



MassEnergyInsight

OVERVIEW OF A SUCCESS

FINAL REPORT
JUNE 2012

MassEnergyInsight

A web-based energy information management and reporting tool, MassEnergyInsight was designed by Peregrine Energy Group, launched in January 2010, and rolled out to all 351 Massachusetts cities and towns. MassEnergyInsight was developed to support the Massachusetts Green Communities Designation and Grant Program. An initiative of the Green Communities Division of the Massachusetts Department of Energy Resources, the program works with municipalities toward qualification as a Green Community and provides funding to qualified municipalities for energy efficiency and renewable energy initiatives.

Since its launch, MassEnergyInsight has made it possible for hundreds of communities to centralize and understand their energy data – often for the very first time. Green Communities applicants regularly use MassEnergyInsight reports to establish their energy baseline, develop their energy reduction plan, and prioritize their efforts to get the greatest return for their investments in energy efficiency.

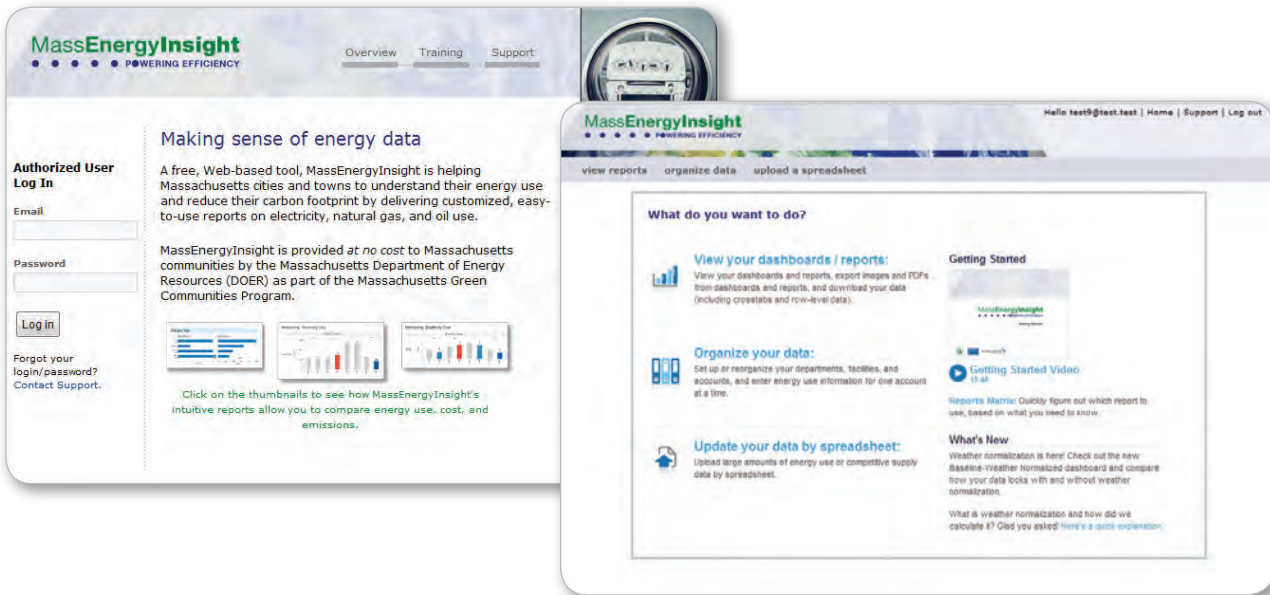
As more communities engage with MassEnergyInsight, the resulting Green Communities applications are increasingly accurate and compelling. Of the 86 Green Community designations to date, 78 are actively using MassEnergyInsight, representing more than 36% of the Massachusetts population and the release of more than \$15.4 MM to support energy reduction efforts within those communities.

But the tool is not just for Green Communities. Any Massachusetts municipality can use the tool at no cost. More than 200 municipalities already use MassEnergyInsight to access the key information they need to develop energy efficiency strategies that lead to long-term cost savings.

OVERVIEW

Structure

Users visit **www.MassEnergyInsight.net** to log in. From there, they go to the MassEnergyInsight home page, where they can navigate to different parts of the system to view dashboards and reports, organize their data, or upload a spreadsheet.



View dashboards & reports

Users can quickly identify what is most important in municipal data – for example, which buildings are least efficient, how use and spending compare with previous years, and whether use and costs are trending upward or downward for the current year. Reports can be exported as PDF files or images, and the data behind each report can be downloaded as a .CSV file for further analysis.



OVERVIEW continued

Organize data

A series of data entry screens provide a user-friendly frontend to a powerful database that centralizes energy data for each participating municipality. Users can enter and update energy data by account, then organize the data to determine how it appears in reports.

The left screenshot displays a table of energy usage data. The table has columns for Date, Usage, Unit, Fuel Grade, Heat Type, and Unit. The data is sorted by Date in descending order. The right screenshot shows a form for adding or editing account information. The form has fields for Type, Address 1, City, Zip, Address 2, State, Gross Floor Area, and Occupants. There are also links for adding, editing, or deleting information.

COMMUNITY IMPACT COMMUNITY

From individual communities to regional planning organizations like the Metropolitan Area Planning Council (MAPC), the insights and monitoring made possible with MassEnergyInsight are bringing cities and towns a range of benefits that extend beyond the Green Communities Designation and Grant program. Communities are already using MassEnergyInsight to:

- Understand the role of energy in their overall community budget
- Monitor use and spending
- Discover equipment/maintenance issues
- Pilot energy efficiency efforts
- Save money by working with vendors and getting value out of the money spent with projects done in collaboration with private capital, such as performance contracts and solar performance partnership agreements
- Focus and connect people and departments

Williamstown, MA

Williamstown, Massachusetts, originally used MassEnergyInsight for their Green Community application. But MassEnergyInsight has proven to be useful beyond that application process on a regular basis.

Municipal staff member Jason McNair regularly uses MassEnergyInsight to review the town's energy use and spending by department, comparing last year with this year and comparing performance from quarter to quarter. He then shares the reports with the Williamstown Director of Public Works and the Town Manager, pointing out anomalies for further investigation. These regular check-ins have not only allowed the town to monitor its progress toward energy goals, but also to spot equipment maintenance issues.

"In the case of water electricity use, it was once noted that there was a spike in electricity usage without the spike in actual water usage," Jason explained. This led to a discovery of some issue where the pumps were recirculating water unnecessarily."

That kind of information has an immediate impact in Williamstown, and Jason insists "overall I think it's an incredibly useful tool."

Upload a spreadsheet

For users with a large amount of energy data to enter, the spreadsheet upload feature allows them to enter it in bulk rather than entering it one account at a time.

EPA Portfolio Manager integration

MassEnergyInsight integrates fully with Portfolio Manager. It can download data directly from Portfolio Manager and display it in within MassEnergyInsight reports, or upload directly to Portfolio Manager, allowing communities to use both systems without requiring a separate data load for each.

System security

The maintenance of data privacy is an important concern for participating cities and towns. To protect this privacy, each user is required to be authorized by their community and then given a unique username and password. Additional steps have been taken to ensure data security on the backend, including PGP file encryption, placing servers behind a private firewall, and using security software.

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Harvard, MA

The Harvard Energy Advisory Committee already knew a good deal about the energy picture for Harvard, MA. Energy Advisory Committee member David Fay had already developed software for managing and reporting on the town's energy data when the Massachusetts Department of Energy Resources made MassEnergyInsight available. He was skeptical that it would be an improvement. But while his home-grown system was a completely custom solution, only he knew how to use it, which mean it was not sustainable over the long term. He agreed to take a look.

To David's surprise, he found MassEnergyInsight to be "robust, useful, and graphically elegant." So he made the decision to migrate Harvard's data from his system into MassEnergyInsight. "A move I've never regretted," he said.

Getting started was straightforward. David participated in one of the earliest trainings and urged his fellow energy committee members to get trained as well. But many found it intuitive enough to use without training. The spreadsheet upload feature made migrating 5 years of data a straightforward process.

Since then, Harvard has used MassEnergyInsight both to put together their successful application to become a Green Community and to

measure the impact of their efficiency efforts. "MassEnergyInsight helped us focus our efforts on a small number of buildings that were major consumers of energy," David explained. "It is essential to documenting our progress to our Board of Selectmen and School Committee." He went on to say that "MassEnergyInsight is a marvelous tool for measuring the impact of our work. Compared to our 2008 baseline, we have reduced our energy usage by about 20%."

David is quick to point out what he sees as the key components to MassEnergyInsight's success: "Robustness, reliability, maintainability, elegance, and transparency." He further explained, "We benefited from each of these even though we already had a leg up on the knowledge component."

Harvard plans to continue using MassEnergyInsight as their primary tool for monitoring energy use and documenting progress, and David hopes to get more Harvard users up and running. "I would like to get the Finance Department and the Board of Selectmen to become MassEnergyInsight users," he reflected. "They periodically request information on energy usage and expenditures from the Energy Advisory Committee that they could obtain themselves with a little effort. We really should force the issue, but it is so damn easy for us to get what they want from MassEnergyInsight that we've avoided the tough love that they need."

OVERVIEW continued

Where the data comes from

The energy data in MassEnergyInsight comes from three primary sources:

1. **Utility data files:** Massachusetts utilities send Peregrine large files of municipal account data at regular intervals. Peregrine maintains an ongoing relationship with these utilities for trouble-shooting data file issues and ensuring that data is received for any new accounts entered into MassEnergyInsight.
2. **Portfolio Manager:** Integration with EPA's Portfolio Manager allows MassEnergyInsight to automatically load data from Portfolio Manager on a regular basis for those communities that wish to use both systems.
3. **User input:** Non-utility data, such as oil or propane, is entered by individual communities, using their energy bills.

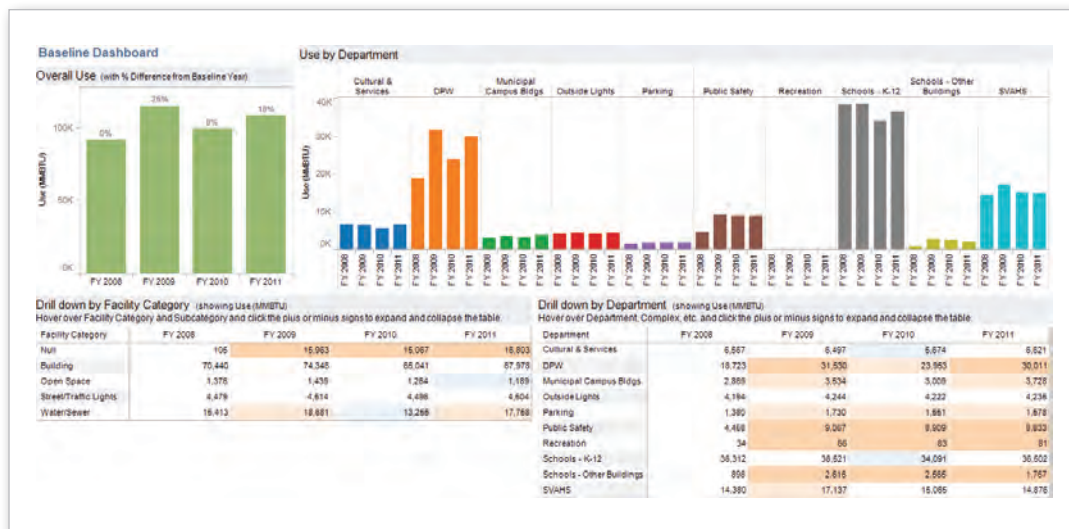
Interactive dashboards & reports

MassEnergyInsight's dashboards and reports were designed specifically to make complex energy data easy for municipal users – energy experts and non-experts alike – to understand and use. Onscreen filters take advantage of the web's interactivity and allow users to modify the way charts and graphs display their data with a single mouse click. Screens redraw on the fly, no waiting for a new query to run.

Each dashboard and report is built around a specific energy-management-related task, such as those illustrated below.

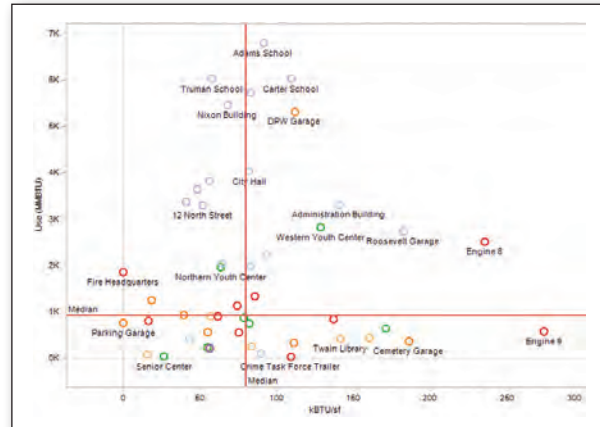
Comparing use with a baseline year

The Baseline Dashboard combines a selection of reports into a single view. Users can compare energy use to a baseline year using a combination of bar charts and numerical tables, then figure out which departments or facilities drive that use. MassEnergyInsight also makes a weather normalized version of baseline numbers available, so that communities can understand the effect of temperature on their overall building energy use.



Benchmarking within a community and against all Massachusetts schools

MassEnergyInsight makes it easy for communities to compare building efficiency in two key ways – comparing the efficiency of buildings within their community, or comparing the efficiency of their schools with schools across the state. For example, in this quadrant report, buildings with the highest use and worst efficiency cluster in the upper right quadrant, making them easy to identify and target for energy efficiency measures.



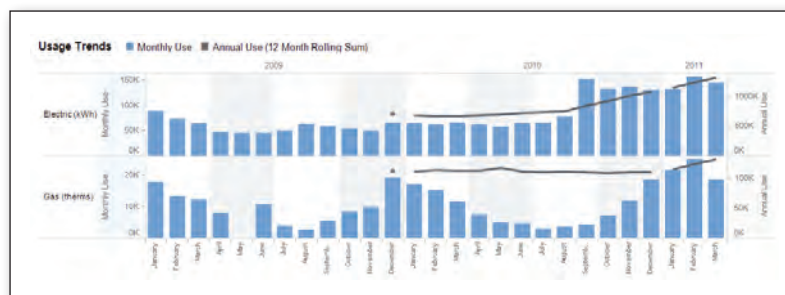
Comparing use, cost, and emissions across facilities

Color-coded bar charts make it easy to compare facilities use, cost, and emissions across a community and can be sorted by any of those categories – for example by use per square foot (rear image) or by cost (front image).



Identifying trends

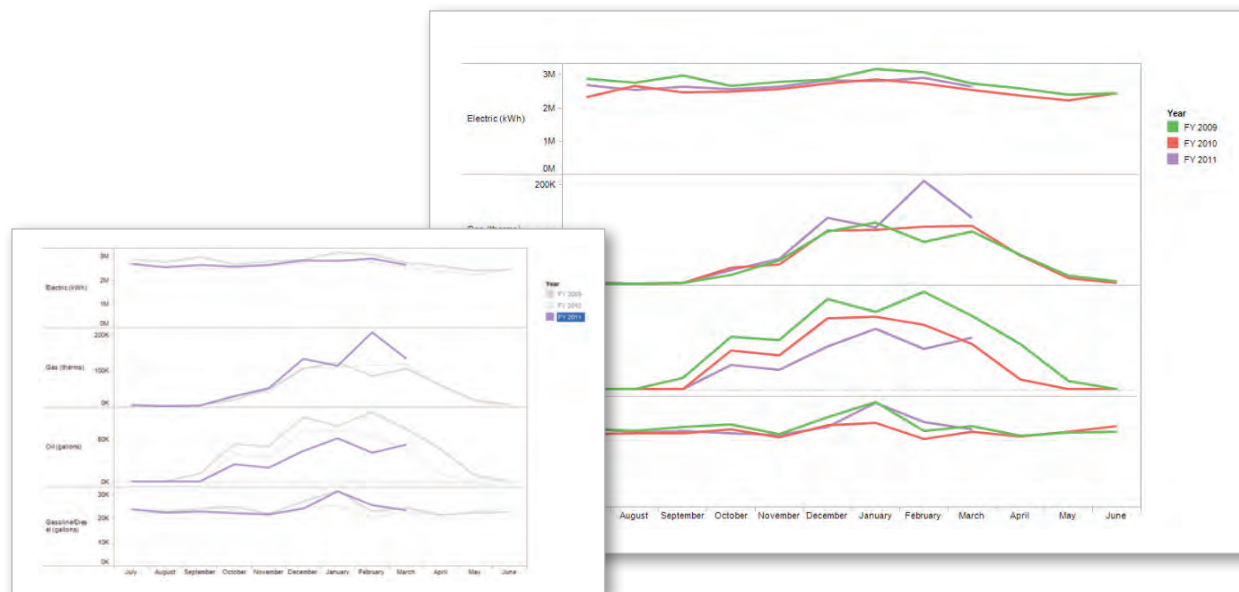
Straightforward visuals let users track trends without getting lost in the details. In this building use report, the grey line is a 12-month rolling sum, which allows users to see overall whether use is increasing or decreasing over time for this building.



OVERVIEW continued

Understanding what is – and is not – normal

The use of color allows users to compare use patterns from year to year and catch anomalies. This report shows annual use patterns for each fuel used; color indicates the year. When users click on a year in the color legend, the screen redraws so that only that year is colored, and other years are muted.



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Millbury, MA

Nobody in Millbury was tracking energy consumption and costs. The finance department paid the town bills. The school department paid the school bills. But no one added them together, and no one looked at use at all. Town Planner Laurie Connors knew the town budget was about \$36 million, and she suspected energy took a noticeable bite, but it was only when she started using MassEnergyInsight during the application process for Millbury's Green Communities status that she knew just how big that bite was.

"It wasn't until the Green Communities project that we started tallying our various accounts and figuring out how much energy the town actually consumed and how much we actually paid, which is an enormous amount of money. We pay almost a million dollars a year for all of our energy consumption."

Once the initial shock wore off, Laurie used MassEnergyInsight to dig into the data and figure out what was driving those costs, and then target those buildings for energy efficiency measures.

"I had no idea what the biggest energy hogs were. I had some idea by looking at the square footage and particular usage of buildings, but I didn't know particularly the town buildings – how those ranked.

We used the information to determine which buildings had the worst efficiency, and then we decided to prioritize those buildings with our grant funding." The town decided to focus on the top energy users on the school side and on the municipal building side, which were the high school and the town municipal building.

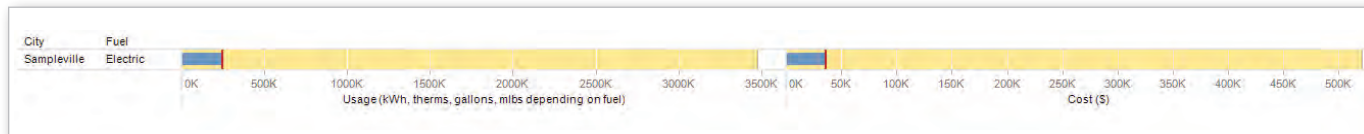
For the high school, the majority of the money would go into a variety of controls in the kitchens for refrigerators and for recommissioning to ensure systems are working the way they were designed. For the municipal building, they decided to explore installing LED streetlights to reduce streetlight consumption.

Laurie pointed out that the monitoring made possible by MassEnergyInsight allowed them to use their Green Communities grant money more effectively. "A lot of the stuff we're doing – we only had so much money," she explained, "so we're doing it as a trial to see what the savings are so we can then go after other schools with future funding. We're doing the controls over at the high school, but the controls over at the middle school and elementary school will need to be done as well. Is it going to be worth it to do those?"

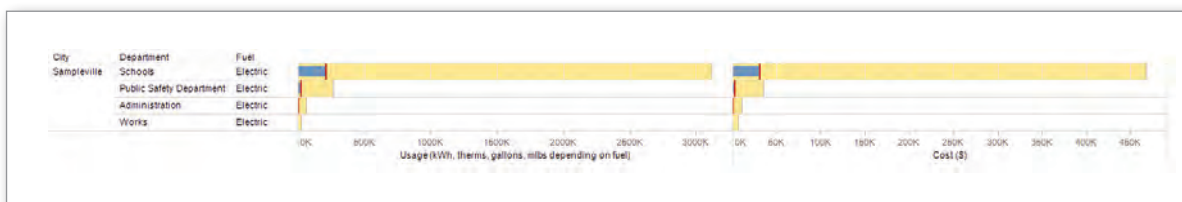
MassEnergyInsight is helping Millbury to save money outside of the Green Communities program as well. The town has been approached by a number of solar companies trying to sell Millbury solar projects

Comparing this year to last

The blue bar shows current energy use and cost. The yellow bar shows last year's total use and cost. If the blue bar is past the red line, then this year's use is greater than it was at the same time last year.



Interactive drill-down features let users decide whether to view data in the aggregate or to explore the data at a more detailed level, such as by individual department or even individual accounts.



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that will generate solar renewable energy certificates (SRECs). These SRECs could save the town up to \$25,000 in energy costs. MassEnergyInsight has been a game changer in these discussions. It gives Laurie a strong handle on town consumption numbers, which she figures is the reason these companies are so enthusiastic about working with Millbury. Additionally, she is using MassEnergyInsight to ensure that the accounts she allocates the SRECs to exceed the total kWh represented by the credits. She explains that without that knowledge “we’re not getting any benefit. We’re just paying more for our electricity,” but with MassEnergyInsight, they’re getting value out of every dollar they are spending.

Metropolitan Area Planning Council (MAPC)

The MAPC is a regional planning organization that serves 101 Massachusetts communities in the Metropolitan Boston area. As MAPC helps communities to apply for Green Communities status, they help those cities and towns to get set up and organized in MassEnergyInsight. Along the way, they are finding some unexpected benefits to using the tool.

“Finding where the bills are – figuring out who tracks the bills – is a way to mobilize people,” explained Helen Aki, MAPC Energy Services Coordinator. “This is especially true for communities without energy staff. The setup task forces different departments and groups to share information and gives them something to focus their efforts on.”

MAPC will use MassEnergyInsight for a pilot program that supports 5 energy planning projects. Four of those projects include the Massachusetts communities of Medford, Medway, Marlborough, and Stoughton. For these communities, the MAPC will set an initial baseline of energy performance with MassEnergyInsight and then use the tool to monitor the impacts of the energy efficiency measures that are implemented as a result of the planning process.

The fifth project is a regional energy planning project with the Reading Municipal Light Department and the four communities that it serves – Reading, North Reading, Wilmington, and Lynnfield. The Reading Municipal Light Department will make data for those four communities available for input into MassEnergyInsight, and will then work directly with each town to monitor the impact of energy efficiency measures implemented as a result of the energy planning process, using MassEnergyInsight.

IMPLEMENTATION Setup

Once the backend system architecture was in place, MassEnergyInsight setup involved two significant efforts: an initial load of historical utility data and a focus group.

Initial data load

To accelerate community involvement, two years of municipal electric and gas utility data was obtained from Massachusetts utilities and loaded into the system in advance of launch. School data was obtained from the Massachusetts School Building Authority. The Peregrine team then reviewed the data, identified facilities within each municipality, and aligned accounts with those facilities as was possible.

Focus group

To ensure that the initial suite of reports and dashboards met municipal needs as fully as possible, Peregrine facilitated a focus group, which included participants from a cross section of Massachusetts communities. Their feedback, in conjunction with strategic input from the DOER, played a pivotal role in defining the initial suite of dashboards and reports.

Launch and Ongoing Support

The MassEnergyInsight launch and statewide rollout was a collaborative effort between DOER staff and Peregrine Energy Group. It was supported by the development of four key resources that remain available to all users on an ongoing basis:

- 1. Informational Web site:** With input from the DOER, Peregrine developed and launched the MassEnergyInsight informational web site, available at www.MassEnergyInsight.net. The site provides an introduction to the system and information on how to get started using it.
- 2. Training:** For the launch, Peregrine delivered 12 training workshops - 3 in each of the 4 Green Communities regions in the state. Workshops were hands-on and let participants review their pre-loaded data, enter additional non-utility data such as oil data, explore the reports, and ask questions. To reach a larger audience, webinars later replaced the classroom training.

Later, 31 on-demand training videos were created to provide 24/7 ongoing access to instruction for MassEnergyInsight users. Each only a few minutes in length, the videos are available from within the Support section of MassEnergyInsight.
- 3. FAQ:** Questions asked during the trainings and those received through Customer Support are captured and integrated into an FAQ that is accessible from within the Support section of MassEnergyInsight.
- 4. Customer support:** Email- and phone-based customer support are provided by experienced staff at Peregrine Energy Group who respond to calls and emails within a business day. Support is available for any kind of question to make sure that all users, regardless of their energy knowledge or computer literacy skills, are successful using MassEnergyInsight. Users can access Support whenever needed using the Web-based form in the Support section, or by emailing or calling directly.

Peregrine also receives account data updates on a regular basis from utilities for all municipal accounts and uploads this data on a monthly basis.

CHALLENGES

The four primary challenges that arose with the MassEnergyInsight implementation are challenges that face almost any effort to collect and analyze energy data:

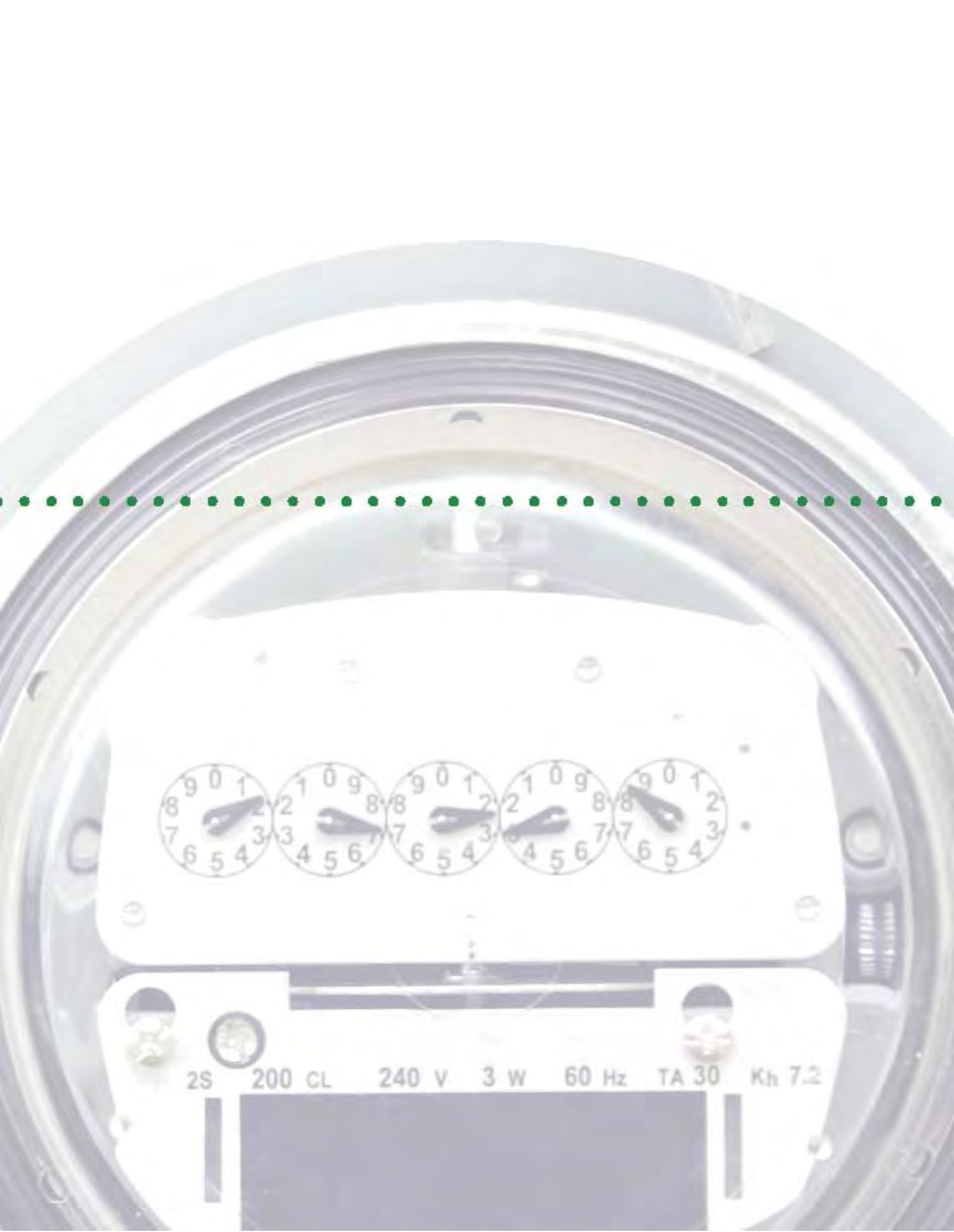
- 1. Identifying all utility accounts:** With multiple people across different departments responsible for utility bills, creating a master list of all accounts for the municipality can present a significant challenge.
- 2. Aligning accounts with facilities:** Because utilities do not necessarily identify accounts using a name or address familiar to the town, it can be difficult to know which accounts match which facilities. This alignment is essential in order to understand the energy performance of a given facility.
- 3. Gathering building information:** Building square footage is a key component of calculating building energy efficiency, but that information is not always readily available or easy to find.
- 4. Utility data collection:** While the utilities are providing regular updates of account data, their information systems can be cumbersome to work with and may not always deliver exactly or all of the data that is expected.

The first three challenges are met through simply putting in the time to locate, understand, and clarify the data. Peregrine addresses the fourth challenge directly with the utilities, as issues arise.

PARTICIPATION

Municipal participation far exceeded the original targets, and it continues to grow. The table below offers a snapshot of just how big MassEnergyInsight has grown during the initial two years of the project:

Users trained in classroom & webinar trainings	420
Total training video views	660
Authorized users	738
Active Green Communities	78
Total active communities	211
Regional entities engaged (regional school districts, water and wastewater districts, etc.)	17
Buildings tracked	8,140
Energy accounts tracked	37,250
Electricity	> 2.1 billion kWh/year
Natural gas	> 88 million therms/year
Oil	> 4 million gallons/year
Total energy spend	\$415 million/year



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