



Memorandum

To: Vail Town Council

From: Community Development Department

Date: February 20, 2018

Subject: Energy Management System Update

I. Background

In 2017, the environmental team in coordination with public works and facilities released a Request for Proposals (RFP) for an energy management system to provide tracking for the town's energy consumption as well as verified greenhouse gas calculations for municipal facilities. Currently this information is manually inputted and calculated on an annual basis through a bulk data transfer via email from local utilities or, in the case of natural gas, hand-keyed each month by the general services administrator from invoices. An automated system will reduce errors, free up staff resources for priority projects, and provide data to facilities and sustainability staff in a timely manner; either on monthly billing cycles or near real-time depending on the location.

The town's Environmental Sustainability Strategic Plan (ESSP), adopted in 2009, identified energy efficiency as a major goal targeting a 20% reduction in municipal and community energy use by 2020. Since the adoption of the 2009 ESSP, the town has adopted stronger climate action goals with a 25% by 2025 and an 80% reduction in greenhouse gas emissions by 2050. To date, the town has completed a number of projects that have helped achieve a 31% reduction in water consumption and a 34% reduction in electricity consumption. Unleaded gasoline use by the town's vehicle fleet has declined. However, natural gas consumption has seen more than a 100% increase with the expansion of snowmelt and diesel consumption has risen with expansion of bus service.

Utilities are a major annual expense for the Town of Vail, with a combined cost of over \$1.1 million. In 2016, the Town of Vail spent \$419,612.96 on Electricity, \$522,494 on natural gas, over \$395,000 on fuels, and around \$190,000 on water.

Project Goal

The goal of this project is to implement an energy and sustainability management system that will provide the Town of Vail with an important monitoring, reporting, and decision making tool that can help meet environmental goals and drive cost savings. In addition to helping achieve sustainability goals, the EMS system will streamline and consolidate information from the town's 170 electric, 21 natural gas, and 80 water, and fleet fuel accounts and provide the best possible data to all staff and decision makers.

Review Criteria

In order to meet the project goals, the staff project team reviewed firms and proposals against the following criteria:

- Intuitive and visually appealing user interface
- Experience working multiple-account organizations spread across multiple facilities and locations
- System adaptability to seamlessly incorporate future growth and real-time technologies
- Ability to integrate software with existing systems (fleet fuels, snowmelt, etc.)
- User generated reporting capabilities
- Value and long-term system viability/sustainability
- Monitor and record electricity, gas, water, and fleet fuel usage across facilities
- Flexibility to incorporate sub metering and provide real-time data
- Deliver access to reporting of utility usage across facilities, including real time data where possible
- Provide remote, on-line access to utility usage data, including real time. This should also include a public access portal for display facilities and web access
- Track and record environmental conditions at facilities to allow for weather normalization
- Provide long-term storage of data
- Provide GHG calculations and emissions totals
- Provide excellent customer service and support
- Incorporate and manage data for approximately 170 electric accounts, 21 gas, 80 water, and municipal fleet fuel consumption

II. Energy Management Systems

Energy Management Systems (EMS) provide the basic function of tracking and monitoring utility consumption. These systems can incorporate real-time data, provide greenhouse gas calculations, alert users to variances in use and billing data, and provide education on behavior, trends, and best practices in sustainable buildings. In a local deployment, these systems have the potential to communicate directly with smart meters and other sub meters to provide near real-time information. Existing sources of this data in the Town of Vail include new Holy Cross smart meters, certain natural gas meters, solar installations, and building controls installed through Johnson Controls.

Data from the EMS will immediately be used by facilities, general services, and the environmental sustainability staff, and in the future, if auditing and control requirements are met, most EMS systems can also be used by finance and accounting to automate bill payment and tracking processes.

An EMS system will meet environmental sustainability goals by providing a data collection and monitoring tool to track improvements from prior and new energy efficiency projects, a 3rd party validated GHG calculation including totals for each

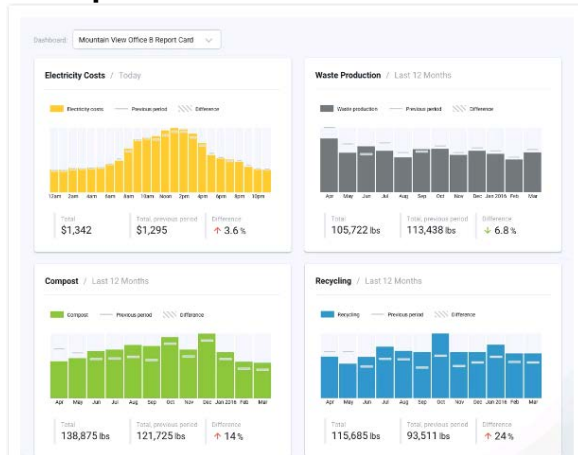
building and overall municipal operations. This information can also be valuable in supporting public education goals of the sustainability plan. Internal education on energy consumption can drive staff behavior and cultural changes that lead to reduced energy consumption. Public display portals can be set up in municipal facilities to show energy use and solar energy production engaging residents and guests.

The information collected through the EMS also provides a valuable management tool to facilities staff by helping to determine which efficiency and sustainability projects provide the most impact and cost benefit to the community by determining the total impacts of each facility using modeling and predictive capabilities.

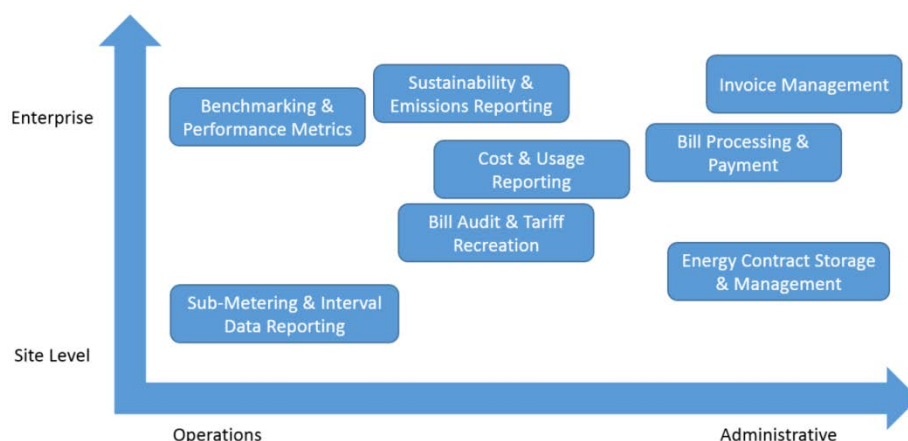
EMS System Service Levels

Service Level 1 \$10-12,000 annually (in-budget option)	Service Level 2 \$20-30,000 annually	Service Level 3 \$100,000+ annually
Automated Billing Data Import	Automated Billing Data Import	Automated Billing Data Import
Weather Normalization	Weather Normalization	Weather Normalization
GHG reporting	GHG Reporting	GHG reporting
	Real Time Data Import	Real Time Data Import
	Public Education Portal	Public Education Portal
	Energy Star Building Scoring	Energy Star Building Scoring
	Multiple Hardware Compatibility and Scalability	Multiple Hardware Compatibility and Scalability
	Energy Modeling Capabilities	Energy Modeling Capabilities
		Customized Hardware Installation

III. Example User Interfaces



Key Features of THG's Energy Intelligence Software



EMS systems provide benefit to multiple departments by providing a tool to assist decision making, automate functions, and meet sustainability reporting requirements.

<http://thgenergy.com/our-solutions/energy-intelligence-software/>

IV. Cost Savings

Total cost savings can be achieved by EMS systems and the expected savings amounts can vary. A study by Lawrence Berkeley National Lab found that EMS systems can achieve up to an 8% savings across all energy accounts or up to a 17% savings on a specific site.¹ These savings can be achieved in the following sectors.

- 2-4% energy reduction through improved scheduling
- 5-8% savings from behavioral changes
- 1-2% savings from bill auditing and reconciliation
- 2-3% savings from detecting portfolio drift (leaving lights/computers/etc. on)
- 2-8% reduction through alerts set up to help minimize peak demand use
- Time and labor savings through a reduction in manual entry, GHG research, and consolidating multiple data sources.

V. Staff Recommendation

\$12,000 was approved in the 2017 budget for the launch and installation of the EMS. This was a simple bare-bones estimate to create a placeholder for the minimum system needs and annual subscription fees prior to the release of the RFP. Staff is recommending the Town Council consider service level 2, with a budget of \$34,000, which would allow the town to implement the most value for the dollar system available and meets both the objectives and review criteria. Annual subscription fees are estimated \$22,000. Comparable EMS vendors that provide the real-time data services can cost as much as \$400,000 for implementation and \$200,000 in annual subscription fees.

¹ Energy Information Systems (EIS) Technology, costs, benefit, and best practice uses
<http://eis.lbl.gov/pubs/lbnl-6476e.pdf>

Appendix:

Energy Information Management Systems Expected Savings and Supporting Research