Sustainability Report 2014

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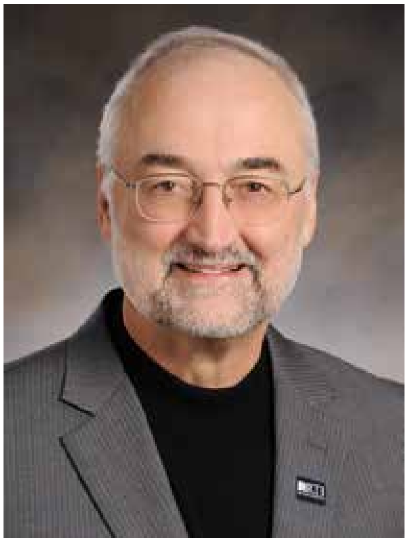
President's Message



RTI's mission of improving the human condition drives every aspect of our work and extends to the way in which we operate our facilities. As a leader in environmental research, we are committed to using our scientific knowledge and technical expertise to develop and implement sustainable practices to ensure environmental responsibility across our operations. At the organizational and individual level, we recognize the importance of protecting the environment and using resources responsibly. We work to foster a culture of environmental sustainability at RTI.

Since launching our corporate Sustainability Initiative in 2008, we have demonstrated our commitment through several projects at RTI's North Carolina headquarters. We have upgraded our infrastructure by expanding the Central Utility Plant for our laboratories, building two LEED Gold-certified office buildings, and retro-commissioning several of our existing buildings to enhance their efficiency. In our operations, we have established a composting program, retired inefficient equipment, recycled materials where possible, and carefully monitored the performance of our facilities. Through these measures, we have reduced the amount of energy we use on campus, become more effective in conserving water, and reduced waste while continuing to address the pollution causing climate change.

By these means and other efforts outlined in our 2014 Sustainability Report, we have reduced the environmental impact of our operations and promoted sustainability in the workplace.

I invite you to learn more about our program, accomplishments, and future goals by visiting www.rti.org/sustainability.

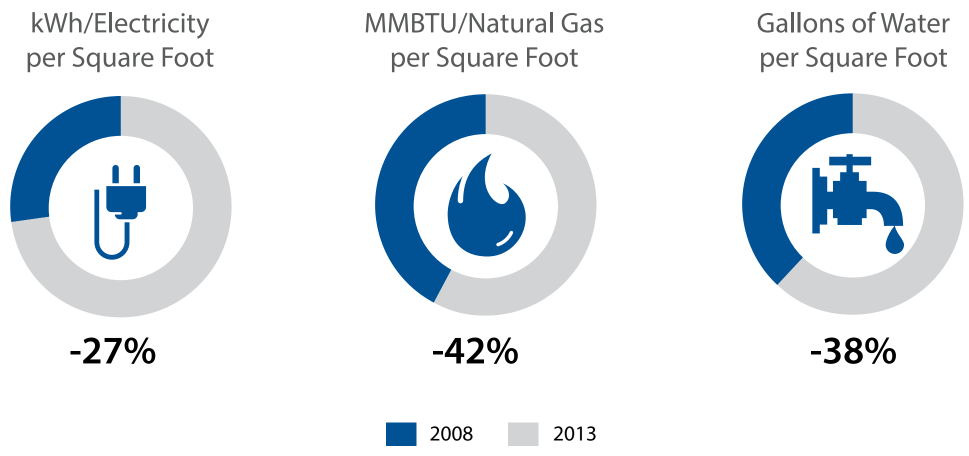
E. Wayne Holden
President and Chief Executive Officer

The Sustainability Initiative's Progress: 2014

RTI International's mission is to improve the human condition by turning knowledge into practice. As an independent, nonprofit research institute, we provide more than just research, development, and technical services to our global clients in industry, commerce, and government; we also act as a role model for other organizations. To that end, we incorporate sustainable best practices into our daily operations. This biennial report is part of our broader Sustainability Initiative and outlines what RTI has done to reduce its negative effects on the environment.

Overall, RTI has exceeded the goals we set for 2013 as part of our Sustainability Initiative. When normalized for weather variation, our use of electricity and natural gas has decreased (see Figure 1). To achieve this decrease, we have consolidated laboratory climate control around our Central Utility Plant (CUP) and up-fitted or demolished older inefficient buildings on our campus. Renovations and new construction at RTI's headquarters incorporate the latest in energy-efficient designs and building systems.

Figure 1. RTI's Main Campus weather normalized reductions from 2008 to 2013



The amount of water required to operate our facilities has also decreased markedly, when normalized for weather. With consolidation of chilled water service to laboratories and the use of condensation in our cooling towers, we have significantly reduced the use of water from municipal sources. Low flow fixtures and improved lab equipment have also reduced our water consumption.

We invite you to read the rest of our 2014 Sustainability Report to learn more about what RTI has done to put its knowledge of sustainability into daily practices.

RTI's Johnson Building

Our Sustainability Commitment

Since our founding in 1958, RTI International has been involved in environmental research by providing technical expertise to government environmental agencies, both domestic and foreign, and industrial clients. As a leader in science and technology, RTI is committed to implementing environmentally sustainable best practices through the application of scientific knowledge, technical expertise, and business acumen. As an advisor and role model for clients and affiliated organizations, RTI strives to ensure responsible stewardship of natural resources. To fulfill our commitment, we are leveraging our unique skills to conserve resources and protect our environment.

RTI launched its Sustainability Initiative in 2008. We continuously examine our operations to evaluate the efficacy of projects addressing environmental concerns. A key to our success has been the investment made in infrastructure to accurately measure and identify opportunities to reduce negative environmental impacts. Each year, we learn more and build upon our knowledge to the betterment of our organization and the planet. RTI's Sustainability Initiative promotes sustainable practices throughout our organization—from energy consumption to material procurement. Furthermore, we train and inform our staff to promote sustainability in the workplace, at home, and in our communities.

The founding meeting for Research Triangle Institute

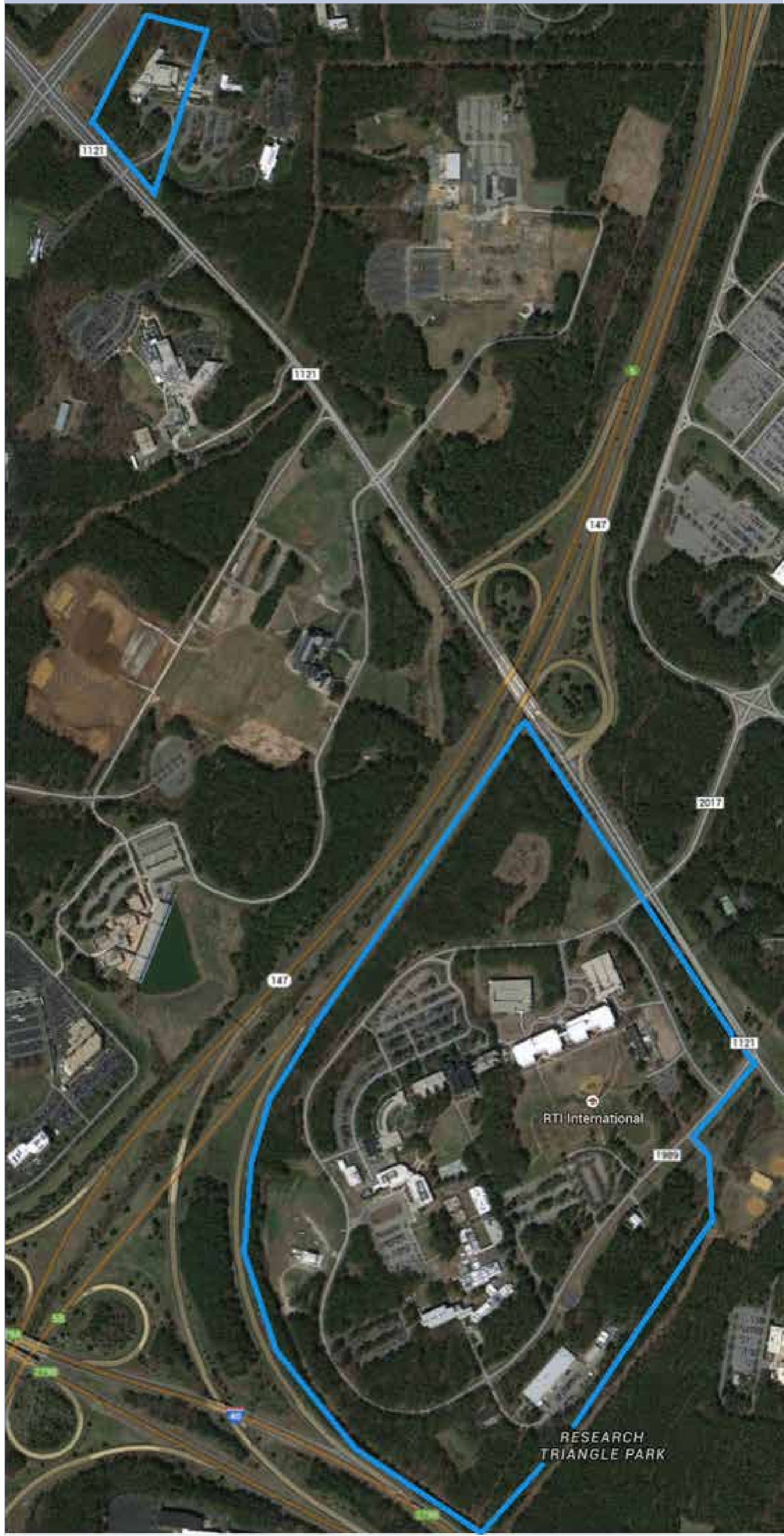
Employee and Community Outreach

RTI employees demonstrate a strong interest and individual commitment to sustainability at work and in their personal lives. RTI's Sustainability Initiative supports their efforts by increasing awareness, understanding, and adoption of sustainable practices across the work-life spectrum. We host staff events focusing on relevant topics, such as electric vehicles, composting, and electric use intensity. We donate materials that still have useful life to local schools and charities rather than sending them to landfills. RTI staff conduct presentations at universities, professional societies, and local council meetings to discuss and demonstrate RTI's activities related to the environment.

RTI has partnered with NC Green Power to add renewable energy generation to the grid in North Carolina. RTI and other member organizations contributed to the installation and maintenance of renewable energy infrastructure that generated 6.3 gigawatt hours in 2013. To encourage employees to use public transit or a bicycle to commute, RTI provides both financial incentives and amenities like showers and bike racks. RTI has helped support regional agriculture by hosting Research Triangle Park's local farmers' market.

The RTP farmers' market is held from spring to fall

RTI headquarters (approximate borders encircled in blue) in Research Triangle Park, NC [Courtesy Google Maps]



Our Sustainability Commitment

RTI's Sustainability Initiative focuses primarily on facilities that are wholly owned and operated by RTI at our headquarters[1] in North Carolina. This report addresses activities related to business activities in which RTI has control. This includes business-related travel, waste disposal, recycling, composting, procurement, and operations. RTI's Main Campus comprises 839,000 square feet, consisting of nine office buildings, eight laboratories, and utility, dining, and maintenance buildings.

Additionally, RTI acquired the Advanced Technology Building's laboratories and offices in 2009. Because this 95,000-square-foot facility was not owned by RTI when we established our baseline for sustainability metrics, it is treated as a separate entity in this report.

Regional offices are not owned by RTI, which limits our ability to make sustainability-focused alterations. Still, RTI's regional office employees make efforts to reduce their environmental impact through many of the same best practices employed at our headquarters.

[1] We define our headquarters as both our Main Campus at 3040 East Cornwallis Road and the Advanced Technology Building.

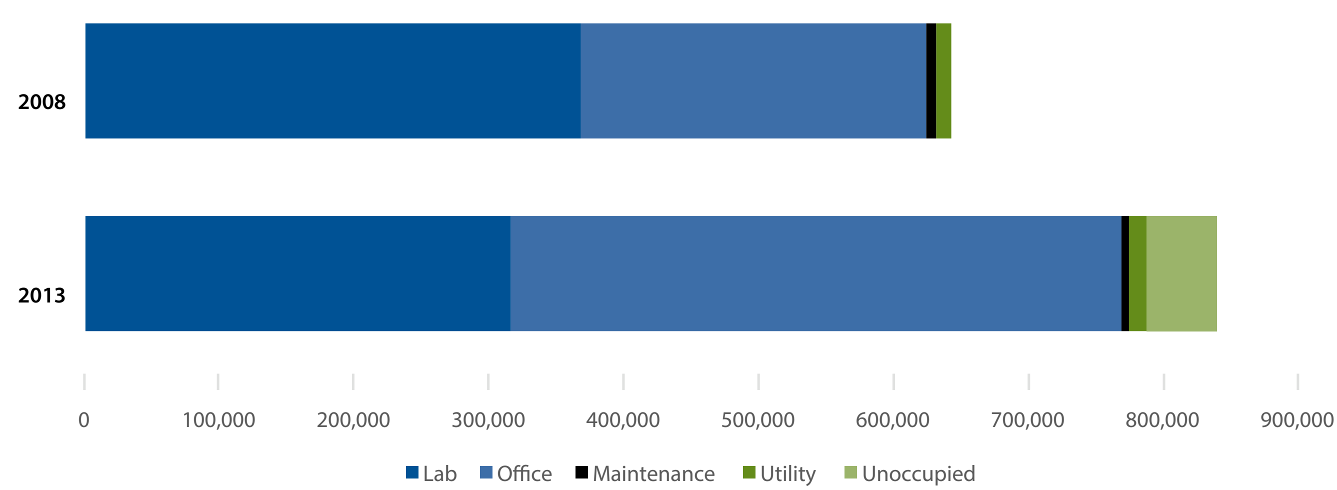
Our analysis demonstrated that our energy and water use were sensitive to weather.

In This Report

For this report, we updated our methodologies for reporting our sustainability metrics to better reflect advances in our monitoring capabilities. We cite the most current national, regional, and state statistics. In light of these changes, the results of this report will not be directly comparable to those of previous reports. Our analysis demonstrated that our energy and water use were sensitive to weather. Therefore, we weather-normalized energy and water data for an accurate comparison of performance versus our 2008 baseline.[2]

Based on revised data using the new methodology, we reviewed our progress in meeting goals established in 2012 related to energy consumption, water consumption, greenhouse gas emissions, and waste management. As shown in Figure 2, from 2008 to 2013, the amount and types of spaces on Main Campus changed with the demolition of older buildings and the construction of new ones. The changes affected our energy-intensity per square foot and we note this in the results. We also present our goals and plans for 2016 and outline activities that supported sustainable practices across our operations.

Figure 2. Square feet of space by building type on RTI's Main Campus



[2] Unoccupied space is minimally conditioned because it is not used for staff or operations.

Energy

Seasonal weather variation plays the major role in the energy performance of RTI's infrastructure as building heating and air conditioning demand represent most of our load. The primary energy sources on RTI's Main Campus include electricity, natural gas, and diesel. Cooling and air handling are primary drivers of our electrical load, with lighting and equipment representing the remaining balance. We use natural gas to heat air and water, and diesel fuel is used for backup power and testing generators.

One of the challenges RTI faces in managing its energy consumption is the energy consumption of laboratory buildings, which is about four to five times the needs of an equally sized office building. Fume hoods used for laboratory work exhaust large volumes of air, which requires conditioning of the laboratory's internal volume many times over every day. Laboratories represent more than 40% of space on Main Campus but consume 70% of the electricity and natural gas used on Main Campus.[3]

Energy Management

RTI installed an electrical submetering system that provides real-time data on electricity use in all laboratory and office buildings. Natural gas is metered at the public utility interconnects. Real-time data are fed into a utility management system that enables our facilities managers to monitor and optimize energy use for all buildings.

RTI implemented several initiatives to improve energy efficiency:

- Retro-commissioned buildings' HVAC systems on campus
- Expanded the period in which buildings are "set back" for HVAC and lighting needs during non-work hours
- Launched a "Shut the Sash" campaign to encourage laboratory staff to close sashes and place fume hoods in standby when not in use

[3] Laboratory buildings do house other types of space (e.g., researchers' offices) that change the overall air handling requirements. If a majority of a building's purpose is dedicated to laboratories, we have counted it as a laboratory.

Our goal is to act strategically when making decisions regarding where and how to improve efficiency.

Projects Implemented

The energy audits RTI completed from 2012 to 2013 have enabled prioritization and effective implementation of energy-saving strategies. We have expanded the number of buildings served by our CUP, which provides steam heat and chilled water-cooling to laboratories on Main Campus. Since laboratories are our most energy-intensive buildings, the scale of economy provided by the CUP reduces our total campus demands for electricity and natural gas. In conjunction with large capital projects such as the CUP expansion, RTI has also undertaken a number of smaller projects to improve the efficiency of our existing building systems, including replacing aged equipment and reducing services to offline buildings. Table 1 shows a summary of energy efficiency projects completed from 2012 to 2014.

Table 1. Energy efficiency projects implemented from 2012 through 2014

Project	Objective	Date Completed
Central Utility Plant expansion	Replace old, inefficient HVAC with a central high-efficiency system	Winter 2012
Laboratory closing	Reduce HVAC and electrical, service to the building	April–May 2014
Laboratory and office building retro-commissioning	Alter HVAC set points and system control logic. Received an Energy Star rating for the building.	Spring 2012
Laboratory fume hood reprograming	Reduce air changes and energy used in labs during off hours	February–March 2014

Goals Achieved

In our 2012 report, we set out to reduce our electricity use by 15% per square foot and achieve a 25% reduction in natural gas use per square foot (using 2008 as a baseline) by 2013.[4] RTI has met the goal of reducing overall consumption through careful planning and operational fine-tuning.[5]

[4] Comparison to the goal used a recalculated 2008 baseline based on our new methodology. Because diesel is used only for emergency power, no specific reduction targets were set for this fuel.

[5] A direct comparison absent weather normalization is provided for context relative to the methodology under which the goals were set for reducing energy consumption.

Table 2. Absolute change in energy intensity for Main Campus

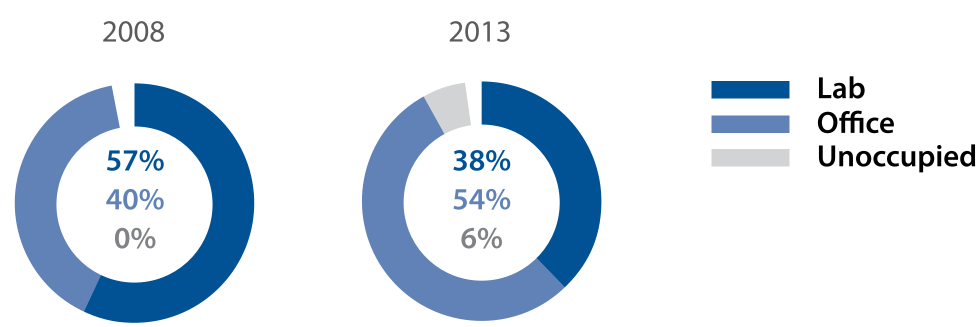
RTI's Headquarters	MMBTU/Electricity per Square Foot	MMBTU/Natural Gas per Square Foot
Percent Changed 2008–2013	−28%	−26%
2013 Goal	−15%	−25%

On the Main Campus, electricity use per square foot decreased by 28% and natural gas decreased 26% per square foot from 2008 to 2013 (see Table 2). The reduction is due in part to reduced demand from our laboratories through the use of the CUP, the overall reduction in laboratory spaces, the addition of newer energy-efficient office spaces, and the changes made to the operation of laboratories.

Buildings' Effect on Energy Intensity

To provide further context for the extent of our energy savings in 2013 compared to 2008, RTI's total square footage on Main Campus expanded from 643,000 to 839,000 square feet. Most importantly, square footage changed with respect to the relative proportion of office space to laboratory space (see Figure 3). The increase in offices meant a decrease in the average energy intensity per square foot on Main Campus; the retirement of buildings from service also reduced energy loads.[6]

Figure 3. Relative percentages of types of buildings on Main Campus[7]



[6] The relative size of the buildings (6% of space in our headquarters) creates a down-weighting factor on the overall campus energy intensity. However, excluding the buildings presented its own challenges due to an inability to clearly disaggregate some utility services from the broader campus. In light of this, they were left in the calculation because they are still using energy.

[7] Maintenance and utility space did not change with respect to physical footprint and was omitted from the table.

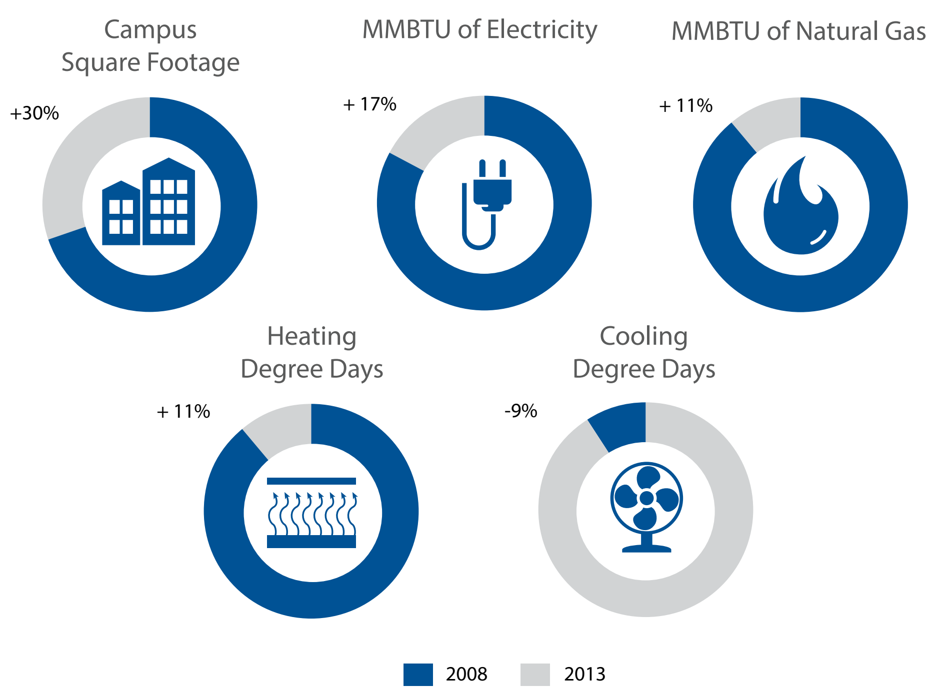
Weather Normalization

With respect to day-to-day energy use intensity, weather is a large driver of our demand for energy. Because weather has such a strong influence on our energy use, we quantified the relationship between the two.

Since 2008, there have been relatively cool summers but also some colder-than-average winters. This lowered the demand for electricity in the summer and increased demand for natural gas in the winter. Comparing our hourly interval data for electricity to hourly weather data from the Raleigh-Durham International Airport's National Oceanic and Atmospheric Administration weather station, we ran a regression analysis on the years 2008 and 2013 to remove the weather-influenced difference between our baseline year and the year to which our goals were set.

Figure 4 shows 2008 and 2013 comparisons for electricity use, gas use, cooling degree days, heating degree days, and square footage for RTI's Main Campus. Heating and cooling degree days are weather normalization factors that demonstrate how much warmer or cooler a day is than the optimal temperature for comfort.

Figure 4. Energy consumption, heating and cooling degree days, and square footage for RTI's Main Campus [8]



[8] Weather data computed from WeatherUnderground's average daily temperatures.

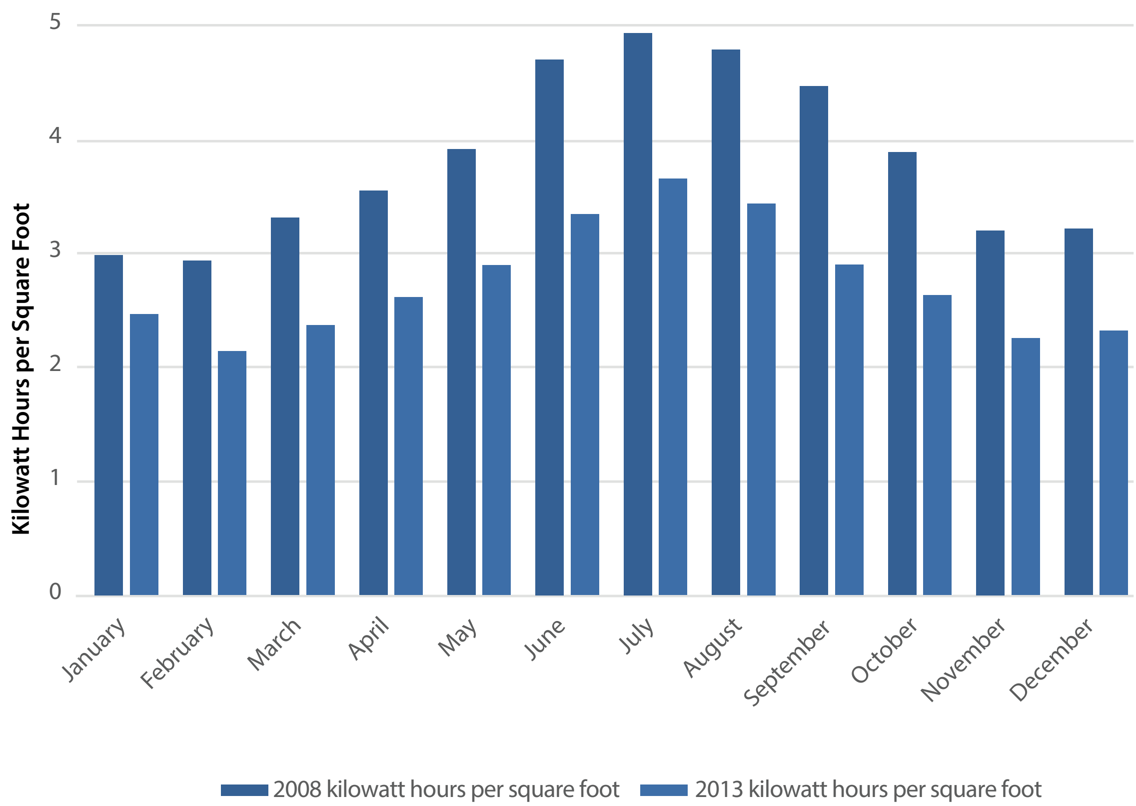
Electricity

Since most of our electricity use is for cooling, the electricity data were regressed against cooling degree hours. Negative values were retained to maintain a complete functional relationship between the variables since some cooling loads still exist in winter. Each function was then compared to an expected monthly average cooling degree hour, which gave an expected value for each function.

Comparing 2008 to 2013, the analysis indicates there was an average 27% decrease in electricity used per square foot (see Figure 5). This attributed to the reduced demand for electricity needed to cool individual buildings through the completion of the CUP and the system modifications and improvements made throughout Main Campus.

From 2008 to 2013, we were able to reduce electricity use intensity by 27% and natural gas use by 42%.

Figure 5. Comparison of 2008 and 2013 electricity use shown as kilowatt hours per square foot

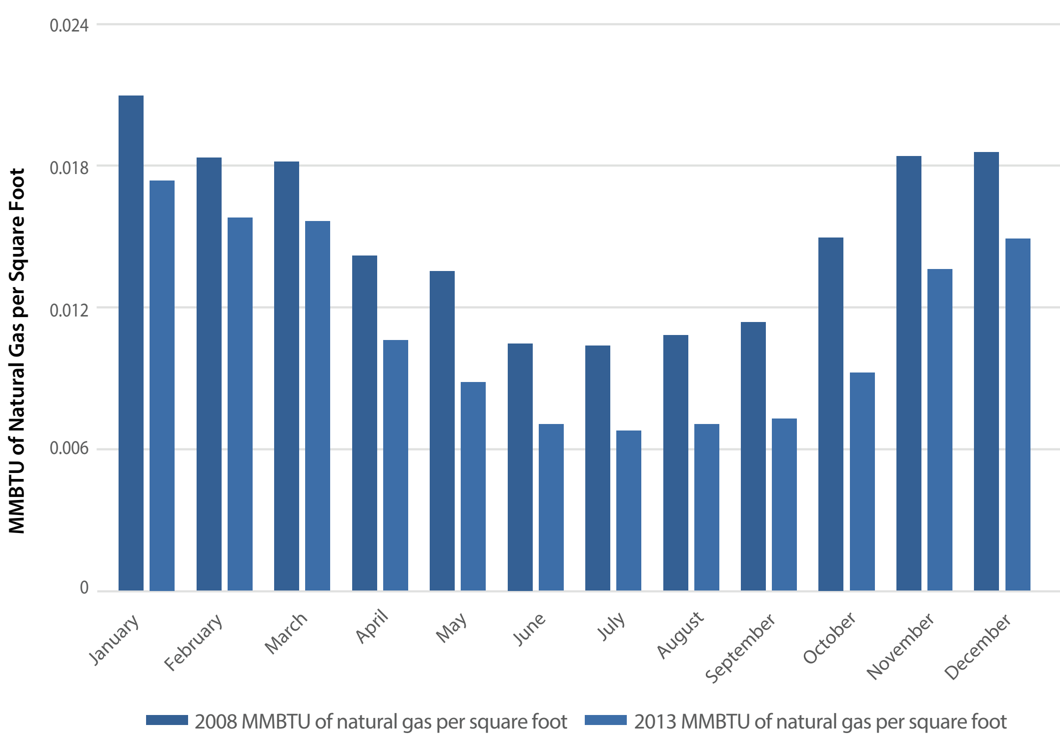


Natural Gas

The same drivers of the changes in electricity demand are also seen in natural gas use for heating. RTI's natural gas use is correlated more strongly to the weather than our electricity use because natural gas is used primarily for heating buildings. Again, given the increase in the relative percentage of office space to laboratory space, some of the dilution in energy used per square foot results from the addition of office space. As demonstrated in Figure 6, which is normalized for weather, RTI's Main Campus used 42% less natural gas per square foot in 2013 than in 2008.

The difference observed in 2008 compared to 2013 for natural gas use is similar to what was found with electricity. When natural gas use is plotted against heating degree hours, a demonstrable decrease in the amount of natural gas used per square foot is evident. By using a centralized steam system for heat, decreasing the number of air changes in laboratory spaces while still maintaining safe operating conditions, and building more efficient office buildings, we significantly reduced the amount of natural gas used by our facilities.

Figure 6. Comparison of 2008 and 2013 natural gas use shown as MMBTU of natural gas per square foot



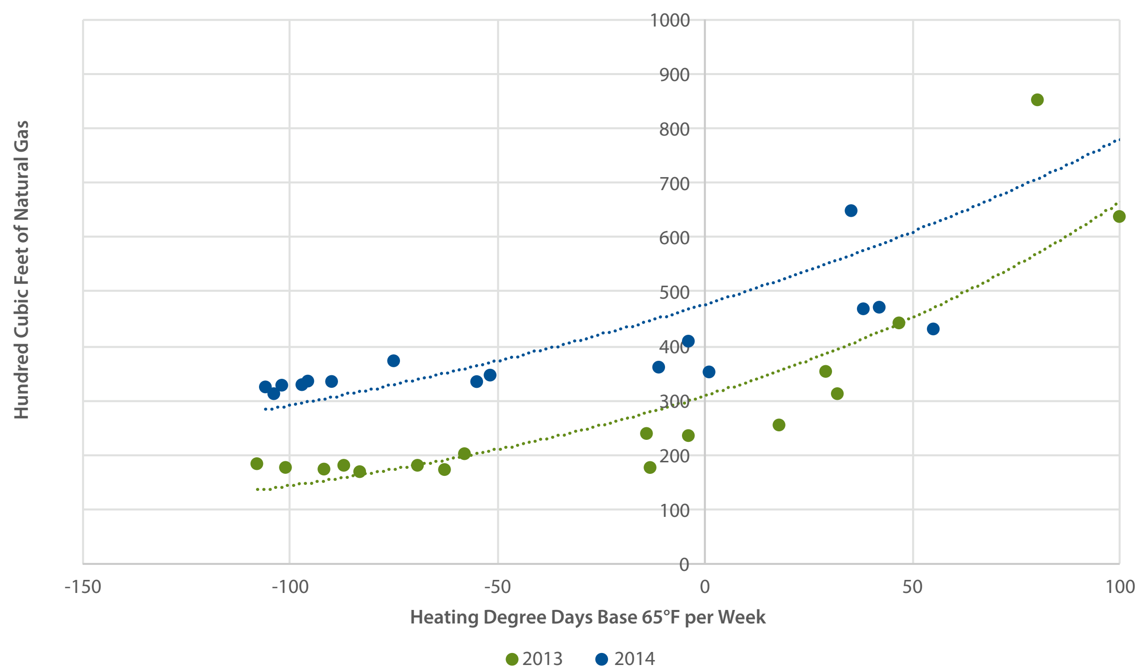
Maintaining Performance

RTI has become well attuned to detecting and understanding "upset conditions" in our infrastructure and building management systems. Upset conditions can arise for a variety of reasons, from something as mundane as component failure, to more complex systemic issues. While the individual breakdowns resulting from such conditions may be individually small, in aggregate, they represent a potentially large increase in energy use absent such faults in the system. As a result, RTI's facilities managers have focused on quickly identifying and correcting such situations.

During summer 2014, we discovered that the offices were using 18% more natural gas than the previous summer, when weather normalized (see Figure 7). RTI's technicians were able to diagnose the root cause and fix the problem, bringing operating conditions back to the original set point.

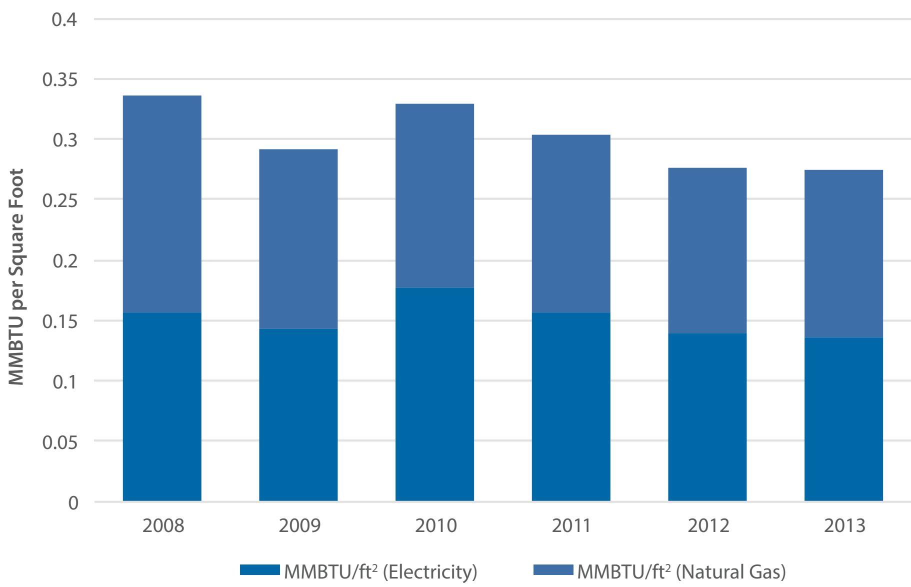
RTI has become well attuned to detecting and understanding "upset conditions" in our infrastructure and building management systems.

Figure 7. Observed deviation in summer natural gas use with trend lines



This is just one example of how RTI works to ensure that its systems are carefully maintained and operating efficiently. We recognize the dynamic nature of our operating infrastructure, and, by taking deliberate efforts to track performance, we have met our goals for performance and energy reductions (see Figure 8).

Figure 8. Energy use per square foot on RTI's Main Campus



Water

RTI uses water for heating and cooling, laboratory operations, domestic use, irrigation, and general maintenance activities, such as cleaning and fire hydrant flushing. Our conservation efforts include low-flow fixtures, employee outreach and education on water conservation, and additional measures to implement in times of drought. Our primary goal is a commitment to investigate how operational improvements can reduce water use throughout the year. This includes expansion of our metering systems, periodic review of water system performance, and routine maintenance.

Water Conservation Measures

RTI has leveraged the insights provided by a detailed baseline study of its water use on Main Campus. This study identified where water is used, how it is used, and the volume used per building and per activity. By installing water meters throughout campus buildings and in the laboratories, RTI better monitors its water systems. These data have proven invaluable in specifically identifying areas that offer efficiency improvements and in evaluating implemented projects for their realized efficacy.

Our water conservation initiatives include

- Increasing the frequency of system inspections
- Communicating strategies to staff for reducing water consumption on campus
- Reducing water-intensive operations only to what is required.

Projects Implemented

RTI's water reductions have been driven primarily by changes to HVAC systems and our ending of water-intensive research operations (see Table 3). The use of cooling towers in producing chilled water for conditioning our buildings produces an energy efficiency gain but also represents a large demand for water. We have sought to reduce our use of water from municipal sources through the collection of condensation from condensing coils.

The cooling towers do not require potable water, so using the collected condensation provides broader environmental benefits.

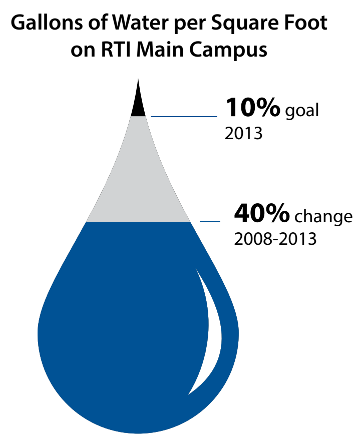
Table 3. Water conservation projects implemented from 2012–2014

Project	Objective	Data Completed
Central Utility Plant expansion	Replace old HVAC systems with a central high-efficiency system to reduce evaporative losses	Winter 2012
Condensation collection system	Reduce volume of water cooling towers pull from municipal sources	Summer 2014
Laboratory closing	Reduced water service to the building	April–May 2014

The air conditioning systems in the buildings connected to our Central Utility Plant produce condensation while cooling incoming air on the chilled water heat exchangers. This is largely free of any minerals, making it ideal for use in the plant's cooling towers. The condensation was originally piped out of the buildings to drains, but it has since been redirected via a new piping network to the cooling towers' basins. Thus, water condensed from the atmosphere is used in the evaporative cooling process, which reduces the amount of water RTI needs to pull from the City of Durham.

Reducing the amount of potable water used to operate the cooling towers reduces the amount of energy and treatment chemicals the City of Durham uses to treat water. The cooling towers do not require potable water, so using the collected condensation provides broader environmental benefits.

Figure 9. Absolute change in water intensity for Main Campus



Goals Achieved

In 2012, we set a goal to reduce water used consumption 10% per square foot. As demonstrated in Figure 9, the observed reduction in water use on Main Campus in 2013 was 40% from our baseline in 2008.[9]

[9] A direct comparison absent weather normalization is provided for context relative to the methodology under which the goals were set for reducing water consumption.

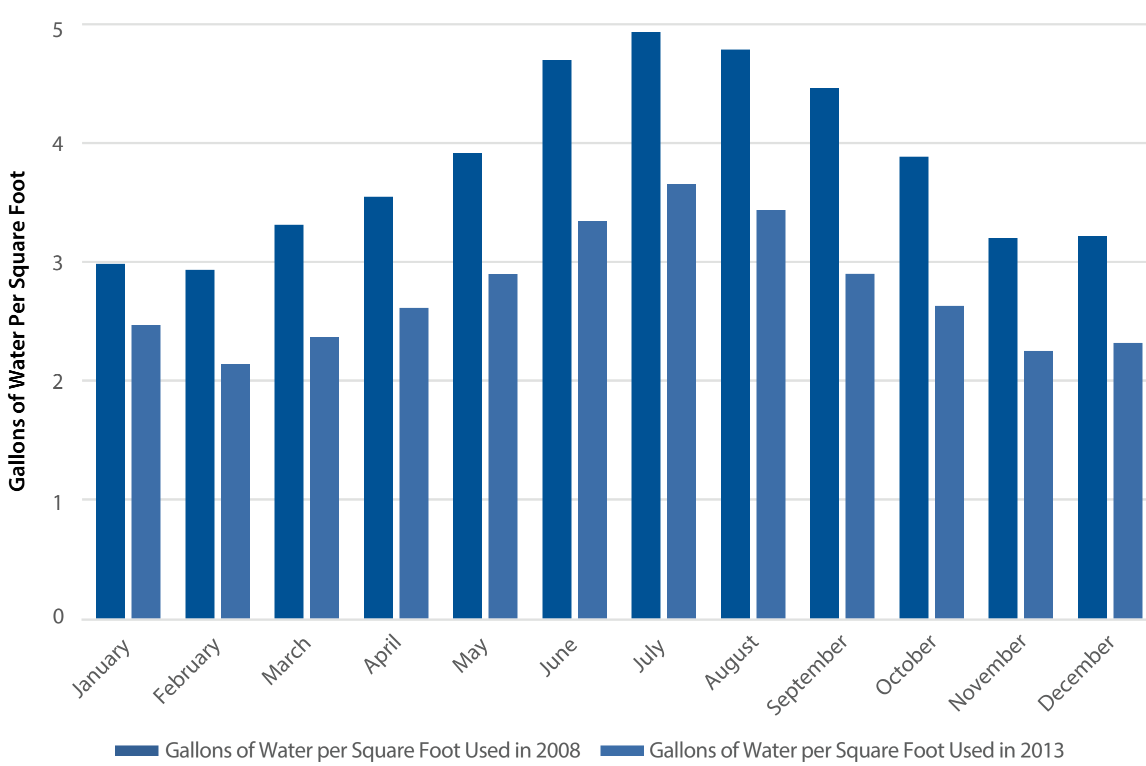
For Main Campus, we exceeded that goal through the use of a chiller condensation collection system, low-flow fixtures, termination of water-intensive operations, reductions in irrigation, and improvements in the water efficiency of processes employed on campus at RTI.

Weather Normalization and Other Changes in Water Intensity

Much of RTI's water use on Main Campus is driven by the need to use water for evaporative cooling, so we normalized our water use to cooling degree days. Lesser sources of water consumption, including some of the processes used in research, have also been altered or phased out completely, which has further reduced the amount of water used on Main Campus. Since our condensation collection system was not completed until mid-2014, we are not yet able to predict the amount of water reduction achieved with the system fully functional.

The reductions observed in 2013 compared to 2008 will likely be magnified by the addition of the condensation collection system. This will allow for more "free" water versus municipal-water to be used in the cooling towers. In 2013, even before the collection system was installed and operational, RTI's Main Campus achieved an average reduction in water use per square foot of 38% compared to 2008, when weather-normalized (see Figure 10). The result of our efforts in early 2014 will further reduce the amount of water used on Main Campus in the future.

Figure 10. Comparison of 2008 and 2013 water use shown as gallons of water used per square foot.



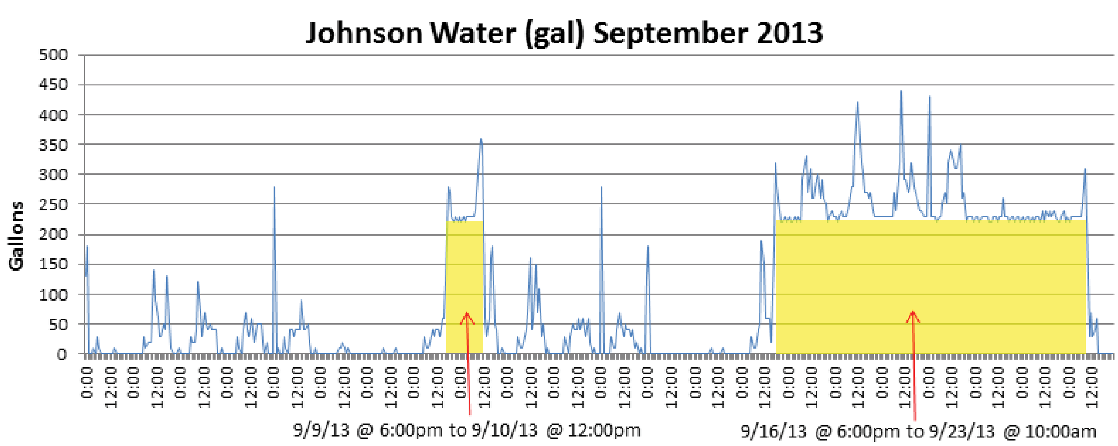
The ability to identify and rectify problems quickly has allowed RTI to minimize the amount of water wasted.

Maintaining Performance

In the Johnson Laboratory, a reverse osmosis system used to produce de-ionized water failed twice during September 2013 (highlighted in Figure 11). As a result, a large volume of water was going straight to sewer. RTI's Facilities staff were able to identify the problem through a routine check of the water meters. The problem was quickly corrected, which stopped the waste of water and prevented further destruction of the membrane.

The ability to identify and rectify problems quickly has allowed RTI to minimize the amount of water wasted through leaks or faults in equipment. When we identified a similar uptick in water consumption at our Advanced Technology Building, RTI's engineers and technicians rapidly diagnosed the problem based on lessons learned from previous experience.

Figure 11. Water consumption record from Johnson Laboratory's meter with failure points highlighted



Greenhouse Gas Emissions

Our research and business operations generate greenhouse gas (GHG) emissions from several sources, including our use of electricity; natural gas; campus vehicles operated by security and facilities personnel; employee commuting; and business travel. Electricity is the most significant contributor to RTI's GHG emissions, followed by natural gas, commuting, and air travel. Given the ever more serious projections of the risks posed by continued emission of GHG to the atmosphere, RTI heeds the need to reduce emissions. In calculating our GHG emissions, we used the Greenhouse Gas Protocol's classifications for the scope of our emissions.

Scope 1—emissions result directly from RTI's operations (e.g., natural gas)

Scope 2—emissions occur through a demand created by RTI's operations (e.g., electricity)

Scope 3—emissions result from RTI's activities but occur outside of our direct control (e.g., commuting)

For conversion factors, we used data from the U.S. Environmental Protection Agency and the U.S. Energy Information Administration. Some aspects of our GHG emissions fall outside of the physical boundaries outlined in the introduction to this report, such as air travel originating from regional offices to other locations. Those activities are treated the same as if they happened on campus because RTI does have direct control over scheduling flights.

New Methodology

RTI recognizes that a metric ton of carbon dioxide or other GHG emitted has an effect on the climate regardless of the type of source and whether or not it happened on or off campus. In the previous report, all emissions were treated equally with respect to management goals. In this report, we reorganized our goals to focus on factors over which we have control while maintaining our reporting of emissions. RTI is committed to continuing its efforts to reduce emissions, but we acknowledge broader structural changes to our energy economy are needed to accomplish significant goals.

RTI's natural gas consumption reduced by 42% since 2008, when normalized for weather and building area.

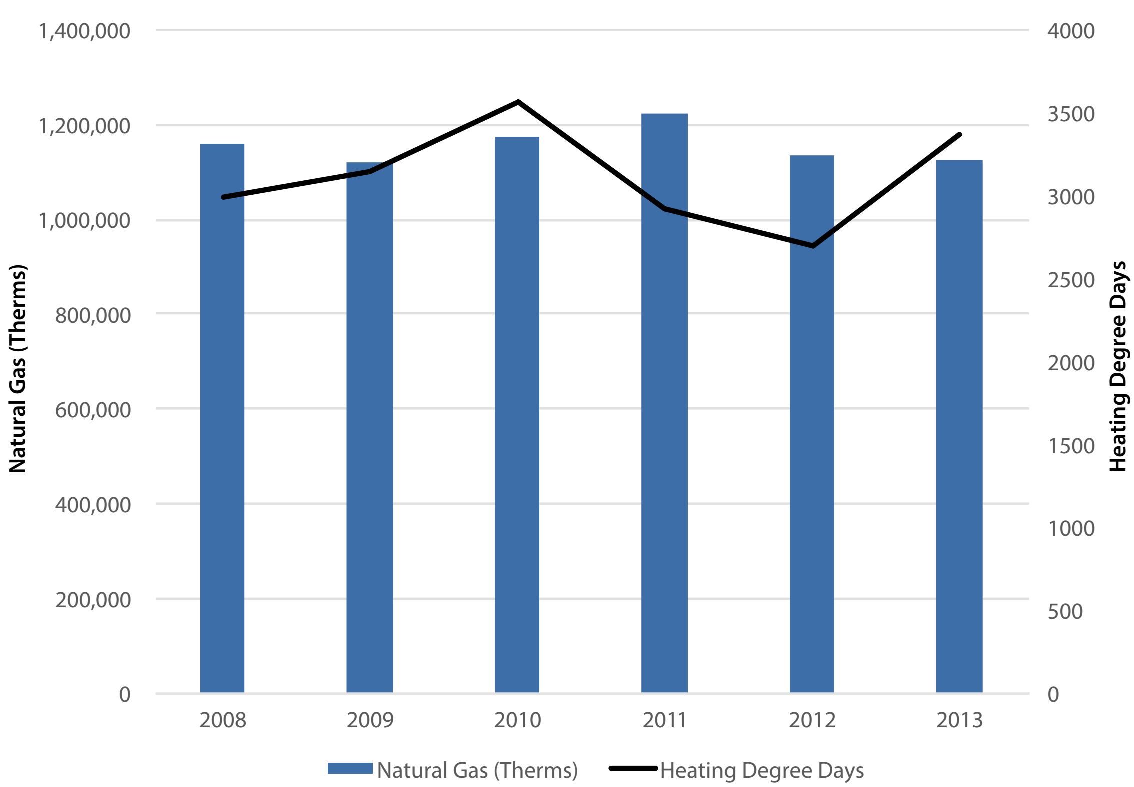
For example, even if we reduced electricity demand at our headquarters but our electricity supply shifted away from nuclear power to more natural gas power generation, as has happened in some markets in the United States, the contribution from electricity to our total emissions could increase. RTI's consideration of external factors allows us to better create achievable GHG reduction goals. We maintain our focus on producing the desired environmental outcome: a reduction of climate-harming pollution.

Scope 1 Emissions

Natural Gas

RTI's natural gas consumption reduced by 42% since 2008, when normalized for weather and building area. For GHG reporting purposes, examining the total amount of natural gas combusted at RTI shows a net 3% reduction in gas burned on Main Campus, absent weather or space normalization, from 2008 to 2013 (see Figure 12).

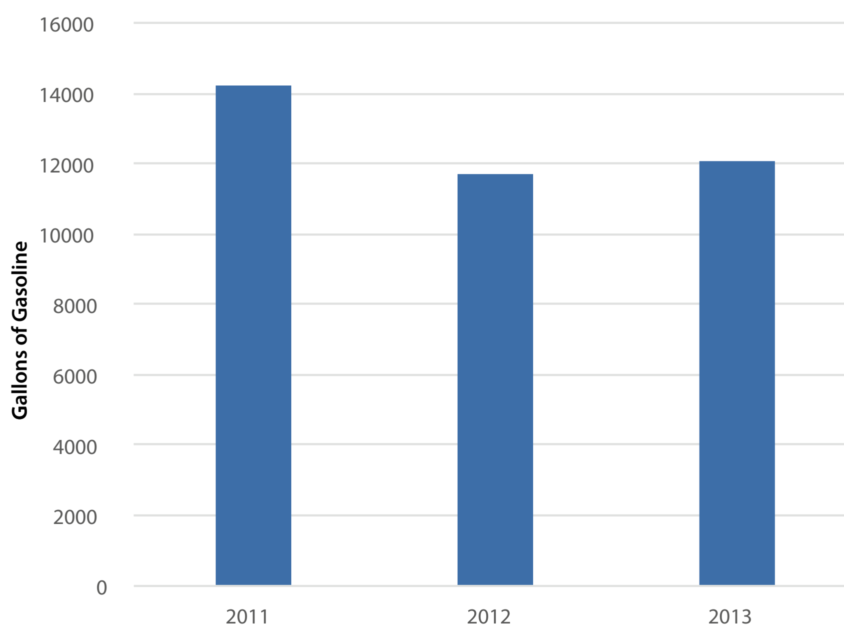
Figure 12. Therms of natural gas burned versus heating degree days



Campus Vehicles

Campus vehicles are employed for maintenance, security, and grounds keeping. RTI employs two neighborhood electric vehicles, but the majority of our vehicles are gasoline powered. In the last few years, we have started to convert our fleet from large vans to more compact work vans. As shown in Figure 13, this has helped reduce the amount of gasoline used by more than 15% from 2011 to 2013 (data was not available before 2011).

Figure 13. Gallons of gasoline purchased for RTI's campus vehicles



Other Sources

RTI uses diesel fuel in its backup generators. These run only during tests or power outages, which are infrequent. Propane was used for a period to provide heat in a research test site and is still used in some forklifts. In past reports, we assumed that the quantities of fuel purchased represented the total amount of fuel burned on site. In collecting data for this report, we learned that assumption was incorrect, and we are not currently able to report accurate emission totals from these sources. As part of our work to better monitor our sustainability performance, we are setting a goal to improve record keeping for our reporting.

Scope 2 Emissions

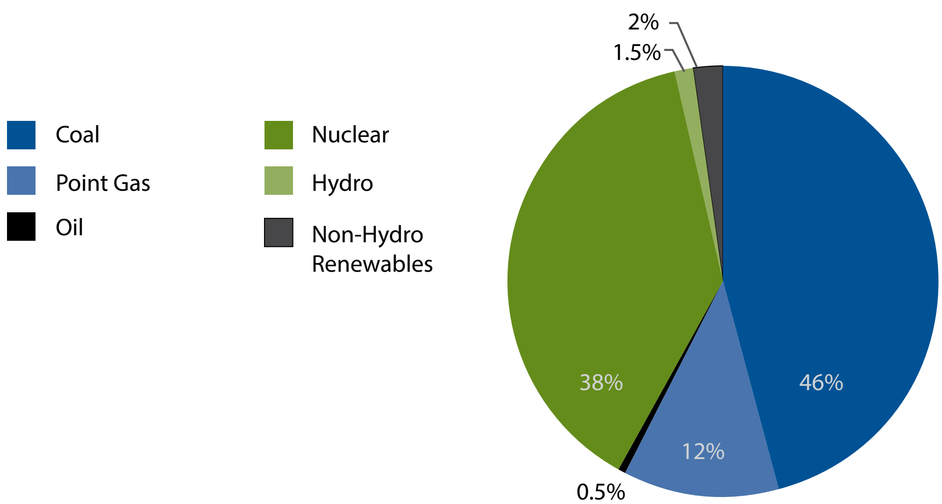
Electricity

RTI's electricity is provided by Duke Energy. As shown in Figure 14, the mix of electric generating units that power North Carolina consists of coal, nuclear, natural gas, solar and wind, hydroelectric power, and oil.

We calculated carbon intensity of electricity using the U.S. Environmental Protection Agency's Air Markets program data[10] for calculating the carbon dioxide emissions and the Energy Information Administration's data for electricity generated.[11,12] Ranking the change in carbon intensity from 2008 to 2013 in the contiguous 48 states illustrates that North Carolina's electricity supply has generally become less carbon intensive, which benefits our reduction in overall GHG emissions by magnifying the effect of our drop in electricity demand (see Figure 15).[13]

From 2008 to 2013, the carbon intensity of electricity in North Carolina dropped from 0.261 metric tons of carbon dioxide per megawatt hour to 0.217 metric tons of carbon dioxide per megawatt hour. The state's position nationally was below the median of 0.274 metric tons per megawatt hour in 2008 and fell further below the median of 0.239 metric tons per megawatt hour in 2013. The drop in carbon intensity coupled with a 15% drop in electricity demand on Main Campus resulted in a decrease of annual emissions by 24% from 2008 to 2013.

Figure 14. Sources of electricity for Research Triangle Park, North Carolina [Source: EPA Power Profiler]



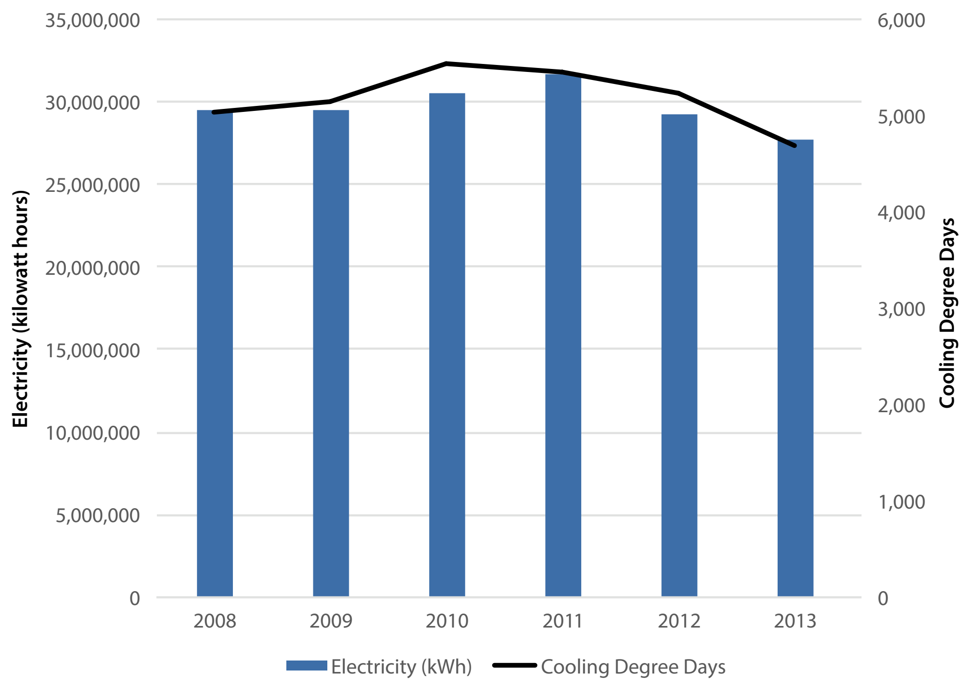
[10] U.S. Environmental Protection Agency. 2015, Air Markets Program Data: State Emissions per Year, http://ampd.epa.gov/ampd/

[11] U.S. Energy Information Administration. 2015, Form EIA-923 detailed data, http://www.eia.gov/electricity/data/eia923/

[12] U.S. Energy Information Administration. 2015. State Level Data Sets. http://www.eia.gov/electricity/data/state/

[13] Hawaii and Alaska were omitted from the analysis because of a lack of data from EPA.

Figure 15. Kilowatt hours of electricity used versus cooling degree days



Scope 3 Emissions

Commuting

RTI is able to estimate the amount of GHG produced by employee commutes via the data provided in the GoTriangle biannual commuter survey. RTI employees answered survey questions on average commute distances, number of occupants per vehicle, and mass transit and bike commuting to RTI. With this information, we used the Greenhouse Gas Protocol's methodology for estimating commuting emissions.

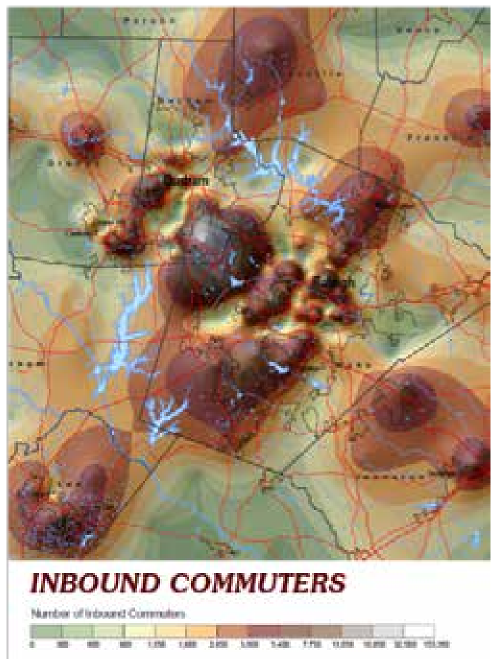
On average, RTI's employees traveled less than 35 miles per day, round trip. The Research Triangle Park is the area to which the largest proportion of the population commutes in the region.[14,15] Our suburban location between the major cities of Durham and Raleigh does not have extensive mass transit systems. This limits employees' transportation options, resulting in 84% of employees in 2013 driving to work alone. Single-occupant-vehicle commuters have been greater than 80% of the population since 2008. To encourage electric vehicle use, RTI installed charging stations in parking decks. We continue to offer incentives and amenities on campus to make it easier for employees to bike or take mass transit to work.

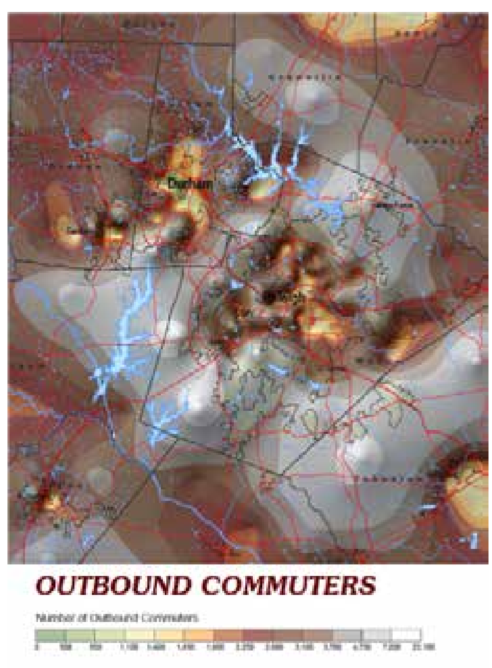
[14] RTI International. 2009. Commuting in Central North Carolina 2000: Inbound Commuting. Available at http://www.rti.org/pubs/mr-0012-0906-chrest.pdf

[15] RTI International. 2009. Commuting in Central North Carolina 2000: Outbound Commuting. Available at http://www.rti.org/pubs/mr-0012-0906-chrest.pdf

Total emissions from commuting were 4,737 metric tons CO_2 equivalent in 2008 and 4,365 metric tons CO_2 equivalent in 2013. The drop is attributable in part to the increase in teleworking, as the proportion of workers commuting alone stayed relatively flat, and those using public transportation generally decreased use. RTI's expansion of telecommuting options to employees has aided in reducing commuting-related emissions. The practice increased substantially from 0.7% of employees telecommuting in 2008 to 7% telecommuting in 2013.

For an independent project, RTI's GIS team created maps of the commuting patterns in North Carolina's Research Triangle region





Business Travel

Because RTI conducts significant business abroad, the amount of business air travel is high. In recent years, employee air travel increased as RTI expanded its overseas operations. In 2008, RTI employees logged 19.6 million miles of air travel, and in 2013 they traveled 24.1 million miles. Using the Greenhouse Gas Protocol's methodology for estimating emissions from air and rail travel, we found that, from 2008 to 2013, RTI averaged 3,279 metric tons of carbon dioxide–equivalent emissions each year.

Greenhouse Gas Mitigation

As shown in Table 4, our energy efficiency efforts on Main Campus reduced total emissions by about 14% from 2008 to 2013.

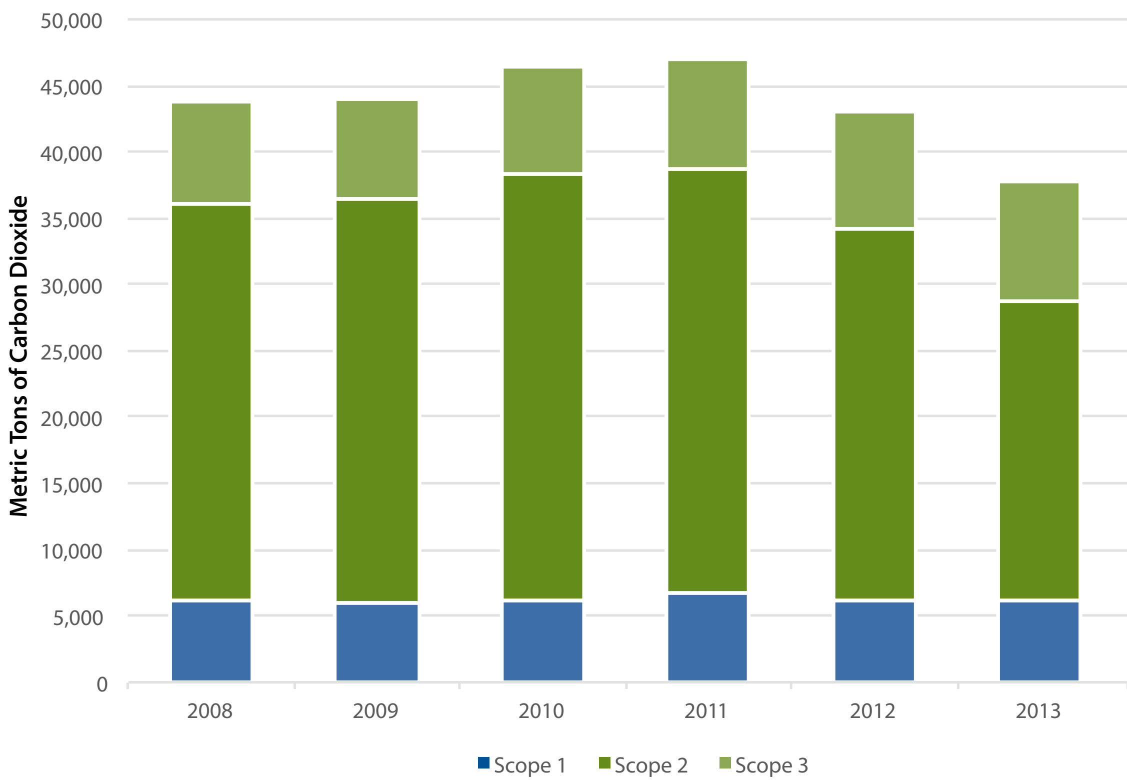
Table 4. Percent change in RTI's emissions by GHG protocol scope

RTI's Main Campus	Scope 1	Scope 2	Scope 3	Total
Percent Reduced 2008–2013	-1%	-25%	16%	-14%

Because our GHG emissions are heavily tied to energy use on campus, our energy and GHG emissions reduction plans are directly related. Most of our emissions come from Scope 2, which is exclusively electricity. As we continue to reduce our demand for electricity, we also expect to see emissions continue to decline if the electricity supply migrates to less carbon-intensive sources while maintaining or expanding the contribution of carbon-free sources of power, such as nuclear energy, on the grid.

Growth in business travel abroad accounted for the increase in our Scope 3 emissions from 2008 to 2013. This increase was driven primarily by the rise in business air and rail miles traveled by RTI's employees. In recognition of the effect on our overall emissions, we will adopt strategies to reduce the amount of travel required to reduce our GHG emissions. A summary of RTI's Main Campus total emissions is seen in Figure 16.

Figure 16. Main Campus total emissions by GHG protocol scope



Waste Management

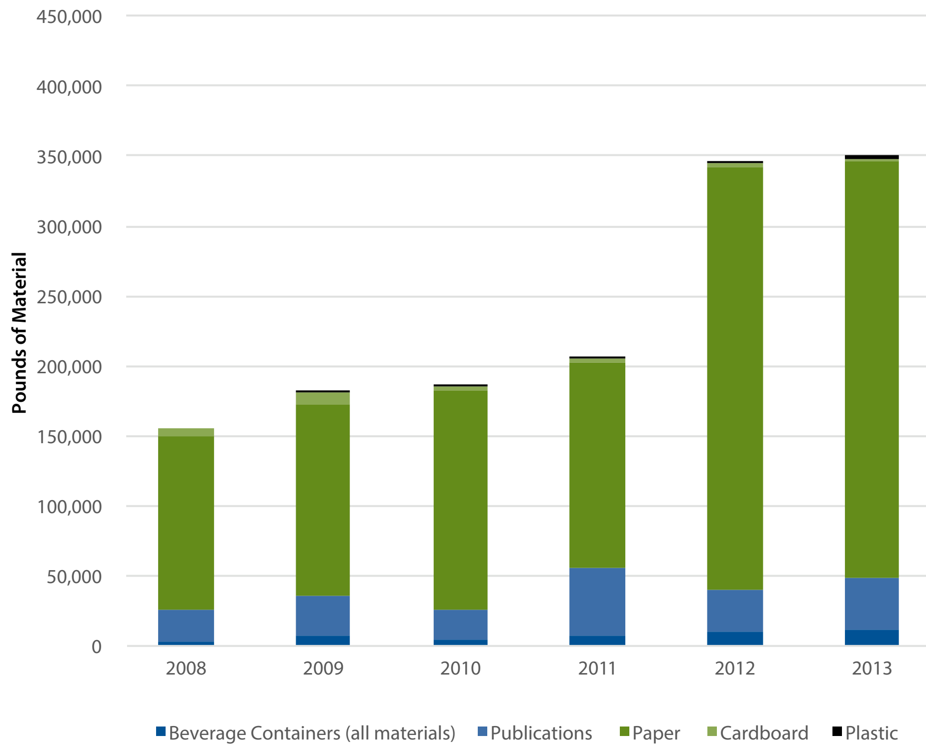
RTI's research and business operations generate waste in a variety of forms, including laboratory chemicals and supplies; paper and other office materials; food waste; and retired electronic equipment. At present, we do not have a way of accurately measuring the amount of municipal solid waste leaving our facilities. However, we are able to measure the amount of recycled material and compost leaving our facilities. RTI continuously strives to reduce or eliminate the use of hazardous and nonhazardous materials wherever possible without compromising product quality or employee safety.

Recycling and Waste Reduction Efforts

RTI conducted a range of initiatives to reduce waste and encourage recycling at all of our facilities, including the following:

- Streamlining chemical storage in our laboratories and requiring researchers to discard expired or otherwise unusable stock as soon as it is identified
- Continuing the use of our composting program at the campus cafeteria and café as a means of diverting organic material from the landfill
- Providing campus education and outreach related to composting and waste disposal questions
- Donating equipment and supplies to local schools and charities
- Encouraging dematerialization through electronic record keeping and archiving
- Purchasing 30% post-consumer recycled paper for when printed copies are needed
- Expanding our recycling program to encourage employees to recycle batteries, toner cartridges, and cell phones.

Figure 17. Total pounds of material recycled by RTI in the Triangle from 2008-2013



As shown in Figure 17, RTI has increased recycling rates at our headquarters over the years. We have achieved a high level of office paper and publication recycling, consolidated paper record facilities, and recycled documents that were digitized. Realizing that the best way to conserve a resource is to minimize its use, RTI has also sought to reduce or eliminate the amount of paper we use through digital archiving, digital distribution of publications, and other efforts, such as phasing out the distribution of paper phone books.

Our efforts to encourage employees to recycle beverage containers through the distribution of recycling containers in break rooms reduced our contribution to landfill waste and conserved plastic and metal resources.

Beyond typical waste streams, such as paper, plastics, and metal cans, RTI also produces a significant amount of unique waste streams, such as chemical and biological wastes, specialty metals, scientific instruments, and electronics from our operations. RTI is committed to finding a new user or a recycler for these types of materials, whenever possible. If disposal is the only option, RTI ensures the task is performed safely.

Table 5. Pounds of electronic waste and metals recycled or repurposed [estimated totals in italics]

Materials		2012	2013
Electronics	Donated	*6,919*	*3,736*
	Recycled	46,085	51,715
Metals	General	40,900	35,000

RTI recognized that, because of the high energy of production, electronics and metals represent a waste stream that crucially needed to be recycled. Some of these materials are toxic if not disposed of properly. As a result, RTI works with recyclers to ensure that materials are properly processed when recycled (see Table 5).

Composting

In an effort to reduce the volume of material entering landfills and the amount of methane released through decomposition, RTI contracts a local composter to take food waste from our cafeteria and café. In the dining areas, specially marked bins show where to dispose of compostable items. To minimize cross contamination in the compostable waste stream, RTI's dining services provide compostable food containers made from a pressed fiber material with high post-consumer content. We send the diverted organic material to the composting contractor, who turns it into a topsoil amendment.

Compost bins in RTI's café

Participation has allowed us to provide students and educators access to much needed equipment.

Goals Achieved

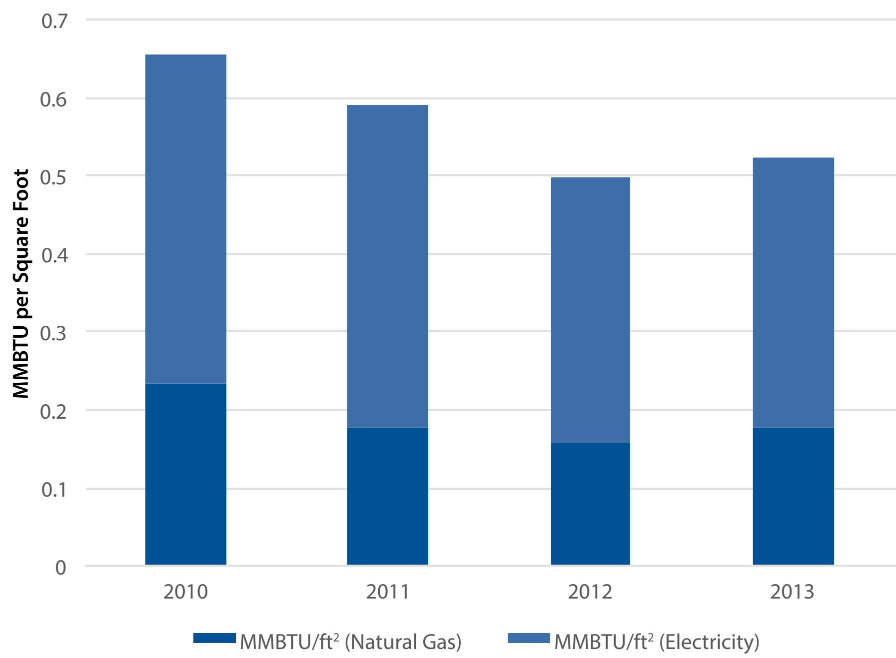
Maintaining Performance

When RTI upgrades its computer systems, we are often left with many devices that still have useful life but do not meet our current needs. RTI has partnered with the United Way of the Greater Triangle's Teaming for Technology Program to donate electronics, such as computers and audio/video equipment, to local schools, education support nonprofits, and their students. Participation has allowed us to prevent otherwise useful equipment from being scrapped and provided students and educators access to much needed equipment.

Advanced Technology Building

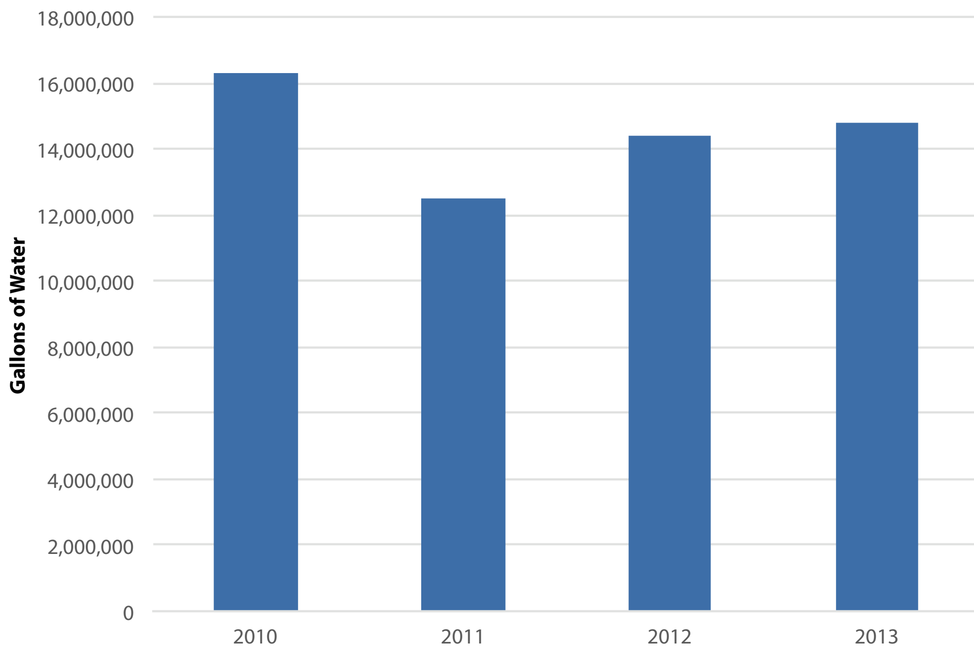
RTI acquired the Advanced Technology Building (ATB) in 2009. The building's energy and water use is more directly related to the amount of work taking place in the building than weather variations. The facility represents a large percentage of the total energy and water used by RTI's headquarters.

Figure 18. Energy use at RTI's Advanced Technology Building



With energy and water use being driven heavily by the facility's process loads, our options for reducing energy and water use are somewhat limited. However, this has not prevented RTI from finding ways to make the building more resource-efficient. Figures 18 and 19 demonstrate our efforts to reduce energy and water use at the ATB. Large volumes of de-ionized water are required for the work performed, which generates a large amount of "reject" water. The reject water produced contains too high a volume of dissolved solids to pass through the system, but can be used for other processes. We have routed some of this water to the evaporative chillers on site to reduce the amount of water we require for cooling the ATB. RTI continues to investigate ways to reduce the water and energy use at this facility.

Figure 19. Water consumption at RTI's Advanced Technology Building



RTI's Advanced Technology Building

Goals for 2016

RTI recognizes that, to uphold our commitment to sustainable best practices, we have to continue to set goals to reduce resource consumption. We also recognize that we are approaching a point at which it will no longer be possible to match the significant reductions we previously achieved through large-scale and capital-intensive projects, such as construction of the Central Utility Plant. Using the principles and practices that have guided RTI thus far in our Sustainability Initiative, we will continue to deploy increasingly more efficient technologies to manage and run our buildings and reinforce best practices throughout our workforce and facilities.

As we look to the coming years, we plan to achieve a 4% reduction in electric and natural gas consumption and a 10% reduction in water consumption by 2016 (see Figure 20). The effort we have begun to revamp storage of laboratory samples and chemicals will continue, with the goal of reducing waste. Through our routine work and in our long-term designs for the future of our headquarters, we will incorporate sustainability-focused planning and best practices as we modernize our infrastructure. In areas in which we identified the need for better reporting, we will improve the process. By conducting reviews such as this report, we can better measure how well we are performing as stewards of the environment.

Every day we fulfill RTI's mission to improve the human condition by turning the knowledge we gain from the work of our Sustainability Initiative into everyday practices throughout RTI and the greater world beyond.

Figure 20. Energy and water consumption goals for 2016