THE UNIVERSITY OF RHODE ISLAND

GREENHOUSE GAS EMISSIONS INVENTORY & PROJECT RECOMMENDATIONS

THINK GREEN WE DO
The University of Rhode Island has been at the forefront of environmental research for decades, helping to develop a greater understanding of ecology while also examining the impact of human activities on ecosystems as varied as the deep sea and suburban backyards. The operations of the campus itself have not always kept up with the advanced research and teaching taking place within its buildings, but that is changing as the University sets ambitious sustainability goals and implements actions to achieve those goals.

In 2007, the University signed on to the American College and University President’s Climate Commitment (ACUPCC), demonstrating URI’s commitment to achieve carbon neutrality (no net greenhouse gas emissions). To provide strategic guidance and oversight of the University’s commitment, the president established a Council on Sustainability, and work began to draft a Climate Action Plan (CAP) to decrease its greenhouse gas emissions. In 2010, the URI Energy Fellows were tasked with researching and proposing possible mitigation strategies. Over the past five years, the University has made great strides in achieving many goals, some even several years earlier than planned.

This report summarizes URI’s updated goals for moving toward climate neutrality, and strategies that support efforts to reduce the campus’ carbon footprint through outreach and education. It is purposefully open-ended to better serve as an evolving guide that can be revised as goals and projects are reevaluated and new opportunities arise. With constant improvements in energy efficiency and alternative energy technologies, and an ever-changing economic climate, it is extremely difficult to forecast an exact path to climate neutrality. However, through this report, the university can progressively decrease its greenhouse gas emissions.

**Emissions Inventory**

URI’s total emissions for the fiscal year 2016 is 68,493 MTeCO₂. For reporting purposes, URI emissions are divided into three categories.

- **Scope 1** emissions are from sources that are owned or controlled by the University. These include fuel combustion to heat buildings and to operate vehicles and machinery.
- **Scope 2** emissions are from the consumption of purchased electricity, steam, or other sources of energy (e.g. chilled water) generated upstream from the University. In URI’s case, this is primarily from purchased electricity.
- **Scope 3** emissions are a consequence of the operations of an organization, but are not directly owned or controlled by the University. At URI these emissions are the result of commuting, business travel, third-party distribution and logistics, production of purchased goods, solid waste, wastewater and use of URI fleet vehicles.

At URI, according to fiscal year 2016 data, Scope 1 emissions are the largest at 37% of total emissions, followed by Scope 2 at 35% and Scope 3 at 28%. The leading individual source of emissions is purchased electricity at 35% of total emissions, followed by on campus stationary combustion at 33%, and student, faculty, and staff commuting at 23%.

**Emissions Reduction Goals**

Reduction goals are projected based on GHG emissions reductions achieved since 2005, averaging a 2,000 MTeCO₂ decrease each year. The University will aim to reduce by 10% below 2005 levels (baseline) by 2020, 20% below baseline by 2025, and 40% below baseline by 2035.

If emissions actually could be decreased by an average of 2,000 MTeCO₂ annually, and the university develops a corresponding capital investment strategy, URI could achieve climate neutrality by 2055. However, unforeseen changes in technology, governance and financial conditions may possibly hinder or accelerate progress. Therefore, climate neutrality by the year 2100 could be considered a conservative estimate.
Recommended Mitigation Strategies
To achieve greenhouse gas emissions gradually over the next several years, mitigation strategies focused on Buildings and Operations, Transportation, and Energy have been recommended based on the best available data and conservative assumptions. These strategies are a mixture of still relevant actions carried forward from the 2010 Climate Action Plan, and new strategies developed for this 2015 report. To move URI towards a path to climate neutrality this current plan recommends that projects with the most significant impact on emissions reductions, and the greatest average annual benefits, become a priority in the earlier years. Projects that can be implemented more quickly are also recommended for the first few years of this plan as cost savings realized from these initial projects could be used to support the implementation of projects in later years, which may have higher costs.

Outreach to Support Implementation
To better inform the campus community, projects that connect and engage the public with efforts to reduce URI’s carbon footprint will continue to be supported and expanded by the institution. Currently offering trainings in sustainable horticulture, agriculture, energy, and water management, URI is well positioned to enhance community sustainability awareness. To continue growing its community connections, URI will focus on public sustainability lectures, alumni involvement in campus sustainability projects, and engagement of students, faculty, and staff.
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Background
In 2007, the University of Rhode Island was among the first institutions to join the American College and University President’s Climate Commitment (ACUPCC). The ACUPCC, now called the Climate Leadership Network, is a national network of almost 700 colleges and universities committed to achieving climate neutrality and integrating sustainability into their campus cultures. Climate neutrality is defined by the Network as “having no net greenhouse gas (GHG) emissions, to be achieved by eliminating net GHG emissions, or by minimizing GHG emissions as much as possible, and using carbon offsets or other measures to mitigate the remaining emissions”. To date, URI’s commitment to emissions reductions is upheld by URI’s 11th President, Dr. David M. Dooley.

Why Universities?
Scientists agree that significant reductions in GHG emissions are needed to avoid the worst effects of climate change. This will require innovations in technology, shifts in cultural perceptions, and increased environmental awareness. Higher education institutions, in particular, hold immense potential for advancing sustainability through teaching, research, and outreach. Embracing this unique opportunity, URI acts to promote environmental knowledge and to serve as a model of sustainable practices by serving as a living case study for our students, faculty, staff, and global community.

The Carbon Commitment
By joining the Climate Leadership Network, URI has committed to develop, implement, and study the progress of strategies to reach eventual climate neutrality via the Carbon Commitment. Projects and interim goals for reducing GHG emissions ensure that the University monitors its GHG emissions by conducting yearly inventories and publishing periodic progress reports. All action plans, inventories, and reports are publicly available through the Second Nature Reporting System.

Reducing URI’s Carbon Footprint
This report summarizes URI’s current goals for achieving climate neutrality and our strategies for supporting sustainability initiatives in all university research, education, and outreach endeavors. It is purposefully open-ended to allow for alterations as technologies, priorities, and best practices. With constant improvements in energy efficiency and alternative energy technologies, and an ever-changing economic climate, it is extremely difficult to forecast an exact path to climate neutrality. This report is intended to serve as an evolving guide that will be updated as goals and projects are reevaluated and new opportunities arise. Every five years, this report will be updated to better inform institutional goals in sustainability.

URI President’s Council on Sustainability
To oversee URI sustainability efforts, the President’s Council on Sustainability was created in 2007. The Council oversees five working groups comprised of University community members who work to assess and identify further opportunities to enhance URI’s path towards climate neutrality. Each working group is focused on one of five areas: Curriculum and Research, Community Culture and Outreach, Transportation, Facilities and Operations, and Climate Action. Working groups will meet regularly throughout the year to track projects and to ensure harmony with the University’s vision. Insights shared by other universities and gained through URI-specific projects are used to inform future sustainability initiatives.
Making Progress Toward URI Sustainability

Living Green

Center for Chemical and Forensic Sciences
Opened in 2016, the 135,000 square foot building’s state-of-the-art facilities feature sustainable building materials with recycled content, LED lighting, certified wood products, and water conservation technologies. The Center strengthens URI’s leadership position in the health and life sciences and in building the state’s knowledge economy. It will be the third science research building, and the ninth building across all campuses, to be designed to LEED standards.

Hillside Residence Hall Sustainability Features
The 120,000 square foot residence hall provides multi-disciplinary learning opportunities in a comfortable, sustainable setting. The structure features a solar hot water system, sun shading fixtures and window vents to keep rooms comfortable while taking advantage of natural light and air currents. A vegetated green roof occupies a portion of the roof area and captures rainwater. Rain gardens on the hall grounds collect and clean stormwater runoff. Hillside Hall is a U.S. Green Building Council LEED Gold certified building.

Campus Recycling Success
Through a focused effort by the URI community, the University has dramatically reduced the amount of solid waste that needs to be landfilled. In 2005, nearly 3,000 tons of waste were shipped to RI’s main landfill; in 2014, that amount has been reduced by 33% and the amount of materials that are recycled has increased dramatically. In addition, methane gas recovered from URI’s landfilled waste is now used to generate electricity at the state’s landfill facility.

Building Green

Center for Chemical and Forensic Sciences
Opened in 2016, the 135,000 square foot building’s state-of-the-art facilities feature sustainable building materials with recycled content, LED lighting, certified wood products, and water conservation technologies. The Center strengthens URI’s leadership position in the health and life sciences and in building the state’s knowledge economy. It will be the third science research building, and the ninth building across all campuses, to be designed to LEED standards.
**Playing Green**

**Keaney Gymnasium Lighting**

As part of URI’s Energy Conservation Initiative, lighting upgrades to URI’s Keaney Gymnasium were installed. The old gymnasium lighting was inefficient and needed to stay on continuously. New lighting with automatic controls saves 71% in electricity use and dramatically improves gym lighting and the game experience.

**Learning Green**

**Aquaculture Water Reuse**

URI’s East Farm aquaculture research center was using 50 million gallons of freshwater drawn from a local aquifer. With the installation of a recirculating system that filters and reuses water, freshwater use has been cut by 80%.

**Campus Green**

**CBLS Rain Garden**

Roof and road runoff are directed into rain gardens like this one adjacent to the Center for Biotechnology and Life Sciences (CBLS) building. Water filters through grassy areas and volumes are slowed by rocks, native plants and other diversions, allowing sediment and pollutants to filter out of rainwater while providing wildlife habitat. Treated water eventually flows into nearby storm drains and waterways.
This table summarizes progress toward the recommendations from the 2010 Climate Action Plan. Recommendations that have been removed, as well as challenges to implementing other projects are also included. The table also includes URI Energy Conservation Initiative Project 8, which was originally scheduled as a 40-year target but has now been completed.

<table>
<thead>
<tr>
<th>Previously Recommended Projects</th>
<th>Actions</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td><strong>Implement by 2015</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiesel Fuel Transition</td>
<td>URI’s research ship, the Endeavor, is now fully powered by B5 biodiesel. Other fleet vehicles have not yet made the transition, but this remains a recommendation in the 2015 CAP.</td>
<td>In progress</td>
</tr>
<tr>
<td>URI Energy Conservation Initiative Project 7</td>
<td>URI Energy Conservation Initiative Project 7 actions listed in the previous CAP have been completed. These included lighting upgrades, steam trap upgrades, building management systems, water conservation, behavior change initiatives and building weatherization.</td>
<td>Completed</td>
</tr>
<tr>
<td>Nightly Monitor/Desktop Shutdown</td>
<td>With multiple computer labs operating under different policies and supervisors, a campus-wide computer-shutdown policy is proving challenging. It remains a recommendation in the 2015 CAP.</td>
<td>Not yet initiated</td>
</tr>
<tr>
<td>Increased Bus Trip Frequency</td>
<td>This recommendation has been removed from the 2015 CAP because the bus frequency is largely out of the control of URI. Today the 66 bus route stops almost hourly on URI’s main campus. A half-hour arrival window has not yet been achieved based on RIPTA’s limited capacity. However, a real-time bus location website with estimated bus arrival times is currently being developed with aims of increasing bus ridership. Greater demand may encourage RIPTA to increase their bus frequencies.</td>
<td>In progress</td>
</tr>
<tr>
<td>Real Time Energy Monitoring</td>
<td>URI's newest residence hall has a real-time monitoring system that displays the building’s energy consumption on a screen in the dorm’s lobby. All other buildings have older, individual meters that require visual readings. These meters are currently in the process of being replaced with modern meters that can store usage data in a single database. This will allow individual building monitoring without periodic visual inspections. It will also allow the campus community to view real-time energy consumption.</td>
<td>In progress</td>
</tr>
<tr>
<td>Cooling &amp; Heating Set-points</td>
<td>All buildings with building management systems are currently using cooling and heating set-points to reduce energy usage. Since the previous CAP, 14 new building management systems have been installed and 33 systems have been retro-commissioned for better building control and maintenance.</td>
<td>Significant progress</td>
</tr>
<tr>
<td>Transportation Marketing Program</td>
<td>Currently, Parking Services, Zipcar, and RIPTA all participate in Family Orientations. This ensures that students and parents are made aware of the many commuting options. There is also a student guidebook that provides students with contact information for different transportation services. However, more can still be done to promote greener transportation options. Therefore this remains a recommendation in the 2015 CAP.</td>
<td>In progress</td>
</tr>
<tr>
<td>Employee Telecommuting</td>
<td>This recommendation has been removed due to inconsistent applicability and variations in union contracts. Many URI employees simply cannot complete their work from home or are restricted by preexisting contract clauses. However, increasing video conferencing between URI campuses is a recommendation in the 2015 CAP.</td>
<td>In progress</td>
</tr>
<tr>
<td>Car Sharing Program</td>
<td>Zipcars are now available on campus. This allows students, staff, and faculty to rent vehicles per hour, which encourages them to leave their personal cars at home and reduce their number of trips.</td>
<td>Completed</td>
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## Status of Previously Recommended Projects

<table>
<thead>
<tr>
<th>Previously Recommended Projects</th>
<th>Action</th>
<th>Status</th>
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<tbody>
<tr>
<td><strong>Implement by 2015 (continued)</strong></td>
<td></td>
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<tr>
<td>Summer Building Consolidation</td>
<td>Due to faculty and staff office locations across campus, it has not been feasible to shutdown buildings during the summer. Although classrooms may not be in use, URI employees still need access to building offices and laboratories, thus hindering the implementation of this recommendation.</td>
<td>Not yet initiated</td>
</tr>
<tr>
<td>Solar Thermal for a Dorm</td>
<td>URI’s newest residence hall, Hillside, has successfully implemented a solar thermal water heating system. This has significantly reduced this dormitory’s steam water-heating demand.</td>
<td>Completed</td>
</tr>
<tr>
<td>Vending Misers</td>
<td>A change in vending machine contracts has removed the need for this project. In URI’s new contract with Coca-Cola, all vending machines are required to conserve energy and use energy management systems and other energy saving technologies. Presently, over 50 vending machines are Energy-Star rated and at the end of the contract URI holds the right to request further energy efficiency improvements.</td>
<td>Significant progress</td>
</tr>
<tr>
<td><strong>Implement by 2020</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-Campus Combined Heat and Power Plant</td>
<td>Due to concerns of increased on-campus pollution and issues with large-scale fuel delivery, the previous combined heat and power (CHP) plant recommendation has been modified. To balance pollution concerns and fuel supply limitations, the URI 2015 CAP recommends a smaller CHP plant. As part of URI Energy Conservation Initiative Project 9, a technical feasibility study for a 4MW plant is being conducted.</td>
<td>In progress</td>
</tr>
<tr>
<td>Purchased Wind Power</td>
<td>As a state university URI selects its provider based on a bidding process. This guarantees least cost procurement for energy. At this time renewables still present higher cost to the university. This remains a recommendation in the 2015 CAP due to potential support from the community.</td>
<td>Not yet initiated</td>
</tr>
<tr>
<td>Wind Turbine Installations</td>
<td>Feasibility studies were conducted by URI Energy Conservation Initiative in regards to wind turbine installations on URI campuses. Unfortunately, the studies projected a low return on investments which forced the reconsideration and removal of this recommendation.</td>
<td>On hold</td>
</tr>
<tr>
<td>Freshman Parking Restrictions</td>
<td>Allowing underclassmen to have cars on campus is considered by Enrollment Services to be a large draw for perspective students and parents. This perception has thus far prevented the implementation of this measure. However, it remains a recommendation in this report due to the measure’s potential for decreasing personal vehicle use. By pairing this measure with initiatives for improving green transportation options and marketing, it is hoped that the current, perceived need for freshmen parking will decrease.</td>
<td>Not yet initiated</td>
</tr>
<tr>
<td>Fully Subsidized Bus Passes</td>
<td>Currently, faculty, staff and students can purchase 50% subsidized bus passes at the Memorial Union. A full subsidy has not yet been achieved. However, RIPTA bus pass sales have increased by 40% since 2009.</td>
<td>Not yet initiated</td>
</tr>
<tr>
<td>Carpool Lot</td>
<td>This remains a recommendation in the 2015 CAP. Due to logistical challenges and campus parking reconfigurations, implementation has been put on hold. However, now that ample commuter parking has been built at the bottom of campus and one large commuter lot remains closer to the heart of campus (at the top of the hill), URI is well positioned to encourage carpooling by restricting the upper lot to only carpooling students.</td>
<td>Not yet initiated</td>
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### Status of Previously Recommended Projects

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<tr>
<th>Previously Recommended Projects</th>
<th>Action</th>
<th>Status</th>
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<tbody>
<tr>
<td><strong>Implement by 2020 (cont.)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Infrequent Parking Permits</td>
<td>This recommendation is predicted to have little effect on URI’s GHG emissions and has been removed from the 2015 CAP. It is assumed that very few commuters drive to campus on an occasional basis. Therefore, trip frequencies are not expected to decrease with the creation of an infrequent parking permit.</td>
<td>Removed</td>
</tr>
<tr>
<td><strong>Implement by 2050</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URI Energy Conservation Initiative Project 8</td>
<td>URI Energy Conservation Initiative Project 8 actions listed in the previous CAP have been completed. These included lighting upgrades, steam trap upgrades, building management systems, water conservation, behavior change initiatives and building weatherization.</td>
<td>Completed</td>
</tr>
<tr>
<td>Outdoor Lighting</td>
<td>This recommendation has become part of URI Energy Conservation Initiative Project 9 (currently underway). All exterior lighting will be changed to energy efficiency LED technologies.</td>
<td>Significant progress</td>
</tr>
<tr>
<td>50 KW Solar Photovoltaic System</td>
<td>Previously, there were very few state incentives for solar projects which translated into projected low returns on investment. However, as photovoltaic costs continue to decrease and state incentives become more readily available, an on-campus solar farm feasibility study is underway.</td>
<td>In progress</td>
</tr>
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</table>
The emissions inventory for 2016 was completed using Carbon Management and Analysis Platform (CarbonMAP), developed by the University of New Hampshire’s Sustainability Institute. Emissions are divided into three categories based on source and are calculated as metric tons of CO2 equivalent (MT eCO$_2$).

**Scope 1** includes emissions owned or controlled by the institution, such as the on campus steam plant and URI fleet vehicles. URI FY2016 total: 25,273 MT eCO$_2$

**Scope 2** emissions are the indirect emissions from purchased electricity. URI FY2016 total: 23,632 MT eCO$_2$

**Scope 3** emissions are indirect emissions as a result of URI’s everyday activities, which takes into account commuting, landfilled waste, paper consumption, and URI-related travel. URI FY2016 total: 19,383 MT eCO$_2$

Reduction due to forest sequestration of carbon from URI’s 2,300 forested acres totaled 2,949 MT eCO$_2$

**URI’s net emissions for the fiscal year 2016 is 65,873 MTeCO$_2$**

Scope 1 emissions are the largest at 37% of total emissions, followed by Scope 2 at 35% and Scope 3 at 28%. The leading individual source of emissions is purchased electricity at 35% of total emissions, followed by on campus stationary combustion at 33%, and student, faculty, and staff commuting at 23%.
Emission Trends: Emissions per square foot have seen a downward trend since 2008, indicating that energy efficiency and conservation are being increased. This is likely a combination of implementation of URI conservation projects as well as increasing awareness and behavior change by the URI community. However, metrics tons of carbon emissions per full time student peaked in 2013 but have declined since that time. This change reflects the new construction on campus that includes energy-intensive buildings (research buildings), as well as increased student population.
Emissions reductions goals are based on past reductions achieved since 2005, an average of 2,000 eMTCO$_2$ each year. If emissions actually could be decreased by 2,000 eMTCO$_2$ annually beginning in 2020, and the university develops a corresponding capital investment strategy, URI could achieve climate neutrality by 2055. However, unforeseen changes in technology, governance and financial conditions may possibly hinder or accelerate progress.

<table>
<thead>
<tr>
<th>Target</th>
<th>Year</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Years</td>
<td>2020</td>
<td>30% reduction below 2005 levels</td>
</tr>
<tr>
<td>10 Years</td>
<td>2025</td>
<td>40% reduction below 2005 levels</td>
</tr>
<tr>
<td>20 Years</td>
<td>2035</td>
<td>60% reduction below 2005 levels</td>
</tr>
<tr>
<td>30 Years</td>
<td>2055</td>
<td>80% reduction below 2005 levels</td>
</tr>
<tr>
<td>40 Years</td>
<td>2035</td>
<td>100% reduction below 2005 levels</td>
</tr>
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</table>
The following recommended mitigation strategies have been developed based on the best available data and conservative assumptions, and are focused on efficiency, conservation and renewable energy. These assessments are intended as initial evaluations to guide the process of reducing greenhouse gas emissions. It is important to note that the recommended mitigation strategies in this report may require further feasibility studies before implementation can occur and that future changes in technology and other factors may require that actions be revised. The actions in the following tables are a mixture of still relevant recommended actions carried forward from the 2010 Climate Action Plan, as well as new actions developed as part of this update.

To better inform the community, projects that connect and engage the public with sustainability issues will continue to be supported and expanded by the institution. Outreach efforts in the form of trainings in sustainable horticulture, agriculture, energy, and water management, positions URI as a community resource for sustainability education and awareness. By encouraging public sustainability lectures, alumni involvement in campus sustainability projects, green outreach initiatives, and engagement of students, faculty, staff and local residents, the University aims to continue growing its community connections.
Overall, transportation accounts for nearly a quarter of URI’s total greenhouse gas emissions. With over 300 fleet vehicles, over 2,000 faculty and staff, and 10,000 student commuters to all campuses, transportation is one of the most prevalent and complex issues URI faces. Transportation has been and will continue to be a critical issue for URI. Given the physical location of URI and its current connections to transit, it is clear that URI and its students will rely on vehicles for the foreseeable future. Excluding fleet vehicles, commuting represents an indirect source of emissions that the university has limited control over (Scope 3 emissions). URI is exploring ways to reduce and mitigate the impact of travel. While increasing use of mass transit is an ideal solution, incentives for driving less can also be effective. Continued awareness of current travel trends and research into new methods of reducing commuter travel that URI can translate into action will be required to reduce our total emissions.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Expected Reductions (MT eCO₂)</th>
<th>Comments/ Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpool parking lot/ parking pass</td>
<td>2,258</td>
<td>20% participation</td>
</tr>
<tr>
<td>Park and ride (Cranston, Warwick)</td>
<td>1,673</td>
<td>20% participation for large number of faculty and staff in the area</td>
</tr>
<tr>
<td>Fully subsidized bus passes</td>
<td>764</td>
<td>20% increase in ridership, no charge for use of state beach parking lots in off season</td>
</tr>
<tr>
<td>Narragansett park and ride (off season beach lots)</td>
<td>226.8</td>
<td>Removes 900 vehicles</td>
</tr>
<tr>
<td>URI gasoline fleet vehicles converted to electric</td>
<td>562</td>
<td>All vehicles switched</td>
</tr>
<tr>
<td>URI diesel vehicles converted to B20</td>
<td>33</td>
<td>All vehicles converted</td>
</tr>
</tbody>
</table>
**Carpool Parking Lot**

Carpooling is one of the most effective ways to reduce the number of single occupancy vehicles (SOVs) commuting to campus. The establishment of a carpool parking lot behind the fine arts center would greatly increase the incentive for carpooling. Students could not only split the cost of the pass, but have preferred parking.

**Biodiesel Vehicle Conversion**

Transitioning to a B10 (10% biodiesel) ultra-low sulfur diesel fuel for URI’s fleet vehicles would significantly mitigate carbon emissions, not to mention diesel pollution, in a quick and simple way. Blends up to 20% biodiesel require no modifications to both existing machinery and pumping equipment. Small scale biodiesel use was piloted during the summer of 2009 at the University and no negative effects were observed. In the future, we can transition to higher blends of biodiesel.

**Park & Ride (Cranston, Warwick, North Kingstown)**

Institutional Research data shows there is a large number of faculty and staff that live in the Providence, Cranston, and Warwick area. By creating a safe, local Park and Ride in this area, faculty and staff could be provided an incentive to carpool. Faculty and staff share similar hours on campus; having a central area to store vehicles and meet up would be a huge incentive.

**Park & Ride (Scarborough State Beach)**

RIPTA provides a bus route that serves the majority of Narragansett down through Pt. Judith Road. Scarborough Beach, which contains parking lots that are closed for the majority of the school year, is ideally situated near many neighborhoods where commuters live. By allowing these parking lots to be converted into bus stops, students will be able to drive and park directly at the pickup location. With a dedicated bus for transportation to the University, the incentives would be even higher.

**Electric Vehicle Fleet Conversion**

In 2005, Governor Carcieri issued Executive Order 05-13, which mandates the State’s purchase of alternative fuel and hybrid electric vehicles when possible. Transition from a gasoline to electric fleet would save considerable amounts of greenhouse gas emissions.

In 2013, URI partnered with the Rhode Island Office of Energy Resources and the Ocean State Clean Cities Coalition to site an electric vehicle charging station on campus at the Mallon Outreach Center. By creating the infrastructure needed for alternative fuel vehicles, URI can continue to promote alternative means of travel.

**Freshmen Parking Ban**

Over 900 freshmen apply for and receive parking passes every year. However, many freshmen only use their car for trips into near-by Wakefield or to the top of campus. By banning freshmen resident parking and providing adequate public transportation both within and outside of campus, many vehicle trips can be eliminated. An appeal process for students with work or special situations can also be created.

**Fully Subsidized Bus Passes**

Currently, bus passes are 50% subsidized at the University. The initial implementation of this saw a 40% increase in bus pass sales since 2009. By providing completely subsidized bus services, students may be much more inclined to participate.
With approximately 68% of students, faculty, and staff commuting to URI in single-occupancy vehicles, it is inevitable that a large portion of the University’s GHG emissions is generated through transportation. Since these emissions are not directly controlled by the University, transportation represents a great opportunity for behavior change campaigns. Opportunities include:

- Presenting transportation options to new students during orientation
- Creating a web page focused on green commuting opportunities to and from campus
- Implementing campus-wide information campaigns
- Developing a real-time shuttle monitoring app
- Collecting more comprehensive commuter behavior data through surveys to inform transportation initiatives
- Encouraging faculty and staff video conferencing between university campuses
The University aims to reduce energy needs, sustainably source energy, and explore the use of renewable energy projects. We live in an era of increasing energy demand and higher prices. In order to mitigate the emergent threat of climate change, utilizing and managing resources efficiently is fiscally sensible.

With over 1000,000 square feet of LEED certified buildings, the University of Rhode Island is a leader in developing efficient green infrastructure. In 2016, there was a 50% reduction from the 2005 GHG Inventory in kilograms of carbon dioxide equivalent per 100,000 square foot of building space. As an institution, URI practices cutting-edge conservation strategies in order to achieve our campus-wide sustainability goals. In 2008, URI implemented a multi-phase energy savings performance contract with an energy services company that has created significant energy savings for URI. Additional conservation and retrofit projects are in the pipeline.

URI Energy Conservation Initiative Project 9 included projects that improved building energy use, increased efficiency of heating and cooling systems, improved the University’s campus-wide, steam heating system, and upgraded exterior lighting with LED technology. Project 10 will include fume hood upgrades in the science academic buildings, a decentralization of Fogarty Hall’s heating system, compre-

<table>
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<tr>
<th>Project Name</th>
<th>Expected MTCO2 Reductions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>URI Energy Conservation Initiative—Project 9</td>
<td>2,810</td>
<td>See description above</td>
</tr>
<tr>
<td>URI Energy Conservation Initiative—Project 10</td>
<td>TBD</td>
<td>See description above</td>
</tr>
<tr>
<td>Solar Thermal (Residence Halls)</td>
<td>708 (steam) 1,980 (oil)</td>
<td>Emission reductions vary depending on the fuel being replaced</td>
</tr>
<tr>
<td>50 kW Photovoltaic System</td>
<td>330</td>
<td>New government incentives for solar projects such as The Solar investment Tax Credit (ITC), should be considered. Financial options such as power purchase agreements with a third party or self-procurement should be considered.</td>
</tr>
</tbody>
</table>

The significant emissions reductions from URI Energy Conservation Initiative projects 7 & 8 are equivalent to over 300 acres of trees planted, and 245 vehicles removed from the roads.
URI Energy Conservation Initiative Project 9
Based on previous success, the URI Energy Conservation Initiative has developed proposed additional energy efficiency and conservation measures and building improvements for future implementation at the University of Rhode Island. Project 9 demonstrates the potential of future projects to help achieve our reduction goals. Energy conservation measures related to Project 9 began implementation in July 2015. Projects include:

- Exterior LED Lighting Upgrades
- Fume Hood Upgrades at CBLS
- Window Air Conditioning Unit Monitoring and Control
- Comprehensive Building Weatherization Upgrades
- Replace Animal Quarters Multi-zone AHU with VAV at Fogarty Hall
- Replace Steam and Condensate Piping between Butterfield and Bressler
- Add Air Conditioning to Edwards Auditorium
- Replace (2) Steam Valves at Pastore Hall
- Piping Insulation and Thermal Insulated Blankets for Fittings
- Fogarty Hall Decentralize Heating System/Compare to New Piping
- Campus re-lamping using LED Technology

URI Energy Conservation Initiative Project 10
URI intends to develop and implement Project 10 by 2020. Energy conservation measures planned include:

- Comprehensive multi-campus interior LED dimmable lighting
- Fume hood upgrades at CBLS
- Replacement of AHU of animal quarters at Fogerty Hall
- Decentralize heating system at Fogerty Hall
- Continuous commissioning
- Plug load controllers
- Comprehensive building weatherization upgrades
Combined Heat & Power Plant Feasibility Study
The URI Energy Conservation Initiative plans to provide a study/fatal flaw analysis for the combined heat and power plant to URI as part of Project 9. The Technical Feasibility Study will cost $58,000 and should a “fatal flaw” be identified before study completion, URI will have the option of discontinuing the study and only paying a portion of the study fee expended to date.

Energy Star Appliance Mandates
URI should develop a policy that sets a standard of purchasing products that have a lesser or reduced effect on human health and the environment. Requiring that staff and faculty purchase ENERGY STAR appliances will reduce emissions directly related to building operations. With over 30 residence halls on campus, the University can save money and reduce emissions by mandating residents to purchase ENERGY STAR appliances.

Solar Thermal Hot Water Systems (Residence Halls)
Residence Halls are an ideal application for solar thermal because of these buildings high demand for hot water. An evacuated tube solar thermal system has the ability to withstand freezing temperatures while maintaining high efficiency, and is therefore ideal for a New England Climate.

50 Kilowatt Photovoltaic System
URI is exploring the development of a solar farm on a former landfill. Photovoltaic systems can potentially be installed on southern exposure rooftops throughout campus. Government and state subsidies may be a necessary element to achieve this goal. It is important to note that as the size of the system increases, the cost per watt installed decreases.

Campus Composting Program
Nothing on composting??

Individual Building Metering
Installing utility meters on all campus buildings will track and measure the energy performance of URI facilities on an individual basis. Monitoring a building’s performance will provide accurate data for planning and evaluating efficiency projects.
Energy Consumption Trends: Energy Consumption Per Square Foot has seen a downward trend since 2008, indicating that energy efficiency and conservation are being increased. This is likely a combination of implementation of URI conservation projects as well as increasing awareness and behavior change by the URI community. However, millions of British Thermal Unit (MMBtu) energy consumption per full time student and per square foot of building space peaked in 2013-2014 but have declined since that time. Similarly, This change reflects the new construction on campus that includes energy-intensive buildings (research build-
Many energy efficient upgrades are being implemented across URI’s campuses. However the benefits of these upgrades may not be fully realized if building occupants are unaware of how buildings, combined with personal behaviors and habits, consume resources. Outreach programs such as the following can boost achieved reductions:

- Implementing residence hall competitions aimed at decreasing electricity use and increasing recycling
- Posting educational signage throughout campus
- Creating competitions between colleges in the University aimed at reducing paper use and energy consumption in classrooms, offices, and laboratories
- Appointing a Sustainability Officer in each office and department to assist in educating co-workers about the projects described in this section
- Launching campus-wide information campaigns about executed projects from this section
- Expanding current behavior-change campaigns targeting recycling, reducing water use, and turning off electronics, lights, fans and air conditioning.

The URI Outreach Center provides a window to the College of Environment & Life Sciences and Cooperative Extension through which citizens, communities, government agencies and businesses can access research-generated knowledge and
Greening the University’s energy sources will require substantial financial investments and a strong backing from the public, the University community, and the state. Communication is the key to sparking and growing this support. By educating the community on both the benefits and challenges of green energy, the University can spur productive conversation and encourage institutional and community change. Key communication goals include:

- Summarizing all University renewable energy feasibility studies for the public
- Creating a web page with infographics visually representing the University’s total energy use and greenhouse gas emissions
- Providing educational, public tours to highlight URI’s green buildings, renewable energy installations, and sustainable landscape design measures
- Continuing to offer annual energy efficiency and renewable energy information sessions targeted at the public and coordinated by the URI
To better inform the community, projects that connect and engage the public with sustainability issues will continue to be supported and expanded by the institution. Currently offering trainings in sustainable horticulture, agriculture, energy, and water management, URI is well positioned to enhance community sustainability awareness. By encouraging public sustainability lectures, alumni involvement in campus sustainability projects, green outreach initiatives, and engagement of students, faculty, staff and local residents, the University aims to continue growing its community connections.
OVERALL CHALLENGES

Conditions and Technology Change
One of the initial priority actions that emerged when URI and its contractor NORESCO began planning
energy conservation implementation actions was the replacement and changeover to energy-saving
lighting equipment in all URI buildings. It was determined that URI could achieve significant reductions
in electricity use by replacing incandescent lighting with CLF lighting equipment. Now, only a few
years on, the cost of even more efficient light-emitting diode (LED) lighting has been reduced dramati-
cally to the point where URI’s most recent energy initiative will involve campus wide switching to LED
lighting equipment, again at significant energy savings.

Renewable Energy Solutions Require Ongoing Attention
While this document contains mainly measures for conservation and efficiency, it is important to note
that a net-neutral campus will need considerable renewable energy sources to achieve climate neutral-
ity. While remarkable reductions in energy use can be achieved through conservation and efficiency,
with our current energy infrastructure there will still be some level of emissions for the foreseeable fu-
ture.

In 2004, URI conducted a feasibility study to determine if the use of wind turbines on the Main Campus
to generate electricity would be economically viable. At that time the determination was that it was not.
This led to an investigation of wind energy potential on URI’s Bay Campus—a windier site directly on
the shore of Narragansett Bay. There is greater promise for wind energy generation at that bayside
area. However, there are logistical and local concern issues that will need to be addressed in order for
wind energy for URI to become a reality.

Another opportunity that may prove feasible is the development of a solar panel “farm” on URI’s closed
landfill on Plains Road. This 12-acre site and adjoining land could accommodate a sizable array of
solar panels that could provide electricity for URI to use on campus or to sell to other users. Success-
ful implantation of this option may require URI to engage with a third-party solar developer through a
special agreement that uses private sector funding for construction and operation. Finding the best
technical and economic solutions for this opportunity will require a commitment of URI resources and a
desire to bring this renewable energy option to reality.

Changing Campus Culture Toward Sustainability Is a Continuing Challenge
When surveyed, the great majority of students attending or planning on attending college indicate that
sustainability and its practice on campus is an important reason for choosing the school as the place
where they will pursue a college education. Those engaged in sustainability at URI place great empha-
sis on effective and expanded student engagement in sustainability as well as cultivating that culture
across the URI community. However, as students arrive to start their URI education and then leave
upon completion, there is a constantly changing student community that presents challenges in contin-
uing engagement and affiliation. URI is always seeking new and compelling ways to bring that en-
gagement to the forefront including supporting our Student Action for Sustainability group, extending
membership on the URI President’s Council on Sustainability to students, creating volunteer opportuni-
ties for action, and providing ongoing and extensive outreach and information to the entire URI com-
munity—including our faculty and staff who, unlike students, generally have a long-term presence on
campus. Our focus will be on finding more effective ways to promote engagement and a shared cul-
ture as we work toward URI sustainability goals.
GHG INVENTORY CHALLENGES

Standardize and institutionalize the data collection process
This action remains a top priority. If the same data sources can be identified and referenced each year, a more precise comparison can be achieved. This will better showcase emission reductions and more clearly outline areas for improvement. Ongoing oversight and management by a URI staff GHG inventory coordinator will better ensure data consistency. Exploring new methods for data collection may also improve GHG inventory accuracy. For example, URI currently lacks accurate commuter mileage data. Best estimates have been made for the 2014 GHG inventory, but a survey of commuter behavior and patterns could add some valuable data and insight. Other methods to augment current data sources will also be pursued for future GHG inventories.

Design and conduct a new and more comprehensive transportation survey
Drawing on the experiences of other universities’ survey efforts, URI should create and implement a survey of students, faculty and staff regarding commuter travel and behavior. A basic transportation survey was conducted in 2009. However, a more accurate survey that takes into consideration all commuting scenarios needs to be repeated on a regular basis, perhaps every second or third year, in order to account for changing conditions.

Ensure and continue staff, student and President’s Council on Sustainability involvement in the GHG process
The 2014 GHG inventory process (and integration into the Climate Action Plan) benefitted by having direct and ongoing involvement by students, staff and Council members. It also provided an excellent learning experience for the students involved and the effort they put into the work allowed staff to direct additional attention to data analysis and report development. Council members can play a key role in assessing and prioritizing recommended actions as well as identifying roles and responsibilities for implementation of the URI Climate Action Plan.
We thank all who participated and assisted in the preparation of this document, as well as anyone who reads this document and shows an enthusiasm for sustainability. With the combined awareness and commitment of the campus and community as a whole, the goal of a sustainable future for URI can and will be achieved.

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