

Energy Savings Plan



Core Laboratories

Energy – Sustainability
Management System

Energy Savings Plan

*Energy Savings Plan for Advanced Technology Centers (ATC's),
Godley Manufacturing and Completions Diagnostics Lab*

Introduction

Core Laboratories sustainability management system focuses the Company's efforts to reduce our environmental footprint, increase performance and improve the sustainability of our Company. It is a conviction that these principles drive Company success by reducing waste, consumption of non-renewable resources, and even the cost of operations. These principles make our Company stronger, socially responsible, efficient and profitable well into the future.

Scope

To reduce energy consumption by 7.5% over 5 years while creating operational excellence through the management of buildings, electronic equipment, Energy usage, and operational processes utilizing sustainable resources. This plan is developed for our six ATC's, Godley Manufacturing and our Completions Diagnostics Lab but should be a goal for other locations as well.

Five Year Targets

From 2015 to 2020 Core Laboratories will put in place measures to reduce electricity consumption by 7.5% from the current usage rates in MWh.

Electricity Consumption History for Base and Target Year Determination

| Advanced Technical Center | 2013 Units Consumed (MWh) | 2014 Units Consumed (MWh) | 2020 Units Consumed Target (MWh) |
|---|----------------------------------|----------------------------------|---|
| Houston, USA | 9,212 | 8,936 | 8,266 |
| Aberdeen, UK | 891 | 805 | 745 |
| Netherlands | 745 | 713 | 660 |
| Malaysia | 1,113 | 946 | 875 |
| UAE | 993 | 424 | 392 |
| Canada | 2,848 | 2,797 | 2,587 |
| Godley Manufacturing, USA | 6,468 | 7,087 | 6,555 |
| Completions Diagnostics Lab, Houston, USA | 673 | 665 | 615 |

Grandfathered Clause Provision

Equipment, buildings, services and other energy consuming devices are grandfathered in their current state for the length of this plan with the following exceptions:

1. When equipment is replaced the plan will apply to new purchases.
2. New construction or remodeling of existing space will comply with plan.
3. When savings from replacement outweighs cost of keeping less efficient equipment or systems in place.
4. When cost of energy efficient replacement outweighs the savings approval to deviate from plan must be approved by Chief Operating Officer (COO).

Electricity from Renewable Sources

Where available from electricity provider seek to source our electricity from renewable sources or low-carbon emitting natural gas sources. Where the cost of these electricity sources is cost prohibitive deviation from the plan must be approved by the COO.

Energy Saving Opportunities

Lighting

1. Safety - Lighting in all work areas will be sufficiently bright, and within local regulatory code, to not pose a safety risk to employees.
2. Employee involvement – Large savings can be obtained from simply turning on and off lights. Management will have a program in place to educate employees on smart energy usage.
3. Replacement of light fixtures, bulbs and switches can lead to energy consumption savings – Replace with Energy Star or similar rated equipment. Good choices for bulbs include halogen incandescent, compact fluorescent lamps (CFLs) or LEDs. These bulbs meet minimum energy efficiency standards and have a longer life. Switches should be replaced with motion sensor light switches for any new construction, remodeling or electrical updates.
4. Determine the minimum light level to maintain security when the operation is not operating.

Appliances and Electronics

1. Appliances used in common areas – Should be Energy Star or similar rated. When replacing appliances make energy savings a priority of the purchase.
2. Energy efficient computer use – Replace equipment, especially monitors, with Energy Star qualified monitors.
 - Use sleep mode and power management features.

- Turn off the monitor if you aren't going to use your PC for more than 20 minutes.
- Turn off both the CPU and monitor if you're not going to use your PC for more than 2 hours.
- It is a common misperception that screen savers reduce a monitor's energy use. Use automatic switching to sleep mode or simply turn it off.
- Another misperception, carried over from the days of older mainframe computers, is that equipment lasts longer if it is never turned off.
- Consider placing monitors, printers, and other accessories on power strips/surge protectors. When this equipment is not in use for extended periods, turn off the switch to prevent them from drawing power even when shut off.
- Use rechargeable batteries for products like cordless phones, digital cameras and wireless keyboard and mouse.

Facility Heating & Cooling

1. Temperature Control – A variety of technologies are available for heating and cooling. These systems and supporting equipment such as thermostats and ducts provide opportunities for saving energy and money.
 - a. In winter set the thermostat to 68°F during work hours and lower during operations closures – as savings of 1% for each degree if the setback period is eight hours.
 - b. In summer set the thermostat to 78°F (26°C) during work hours only when employees are present and need cooling.
 - c. A common misconception associated with thermostats is that a furnace works harder than normal to warm the space back to a comfortable temperature after the thermostat has been set back, resulting in little or no savings. In fact, as soon as your building drops below its normal temperature, it will lose energy to the surrounding environment more slowly. The lower the interior temperature, the slower the heat loss. So the longer the building remains at the lower temperature, the more energy you save, because your building has lost less energy than it would have at the higher temperature. The same concept applies to raising your thermostat setting in the summer.
 - d. Offices using heat pumps, electric resistance heating, steam heat, and radiant floor heating will have limitations for thermometer control.
 - e. Management of the heating and cooling should be maintained by a person of authority not individual employees.
 - f. In areas where laboratory or other equipment requires a constant temperature that temperature must be maintained.

2. Heating and cooling systems – There are numerous options for heating and cooling equipment. In new construction, or when replacing older units, explore your options with suppliers with energy savings in mind. Heating and cooling systems are long term investments so take the time to do the research and choose the best option.
3. Weatherize – Weatherizing helps save energy, and it can also improve comfort. Conduct energy audits to build your strategy for weatherizing, and learn about air sealing, insulation, moisture control and ventilation.
 - a. Energy audits- Professional energy audits provide a thorough assessment of energy use. However, locations wishing to perform a do-it-yourself for smaller location contact Corporate Safety Director for instructions.
 - b. Air Sealing – Reducing the amount of air that leaks in and out is a cost-effective way to cut heating and cooling costs, improve durability, increase comfort, and create a healthier indoor environment. When air leakage is detected by an audit or inspection steps should be taken to reduce or eliminate the leakage. Solutions can range from caulking to weather-stripping to replacement of structures like doors or windows.
 - c. Insulation – Be aware of insulation and when the opportunity arises during construction or remodeling take measures to insure sufficient insulation values.
 - d. Moisture Control – Properly controlling moisture will improve the effectiveness of air sealing and insulation efforts, and these efforts in turn will help control moisture. Moisture or water vapor moves in and out of a building in three ways; with wind current, by diffusion through materials, and by heat transfer. More than 98% of all water vapor movement in building cavities is from air movement making air sealing critical.
 - e. Ventilation – There are three basic ventilation strategies; natural ventilation, spot ventilation and whole building ventilation. These methods should be considered in very mild environments and storage or warehouses without HVAC heating or cooling.
 - i. Natural ventilation – Natural movement of air through windows and doors. Natural ventilation is unpredictable and uncontrollable – you can't rely on it to ventilate uniformly
 - ii. Spot ventilation – Spot ventilation can improve the effectiveness of natural ventilation by removing indoor air pollution and/or moisture at its source. Spot ventilation includes the use of localized exhaust fans to move air, an option that may save energy in areas forced air systems are inadequate.
 - iii. Whole-building ventilation – The decision to use whole-building ventilation is typically motivated by concerns that natural ventilation won't provide adequate air quality, even with source control by spot ventilation. Whole-building ventilation systems provide controlled, uniform ventilation throughout the building. These systems use one or more fans and duct systems to exhaust stale air and/or supply fresh air to the building.

4. Water heating – Heating water is a major source of energy usage in both large and small operations. Reducing hot water use, employing energy-saving strategies and choosing an energy efficient water heater can result in high energy savings.
 - a. Selecting new or replacement water heaters – Consider the wide variety of energy saving types now available, and the right size for building water usage. Also, consider tankless or demand-type water heaters. These have the advantage of providing constant hot water in high demand applications, and not constantly heating water in low demand applications. Tankless water heaters are also available in electric or natural gas.
 - b. Selecting new or replacement industrial water heaters – For larger applications the same rule applies as for heating and cooling equipment. These systems are seldom replaced and a large investment so take the time to do the research and choose the best option.
5. Energy audits – For older buildings consider professional building energy audits to identify energy savings. The older the building the less likely materials meeting energy efficient building codes were used. There may be savings available at comparatively low cost.

New Construction, Remodeling, and Updating

1. Contractor selection – Selection of contractors or architects is important to any new construction or remodel. Suppliers should be capable and knowledgeable of “green building” certification programs, and application of EPA’s Energy Star or other comparable program.
2. Design for efficiency – Before designing a new structure or remodel an existing one, consider investing in energy efficiency. The planning process is also a good time to look into a renewable energy system that can provide electricity, water heating, or space heating and cooling. Consider if windows, doors or skylights are energy efficient.
3. Landscaping – When landscaping is controlled and cost paid by the location consider energy conserving landscape strategies for the climate. Appropriate landscape correctly placed can save water, provide shade, and block or deflect winds.
4. Location selection for new construction or lease.
 - a. Available resources – Consider electric, natural gas and water providers and options for renewable resources sources with low environmental impact opportunities.
 - b. Impact on environment – When considering land options biodiversity should be a major concern. Core Laboratory seeks to limit, where ever possible, impact to the variety of life in a particular habitat or ecosystem. Care should also be exercised that our daily activities do not disrupt the social and cultural fabric of the community.

- c. Proximity to work – Locating facilities close to our suppliers and clients location reduces energy consumption, time and cost for travel and expenses.

Operational Controls

1. Quality control – Substantial energy savings can be obtained from dedicated quality management throughout operations. Rework of products or laboratory analysis is almost a 100% loss of energy. Equipment or laboratory apparatus usage with high electricity requirements is wasted on unbillable products, only to be repeated again.
2. Work flow – Optimizing work flow to take advantage of peak energy usage, making it possible to reduce heating or cooling for longer periods. Schedule work to complete during daylight, or when ambient temperatures are optimal and comfortable for employees without additional heating or cooling.
3. Workforce management – When employees are in the facility they use energy resources. When work is not completed during the normal work schedule working overtime hours increases facility usage and energy cost. Managing workforce to optimize productivity during the scheduled work time will improve the probability of putting energy efficient strategies in place that will be effective.

Data Collection

Participants in the Energy Savings Plan will complete Appendix I Data Collection by January 15th for the preceding year, and submit to the Corporate Safety Director. Monthly tracking will also take place at the local level to track progress during the year. If at the six month period trending of energy usage is flat or raising the Corporate Safety Director will be consulted to determine causes. Typical causes for increases are: increased productivity, expansion of building space, addition of operational capabilities, increased staffing, etc. In these instance efforts will be made to normalize data or reset reasonable reduction goals.

APPENDIX I –Data Collection

Electricity consumption MWh/Month

Location Name: _____

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------|------|------|------|------|------|------|
| Jan | | | | | | |
| Feb | | | | | | |
| March | | | | | | |
| April | | | | | | |
| May | | | | | | |
| Jun | | | | | | |
| Jul | | | | | | |
| Aug | | | | | | |
| Sep | | | | | | |
| Oct | | | | | | |
| Nov | | | | | | |
| Dec | | | | | | |
| Annual Total | | | | | | |