

ISO 50001 Energy Management System Case Study

2021

United States

AstraZeneca Gaithersburg, MD USA

27.5% Energy Improvement Under ISO 50001 EnMS



Photo 1: Main building on Gaithersburg campus; One Medimmune Way (OMW)

Organization Profile & Business Case

AstraZeneca is a global, science-led biopharmaceutical company that focuses on the discovery, development, and commercialization of prescription medicines in Oncology, Rare Diseases and Biopharmaceuticals, including Cardiovascular, Renal & Metabolism, and Respiratory & Immunology. The campus in Gaithersburg is one of three of AstraZeneca’s global strategic R&D centers. With 10 buildings across the campus, there are significant savings opportunities associated with the operations of heating, ventilation, and air conditioning (HVAC) systems for offices, labs, and manufacturing areas.

AstraZeneca (AZ) takes pride in our mission to produce innovative, life-saving medicines and our commitment to pursue this mission in a sustainable manner. This commitment is part of the organization’s global

| Case Study Snapshot | |
|---|--|
| Industry | Pharmaceuticals |
| Product/Service | Pharmaceutical drugs |
| Location | Gaithersburg, MD USA |
| Energy management system | ISO 50001 |
| Energy performance improvement period, in years | 10 |
| Energy Performance Improvement (%) over improvement period | 27.5% |
| Total energy cost savings over improvement period | \$4,052,186 saved in 2020 over 2010 baseline |
| Cost to implement EnMS | >\$460,000 |
| Total Energy Savings Source over improvement period | 310,868 GJ |
| Total CO ₂ -e emission reduction over improvement period | (1,559) metric tons <i>negative due to CHP and renewable energy purchasing</i> |

strategy, with corporate goals to be carbon zero by 2025 for our own operations and reduce our waste

generation and water consumption as we grow as a business. This is pursued with vigor in Gaithersburg, where the operations team has rolled out multiple initiatives to help deliver on these targets.

AZ Gaithersburg Campus is committed to the AZ Ambition Zero Carbon initiative and integrates continual energy performance improvement strategies into its facilities, operations, design, and procurement practices through its ISO 50001 Energy Management System. We

are dedicated to take climate action now for healthy people and a healthy planet by setting and tracking aggressive energy targets and committing the resources to achieve these goals. The core values of AZ include “doing the right thing” which drives the mission to reduce energy, carbon, water and waste.

A message from our CEO, Pascal Soriot, explains our motivation to act, “Climate change is an urgent threat to public health, the environment and the sustainability of the global economy. Since 2015, we have reduced our greenhouse gas emissions from operations by almost a third and our water consumption by almost one fifth. But now is the time to act even faster and redouble our efforts. The commitments AstraZeneca has made today as part of our ‘Ambition Zero Carbon’ strategy will enable us to speed up the reduction of our Company’s impact on climate and inspire collaboration at a global level to effect policy change.”

Business Benefits

Energy Performance:

In 2010, we pledged to reduce our energy intensity by 25% by 2020 through the US Department of Energy’s (DOE) Better Plants® program and reduced 27.5% over 10 years; exceeding our goal by the end of 2020. The team used a DOE regression model to account for weather, production, and other factors outlined in the Do, Check, Act section of this case study. Compared to 2010, we save 94,938,446 kWh/year at the source of generation (power plant) and consume an additional 293,760 therms/year. The increase in natural gas can be attributed to the addition of two combined heat and power (CHP) engines capable of producing 4.8 MW of electricity (photo 2). This energy savings equals \$4,052,186 saved in 2020 compared to 2010 energy consumption. The site purchases 100% renewable electricity with no atmospheric greenhouse gas emissions. We have increased natural gas consumption due to the CHPs, however the plan with Ambition Zero Carbon is to substitute natural gas with 100% renewable sources of heat and power by 2025.



Photo 2: Inside the CHP engine room

In 2014, we were the first biopharmaceutical company to receive certification under DOE’s Superior Energy Performance® program with 8.5% improvement, and we re-certified to the program at the Gold level for 2020-2023 with a 5.2% improvement. We were the first biotech laboratory facility registered to the ISO 50001 and SEP Energy Management standard and were re-registered in 2020 for the 3-year period through 2023.

In, 2019 we conducted two energy assessments. The first, an ASHRAE Level II audit followed by a Treasure Hunt in partnership with the Department of Energy. Both assessments identified several opportunities and we’ve instituted a Plan to implement the Energy Conservation Measures identified which will reduce energy costs by ~\$1.5 Million.

The ISO 50001 Energy Management System has driven the delivery of these performance benefits and improved communication between internal teams and site leadership. Another AZ site is independently ISO 50001 certified and a combined effort has led to improved procurement practices across the entire organization.

In addition the many energy benefits relate to ISO 50001 adoption, we observe a culture change aimed toward sustainability. The Gaithersburg campus is proud of our Zero Waste infrastructure but achieving the 85% recycle rate in the most recent quarter could not be accomplished without the participation of all

employees on campus. The EnMS has benefited other areas for improvement with respect to Greening of Labs, zero waste, and water efficiency projects with an approach similar to ISO 50001.

Cost:

All values for the cost of the ISO 50001 management system are estimated. The internal/external staff time to develop, implement, and maintain Energy Management System is greater than 1 year at \$80,000/year. The time spent preparing for an audit is one half year to one year or \$40,000-80,000. The cost of monitoring and measuring equipment installed to meet EnMS requirements is \$200,000. The cost of the third-party audits is >\$100,000. The EnMS total cost overall is >\$460,000 since its inception. The overall energy cost savings equate to between 25%-50% due to operational savings from energy management and investment in capital projects identified through energy audits.

“By prioritizing the ISO 50001 Energy Management System in every-day decisions, AstraZeneca’s Gaithersburg Campus has improved energy savings, reduced costs, implemented site-wide environmental sustainability programs, and earned the site a Green Lab certification.”

—Joe Ernstberger, Executive Director, Site Operations

Plan

Commitment from leadership:

Sustainability is embedded in operations at the Gaithersburg campus. Governed by senior management and implemented by cross-functional teams, a dedicated Sustainability Group and active employee Green Team, we set and track progress against annual targets which support AstraZeneca’s global ten-year commitments. The leadership team made the commitment to the energy policy, continual improvement and set up the program to communicate with the sustainability team quarterly on objective and targets. Finally, there is an AZ global natural resource reduction fund allocated to projects for energy, water,

and waste improvement from which our site has benefited since 2015.

Data:

Energy types used at the facility are identified and documented in the Energy Monitoring and Measurement Plan. The energy types are updated whenever a new type is introduced. Energy consumption is measured for each energy type using utility bills (Electric and Natural Gas), meters, and/or engineering calculation (Photovoltaics, diesel) and is recorded using an excel spreadsheet (Energy and Water Master Consumption Spreadsheet).

Estimates of consumption by energy use are based on available monitoring data (e.g. Building Management System, Facilities Intelligence Dashboard, Submeter data), facility and equipment knowledge, and outside technical support from consultants/vendors as needed. Additionally, energy uses are identified and quantified by performing an energy evaluation (e.g. ASHRAE Level II audit) to create an energy profile at least once every three years unless there are major changes to energy-using processes at the facility. Records of such evaluations are maintained.

Based on these evaluations, the Sustainability team creates a Sankey diagram as a tool to identify opportunities and choose the Significant Energy Users (SEUs). The projects are chosen based on a prioritization method which incorporates cost, payback, and impact on environment, SEU, and maintenance. The best projects are proposed to an internal fund for energy, waste, and water projects. When funded, the projects are tracked to compare actual to estimated saving.

Targets:

Objectives and energy targets aligned with corporate policies, legal and other requirements, and the energy policy are defined and documented in the Energy Plan. Objectives and energy targets will 1) be measurable if practical, 2) consider SEUs, and 3) take into account opportunities to improve energy performance and the

EnMS. They will be monitored (at least quarterly), communicated, and updated as appropriate.

Do, Check, Act

Implementation:

Planned changes will be evaluated and implemented in a manner that will preserve the control of these operations, including, for example, updating training, procurement, and written information. The consequence of any unintended changes will be reviewed by the Energy, Carbon, Water (ECW) team to evaluate any adverse effect on performance, as necessary. As applicable, AstraZeneca ensures that outsourced SEUs or processes related to its SEUs are controlled. This may include providing specifications to, and communications with, contractors or suppliers.

Top management support:

During the course of a year, outputs from the management review meeting(s) will include any decisions related to improvement opportunities and the need for any changes to the EnMS including:

- opportunities to improve energy performance
- the Energy Management System Policy;
- the Energy Performance Indicators (EnPIs or Baselines (EnBs));
- any changes to the Superior Energy Performance ISO 50001(SEP) performance level (if applicable)
- any changes to objectives, targets, action plans, and/or other elements of the EnMS; and actions to be taken if they are not achieved,
- opportunities to improve and integration with business processes,
- the allocation of capital and/or resources.
- improvement of competence, awareness and communication, and
- changes related to the SEP Scorecard credits being claimed, as applicable

Energy Performance:

The *Energy Monitoring and Measurement Plan* identifies data collected and methods for analysis. Data includes:

- Facility energy consumption.
- Energy consumption related to the SEUs.
- Relevant variables for facility and SEUs.
- ENPIs.
- Operation of SEUs.
- Static Factors as applicable (e.g. Square footage).
- Data needed for Action Plans as needed.

Improvement in energy performance will be evaluated by:

- Comparing the EnPI values against corresponding baselines.
- Reviewing actual versus expected energy consumption.
- Evaluating the effectiveness of action plans in meeting objectives and energy targets.

Records of monitoring and measurement results will be maintained. AstraZeneca will investigate and respond to significant deviations in energy performance and document the results.

The tools used for data collection and storage include Siemens Navigator and a in-house platform known as the Facilities Dashboard. Both retrieve information from the Building Management System (BMS).

Improvement:

To determine energy performance improvement we use a regression model developed by DOE where the most recent 12 month period is compared to the baseline year. The variables are weather (heating and cooling degree days), water (production metric), and CHP run hours. Electricity and natural gas are individually compared to the variables which offer the best statistical relationship. In 2010, we pledged to reduce our energy intensity by 25% by 2020 through the US Department of Energy's (DOE) Better Plants® program and reduced 27.5% over 10 years exceeding our goal by the end of 2020. Currently, our baseline is 2019 for ISO 50001 and SEP.

Operational control:

AstraZeneca establishes and maintains a plan for operations and maintenance activities related to its significant energy uses as well as a plan for effectively

managing changes including those resulting from the implementation of Action Plans, Energy Conservation Measures (ECMs) and plans to address any risks and opportunities.

We consider energy performance improvement opportunities and operational controls in the design and/or purchase of new, modified and renovated facilities, equipment, systems and/or processes that will have a significant impact on the facility energy performance over the planned or expected operating lifetime.

There is a mandatory training on the EnMS for all employees, a sustainability wall describing the achievement of the EnMS (photo 3), an active green team from many disciplines, green labs team, and site signage about the EnMS.



Photo 3: site signage about energy conservation posted on the sustainability wall

To prepare for an audit, we do an extensive review of EnMS documents, reread the standard, and do a self-audit amongst the sustainability team members.

Transparency

AstraZeneca reports our sustainability initiatives including ISO 50001 externally and internally:

- Our Gaithersburg campus recently achieved Gold status under AstraZeneca’s Green Labs program, demonstrating progress in reducing energy and waste, and alignment with

AstraZeneca’s sustainability vision. We completed a benchmark survey in 2019, which provided direction for increasing sustainability across many measures, including resource efficiency and waste management.

- Maryland Green Registry “promotes and recognizes sustainable practices at organizations of all types and sizes. Member agree to share at least five environmental practices and one measurable result while striving to continually improve their environmental performance” and AZ has been a member since 2013
- [Sustainability report 2021, AZ – company website](#).
- On site, we have an awards wall where the energy policy is visible
- Pamphlets about the EnMS are given to visitors

“We take pride in our mission to produce innovative, life-saving medications and our commitment to pursue this mission in a sustainable manner. Our Gaithersburg Campus is committed to our Ambition Zero Carbon initiative, integrating energy improvement strategies into our facilities, operations, design, and procurement practices through the ISO 50001 Energy Management System”

—Joe Ernstberger, Executive Director, Site Operations

What We Would Have Done Differently

We installed two CHP units for energy resilience and to decrease source electricity consumption. In hindsight, the money invested into the second unit, if allocated into ECMs, could have reduced the site energy now covered by the CHP.

Now we prioritize projects for energy reduction. Between investing in PV and ECMs, we are choosing to fund ECMs instead of offsetting with renewable energy onsite. Based on the lesson from a second CHP install,

we know to invest in Energy Conservation Measures before energy generation.

The Energy Management Leadership Awards is an international competition that recognizes leading organizations for sharing high-quality, replicable descriptions of their ISO 50001 implementation and certification experiences. The Clean Energy Ministerial (CEM) began offering these Awards in 2016. For more information, please visit www.cleanenergyministerial.org/EMAwards.

