</i>	<i>442,647</i>	<i>-68.86%</i>	<i>294,000</i>	<i>-12.16%</i>	<i>240,122</i>	<i>8.40%</i>	<i>213,346</i>	<i>18.61%</i>

BOE Oil Use by Facility

Facility	FY 08	Base	FY 09	% Reduction	FY 10	Base	FY 11	% Reduction	FY 15	% Reduction
Central Office	5000	100.00%	5300	-6.00%	5000		5500		4806.9	3.86%
<i>Total</i>	<i>5000</i>	<i>100.00%</i>	<i>5300</i>	<i>-6.00%</i>	<i>5000</i>		<i>5500</i>		<i>4806.9</i>	<i>3.86%</i>