

Town of Ipswich, Massachusetts

ENERGY REDUCTION PLAN

In fulfillment of the
MASSACHUSETTS GREEN COMMUNITIES GRANT PROGRAM
CRITERIA 3



Prepared by
Town of Ipswich, Massachusetts

November 2019

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I. Purpose and Acknowledgements

The Town of Ipswich has completed and adopted this Energy Reduction Plan (“ERP”) for submission to the Massachusetts Department of Energy Resources (DOER) in fulfillment of Criteria 3 of the requirements for Green Community designation.

The Town views the formulation of this ERP as an important component of a parallel initiative to develop a 20-year plan for municipal facilities¹. As part of that effort, Town staff have been inventorying major facilities across the Town and preparing condition reports that identify operational issues and opportunities for improvement and infrastructure renewal needs. Energy use and energy systems are an important component of this effort. Audits of all buildings were performed by Energy Conservation, Inc. during the summer and fall of 2019.

We acknowledge that in the past, the Town has not been particularly systematic in its treatment of energy as an operating expense. A historic silo-oriented mentality has left individual departments to track and manage energy use and cost and there has been no comprehensive accounting of energy consumed by the Town for buildings, water and wastewater pumping, vehicle use by multiple departments, and street lighting. An additional dividend of creating this ERP has been making use of the MassEnergyInsight (MEI) tool provided by DOER. MEI has allowed the Town to match utility accounts to facilities, develop a comprehensive understanding of the municipality’s significant energy use and expense, and to track our progress toward reducing energy use across our portfolio.

Finally, we want to credit our Electric Light Department for the efforts they have undertaken over the past five years and more to identify and implement energy efficiency opportunities when available throughout the Town. The Town has chosen 2018 as its baseline year for this ERP.

We attach, as Appendix C, a letter from our Town Manager, Anthony Marino, verifying the Select Board’s adoption of this ERP, as well as a letter from the School Superintendent confirming the School Committee’s endorsement of the Plan.

¹ See Facilities Condition reports for all municipal facilities at the following links:

Utility Buildings: <https://www.ipswichma.gov/DocumentCenter/View/11886/Town-of-Ipswich-Utility-Buildings---Ipswich-MA---Final>

Municipal Buildings: <https://www.ipswichma.gov/DocumentCenter/View/11887/Town-of-Ipswich-Municipal-Buildings---Ipswich-MA---Final>

School Buildings: <https://www.ipswichma.gov/DocumentCenter/View/11888/Town-of-Ipswich-Schools---Ipswich-MA---Final>

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Preparation of this Plan has been a collaboration of Town and School Department officials and residential volunteers. They include:

- **Anthony Marino**, Town Manager
- **Kerry Mackin**, Select Board
- **Frank Ventimiglia**, DPW Operations Manager
- **Chris Rais**, Facilities Representative
- **Kim Michaud**, Facilities Administrator
- **Tim Goodrich**, Finance Committee
- **Carl Nysten & Chub Whitten**, School Committee
- **Marc Simon**, Resident and Energy Specialist
- **Mike Johnson**, Resident
- **Carolyn Britt**, Resident
- **Rex Bradford**, Business Community
- **Michele Hunton**, Business Community/Environmental Law

Technical support and drafting assistance was provided by Cara Goodman at the Metropolitan Area Planning Council (MAPC).

II. Executive Summary

About the Town of Ipswich

Ipswich is located 30 miles northeast of Boston in Essex County. It is bordered by Boxford on the West; Topsfield on the Southwest; Hamilton and Essex on the South; Plum Island Sound and Ipswich Bay on the East; Rowley on the North.

The Town of Ipswich is intersected by a number of transportation corridors, including Route 1, which pass north-to-south through the western part of the town. Route 1A/133 which pass from the south-southeast to the northwest through the center of town. The MBTA Commuter Rail from Boston to Newburyport also stops in downtown Ipswich. These transportation routes have made Ipswich a commercial and business center as well as an attractive home for commuters.

The Town's population was 13,175 as of the United States 2010 Census. Ipswich is one of the largest towns in the Commonwealth of Massachusetts, based on land area with approx. 42.5 square miles, including about 6 square miles of salt marsh. Even with its large size, Ipswich has remained a town, governed by a Select Board made up of elected representatives and a Town Meeting. The Town is administered by a professional Town Manager.

Summary of Municipal Energy Uses

Buildings

With a population of approx. 13,000, the Town of Ipswich has a moderate portfolio of municipal buildings. The Town is including 14 buildings in its ERP that are regularly occupied, in addition to seasonal and unoccupied special purpose structures (e.g. bath houses, pump stations) that are included under the pumping and open space categories. Buildings account for 73% of municipal energy use on an MMBtu basis.

Like most cities and towns, Ipswich's municipal building standard and building uses have evolved over time as population segments have grown and new municipal responsibilities have emerged. A number of municipal buildings have been and continue to be repurposed. The existing Ipswich Town Hall, for example, was originally built in 1936 to serve the town as a High School and was later converted to the Middle School, serving as a school for 65 years. In 2001, it was converted to Town Hall and had several systems updated and/or replaced and new partitions put up throughout the building to create space for not only the Town Department offices but also act as the hub for the Council on Aging which operates out of the lower level.

One result of extensive building adaptive reuse and repurposing over time has been, in some cases, the modernization of older systems when buildings change hands, and, in other cases, the re-partitioning of building spaces into configurations that were never intended and

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which are not well supported by mechanical systems. And sometimes, both situations have resulted as has occurred in Town Hall.

The Town's School Department has three schools, including two buildings that house elementary school classrooms and one combined middle school and high school that is housed in one building, plus an administration building that was formerly an elementary school.

There are two fire stations and one police station. There is a Town yard that is home to the Department of Public Works equipment and a Utility Building and yard across town that houses the Electric Light, Water Distribution and Sewer Department Offices. The town also owns and operates a water treatment plant, sewer treatment plant and electric generation plant.

Currently, there is one active library and a Visitor's Center located in the downtown of Ipswich (the visitor center is not Town-managed and is excluded from the baseline).

There is a large and active Cemetery and Parks Department located at 29 Town Farm Road, which operates many parks and beaches, as well as facilities at the former Polo Fields that are now owned by the Town and are currently used as soccer fields. There is a Senior Center located at Town Hall that is used extensively by a growing elder population. The Senior Center also operates two buses to assist with transporting their residents.

As noted earlier, over the years the Town has reinvested in schools with a range of mechanical and lighting system upgrades, building automation systems, and additions and renovations.

Nevertheless, there is a lot more that can be done to reduce energy use. Some municipal buildings are older and have not been updated, while others have been renovated, but have operational problems.

The performance of municipal buildings has more room for improvement, and the opportunities identified in this plan will result in significant additional energy reductions over the remaining years covered by this ERP. Reductions identified come from building assessments completed by Energy Conservation, Inc. as part of their recent building audits.

Vehicles

Ipswich has a combined total of 80 municipal vehicles, of which 61 were exempt and 19 were non-exempt. Three of these are recently-purchased electric vehicles, being used by the Conservation Department. Vehicles accounted for less than 2% of municipal energy use during the 2018 baseline year. In FY 2018, vehicles used 5,354 gallons of gasoline and 1,039 gallons of diesel.

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Water and Wastewater

Ipswich operates both a water and a wastewater treatment plant. Ipswich has taken steps to reduce the power usage at both the water treatment and wastewater treatment facilities but there is still room to improve.

Pumping to move water to and sewage from Town residences and businesses requires an extensive pumping network. There are five active sewage pumping facilities, plus the sewer treatment plant which pumps the outgoing effluent. There are nine water pumping facilities, five of which have associated wells, plus the pumping of treated water into the system from the Water Treatment Plant. Water and sewer services accounted for 17% of energy use in the 2018 baseline year.

Streetlights and Traffic Signals

There are 1,572 streetlights in Ipswich. As of August 2018, all streetlights were converted to LED lights. Through the conversion project, Ipswich lowered annual streetlight energy consumption by an estimated 60%.

The Town is responsible for five traffic signals throughout the Town. Street lighting, including traffic signals, accounted for about 6% of energy use in FY 2018.

Summary of Municipal Energy Users

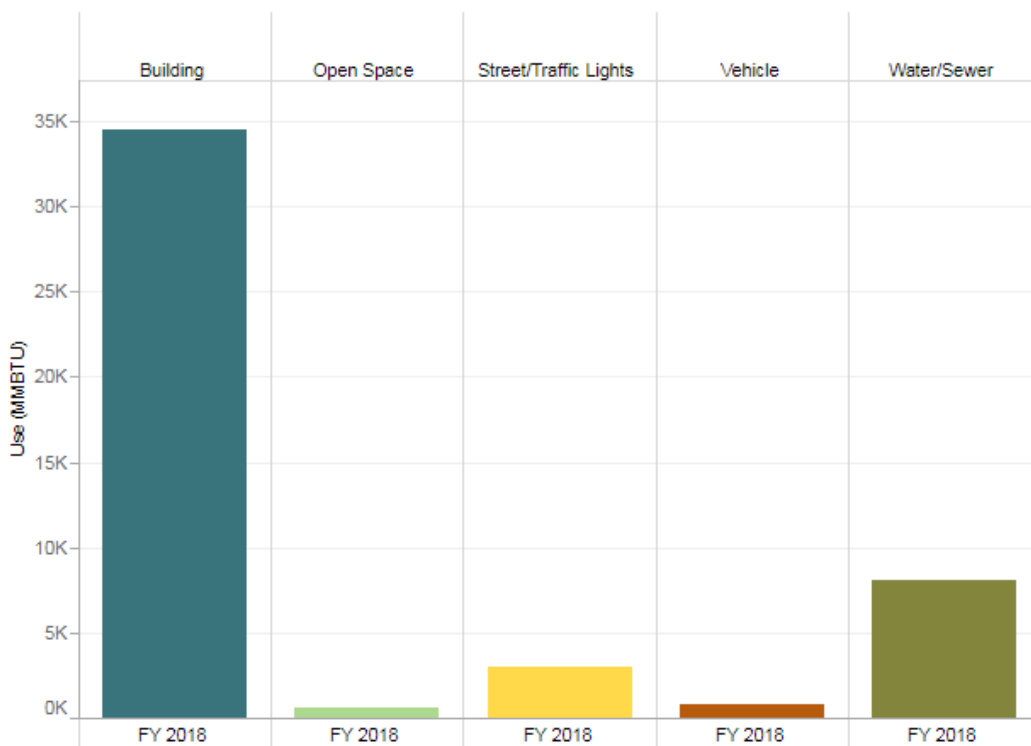
Buildings	Number
Oil Heat	4
Natural Gas Heat	8
Electric Heat	3
Water and Sewer Infrastructure	
Wastewater Treatment Plant	1
Drinking Water Treatment Plant	1
Pumping Stations	14
Vehicles	80
Non-Exempt	19
Exempt	61
Streetlights	1,572
Traffic Signals	5

Summary of Energy Use Baseline and Plans for Reductions

This ERP commits Ipswich to reduce energy use in municipal facilities by at least 20% compared to Fiscal Year 2018 over five years. Ipswich has selected 2018 as its baseline year in order to take credit for the LED streetlight conversion achieved in early FY 2019.

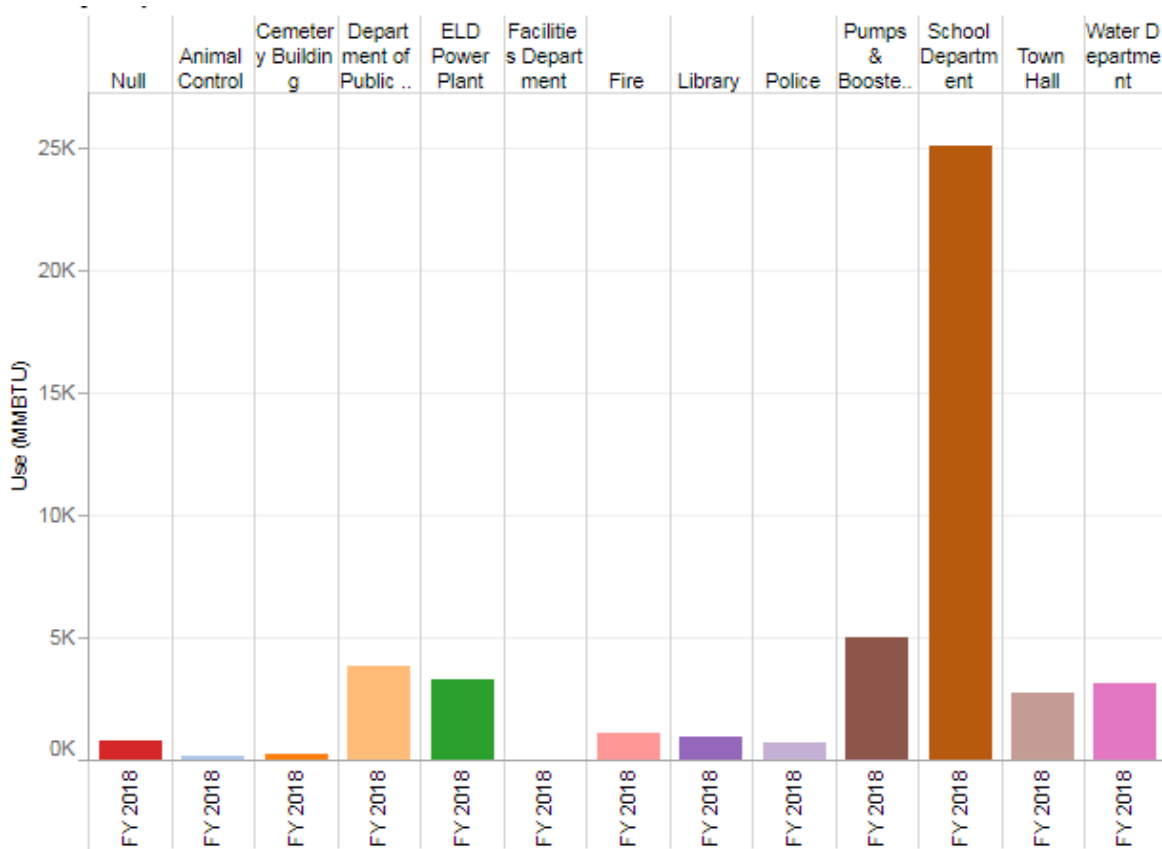
As shown in the graph below, buildings made up the large majority (73%) of total energy use in the baseline year.

Municipal Energy Use Baseline Dashboard from MEI (FY 2018) by Facility Category



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Municipal Energy Use Baseline Dashboard from MEI (FY 2018) by Department



As split by department, the School Department is the largest energy user, using 53% of the total baseline year energy.

In 2019, the Town partnered with two energy auditors to get a comprehensive set of proposals for inclusion in this ERP. In May, Cambridge Energy Services (CES) performed an HVAC-specific audit of Ipswich Middle/High School. In August, Energy Conservation Inc. performed audits on all large municipal buildings that use a significant amount of energy. The results of the two audits were included in this ERP. Ipswich is a member of the Metropolitan Area Planning Council (MAPC) and worked with MAPC to develop this ERP.

Facilities Condition Assessment (see bottom of page 3). The Town has initiated a detailed survey of Town buildings to assess their existing condition and near-term and long-term capital needs. The goal of this process is to identify immediate necessary improvements, to anticipate and budget for future building needs, and to secure information relevant to decisions about long-term use or disposition of buildings. The School Buildings and Facilities Department, which includes skilled tradespeople, has been touring each building and preparing these analyses. In

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the course of this effort, immediate energy savings opportunities have been identified and implemented in many buildings. At the same time, the Town has hired a new Facilities Director and Assistant Facilities Director, both of whom will be responsible for taking the lead in execution of plans that are being developed.

In total, anticipated energy reductions under Ipswich’s proposed 5-year plan, ending in 2023, will equal 21% of the 2018 baseline.

Table 2 below summarizes Ipswich’s plans for energy reduction. The full details are included in the “Energy Reduction Plan” section, below.

Ipswich Energy Use Baseline and Plans for Reduction

Table 2a. Summary of Municipal Energy Use & Reductions				
Facility Category	MMBTU Used in Baseline Year	% of Total MMBTU Baseline Energy Consumption	Projected Planned MMBTU Savings	Savings as % of Total MMBTU Baseline Energy Consumption
<i>Buildings</i>	34,474	73.4%	8,138	17.3%
<i>Vehicles</i>	791	1.7%	33	0.1%
<i>Street/Traffic Lights</i>	3,041	6.5%	1,769	3.8%
<i>Open Space</i>	578	1.2%	0	0.0%
<i>Water/Sewer/Pumping</i>	8,064	17.2%	181	0.4%
Total Non-Weather Normalized	46,948	100.0%	10,121	21.6%
Data is not weather normalized and can only be compared against other data that is not weather normalized.				

III. Energy Use Baseline Inventory

Inventory Tool Used

The Town of Ipswich is using MEI as its inventory tool. Initial MEI set up of all municipal buildings and other accounts has been completed. All energy use is accounted for in the system, including vehicle fuel.

Having all of the municipal energy data in one comprehensive platform will be a very valuable tool for the Town going forward. Anticipated users include staff in the Facilities Department and Department of Public Works, as well as other employees who will assist with the management of the data.

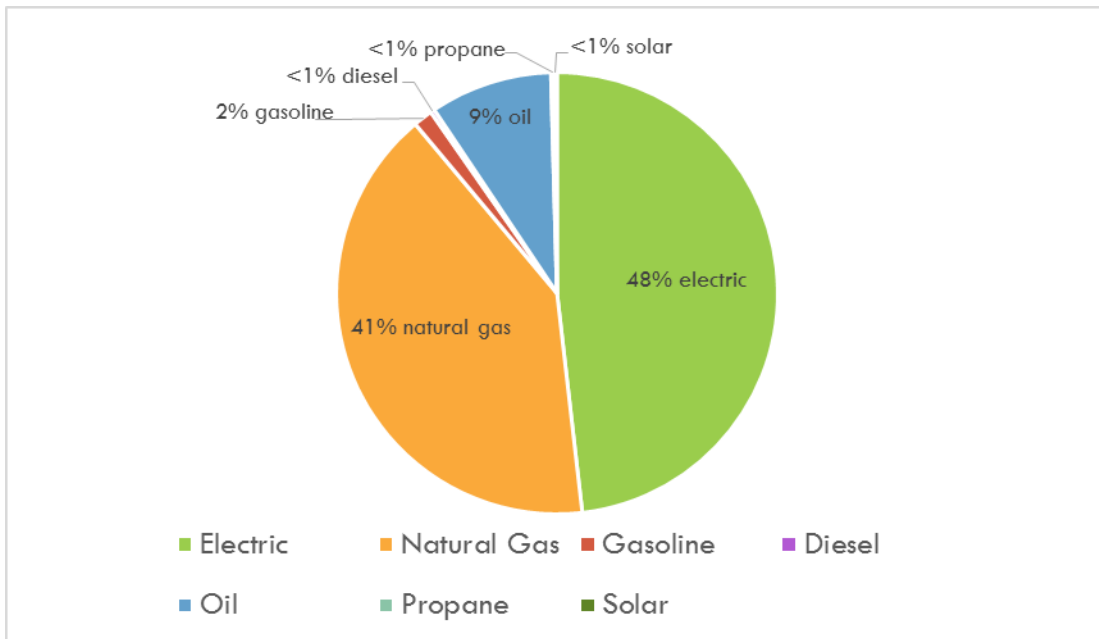
Baseline Year

Ipswich will use Fiscal Year 2018 as its baseline year. FY 2018 ran from July 1, 2017 to June 30, 2018. This will give the Town until June 30, 2023 (FY 2019 – FY 2023) to reach its 20% energy reduction goal.

Municipal Energy Consumption for the Baseline Year (FY 2018)

In the baseline year, Ipswich used 46,949 MMBTU of energy. The two largest sources were electric and natural gas use, which were each 48% and 41%, respectively, of the total use in the baseline year. Oil made up 9%, gasoline made up 2%, and use from diesel, propane and solar electric (from the Town Hall array) were less than 1% each.

Energy Usage in FY2018 by Fuel Type



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Table 2b. Top 5 Energy Consuming Facilities in Ipswich		
Facility Name	MMBTUs	Percent of FY2018 Baseline
Ipswich Middle School/High School	17,609	38%
Ipswich Wastewater Treatment Plant	4,960	11%
Winthrop Elementary School	4,672	10%
Ipswich Drinking Water Treatment Plant	3,093	7%
Streetlights & Traffic Lights	3,041	6%
Total FY 2018 Usage for Top 5	33,375	71%
Total FY 2018 Usage Baseline	46,949	100%

Table 2b shows that the top 5 largest energy users in town account for over 70% of all usage. The top user is the combined Middle School/High School.

Energy Use Intensity (EUI) is a measure of the energy used per square foot, with lower EUIs indicating more efficient buildings. Buildings with a higher EUI generally have more opportunities for cost-effective energy efficiency upgrades.

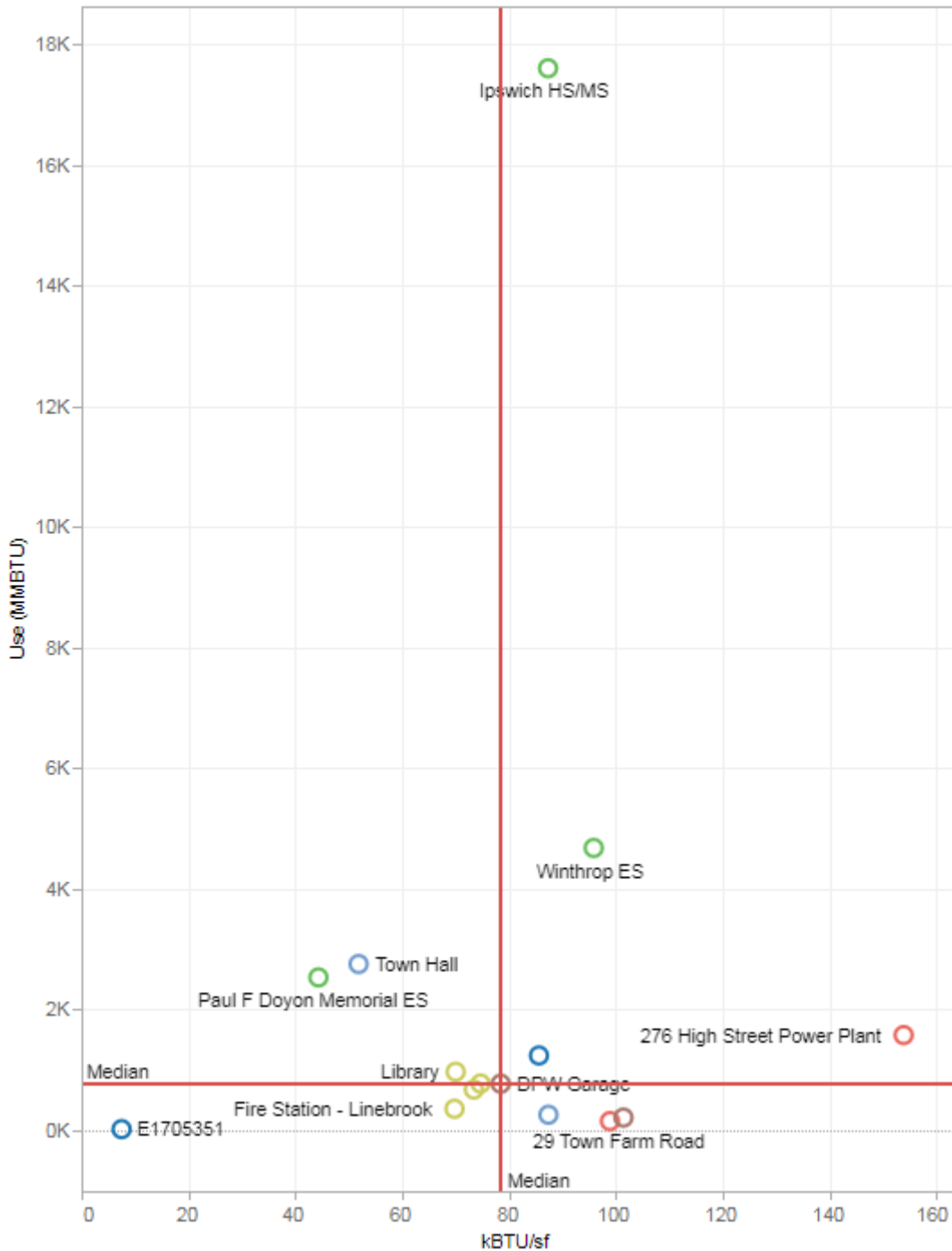
The median EUI of all buildings in Ipswich is 74 kBtu per square foot. As shown in the figure below, the least efficient building is the ELD Power Plant, with an EUI of 153 kBtu/square foot. The largest user in town, the Middle School/High School, has a EUI of 87.

Any buildings with high usage or above the median efficiency present the best opportunities for savings, as shown in the top right corner of the graph.

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Energy Use Intensity (kBTU/sf) and Total Energy Use (MMBTU) for Buildings *

Efficiency and Use



*Points further to the right have a higher energy use per square foot (i.e. less energy efficient). Points higher up use more total energy. Red lines show the medians for the town's buildings.

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Energy Reduction Goal

Ipswich's energy reduction goal will be measured against the baseline of 46,949 MMBTU. In order to reach the 20% reduction goal, Ipswich will reduce its municipal energy use by at least 9,390 MMBTU.

The Town's full municipal energy use data, by facility and fuel type, is shown in tables 3A and 3B, included in Appendix D.

IV. Energy Reduction Plan for Ipswich

Narrative Summary

Starting with baseline year FY 2018 gives the Town until June 2023 to implement energy conservation measures and achieve the goal of reducing annual consumption by at least 9,390 MMBTU.

Looking forward, Ipswich's plan is to:

- Focus on specific capital projects identified by both our internal building assessments and the information from our 2019 contracted audit that are consistent with the Town's Facility Condition Assessment (see page 3)
- Implement additional lower cost operations and maintenance improvements ourselves
- Proceed with comprehensive retro-commissioning (to improve performance via operational improvements/efficiencies) in all schools. as well as with installing web-based building management systems
- Continue to have in-house Facilities Department staff ensure that all existing and replacement building equipment is operating at maximum efficiency
- Improve our vehicle fleet management with an eye toward reducing fuel use, including better tracking and analysis of fuel consumption, reinforcement of energy reduction objectives with vehicle users, adoption of energy savings maintenance practices and materials where practical, and replacing end-of-life vehicles with more energy efficient models. This includes hybrid and plug-in electric vehicles, where possible and practicable.

Our primary strategy for realizing additional reductions quickly is to implement some of the lower cost operations and maintenance improvements projects. The table below summarizes the planned energy reductions by facility.

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Summary of Identified Savings by Facility			
	Projected Planned MMBTU Savings	FY 2018 MMBTU usage	Top 5 Energy User
Buildings			
Ipswich Middle/High School	3,925	17,609	1
Doyon Elementary School	184	2,527	
Winthrop Elementary School	2,549	4,672	3
Paine School Admin Building	188	250	
Town Hall	437	2,748	
DPW Garage	173	765	
Main Fire Station	127	771	
Linebrook Fire Station	-	349	
Police Station	-	668	
Public Library	369	962	
Animal Shelter	-	145	
Cemetery Building	8	203	
276 High St Power Plant	76	1,571	
Utility Administration Building	948	1,233	
Buildings Sub-Total (includes ALL buildings)	8,984	34,473	
Vehicles	33	791	
Streetlights / Traffic Lights	1,769	3,041	5
Open Space	-	578	
Water/Sewer/Pumping	181	8,064	2 & 4
Total	10,967	46,947	
Savings as Percent FY2018 Baseline	23.36%		

Overview of Year 1 – FY 2019

In 2018, the Town hired a new Facilities Director with extensive construction and management experience that will take the lead in Town building repairs and refurbishment.

During the first year since our 2018 baseline year, the Town has proceeded on initiatives to both reduce energy use and set the stage for future energy reductions.

The Town's Electric Light Department took the lead in replacing all streetlight fixtures to LED, which was completed in August of 2018. This project will save an estimated 1,769 MMBTU annually.

Overview of Year 2 – FY 2020

At the beginning of FY 2020, the Town replaced three gasoline-fueled vehicles with three electric vehicles (Chevy Bolts), saving an estimated 33 MMBTU annually. The measures below are also planned for implementation in FY 2020.

- Ipswich High/Middle School
 - Unit Ventilator Service and Testing
 - Hot Water Temp. Reset
 - Ceiling Plenum Air Sealing & Insulation
 - Attic Air Sealing and Insulation
 - Comfort related DDC Improvements
 - Unit Ventilator repairs

Overview of Year 3 – FY2021

- Ipswich High/Middle School
 - Variable speed pumping
- Public Library
 - LED Lighting
- Paine School Admin Building
 - LED Lighting
- Winthrop Elementary School
 - LED Lighting
 - Weatherization
- Wastewater Treatment Plant
 - Weatherization
- DPW
 - Weatherization
- ELD Power Plant
 - Weatherization

Overview of Year 4 – FY2022

- Town Hall
 - New Boiler System
 - LED Lighting
- Public Library
 - Pipe Insulation
 - HVAC Energy Monitoring and RCx
- Paine School Admin Building
 - Pipe Insulation
- Utilities Admin
 - LED Lighting
 - Weatherization
- Doyon Elementary School
 - Weatherization

Overview of Year 5 – FY2023

- Ipswich Wastewater
 - LED Lighting
- Ipswich Water Treatment
 - LED Lighting
- Cemetery Building
 - LED Lighting
- Main Fire Station
 - Weatherization
- Paine School Admin Building
 - Weatherization
- Winthrop Elementary School
 - RCx, HVAC Repair, & Scheduling

Energy Conservation Measures Summary

The attached Table 4 (Attachment 1) summarizes specific improvements that the Town plans to pursue. The table below shows the summary of which measures are planned for implementation in each year of the ERP.

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Town of Ipswich 5 Year ECM Plan								
Year 1 FY 19	Energy Conservation Measure	ECM Type	Est. Cost	Annual Savings				
				Electricity	Gas	Gasoline	Oil	Total
Location				KWH	Therms	Gallons	Gallons	\$
Town-wide	LED Streetlight Retrofit	Streetlights		518,329				
			0	518,329	0	0	0	0
Year 2 FY 20	Energy Conservation Measure	ECM Type	Est. Cost	Annual Savings				
				Electricity	Gas	Gasoline	Oil	Total
Location				KWH	Therms	Gallons	Gallons	\$
Vehicles	3 EV vehicle replacements	Vehicles		-1,725		314		\$473
Ipswich Middle/High School	Unit Ventilator Service and Testing	HVAC	\$25,000	1,500	2,800			\$3,300
Ipswich Middle/High School	Hot Water Temp. Reset	Hot Water	\$50,000	-14,600	9,000			\$7,900
Ipswich Middle/High School	Ceiling Plenum Air Sealing & Insulation	HVAC	\$10,000		800			\$900
Ipswich Middle/High School	Attic Air Sealing and Insulation	Weatherization	\$15,000		2,400			\$2,700
Ipswich Middle/High School	Comfort related DDC Improvements	Building Control	\$50,000	120,000	10,600			\$29,900
Ipswich Middle/High School	Unit Ventilator repairs	HVAC	\$50,000	4,500	8,400			\$10,100
			\$200,000	109,675	34,000	314	0	\$55,273
Year 3 FY 21	Energy Conservation Measure	ECM Type	Est. Cost	Annual Savings				
				Electricity	Gas	Gasoline	Oil	Total
Location				KWH	Therms	Gallons	Gallons	\$
Ipswich Middle/High School	Variable speed pumping	Pump/Motor/Drive	\$40,000	42,300				\$6,300
Public Library	LED Lighting	Interior Lighting	\$35,196	35,169				\$4,494
Paine School Admin Building	LED Lighting	Interior Lighting	\$14,689	6,600				\$1,098
Winthrop Elementary School	LED Lighting	Interior Lighting	\$95,543	53,402				\$8,881
Winthrop Elementary School	Weatherization	Weatherization	\$15,087	1,627	1,504			\$978
DPW	Weatherization	Weatherization	\$31,203	1,329	1,688			\$2,207
ELD Power Plant	Weatherization	Weatherization	\$11,397	22,354				\$3,600
Ipswich Wastewater	Weatherization	Weatherization	\$10,885	17,331			148	\$3,281
			\$254,000	180,113	3,192	0	148	\$30,839
Year 4 FY 22	Energy Conservation Measure	ECM Type	Est. Cost	Annual Savings				
				Electricity	Gas	Gasoline	Oil	Total
Location				KWH	Therms	Gallons	Gallons	\$
Town Hall	New Boiler System	HVAC	\$56,952		3,606			\$3,967
Public Library	Pipe Insulation	Hot Water	\$7,800		560			\$644
Paine School Admin Building	Pipe Insulation	Hot Water	\$3,400		365			\$420
Doyon Elementary School	Weatherization	Weatherization	\$20,876	2,303	536		888	\$2,938
Town Hall	LED Lighting	Interior Lighting	\$39,970	22,500				\$3,742
Public Library	HVAC Energy Monitoring and RCx	Retrocommission	\$78,000	56,573				\$9,617
Utilities Admin	Weatherization	Weatherization	\$12,573	444	9,027			\$1,610
Utilities Admin	LED Lighting	Interior Lighting	\$28,358	13,220				\$2,198
			\$247,929	95,040	14,094	0	888	\$25,136
Year 5 FY 23	Energy Conservation Measure	ECM Type	Est. Cost	Annual Savings				
				Electricity	Gas	Gasoline	Oil	Total
Location				KWH	Therms	Gallons	Gallons	\$
Ipswich Wastewater	LED Lighting	Interior Lighting	\$29,298	21,995				\$3,658
Ipswich Water Treatment	LED Lighting	Interior Lighting	\$11,850	7,606				\$1,265
Main Fire Station	Weatherization	weatherization	\$18,066	906	889	257		\$1,618
Paine School Admin Building	Weatherization	weatherization	\$23,909	1,581	1,240			\$1,081
Winthrop Elementary School	RCx, HVAC Repair, & Scheduling	Retrocommission	\$270,000	27,207	21,184			\$27,927
Cemetery Building	LED Lighting	Interior Lighting	\$6,359	2,503				\$416
			\$359,482	61,798	23,313	\$257	\$0	\$35,965
Total Annual Energy Savings				964,955	74,598	571	1,036	10,967

Program Management Plan for Implementation, Monitoring, Oversight

Implementation

Ipswich's Town Manager will have ultimate responsibility for implementing this ERP, with responsibility for specific elements assigned to individual departments and personnel. Building upgrades to both municipal buildings and school buildings will be managed by the Town's Facilities Department.

The Facilities Department will oversee the implementation of individual energy conserving measures identified in the 2019 contracted consultant audits, including the design process, equipment selection, construction monitoring and oversight, and confirming that projects are properly commissioned.

The streetlight conversion project was completed in 2018 through the Electric Light Department in conjunction with the Public Works Department, which presently has lead responsibility for streetlight management.

Monitoring

The Facilities Department will use MEI to track ongoing energy use and report actual changes in energy use. They will be responsible for supporting building owners and operators (i.e., the respective Town departments and schools) to ensure that energy reduction strategies instituted under the plan continue to deliver savings. This will include:

- Checking in with building users regularly to identify building comfort or performance issues that could be indicators of equipment issues,
- Frequent confirmation of proper temperature settings and scheduling on programmable thermostats and other building management systems
- Preventative maintenance of building systems and timely replacement of worn components
- Issuing work orders for necessary repairs

Oversight

The Town Manager, or a designee, will track progress toward goals and the status of project implementation. Quarterly and annual reports on activities and accomplishments under the ERP will be disseminated to stakeholders and filed with the DOER's Green Communities program.

Summary of Energy Audits or Other Sources for Projected Energy Savings

Strategies for energy reduction in buildings were identified by the Town and by two audits done in 2019, one by Energy Conservation Inc. and one by Cambridge Energy Services. The full audit reports are attached. The strategies include:

- Attending to regular maintenance of wear items that reduce system efficiency
- Investing in equipment enhancements to increase efficiency
- Using infrastructure modernization investment through the capital improvement process to increase equipment efficiency as well as reliability and performance

Other sources of savings include the recent conversion of streetlights to more efficient LED technology. Additionally, as vehicles are replaced at the end of their useful lives, they will be replaced with higher efficiency models, including hybrid and plug-in electric vehicles, where available and practicable.

Long-Term Energy Reduction Goals – Beyond 5 years

Municipal Buildings

As the Town continues to renovate, add to, and replace facilities in the context of the 20-Year Building Plan, it intends to reduce the energy required per square foot of building area to carry on government and school functions. Our adoption of the stretch code will ensure that this efficiency improvement occurs as part of all major municipal building construction.

Vehicles

We anticipate that all future vehicle purchases will be more efficient than our existing fleet. Part of the vehicle purchase process will be to evaluate on a case by case basis whether end-of-life vehicles can be replaced with electric vehicles or hybrids. The Town will make both energy efficiency and life cycle cost key criteria for selecting new vehicles. We will ensure that new vehicles are well matched to the purposes for which they are intended so that operational functions are not sacrificed. Further, we will continue to encourage all vehicle users to operate their vehicles to minimize idling to reduce energy use and local air pollution. And finally, the Town will enhance tracking systems for vehicle fueling and scheduled maintenance.

Perpetuating Energy Efficiency

The Town plans to integrate energy efficiency and conservation strategies where practical into all municipal government operations, where practical, including construction, purchasing, planning, and policy making. Older structures will be renovated or give way to newer ones over time, and our plan is to make energy efficiency and renewable energy development a part of renovations and future buildings to the full extent practical.

Onsite Renewable Energy Projects and Renewable Energy

Ipswich intends to continue to look for opportunities for distributed-generation with photovoltaics on both municipal and school buildings, coordinating this activity with roof replacement schedules. There are already photovoltaics installed on the Town Hall roof. Wind energy generation is also something the Town will continue to pursue if opportunities become available.

V. Appendix A – List of Attachments

1. Attachment 1 - Table 4: Proposed Energy Conservation Measures
2. Attachment 2 – Vehicle and Streetlight Calculations
3. Attachment 3 – CES Audits (May 2019)
4. Attachment 4 – ECI Audits (August 2019)

VI. Appendix B - Methodologies for Energy Reduction Projections

Streetlight Conversion to LED

Ipswich's 1,572 streetlights were replaced in 2017-2018. The pre-conversion estimated annual consumption was approx. 886,000 kWh, since the conversion has been completed the new estimated annual consumption is 368,000 kWh. Annual savings are estimated at 518,000 kWh, or 1,769 MMBTU. See full calculations in Attachment 2.

Electric Vehicles

Ipswich is projecting an energy reduction of 33 MMBTU associated with the 2019 replacement of three gasoline-fueled vehicles with three electric vehicles (Chevy Bolts). See full calculations in Attachment 2.

VII. Appendix C - Authorizations and Endorsements of Ipswich's Energy Reduction Plan

VIII. Appendix D: Municipal Energy Consumption for FY 2018 – Native Units and MMBTUs

Table 3a. Baseline in Native Units:

ERP Guidance Table 3a - Municipal Energy Consumption for 2018 (Native Fuel Units)

		Electric (kWh)	Gas (therms)	Oil (gallons)	2018 Gasoline (gallons)	Diesel (gallons)	Propane (gallons)	Solar Electric (kWh)
Building	Fire Station - Central	68,212	4,208	824	26			
	Fire Station - Linebrook	40,331		1,521				
	Library	115,120	5,691					
	Police Station	188,720	240					
	Paul F Doyon Memorial ES	209,600		12,333			1,072	
	Winthrop ES	224,320	39,069					
	DPW Garage	33,045	6,524					
	Animal Shelter	42,606						
	Paine Building	23,022	1,718					
	Ipswich HS/MS	1,812,572	114,109		110			
	276 High Street Power Plant	460,397						
	Utility Administration	361,297						
	29 Town Farm Road	15,002		1,091				
	Town Hall	199,440	19,583					32,099
Total	3,793,684	191,142	15,769	136		1,072	32,099	
Open Space	Bialek Park Playground	512						
	Linebrook Road Softball Fields	3,572						
	Dix Road Fire Repeater	3,165						
	29 Town Farm Road	0						
	EV Charging Station	1,537						
	Riverwalk	11,160						
	Spring Street Police Repeater	5,268						
	High Street Tennis Courts	7,010						
	21 Fowler's Lane	41,699						
	Vermette Court	94,374						
	Wind Turbine 1	1,174						
Total	169,471							
Street/Traffic Lights	Transfer Station	4,784						
	Central Street Traffic Light	601						
	Street Lights	885,872						
	Total	891,257						
Vehicle	DPW Gasoline Storage Tank				4,484			
	DPW Diesel Storage Tank					1,039		
	Cemetery Off Road Storage T..				734			
	Total				5,218	1,039		
Water/Sewer	Ipswich Drinking Water Treat..	733,472		4,250				
	Pumps & Boosters	1,037,442		10,214				
	40 Plover Hill Police Equipment	3,238						
	Total	1,774,152		14,464				
Grand Total	6,628,564	191,142	30,233	5,354	1,039	1,072	32,099	

**Green Community Energy Reduction Plan
Town of Ipswich, MA**

Table 3b. Baseline in MMBTUs

ERP Guidance Table 3b - Municipal Energy Consumption for 2018 (MMBTU)
Please make sure that any data submitted to DOER contains complete Data!

		2018						Solar Electric	Total
		Diesel	Electric	Gas	Gasoline	Oil	Propane		
Building	Fire Station - Central		233	421	3	115			771
	Fire Station - Linebrook		138			211			349
	Library		393	569					962
	Police Station		644	24					668
	Paul F Doyon Memorial ES		715				1,714	98	2,527
	Winthrop ES		765	3,907					4,672
	DPW Garage		113	652					765
	Animal Shelter		145						145
	Paine Building		79	172					250
	Ipswich HS/MS		6,184	11,411	14				17,609
	276 High Street Power Plant		1,571						1,571
	Utility Administration		1,233						1,233
	29 Town Farm Road		51				152		203
	Town Hall		680	1,958				110	2,748
	Total		12,944	19,114	17	2,192	98	110	34,474
Open Space	Bialek Park Playground		2						2
	Linebrook Road Softball Fields		12						12
	Dix Road Fire Repeater		11						11
	29 Town Farm Road		0						0
	EV Charging Station		5						5
	Riverwalk		38						38
	Spring Street Police Repeater		18						18
	High Street Tennis Courts		24						24
	21 Fowler's Lane		142						142
	Vermette Court		322						322
	Wind Turbine 1		4						4
	Total		578						578
Street/Traffic Lights	Transfer Station		16						16
	Central Street Traffic Light		2						2
	Street Lights		3,023						3,023
	Total		3,041						3,041
Vehicle	DPW Gasoline Storage Tank				556				556
	DPW Diesel Storage Tank	144							144
	Cemetery Off Road Storage T..				91				91
	Total	144			647				791
Water/Sewer	Ipswich Drinking Water Treat..		2,503			591			3,093
	Pumps & Boosters		3,540			1,420			4,960
	40 Plover Hill Police Equipment		11						11
	Total		6,053			2,010			8,064
Grand Total		144	22,617	19,114	664	4,202	98	110	46,949