

UNITED TECHNOLOGIES CORPORATION: ENERGY COUNCIL TO GUIDE ENERGY STRATEGY IN A DIVERSIFIED ORGANIZATION

SOLUTION OVERVIEW

UTC sought to develop an energy management strategy to implement at its 400 diverse manufacturing sites worldwide to reach the company's energy and GHG emissions targets. UTC created a cross-divisional Energy Council to develop the strategy, disseminate energy efficiency best practices, and focus efforts to meet the company's ambitious energy and GHG reduction goals. Key initiatives of the Council were creating a standard set of energy management best practices across the company, drafting an Energy Management Guidebook to reduce energy consumption at manufacturing sites and coordinating energy assessments for facilities of all sizes.

ORGANIZATION TYPE

Diversified manufacturer providing a range of high-technology products and services to the global aerospace and building systems industries

BARRIER

Difficulty organizing and communicating a meaningful energy management strategy and implementing cost-effective energy management best practices for the company's 400 diverse manufacturing sites worldwide, including 160 U.S. locations

SOLUTION

Establish a cross-divisional Energy Council to develop and manage a comprehensive program to reach the company's energy and greenhouse gas (GHG) reduction goals

OUTCOME

Globally, UTC has reduced its absolute GHG consumption by 27% against a 2006 baseline; in the United States, the company met its initial 25% energy intensity reduction goal, set through the Department of Energy's Better Plants Program, three years ahead of schedule

POLICIES

UTC's Energy Council was created in the early 1990s. It is a cross division team that meets monthly to guide the company's energy and GHG management strategy. One of the actions this

group took was to contribute to the development of the Environmental Health & Safety Standard Practice (SP) 017, which is the driving force behind the company's GHG and energy reduction initiatives. The SP was developed using the ANSI 2005 Management System for Energy, the precursor to the ISO 50001 standard, as a guide. SP 017 requires company operations to document and analyze energy and GHG profiles of manufacturing sites, identify significant energy users, and establish prioritized lists of energy conservation projects.

Later, as a complement to SP 017, UTC's Energy Council developed an Energy Management Guidebook that presents a systematic approach to managing energy in manufacturing operations. While SP 017 clearly documents "what" each site has to do to manage energy, the Guidebook teaches facilities engineers and EH&S staff "how" to manage energy. The Guidebook compliments SP 017 by offering a roadmap and presentation of industrial best practices.

Individual UTC business units rely on the Energy Management Guidebook to develop effective site-specific energy management plans. The document contains important information on energy management best practices, including specific guidance on key energy using pieces of equipment, such as lighting, compressed air, boilers and steam, HVAC systems and controls, and combined heat and power. This guidebook is used throughout UTC sites, and has also been distributed to key UTC suppliers to help them improve their energy management practices.

The Energy Council, working with the EH&S Staff, also plays a role in overseeing the tiered approach to conducting energy audits at UTC sites. UTC relies on in-house expertise to complete 20–25 energy audits per year at its large manufacturing sites (between 250,000 and 1 million square feet). The Energy Audits also train site staff working with the EH&S staff on how to better manage energy in the process. Facility engineers and energy engineers are typically recruited to assist on energy audits at different plants from their own business unit, in order to bring in a fresh, outside perspective. UTC takes advantage of the Department of Energy's (DOE's) Industrial Assessment Centers (IAC) to conduct energy audits of smaller-to-medium sized facilities. For its smallest facilities, UTC relies on a free, on-line DOE assessment tool to evaluate energy saving opportunities. Each facility EH&S team is responsible for following up on audit findings. UTC business units may contact the Energy Council to assist with their energy audit plans. Results of audit recommendations are put into a UTC project tracking system that is utilized by the business unit for project management and is periodically reviewed by the Energy Council.

PROCESS

The Energy Council is a cross-divisional team with business unit leaders from energy management, supply chain management, EH&S and Facilities Engineering from the largest sites in the organization. The council is an advisory level group with limited financial resources. The council meets once per month and divides its time into energy supply and energy consumption initiatives. The Energy Council reviews energy performance key indicators on a quarterly basis and identifies and analyzes trends. On an ongoing basis, it identifies best practices that all sites should evaluate and implement when practical. UTC business units, with the assistance of the Energy Council, will develop energy and GHG management plans and identify opportunities for future improvement. The council regularly reviews energy markets and identifies best practices that all

sites should evaluate and implement when practical.

While the Energy Council plays an important coordinating role, the ultimate responsibility for energy reduction resides within each business unit at UTC. The Energy Council, in partnership with UTC's EH&S office, is a coordinator of resources and assistance to each business unit. Depending on need, corporate staff will educate, guide and/or assist business units with technical support. Capital expenditures, however, are the sole responsibility of each business unit.

TOOLS AND RESOURCES

The UTC Energy Council advances the company's energy and GHG reduction goals through several tools: the Energy Management Guidebook, IACs, and the DOE Plant Energy Profile (PEP) software along with energy audit support. The following is a summary of each resource.

The Energy Management Guidebook: This manual, created by the Council, includes industry best practices for reducing manufacturing energy consumption. It covers key areas of manufacturing such as lighting, HVAC and compressed air. It has been distributed to both UTC staff and key UTC suppliers. It is used to establish a common energy language between plants and UTC corporate EH&S support. When a business unit requests energy assistance from UTC corporate office they will reference the energy management guidebook as a starting point for discussion and guidance. [The complete guidebook is available for download here.](#)

Industrial Assessments Centers (IAC): UTC uses IACs to perform energy audits at medium-to-small-size facilities to complement the company's own audits at larger facilities. IAC teams located at 24 universities around the country conduct the energy audits to identify opportunities to improve productivity, reduce waste, and save energy. Results/ findings from IACs and internal audits are reviewed at the business unit level and periodically reviewed by the Energy Council. All projects are entered in a project tracking software that is reviewed by the Energy Council. [More information on the IACs is available here.](#)

Plant Energy Profile: UTC also takes advantage of DOE's [Plant Energy Profile \(PEP\)](#) software as a model for evaluating energy opportunities at small facilities. PEP is an online tool that helps plant managers identify how energy is being purchased and consumed at their plant and find potential energy and cost savings. PEP enables users to complete a plant profile in about an hour. The smaller UTC sites are encouraged to conduct a PEP analysis and utilize a UTC checklist which helps to further define significant energy users and identify the next actions required to reduce energy. Some examples from the UTC checklist are: Do you have a shut-it-off program for production equipment? Do you turn off compressed air systems on weekends? Do you use occupancy sensors in offices and conference rooms? [The full checklist is included in this document.](#)

MEASURING SUCCESS

At the corporate level, UTC monitors performance against the company's GHG reduction and energy cost savings targets. On a quarterly basis, performance against the absolute GHG reduction target is reported to Energy Council as well as to UTC senior leadership. Upon review, the Energy Council will work with business units to develop plans and identify opportunities for future improvement.

Individual sites are required to report energy consumption data via a web-based data collection system created by UTC. Energy consumption and cost data is collected for each site, and this data is used to establish priorities and measure performance. Site information is also compared with similar operations to identify anomalies and track progress toward goals. The energy savings data collected at the site level is then rolled up to corporate-level metrics.

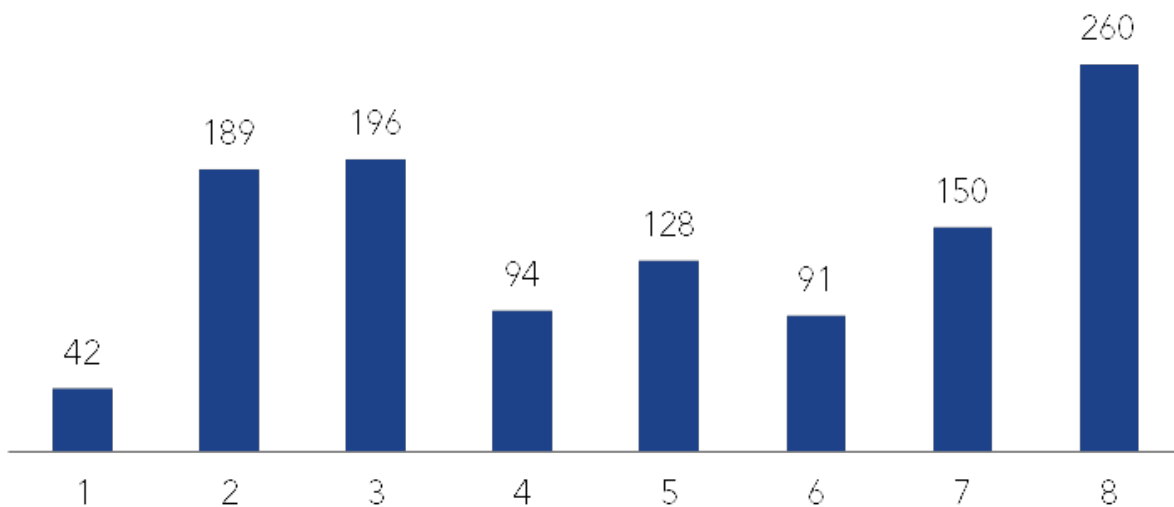
OUTCOMES

Globally, UTC has reduced its absolute energy consumption by 27% against a 2006 baseline; in the United States, the company met its initial 25% energy intensity reduction goal, set through the Department of Energy's Better Plants Program, three years ahead of schedule. In 2013, UTC set a new goal to reduce energy intensity by an additional 17.5% by 2020 across all U.S. facilities.

UTC started collecting project data in 2007. Since then, UTC has completed 1,185 energy projects in its U.S. operations. This represents a total investment of just over \$150 million with total savings over \$53M per year. The energy reduction is about 2,800,000 MMBTU/year. The chart below breaks the completed project down by year starting from 2007 up to 2014.

UTC Projects Completed 2007 - 2014

■ UTC Projects Completed by Year



The energy management approach advanced by UTC's Energy Council has been instrumental in the company's success. In addition to a working energy review system, the Council has helped build a community of energy engineers as a result of training and materials it created or encouraged.

As an example of a successful project driven by UTC's energy management approach, a Pratt & Whitney, Arkansas, site won the 2015 UTC Leadership award in part due to energy improvements identified during a 2010 IAC audit, and subsequent work with the local utilities and internal benchmarking. Twenty-two projects were implement during 2010-2014 resulting in 491,500 KWH/year in savings.

Also, UTC Aerospace Systems' Windsor Locks, Connecticut facility installed two new air compressors that were high efficiency and high pressure. These compressor use waist heat from the compressors to dry the air the before it is delivered to the plant. This resulted in 5.6 million KWH hours/year in savings.

