



A How-to Guide for Congregations

The Unitarian Universalist Congregation of Fairfax (UUCF) Climate Action Group created this information kit to assist other congregations in taking steps to reduce their carbon dioxide emissions.

<https://uucf.org/social-justice/social-action-groups/paris-pledge-initiative/>

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Paris Pledge Background

The 2015 United Nations Climate Change Conference in Paris reached an important agreement, which *“aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, by holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.”*

To achieve these goals, the scientific community proposed the following associated goals for carbon dioxide emissions: 1) *Reduce carbon emissions by 50% by 2030* and 2) *Reach a state of net zero carbon emissions by the year 2050*. The state of net zero carbon emissions (aka “carbon neutrality”) is achieved by balancing the amount of carbon released into the atmosphere with an equivalent amount of carbon sequestered or offset by absorption techniques. These carbon emission goals are now commonly referred to as the “Paris Pledge” and have been adopted as goals by many businesses and organizations around the world, including many churches and other non-profit organizations.

UUCF’s Commitment

In March 2016, UUCF voted as a congregation to make a commitment to the Paris Pledge: we would cut our campus’s carbon dioxide emissions by 50% by 2030, and achieve net zero carbon dioxide emissions for UUCF by the year 2050. Energy consumption at UUCF translates directly into carbon dioxide production, so we have focused on energy conservation and efficiency associated with electrical power and natural gas consumption.

Achieving this objective would require:

1. evaluation of our current facilities, systems, and processes
2. identification of possible changes to reduce our energy use (objectives, steps)
3. evaluation of costs (cost/benefit analysis, pricing)
4. budgeting (grant opportunities)
5. implementation (contractors, resources)
6. tracking of results

UUCF also aims to motivate our members to commit to similar goals at the individual or family level. Steps for this component include communication to members about our congregational efforts and activities to engage members in considering how to reduce their own CO2 output.

Evaluation and Project Identification

UUCF underwent energy audits in 2007 and 2012 (with a conservation plan) to evaluate the campus's energy expenditures. The most significant energy saving improvement prior to 2015 was replacement of the parking lot lights with new LED fixtures.

This early work provided starting numbers for targeting the reduction of our CO2 output.

We identified that our baseline CO2 emissions in 2015 were 108 metric tons. We calculated our CO2 emissions using the EPA formula which is based on our electrical and natural gas consumption.

In 2016, we engaged Mohamed Abaza of Capital Brand Group to perform an energy and lighting audit to identify opportunities that could offer persistent reductions in energy usage, water usage, and overall utility costs. The audit entailed a comprehensive review of the property's electrical, gas, lighting, water, and HVAC systems, identifying conservation measures, implementation costs, payback period, and CO2 savings. The audit also established a baseline of our CO2 emissions so that we could evaluate our progress. (See complete audit results at <https://uucf.org/wp-content/uploads/2016/12/Energy-Audit-Report-for-UUCF-v2.pdf>)

The audit identified

- 6 low cost/no cost energy conservation measures (ECMs)
- 13 capital-based ECMs with payback periods of 1-4 years, 5-9 years, or 9-20 years. Several of these estimates would require vendor/contractor estimates.
- 17 Energy conservation opportunities (ECOs), listed below, to achieve the Paris Pledge goal of 50% reduction by 2030.

ECO-1 Educational Campaign, occupant training (such as turning off lights and equipment)

ECO-2 Implement deeper night time set back temperatures

ECO-3 Air handling unit set point tuning

ECO-4 Shut off/disconnect compressors on water fountains (change to non-refrigerated drinking water)

ECO-5 Enable economizer controls on music room roof-top unit and disable HVAC occupancy controls

ECO-6 Provide and install domestic hot water tank insulation Jacket

ECO-7 Low E coating window film (Note: this objective has been revised toward window replacement)

ECO-8 Replace domestic hot water heaters with tankless instantaneous heaters

ECO-9 Provide and install modlets/smartlets on copiers/PCs/Fax machines for plug load control

ECO-10 Occupancy sensors in all spaces that don't already have them

ECO-11 Water conservation measures, low flow and ultra low flow fixtures with sensors

ECO-12 Daylight dimming in areas with sufficient daylight (perimeter window spaces)

ECO-13 Retro commission and testing and balancing of all HVAC systems

ECO-14 Solar photovoltaic

ECO-15 Install solar thermal system to provide domestic hot water

ECO-16 Provide and install destratifying ceiling fan in sanctuary

Based on the advice of our Energy Consultant, we started by addressing the first capital-based energy conservation measure: switching to LED lighting.

PROJECT 1: LED Lighting

This project consisted of replacing existing incandescent and compact fluorescent lights at UUCF with LED (light emitting diode) bulbs and integrated LED fixtures

One important aspect of the LED project was its visibility to members, demonstrating that UUCF takes environmental and climate change issues seriously and will act in accordance with our Principles and Commitments. It is also an approach that can translate easily to implementation in members' homes and businesses.

Our Energy Consultant helped us develop an RFP outlining the specific changes needed in our facility and submitted this to five identified vendors.

Two of the vendors attended a walk through at UUCF and one provided an initial proposal to perform the work. We worked with the vendor to refine the proposal which ultimately addressed the following:

Replace existing incandescent and CFL (compact fluorescent) lights at UUCF with LED bulbs and integrated LED fixtures.

- Original scope limited to replacements with 4-year pay back.
- Added additional lighting replacements for aesthetics and additional energy-saving considerations.
- Added upgraded sensors for restrooms.
- UUCF would purchase A19 LED bulbs separately and install ourselves.

Project financial impact overview:

- Existing lighting costs (electricity): \$877 per month (\$10,526 per year)
- Expected savings from the current proposal scope: \$6,285 (60% per year)
 - Some additional savings will accrue from reduced ongoing maintenance
- Dominion Power Incentive Payment: \$10,430 (
- Grant from Fairfax County: \$5,832 (an ongoing program to promote energy conservation.)
- UUCF Net Cost for Labor & Materials: \$49,883.
 - Plus \$2K Consulting Fees

Learn about Dominion Power's program: <https://dom-vendor.com/non-residential-lighting>. To be able to qualify for another potential grant, UUCF began the application process to become a 501c(3) nonprofit organization. We have been told that once we receive our full 501c(3) status with the IRS, we will be able to apply for this grant in arrears, even though the lighting project is now complete.

Our financing for the LED project included

- borrowing from our custodial fund, to be paid back in 4-6 months via electric bill savings
- use funds from a recent campaign (REACH campaign) earmarked for environmental improvements

- potentially borrow from UUCF line of credit

We also began developing a proposal for an endowment fund to support emerging consulting services. Unfortunately, this grant was not awarded, since the committee felt that some other proposals were more compelling and we seemed to have a fair amount of funding potential from other sources.

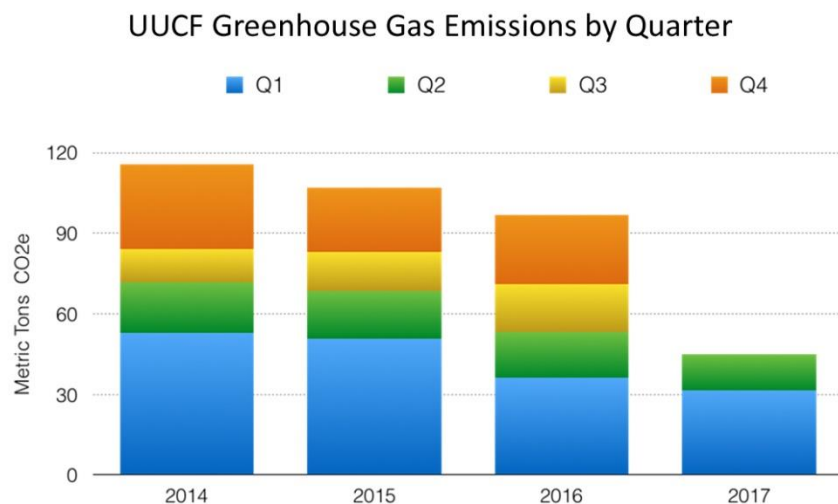
Learning from Unity of Fairfax

Unity of Fairfax was very helpful and generous with information about their LED replacement project. This information helped convince UUCF leadership to invest in this effort on our campus.

Unity shared the following:

- Total cost of LED bulbs and fixture lighting retrofit will be \$62,374 minus a Dominion Virginia Power utility rebate of \$11,948 and a \$6,000. energy efficiency grant
- The remaining kW Efficiency contract of \$44,426. plus a \$3,500 fee for the consultant will occur as a Unity of Fairfax bank loan at a fixed rate of 3.5% for five years.
- Monthly electricity savings from the retrofit will be used to pay off the bank loan over the five years or less. No operating church funds will be used for this project. It will pay for itself. It is estimated that this lighting retrofit will save approximately \$1,221 per month in the church electricity bills.

As of summer 2017, the LED replacement project at UUCF is complete. Removed CFL and incandescent bulbs were donated to Habitat for Humanity ReStore or recycled. We have begun to see significant reductions in electricity costs as shown in the chart and explored in the “Tracking Results” section, below.



PROJECT 2: Windows Improvements

UUCF's campus includes three buildings: the sanctuary, the administration building, and the program building, which joined two original buildings in 2005. The administration building and the two original pods of the program building have original windows dating from around 1960. These are very inefficient, single-pane windows that have significant energy use impacts in both summer and winter. Some window framing also has air leakage issues.

This window replacement project was a key part of scope of the original REACH Capital Campaign and subsequently the UUCF Board established a budget for this work.

The original energy audit proposed adding a coating to the existing windows, but further investigation led us to conclude that replacing the windows would be more effective in the long run. Fortunately, most of the framing can remain intact, which is a significant cost savings.

After completing more research into the alternative approaches for replacing these windows, we decided to proceed and directly engage with several local commercial glass vendors to obtain estimates.

We received three estimates from qualified vendors and are now awaiting final budgetary approval from our Coordinating Team and Board of Directors.

Tracking Results

We have tracked our consumption of both electricity and natural gas since July 2013. We use the EPA's Energy Star Portfolio Manager website to calculate our emissions:

<https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>.

We have had to do some additional calculations on our own, since the EPA site does not yet handle campus environments and we wanted to consolidate results for each of our three buildings.

We are also looking to evaluate the carbon sink capacity of the UUCF campus to contribute to the accuracy of our evaluation. We are evaluating several algorithms which measure trees and other foliage and calculate the amount of CO₂ that is absorbed by these plants.

Communicating Progress

Our efforts to keep the UUCF congregation informed and engaged in this process have included a dedicated website page (<https://uucf.org/social-justice/social-action-groups/paris-pledge-initiative/>), a feature in our weekly blog, and regular posts on Facebook and Twitter. Ministers have mentioned from the pulpit the change to the lighting in our sanctuary in particular.

Sample posts:

Facebook:

Just what is the Paris Pledge? Around the world, congregations and organizations have joined in solidarity with the 2015 Paris Climate Conference's agreement to reduce global warming. Our UUCF commitment is to cut the carbon dioxide emissions generated by UUCF's consumption of electricity and natural gas by 50% by 2030. Learn more about the Paris Pledge:

<http://www.parispledge.org/cutting-your-co2/>

Twitter:

Know the #Paris Pledge, take the Paris Pledge. UUCF has! <http://www.parispledge.org/cutting-your-co2/>

Twitter:

Since 2008, UUCF has cut our annual CO₂ output by 77 tons. That much gas would fill 77 ranch houses, and we're still working. #ParisPledge

The Climate Action Group at UUCF has also worked to engage members in overall climate awareness efforts through projects like the Carbon Footprint Game (<https://uucf.org/social-justice/social-action-groups/cag/carbon-footprint-game/>).

Lessons Learned

The Paris Pledge is an ambitious goal and we are embarking on a long journey to get to a carbon neutral state. We are in the middle of the first series of projects that we believe will enable significant reductions in our greenhouse gas emissions. However, we realize that to reach our goals, we will need to be aggressive and at some point, we will need to invest in local energy generation capability, such as solar photo-voltaic panels. Given our current tree cover, solar panels are not feasible for us in the near term. However, we will monitor the changing economics of local energy generation and hopefully be able to take advantage of improving technologies and economics for this capability.

Resources

Energy and Lighting Audit:

Mohamed Abaza, mabaza@capitalbrandgroup.com

202-738-3036

LED Replacement:

kW Efficiency

- Based in Frederick, MD
- Current business activities are focused completely on Energy Efficiency Upgrades
- Completed Unity of Fairfax LED replacement project in September 2016
- <http://www.kwefficiency.com/>