

## DESIGNING A COMPREHENSIVE ENERGY PLAN

### SOLUTION OVERVIEW

Like many cities, Knoxville, TN, recognized the importance of saving energy and reducing costs but lacked the comprehensive plan, funding, and performance data needed to achieve and track energy reductions. To respond to these challenges, the Mayor launched an Energy and Sustainability Task Force in 2007. The 15-member Task Force, made up of local private and community leaders as well as various City department heads, provided the City the critical early insight it needed to launch a sustainability program. That same year, the City joined ICLEI—Local Governments for Sustainability to access resources to advance sustainability at the local level. City staff used ICLEI's Clean Air and Climate Protection Software to inventory baseline energy use, costs, and greenhouse gas emissions.

The primary outcome of the Task Force and ICLEI membership was the Knoxville Energy Inventory: Government and Community Analysis and Strategic Plans which included baseline energy information and recommendations for next steps. In 2009, to help execute these next steps, the City Council approved entering into the City's first energy services performance contract (ESPC) to retrofit City facilities. This ESPC laid the foundation for more systematic energy tracking efforts, which further expanded in 2012 when Knoxville began working with utilities to gather energy data electronically at the meter level on an ongoing, monthly basis. Today the City receives its energy bills electronically and is able to measure, benchmark, and analyze the savings. Staff continue to work closely with the City's ESCO partner to ensure the energy savings projections are being met.

### COMMUNITY SIZE

Small Urban, Population 180,000

### GOAL

To achieve a 20% reduction in energy intensity by 2020

### BARRIER

Lack of unified organizational plan to implement efficiency improvements; lack of financing; and lack of access to consistent and transparent building performance data

### SOLUTION

Convened a public-private task force to develop a work plan, entered into an energy services performance contract to retrofit municipal facilities, and implemented an energy data tracking

system

## **OUTCOME**

Decrease in energy consumption at 99 retrofitted facilities, ranging from 10% to 30% with an average decrease of 16%; energy use data is now more readily accessible to decision makers, highlighting the opportunities and benefits of improved energy performance and encouraging facility managers to proactively propose new efficiency ideas

## **POLICIES**

Released in 2009, the Knoxville Energy Inventory: Government and Community Analysis and Strategic Plans, publically presented the City's sustainability goals to reduce carbon emissions from both City operations and the Knoxville community by 20% below 2005 levels. Since the release of the Inventory, Knoxville has advanced these goals through a portfolio of both legislative and non-legislative efforts.

- In 2009, Knoxville City Council approved an ESPC agreement to provide retrofits to 99 City-owned buildings and 37 parks and facilities. The retrofits completed under the contract are anticipated to save \$19 million over thirteen years.
- In 2010, the Energy & Sustainability Task Force led a public process to develop the Knoxville Energy and Sustainability Work Plan which included 33 specific strategies; the Plan is implemented by the Office of Sustainability.
- In 2012, the Knoxville City Council adopted a goal to reduce the energy intensity of two million square feet of City facilities 20% by the year 2020.
- In 2013, City Council voted to adopt the 2012 International Energy Conservation Code with amendments matching the state of Tennessee adoption.

## **PROCESS**

### **Work Plan**

Upon establishment in 2007, Knoxville's Energy and Sustainability Task Force researched best practices and advised City government in planning and implementing practical policies and programs through a series of recommendations and documents released over several years. The group was staffed by the City's Sustainability Office and consisted of six volunteer work groups (Community Involvement, Energy, Goods and Services, Infrastructure, Sustainable Growth, and Transportation) that distilled the broad goals of the City's 2009 Energy Inventory into specific and detailed action items. These groups provided prioritized recommendations to the City in October 2010 which were then compiled to create the [Knoxville Energy and Sustainability Work Plan](#) to guide the City over the next five years.

The Work Plan, which involved 10 months of planning, acted as the City's road map to becoming more energy efficient. It helped the City address the lack of a unified plan for efficiency and articulated clear priorities and next steps to decision makers and community members. Some of the

recommendations required policy action from the City Council and financial commitments from City leaders to ensure effective implementation. Items that required capital and/or Council approval included the purchase of energy management software, funding of the Energy Manager position, and adoption of a building energy policy for new municipal construction.

The Work Plan identified public facilities as particularly large consumers of energy and subsequently the source of high volumes of greenhouse gas emissions. As such, the Task Force recommended focusing on energy efficiency and energy management in the public building sector as priorities moving forward.

Convening and managing the Task Force did not cost the City any direct funds, but did require significant staff and volunteer time. In 2007 and 2008, administering the Energy and Sustainability Task Force required roughly 10 hours per week from a City staff person dedicated part-time to Sustainability initiatives. Data gathering and analysis for the 2009 Energy and Emissions Inventory was performed primarily by an unpaid college-level intern, with City Sustainability staff spending roughly 10 hours per week over the period of a year to oversee data management and write the inventory report. Facilitating the development of the Energy & Sustainability Work Plan and coordinating the Task Force and six working groups (comprised of well over 50 individuals) required roughly a combined 25 hours per week from two City staff people dedicated full-time to sustainability initiatives. Six individuals, some community members and some City staff, served as working group leaders for this effort. Data and input from local utilities, City departments, the local transit authority, waste haulers and landfill managers contributed to both the 2009 Energy Inventory Report and 2010 Work Plan. The City updated the 2009 Energy Inventory in January 2014 through a [Progress Report](#) utilizing data through the end of 2012.

Throughout the process, leveraging local leadership support and a peer exchange with other cities that had gone through a similar process were instrumental to the effort's success. The City collaborated with the Southeast Sustainability Director's Network (SSDN) and many of the cities involved in both the Better Buildings Challenge and [Urban Sustainability Directors Network \(USDN\)](#) have also discussed best practices. A new USDN working group focuses on helping local governments manage their data in order to advance their local energy programs through sharing needs, barriers, and solutions for acquiring relevant data from utilities.

### **Energy Services Performance Contract**

In order to execute a broad portfolio of municipal facility retrofits as recommended in the Work Plan, the City entered into an energy services performance contract (ESPC) with an energy services company (ESCO) in 2009. The contract scope, worth \$19 million in upfront capital, targeted 99 City-owned buildings, 37 ballparks/athletic fields, and three public golf courses. Rather than maintain and upgrade buildings on a year-to-year basis, the ESPC vehicle allowed the City to make energy efficient retrofits on a massive scale at a price point much lower than if the City had attempted to piecemeal the planned retrofits on an annual budget cycle. Because the energy savings were guaranteed, the City was able to leverage the subsequent cost savings to pay back the initial cost of the upgrades over a period of 13 years. All of the upgraded equipment is warrantied to last beyond the life of the agreement. The resulting utility bill savings fund the City's repayment of this bond, which has since been refinanced and reduced to \$15.5 million.

Staff from the City's Purchasing Department, Law Department, and Sustainability Office dedicated roughly a combined 15 hours per week throughout procurement and contract negotiations for the ESPC, which lasted 21 months. The staff member in Purchasing who manages the contract spends about 25% of her time providing oversight of the ongoing implementation and verification of the ESPC work. Immediately after the execution of the agreement, the contract consumed 75% of her time for the period of about 12-18 months. Construction occurred in 2010 and 2011. Upon completion of the projects, the ESCO began measurement and verification of project savings in 2012. As a total portfolio, the projects had a 13 year payback period. The savings generated from the energy use reduction allowed the City to pay down the cost of the upgrades.

### **Energy Data Tracking**

Historically, the City received only paper energy bills through the accounting division of the Finance Department, which paid the City's utility invoices. Other than financial records collected from utility bills paid, no central location existed where utility bills were tracked or monitored. The lack of access to consistent and transparent building performance data made it difficult for the Sustainability Office to manage its progress toward its energy reduction goals.

Building off of the baseline data collected for the Knoxville Energy Inventory using the ICLEI Clean Air and Climate Protection Software and the measurement and verification efforts of the ESPC, Knoxville continued to look for ways to systematically track their energy consumption on a regular basis. In 2012, the Sustainability Office began to work with local utilities to gather monthly consumption data electronically at the meter level. A third-party data tracking platform was used to input facility and usage data. The platform, which integrated with EPA's Portfolio Manager tool, was free for the first two years but will require funding for subsequent years. The process to set up and populate the database took roughly 12 months. The Sustainability Office now receives copies of the energy bills for all City facilities in electronic form and enters consumption and expenditure data into an online platform to track and measure progress over time.

As part of the energy data tracking efforts, interns were tasked with organizing the building and consumption data, formatting data into templates compatible with the data tracking platform, producing graphs and reports that highlight specific high/low consumption facilities and researching ways to further reduce consumption.

Through this process, the City learned that the following tips were critical to data management success:

- Understand data needs before asking the utility for information.
- Have as comprehensive a list as possible of facilities' names, addresses, fuel types, square footage, age of building, etc.
- Understand the process by which data will be utilized and uploaded/inputted once is it obtained; the easier it is for the utility, the better.
- Keep a good working relationship with the utility.

### **TOOLS AND RESOURCES**

- [Knoxville's Energy and Sustainability Work Plan](#)
- [Knoxville's Energy Inventory: Government and Community Analysis and Strategic Plans](#)

- [Energy and Sustainability Task Force Resources](#)
- [Knoxville City Council Resolution to join the Better Buildings Challenge](#)
- [Knoxville Energy & Sustainability Initiative 2014 Work Plan & Emissions Inventory Update](#)

## **MEASURING SUCCESS**

The City of Knoxville is measuring the success of its efforts by tracking and verifying reduction in energy consumption and associated greenhouse gas emissions. The City relies on Microsoft Excel spreadsheets, UtilityTrac Plus, and EPA's Portfolio Manager to organize and analyze data. The City utilizes Portfolio Manager and Excel Spreadsheets to visually communicate annual consumption reductions. These tools also identify high and low building performers to help the City identify facility managers who may need additional education to understand the fluctuation in consumption in their facilities.

## **OUTCOMES**

As the Energy Inventory and Work Plan continue to be integrated into City government operations, awareness and education have increased both internally within City departments and externally throughout the community. Facilities managers are increasingly proposing new ideas for improving energy efficiency or installing renewable energy. Knoxville continues to verify energy savings in its City facilities. Results have shown a decrease of 16% in energy consumption in the facilities where retrofits have been made. One of the most successful examples is the [Knoxville Convention Center](#), where energy use has been reduced by almost 30%, saving City taxpayers nearly \$165,000 annually.

