World Fellowship Center

Sustainability Action Plan

World Fellowship Center where social justice meets nature

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INTRODUCTION

About World Fellowship Center

World Fellowship Center (WFC) is a nonprofit educational and cultural retreat and conference center located in New Hampshire's White Mountains with a mission to "promote social justice and connections between people, communities, and nature through education, recreation, and creative expressions." World Fellowship recognizes the connection between environmental stewardship and social responsibility. Since founding in 1941 World Fellowship has instituted and modeled practices that reflect this commitment, such as organic gardening, reusing bath towels, and maintaining their 455-acre land-holding as primarily undeveloped wilderness (to name a few). Increasing energy costs, more frequent and intense drought conditions accompanied by growing human demands on freshwater use, an accelerating rate of species extinction, and plans to expand campus facilities and accommodations are all incentives for World Fellowship's continued interest in sustainable practices.

WORLD FELLOWSHIP'S REQUIREMENTS

- Reducing negative environmental and social impacts
- Developing a mechanism to measure and report performance
- Documenting benefits of current sustainable practices
- Increasing dialogue and awareness surrounding current practices
- Reduce waste (energy, water, post-consumption)

OPPORTUNITIES & RISKS

The following are opportunities presented by "going green" and risks of not pursuing sustainable practices.

Opportunities:

- Reduce operating costs, increase profitability
- Allocate savings from initiatives to fund future improvements
- Increase staff and guest engagement with sustainability practices
- Multiply impact of practices via guest/staff education and adoption
- Enhance role as sustainability model by documenting results
- Distinguish from competitors

Risks:

- Impede innovation
- Misspent funds on waste and delay development
- Harm to organization image
- Greater exposure to rising costs (energy, waste, supply chain)

KEY STAKEHOLDERS

Andy Davis and Andrea Walsh, Co-directors

- Review, approve and implement SAP initiatives
- Manage purchasing and financing
- Oversee education and outreach program – including discussion topics and guest speakers
- Allocate resources to advance initiatives and campus development

Building and Grounds Committee

- Prioritize initiatives and campus development
- Monitor progress of initiatives

Staff

- Communicate sustainable initiatives to guests
- Deliver feedback from guests to co-directors
- Carry out duties in compliance with SAP

Guests

- Actively participate in sustainable practices at WFC
- Adopt sustainable practices to implement in their homes
- Adopt and model sustainable behavior in their communities
- Offer feedback of current and proposals for new initiatives

RECOMMENDED INITIATIVES

New Hampshire Green Hospitality Program Membership

Background

The New Hampshire Green Hospitality Program (NHGHP) is a voluntary assessment for businesses in the hospitality sector that wish to demonstrate and validate their commitment to environmental stewardship and leadership in implementing sustainable practices. Applicants complete a questionnaire to assess their businesses' sustainability initiatives, which the program describes as Environmental Best Management Practices (EBMP). Applicants must achieve all mandatory EBMPs, complete a site visit, and identify at least one new EBMP to implement within 2 years, to receive membership. Higher levels of recognition are possible based on the number of elective EBMPs achieved. The New Hampshire Department of Environmental Services (NHDES) administers the program, and provides on-going technical assistance to reduce environmental impacts while reducing operating costs, to members.

Costs	**Benefits**
$0	Free – no cost to apply, no membership fees. Receive listing on the *NHDES* website and *visitNH* website link. Validation as a Green, New Hampshire Hospitality Provider. NHGHP logo to use for advertising. Receive certificate in recognition of green initiatives, to display to guests. Bi-annual surveys encourage continual improvement.

Discussion

Completing the NHGHP application is WFC's next step in pursuing membership. The application's requirements, which guide or precede other work, justify placing it at the front of the list of recommended initiatives. The NHGHP application is broken down into 10 sections: *Administrative, Waste Management, Water Conservation, Energy Conservation, Housekeeping, Landscaping, Pools & Spas, Kitchen & Food, Other Initiatives*, and *Measurement* (reporting). WFC can use descriptions of current initiatives, provided in this plan's appendix, to complete corresponding sections of the application.

Completing the *Administration* section requires adopting an Environmental Policy Statement and an Environmentally Preferable Purchasing Policy; examples of both are included in Addendum A. The *Administration* section also requires designation of an Environmental Team or representative and a proposal for a new initiative for implementation within 2 years of submitting the application.

The *Measurement* section assists the applicant in tracking energy usage, water usage, and waste generation. Tracking use and generation in these areas facilitates decision-making, better management, and allows monitoring of progress.

Recommendations

I recommend that WFC designate the Buildings and Grounds committee as being responsible for overseeing initiative development and implementation, on the NHGHP application.

I suggest WFC adopt the example Environmental Policy Statement and Environmentally Preferable Purchasing Policy, included in the appendix. WFC should feel empowered to edit either or both policies, to fit their needs and practices.

WFC should include descriptions of current initiatives, considered elective on the application, to receive credit and document actions taken.

Rain Barrel Installation

Background

Rain barrels collect water from a roof, or any other impervious surface, and store it for later use. Homeowners use the collected water for watering lawns and gardens. The water collected would otherwise become "storm water runoff". Impervious surfaces restrict water from soaking into the ground, prolonging contact with the land surface. Storm water runoff can become contaminated with pollutants during the prolonged contact with land surfaces, and consequently transport these pollutants to bodies of water. Storm water is of importance in urban and developed areas, where there are fewer opportunities for runoff to seep into the ground and more opportunities for contamination. In rural and minimally developed areas, impervious surfaces alter natural rainfall runoff and can damage sensitive ecosystems.

Costs	**Benefits**

• Barrel $0.00 - $160.00
• Accessories (spigot, diverter, overflow kit) $12.00 - $30.00
	• Inexpensive and easy to install.
	• Reduces storm water runoff and associated water pollution.
	• Rainwater is not treated (e.g. chlorine, fluoride).
	  ◦ Reduced waste water treatment costs
	  ◦ No salts added that can accumulate in soil
	• Conspicuous, easily reproduced, example of environmental stewardship.

Recommendations

The rain barrel installation should occur within 2 years of submitting the New Hampshire Green Hospitality Program membership application. Detailed instructions on rain barrel construction are in the appendix[i].

I recommend purchasing the rain barrel locally, at Clark's Blue Seal, in Ossipee, New Hampshire ($16.95/55gal). The rain barrel can be installed next to Lloyd Lodge. A suitable location will be under an existing downspout, conspicuous to visitors, and near existing garden beds. Decorating the barrel provides an opportunity to engage with guests regarding water issues and actions WFC is taking to address them.

Energy Tracking (Electricity and Propane)

Background

Measuring and tracking energy use will enable WFC to monitor and manage progress. Establishing a baseline year helps in the decision-making process, when considering and comparing initiatives to implement (i.e., larger use areas have the greatest potential for reduction). WFC can also use baseline and annual use data to credit reductions to specific initiatives, based on the timing of implementation and succeeding reduction.

Costs	**Benefits**
$0	Identify high-impact areas for action. Compare usage from year to year. Attribute reductions to specific initiatives.

Implementation

Option 1: *Eversource Green Button*

Note: Green Button service only applies to electricity consumption.

The Green Button initiative came about in response to a White House call-to-action to provide customers with streamlined, user-friendly, electronic access to their energy usage data[ii]. For WFC to access their electricity usage via the Green Button, WFC must register for an online Eversource account. WFC can consolidate all buildings to one online account. Once registered, WFC can opt for paperless billing by signing-up for e-bill.

Option 2:

Addendum B is an Excel spreadsheet formatted for tracking energy use, with tabs for each building at WFC. WFC can use this spreadsheet to record usage, indefinitely. Each tab includes a table for electricity use and propane use (where applicable). The tables contain formulas that automatically calculate annual consumption by building and in total.

	Propane (gals)	Electricity (kWh)	Biomass (cords)[iii]
2016 Totals	2044.8	32334.9	5
2016 Totals in MMBtu	187.30368	110.2458416	122.75

Table 1: WFC 2016 Energy Use

Recommendations

WFC should use Option 2 to track electricity and propane usage and monitor performance from year-to-year. Option 1 can be implemented, independent of Option 2, at any time. If WFC prefers paperless billing, they should implement Option 1.

Sustainability Reporting

Background

A sustainability report records and highlights a business's sustainability related accomplishments, performance, and statistics. The report should draw connections between the organization's values and operational strategies in the broader context of sustainability. Developing the sustainability-reporting framework early on enables WFC to utilize the report as a planning tool – capturing data in real time, while also documenting mistakes to avoid in future or related initiatives. In developing the framework, it is critical for WFC to establish their purpose for reporting. At a minimum, the report should communicate who WFC is and address how they assess their intent to use resources efficiently. WFC will use key performance indicators (KPI) in their report that target high-priority areas. The corresponding data for KPI's should be comparable, timely, accurate, and clear.

Discussion

A draft of WFC's Sustainability Report is included in Addendum C. The plan's executive summary is a rundown of WFC's sustainability vision, motivation for going green, and achievements to date. The plan describes WFC's criteria for selecting initiatives, their goals and mechanism for monitoring progress, and plans for future initiatives.

Recommendations

WFC can use the draft sustainability report as a starting point, filling in data for key performance indicators as that information becomes available. WFC can make the adopted report available on their website to meet the objective of transparent internal and external communications. The document will also be useful for building sustainability branding.

Energy Efficient Lighting Upgrades

Background

Electricity used for lighting is the largest end use category in the U.S. commercial sector and the second largest end use category in the U.S. residential sector[vi]. WFC has implemented an initiative to replace all incandescent light bulbs with compact fluorescent lamps (CFLs) as they burn out. WFC should revise this initiative to include replacing linear fluorescent (tube) lamps with light emitting diode (LED) lamps, and replacing remaining incandescent bulbs with LEDs

Costs	Benefits
$1.50 - $8.00 per bulb	LEDs have a longer lifespan
Labor	Reduced environmental impacts with LED[iv],[v]
	Reduce operation cost

Discussion

The potential savings listed in table 3 were estimated using a web base calculator, and the assumptions described in table 2[vii].

All scenarios result in reduced electricity consumption and cost savings. Cost savings is determined by daily use, kWh price, and replacement bulb efficiency gain. Replacing bulbs as they burn out distributes capital investment over time, making implementation more feasible, and fully utilizes the bulb's embodied energy. Replacing bulbs before burn out accelerates the acquisition of savings. For example, in the incandescent to LED scenario, replacing an incandescent bulb 500 hours *before* burn out results in a $4.61 savings over the same period:

[51 watts x 500 hours x 0.001 kWh/watt x $0.181/kWh].

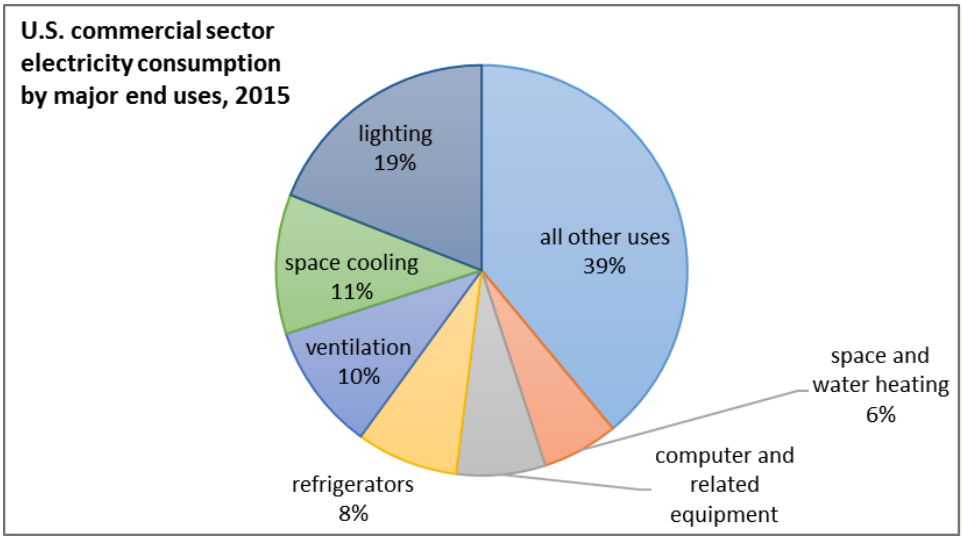


Figure 1: Source U.S. Energy Information Administration, Annual Energy Outlook 2016, Table 5, September 2015

Bulb Type	Lifespan (in hours)	Wattage	$/bulb	Hours/day	Price of electricity
Incandescent	1000	60	$1.00	8	$0.181/kWh
CFL	20000	14	$1.50	8	
LED	40000	9	$1.50	8	
Linear Fluorescent	24000	32	$3.00	8	
Linear LED (tube)	36000	18	$8.00	8	

Table 2: Bulb use assumptions

Current bulb	Linear Fluorescent	CFL	Incandescent
Replacement bulb	**Linear LED (tube)**	**LED**	**LED**
Energy saved per bulb	14 watts	5 watts	51 watts
Money Saved over life of bulb	$91.22	$36.20	$369.24
Number of existing bulbs used for each replacement	1.5	2	400
Cost difference [**$/Replacement - ($/Current x number bulbs replaced)**]	$3.50	($1.50)	($38.50)
Total savings per replacement	$87.72	$37.70	$407.74
Investment (per bulb price difference)	$5.00	$0.00	$0.50
Net savings (per bulb)	$82.72	$37.70	$407.24
Net Monthly Savings per bulb	$0.56	$0.23	$2.47

Table 3: Potential savings by replacement scenario

Recommendations

If incentives become available, lowering replacement costs, WFC should move forward with re-lamping before burn out. Otherwise, WFC should continue replacing bulbs as they burn out, using the replacement scenarios described in table 3.

Lighting and Plug-load Controls

Background

The U.S. Department of Energy identified lighting and plug-in load controls as target areas to reduce wasted electricity[viii].

Lighting controls turn lights on and off, automatically. Examples include occupancy sensors, manual timers, and dimmers. Lighting controls can reduce electricity used for lighting by as much as 30%[ix]. Turning lights off upon exiting, and using task lighting, furthers this initiative where WFC cannot implement controls.

Plug-in loads account for roughly 33% of energy consumed in commercial and residential buildings[x]. Plug-in loads are primarily controlled by turning devices off when not in use. The tendency to forget to power down devices can be managed with manual timers. This is more practical when usage conforms to a predictable and static schedule[xi]. Some devices enter a standby mode, by design, and continue to consume electricity – accounting for 5 -10 percent of U.S. residential energy use[xii]. Advanced power strips (APS) and cooperative management can be employed to reduce this "parasitic" load.

Costs	**Benefits**
Advanced power strip - $9	Reduce wasted electricity
Occupancy sensors $15-$50 (Rebates available)	Communicate sources of wasted electricity
Manual Timer - $13	

Discussion

WFC can communicate practices to reduce wasted energy on their website, and at point of use (e.g., turn off the light signage). Point of use signage should describe and encourage the desired behavior, and communicate the benefits of complying. WFC can design signage to include metrics regarding environmental and cost benefits. Communication is important in managing plug-load, considering it is not feasible, or necessary, to unplug every electronic

device. Focusing on higher impact devices will conserve energy and is a manageable approach[xiii].

Advanced power strips use a control outlet and multiple accessory outlets. When a device plugged into the control outlet is turned off, power is terminated to all accessory outlets. For a computer station, an APS could conserve approximately 20 watts by terminating power to speakers and a printer plugged into accessory outlets.[xiv]. For a computer station that remains idle 16 hours/day, using an APS would save $21 annually:

Figure 2: Sign example

[20 watts x 16 hours/day x 365 days x 0.001 kWh/watt x $0.181/kWh].
This equates to a 5-month simple payback for a $9 APS.

WFC can use manual timers to manage plug-load control on devices that conform to a schedule, for example, coffee makers and lamps. Timers can control individual devices, or groups of devices plugged into a single power strip. A typical coffee maker and microwave consume a total of 2 watts and 3 watts, respectively[xv]. Installing a manual timer to be off from 11pm – 5am (6hrs), would conserve 30 watts per day or $1.09 annually:

[30 watts/day x 200 days/year x 0.001 kWh/watt x $0.181/kWh].

This translates into a 12-year simple payback for a $13 timer.

Recommendations

WFC should purchase and install advanced power strips for the office's computer stations. Installing two APS will result in a $42 annual savings.

While installing manual timers would result in minor savings, I recommend not pursuing implementation now, as they could be disruptive to guests.

The main tenet and value of this initiative lies in promoting energy conservation. Point of use signage is a suitable means to inform efforts, and likely to lead to engagement with guests and staff, compared with installing low-profile devices.

WFC can address power consumption of future purchases in their Purchasing Policy, by requiring electronic equipment be ENERGY STAR qualified and/or Electronic Product Environmental Assessment Tool (EPEAT) registered – which use less standby power compared with standard equipment.

The proposed Environmental policy indicates "WFC continually seeks out opportunities to improve their energy conservation efforts." Accordingly, for new construction, WFC should consider incorporating lighting control technology where appropriate (e.g., bathrooms, storage areas).

Water Heater Insulating Blankets

Background

Energy consumed for water heating accounts for 7% of U.S. commercial building total use, and 17% of U.S. residential building total use[xvi]. Among U.S. lodging facilities that report natural gas usage, 51% of natural gas is used for water heating. (*Note*: no data could be found for propane.) Insulating the water tank reduces standby heat loss and can cut water-heating costs by 7%-16%[xvii].

The water heater tank located in the Cape has an insulating blanket, which WFC installed prior to this action plan. WFC should consider insulating eligible water heater tanks at Uphaus, Weller, and the Cottage. The newest and most efficient system, located in Lloyd Lodge, would not benefit from additional tank insulation and accounts for ~ 60% of hot water usage.

Costs	Benefits
$30/tank (materials) Labor - $20/hour	Reduced water-heating costs.

Discussion

The three tanks to be insulated account for 30% of WFC hot water use. Applying 2016 propane usage (2045 gallons), a 7% reduction in water heating costs equates to a savings of $74.

[2045 gallons x 30% H.W. x 0.51 water heating x 0.07 reduction x $3.40/gallon]

Insulating the remaining three tanks would result in a simple payback of 2 years.

[Materials - $30 x 3 + Labor 3 hours @ $20/hour = $150]

Recommendations

I recommend installing an insulating blanket at Uphaus, which represents approximately 20% of hot water use. An insulating blanket here would save 15 gallons of propane, and have a simple payback of 1 year.

ENERGY STAR Replacements

Background

ENERGY STAR is a U.S. Environmental Protection Agency (EPA) program that assesses products and practices, based on their energy efficiency performance. ENERGY STAR qualified appliances and electronics use 10-50% less energy than standard appliances, and often have improved performance in other areas, such as reduced water use[xviii].

Appliances and electronic devices under consideration for ENERGY STAR replacements in this initiative are: refrigerators, dishwashers, clothes washers & dryers, pre-rinse sprayers, and computers.

Costs	**Benefits**
Cost of replacement	Reduced energy consumption. Reduced water consumption (dishwasher and clothes washer).

Discussion

WFC should consider replacement costs along with the reduction of energy consumption, and associated cost savings. Actual savings depends on replacement efficiency gains, and the amount of time the appliance or device spends in use. Another way to consider this is in terms of simple payback: [$\frac{initial\ investment}{Annual\ savings}$, $where\ Annual\ savings = \frac{\$}{kWh} * ((\frac{Hours\ Used}{Year}$ ($P_{current}$ - $P_{replacement}$)* $\frac{0.001kW}{watt}$), and P is power in watts]. The U.S. EPA and Department of Energy developed Excel-based calculators to estimate the cost savings of upgrading to ENERGY STAR certified equipment[xix]. The results of this calculator, adjusted for WFC's typical usage, are in table *3*. These calculations deliver the cost benefit of early equipment replacement – which is replacing the equipment before it stops working. Cumulative savings is another way to assess cost benefits of early replacement. Cumulative savings is the sum of the total annual cost savings, minus the initial investment. The early replacement scenario contextually defines initial investment as the replacement purchase price. In contrast, the scenario of replacing failed equipment defines initial investment as the price difference between potential replacements. Positive cumulative savings or simple payback shorter than the equipment's assumed lifetime validate considering early replacement. The Purchasing Policy addresses replacing failed or retired equipment, giving preference to products that conserve energy, water, and other natural resources (i.e., ENERGY STAR units).

Cumulative savings = (Assumed lifetime x Annual Savings) - initial investment.

Early replacement	Initial investment = Purchase price
Current unit end of life replacement	Initial investment= ENERGY STAR unit price - Conventional unit price

Equipment	Assumed lifetime[xx]	Electricity Savings (kWh)	Propane (gal)	Water (Thousand gals)	Total Annual Cost Savings	Electricity (kWh)	Propane (gal)	Water (Thousand gals)	Electricity	Propane	Water	Purchase Price	Simple Payback (years)
Refrigerator (69 ft³)	11	870	-	-	$157	918	-	-	49%	-	-	$6,000	38.1
Refrigerator (24 ft3)	12	25	-	-	$5	228	-	-	10%	-	-	$1,000	200
Under-counter dishwasher	11	-	21	3	$71	1717	43	6	0%	31%	31%	$3,500	49.3
Conveyor dishwasher	12	1248	0	5	$226	6682	0	8	16%	-	40%	$11,600	51.3
Washing machine	12	323	5	6	$75	557	7	6	37%	40%	49%	$800	10.7
Clothes Dryer (electric)	12	177	-	-	$32	671	-	-	21%	-	-	$800	25
Pre-rinse sprayer	12	-	52	7	$177	-	36	5	0%	59%	59%	$50	0.3
Desktop computer	4	18	-	-	$3	29	-	-	39%	-	-	$400	133.3

Table 4: ENERGY STAR Costs & Benefits

Recommendations

In general, I recommend that WFC not replace equipment before it has reached the end of its useful life.

WFC should consider using a low-flow pre-rinse sprayer in the Lloyd Lodge kitchen. The T&S Ultimate low-flow pre-rinse sprayer, used in this example, is an inexpensive investment with a simple payback of 4 months[xxi]. Extended use time is one unintended consequence common with this type of (ultra) low-flow sprayer (0.65 gpm), which could reduce savings.

In lieu of early replacement, here are some things that WFC can continue doing to use equipment as efficiently as possible:

Refrigerators

- ◊ Keep the temperature between 35 and 38 degrees Fahrenheit.
- ◊ Leave a few inches around the refrigerator for air circulation; clean condenser coils, if present.
- ◊ Check the door seals.

Clothes washers and dryers

- ◊ Run full loads.

Dishwashers

- ◊ Scrape as much food as possible before rinsing.
- ◊ Run full loads.

Computers

- ◊ Use sleep mode and power management features.
- ◊ Turn off when leaving for two or more hours.

Sustainability Branding & Marketing

Background

Identifying the target segment and Brand Purpose are critical elements to forming a sustainable branding plan. Brand purpose is described by expanding on what WFC does better than similar businesses, and how does WFC receive funds. WFC's target segment are progressive minded individuals, families, and organizations seeking immersion in New Hampshire's beautiful White Mountains. The marketing plan aims to penetrate the market segment and attract more guests, visitors, and donors. In other words, the Branding Plan is about growth (profit and constituency) as well as social awareness.

Building Sustainability Branding

Building the brand begins with the vision of how WFC wishes to be portrayed. WFC has a long history of implementing and modeling sustainable best practices. That history and activism makes WFC more than just a summer camp with a social conscience, and is important to communicate with potential guests. Pursuing certification in the New Hampshire Hospitality Program will help WFC establish their brand, and validates the sustainable initiatives WFC has implemented.

A word cloud is a tool that can be useful to define *Brand Association*. Companies take the most common positive and negative associations and decide how to mitigate the negative and reinforce the positive. The Starbucks Association matrix frequently has both comfortable and friendly with snobbish and pretentious, revealing both the best and worst aspects of their brand image[xxii].

Reaching the Target Audience

When approaching the target audience, it is common to develop "Brand myopia" – where organizations fail to imagine value outside the model they have always used. For WFC, the objective of developing and growing their brand is to reach a wider audience and attract more guests. In practice, WFC could promote the conference center as a space to hold corporate meetings, while being surrounded by nature.

Figure 3: WFC Word Cloud from online reviews.

Fostering Sustainable Behavior

Behavior change is indispensable in achieving sustainability. A quick look at the history of World Fellowship Center reveals that a deliberate intent to further change by providing a setting that inspires models, and cultivates change has existed since the center's conception. It was present in the founding slogan "In a time of war, prepare for peace", and reflected in their mission today: to promote peace and social justice through education and dialogue inspired by nature.

WFC has intuitively engaged in an approach resembling the community-based social marketing strategy described by McKenzie-Mohr[xxiii]. Community-based social marketing is broken down into four steps: uncovering barriers and selecting behaviors, designing strategies, piloting, and evaluating. The use of this systematic process at WFC is discussed below.

Uncovering Barriers and Selecting Behaviors

Key to developing a successful community-based social marketing strategy is deciding which behaviors to promote, and identifying the barriers preventing the behavior's adoption by the community. WFC's goal to minimize waste exposes multiple behaviors to target, for example, reducing the use of disposable cups. Target behaviors should be non-divisible, end-state actions – or the final desired action, rather than precursors to an outcome. Barriers here include availability of reusable cups, and the inconvenience of returning cups for cleaning[xxiv].

Designing Strategies

The objective of designing a community-based social marketing strategy is to reduce barriers, while simultaneously raising awareness of the benefits associated with the target behavior[xxv]. Successful strategy development can take many forms, such as soliciting public commitment or providing informational materials on benefits derived from the desired change. To reduce the use of disposable cups, WFC simply stopped providing them to guests.

Piloting

The pilot phase tests the efficacy of the strategy designed in the prior step, within a restricted audience. Strategies that proceed without a sound understanding of real or perceived barriers have a greater probability of failing during the pilot phase. Conversely, an unsuccessful pilot is an opportunity to revamp the strategy, and re-pilot until the desired level of change is realized.

Evaluation

Evaluation of strategy effectiveness underscores the importance of measuring outcomes (e.g., disposable cups purchased) rather than anecdotal evidence or personal testimony. WFC should evaluate the recommended initiatives described within this SAP to confirm that they produce the intended change. For example, kitchen staff may use the low-flow pre-rinse sprayer for longer durations, resulting in no net change of water use, or worse, an increase.

Sustainability Capital Reserve

Sustainability Capital Reserve

Sustainability capital projects, like all capital projects, require funding. Typically, companies use metrics such as payback periods or return on investment (ROI) to decide which projects receive funding, and which do not. The Sustainability Capital Reserve is a mechanism used to allocate funds that WFC can only use to towards implementing sustainability related projects. WFC can seed the reserve from designated cash donations and operational cost savings from previously implemented sustainability projects. As WFC implements more cost-saving sustainability projects, the reserve replenishes and perpetuates.

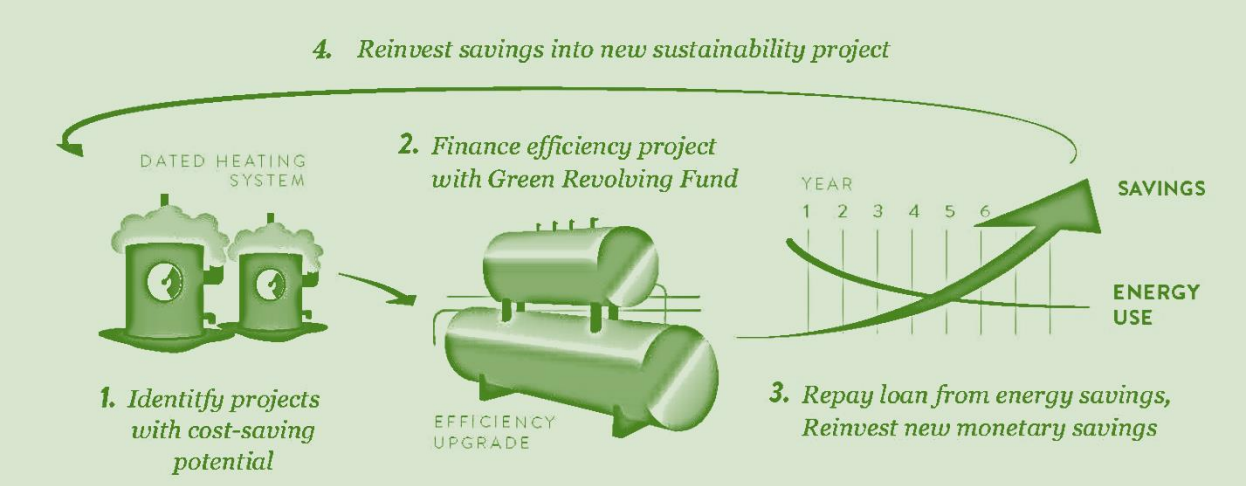


Figure 4: Sustainability Capital Reserve Flow Chart[xxvi]

Methodology

The sustainability capital reserve represents an important piece of WFC's overarching sustainability and strategic development goals. WFC should formalize the decision rules used to prioritize project funding[xxvii]. Tracking operational cost-reductions resulting from sustainability projects is necessary to appropriate this savings from the operational budget back into the sustainability capital reserve. The approach should be methodical, but does not need to be complicated in order to be effective.

Recommendations

- Seed money can come from donations; explore partnerships (existing & new) for opportunities to exchange in-kind donations (i.e., labor to install PV in exchange for hosting Solar Company X's next company retreat).
- Create an option for benefactors to allocate their donations to the Sustainability Capital Reserve on the WFC website.
- Establish a simple accounting mechanism to capture savings from implemented initiatives, using the same or similar KPIs from the draft WFC Sustainability Report-Addendum C.

Performance Metrics & Reporting

Comparable, accurate key performance indicators (KPIs) are the infrastructure for measuring performance. The draft WFC Sustainability Report (Addendum C) uses KPIs to communicate current standings in WFC focus areas, with the intention of eventually comparing performance at different time points. This function is critical to WFC's ability to track progress towards sustainability goals as well as initiative efficacy. WFC can use additional KPIs, to provide perspective surrounding the conditions at WFC during the assessment period. For example, occupancy percentage, or rooms occupied ÷ rooms available, for a specific period may explain fluctuations in energy use, during that period. Another less tangible, yet useful, KPI is customer satisfaction. Customer satisfaction can be difficult to measure, but will be helpful in adjusting and creating buy-in with initiative planning.

Selecting Key Performance Indicators

As mentioned earlier, KPIs should be comparable, timely, accurate and clear. WFC can use the KPIs listed in Table 5 to monitor and communicate their progress in key areas. The development of new goals may require additional KPIs.

Key Performance Indicator	Source	Focus Area
Total electricity consumption	Utility bills	Energy consumption
Total propane consumption	Utility bills	Energy consumption
Renewable energy consumption	Cord wood delivered; installed capacity (i.e., 5kW solar PV)	Source of energy
Scope 1&2 GHG emissions	Calculated from utility bills	GHG emissions
Percentage of organically maintained gardens/landscaping	Calculated ratio	Impact to ecosystem
Total water consumption	Water metering*	Water conservation
Water consumed for agricultural activities	Water metering*	Water conservation
Customer satisfaction	Web based feedback form*	Guest experience
Occupancy ("fill" measure)	Rooms occupied ÷ rooms available	Contextualize other KPIs; justify increasing capacity
Average number of guests per night	Calculated from occupancy ÷ time	Contextualize other KPIs

* Mechanism not currently available.

Table 5: WFC Key Performance Indicators

Sustainability Snapshot

A 'Sustainability Snapshot' is visual representation of WFC's goals, initiatives, and achievements. The snapshot below is a condensed version of the draft Sustainability Report (Addendum C).

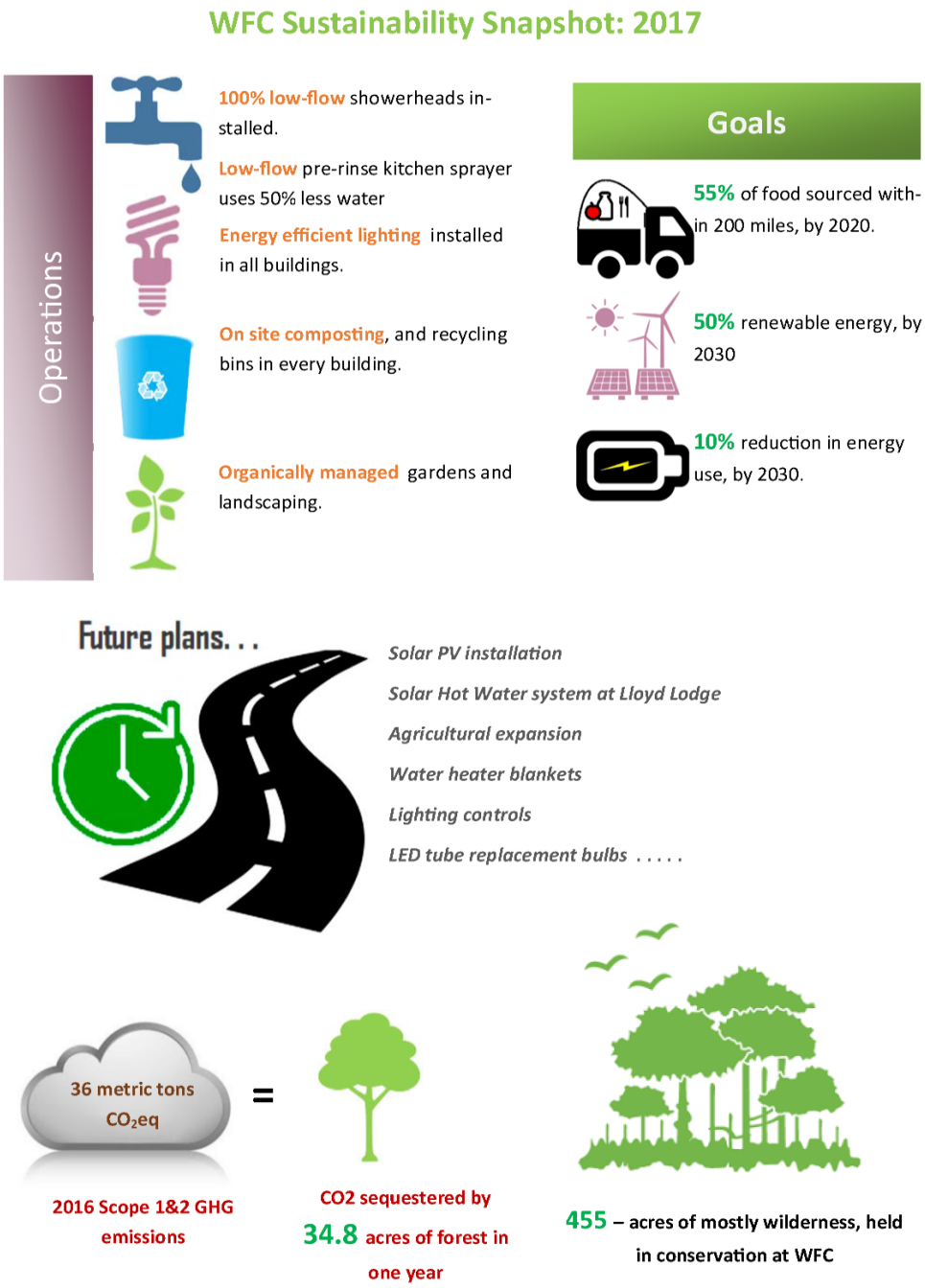


Figure 5: WFC Sustainability Snapshot

FUTURE INITIATIVES

Solar PV Installation

Background

Solar photovoltaic systems produce clean, renewable electricity at competitive prices. Grid-connected systems contribute to the greater good by reducing peak loads, which in New Hampshire coincide with times of principal solar productivity. Photovoltaics also have value for off-grid applications, where providing electricity from existing utility lines is prohibitively expensive. The solar PV marketplace is constantly changing – tax incentives described below expire in 2019; more efficient and less expensive technologies are emerging; the New Hampshire Public Utilities Commission is renegotiating the net metering exchange rate, such that utilities would pay consumers wholesale rates rather than the current 1:1 model. Given the dynamic climate of the PV market, it is more sensible to discuss static benefits of investing in solar electricity – such as energy independence, cost savings, and no emissions.

Discussion

WFC can either purchase or lease solar photovoltaic panels. Solar panel leases or power purchase agreements (PPAs) reduce or eliminate the upfront costs, and typically provide a 15-30% cost savings for electricity, compared with utility provider rates. With a PPA, the installer owns the equipment and receives all tax credits and other financial incentives, including renewable energy credits (RECs). ReVision Energy is a local installer experienced in drafting PPAs for non-profits. ReVision leverages federal tax credits, accelerated depreciation, and state rebates to transfer ownership to the host as soon as possible. Alternatively, if the host is not interested in owning the system, the same benefits are leveraged to reduce the price the host pays for PV generated electricity.

WFC can finance the purchase of a solar system with a loan. For a 5kW system, loan payments would be approximately the same as the cost of purchasing the electricity from the grid[xxviii]. As a non-profit, WFC would need a tax equity partner in order to take advantage of federal tax credits available for solar installations.

Costs	Benefits
$3.36/watt (purchased) or $17k/5kW $0.12-0.14/kWh (PPA)	RECs $55/MWh 30% federal tax credit. Generates no CO_2, SO_2, NO_x, Pb, Hg. NH Public Utilities Commission rebate - $0.65/watt, up to 25% of project cost. Added value to building/campus infrastructure. Net metering.

Recommendations

If WFC moves forward with purchasing a PV system, I recommend that they look for an eligible tax equity partner internally (e.g., board members). The 30% federal tax credit on a $17,000 (5kW) system equals $5,100; NH Public Utilities Commission rebates on this same system are $3250 - - bringing the cost of this system down to $8,650. I recommend siting the first installation at the Cape, because it is occupied year round, and consumes electricity consistently throughout the year.

If WFC is unable to find a tax equity partner, pursuing a PPA remains a good and viable option. WFC pays the highest price for electricity used at Lloyd Lodge, in part because of intensity and related demand charges. Lloyd Lodge accounts for 63% of the electricity consumed at WFC, and because of demand charges has the highest kWh costs on campus. A leased solar installation and PPA with a $0.04/kWh reduction would result in a cost savings of $812/year at Lloyd Lodge.

$$20{,}292\ kWh * \frac{\$0.04}{kWh} = \$811.68$$

WFC could sequester cost savings from the PPA in the Sustainability Capital Reserve, to finance purchasing and installing additional PV systems. It is possible for WFC to pursue both aforementioned options simultaneously – i.e. purchasing a PV installation and signing a PPA, to accelerate growth of the Sustainability Capital Reserve and expedite implementation of future projects.

Solar Hot Water Installation

Background

Propane is the primary fuel used to heat water at WFC. Solar hot water (SHW) systems take advantage of the sun to heat water, reducing costs by displacing expensive fuel with free solar energy. In 2015, WFC selected the propane fired hot water system installed at Lloyd Lodge in part because of its readiness to tie-in with solar thermal collectors. Lloyd Lodge uses the most hot water on campus, making it a prime location for a solar hot water installation.

Discussion

WFC's main objective in pursuing SHW is to reduce propane consumption. The center consumes approximately 2,100 gallons of propane per year for cooking and heating water. Lloyd Lodge (presumably) accounts for 60% of this consumption; approximately half of that propane, or 630 gallons, is consumed heating water. Therefore, the goal of the SHW system is to abate this 630 gallons, potentially saving $2142/year **[630 gal. x $3.40/gal.].**

The 30% federal tax credit available for solar PV also applies to SHW installations. NH Public Utilities Commission provides rebates equal to $0.12/rated kBtu/year[xxix].

WFC must determine cost-effectiveness of a SHW installation in comparison to existing equipment. An analysis comparing two cold-climate SHW systems revealed payback periods close to 50 years (see table 5). Applying linear extrapolation to estimate system costs for WFC resulted in a simple payback period of 10 years. Linear extrapolated estimates for solar energy collected, system costs, and hot water usage, were consistent with projections from a New England Solar Hot Water feasibility study, for a similar SHW project (provided with this plan).

Cold-Climate Solar Hot Water Payback Analysis			
Location	**System installed in Hadley, Massachusetts**	**System installed in Madison, Wisconsin**	**Proposed WFC System -(linear extrapolation)**
Average hot water use	64 gallons per day	71 gallons per day	450 gallons per day
Average solar fraction	61%	63%	-
Lowest monthly solar fraction	2	19%	-
Highest monthly solar fraction	87%	93%	90%
Solar energy collected	8,590 MBtu (12 months)	8,750 MBtu (extrapolated to 12mo)	52,500 MBtu (extrapolated)
Backup system	Oil-fired boiler with indirect water	Instantaneous natural gas water	Propane-fired boiler w/indirect
Annual fuel savings	73 gallons of oil	96 therms of natural gas	573 therms of propane
Net annual savings			$2,142
System cost	$7,808	$6,493	$38958(extrapolated)
Incentive/rebate received by	$1,500	$2,496	$6300 (PUC) + $11500 (Federal)
Net system cost	$6,300	$3,997	$21200
Simple payback period	47 years	46 years	10 years

Table 6: Adapted from "Cost, Design and Performance of Solar Hot Water In Cold-Climate Homes," by Robb Aldrich and Gayathri Vijayakumar.[xxx]

Recommendations

WFC should contact a SHW installer to schedule a feasibility study. The feasibility study should include an onsite visit to determine hot water usage, using an ultrasonic or magnetic flowmeter. The feasibility study should also include design specifications, and a financial analysis. I again recommend that WFC look for an eligible tax equity partner internally (e.g., board members), to take advantage of the 30% federal tax credit.

Agriculture Expansion

Background

WFC's organic vegetable gardens were established under the leadership of Christoph and Kathryn Schmauch, who directed the center from 1970-2001. The Schmauch's used gardening as a way to connect with the local community, and to produce vegetables for guest consumption. WFC seeks to expand agricultural operations and cultivated land, initially for in-house consumption, with a long-term goal of pursuing a community supported agriculture (CSA) like model.

Discussion

Expanding gardening is harmonious with WFC's mission and vision to promote environmental harmony, provide opportunities to enjoy and learn about nature, and model organic agricultural practices. Expansion offers cost-saving opportunities, and is a continuation of WFC's commitment to locally sourcing products. Agricultural activities will also help WFC differentiate itself as a sustainable business, following the sustainable branding & marketing initiative described earlier. Making parts of the agriculture operations (e.g.; harvesting, canning, weeding) available for guest participation fulfills WFC's vision, and resembles the well-established agritourism business model, where agritourists participation in agricultural activities is central to the business model.

Recommendations

1) Establish proportion of agriculture products currently provided by WFC gardens, as a baseline key performance indicator.
2) Engage with guests and staff to determine their interest in participating in gardening activities. There are several ways this can be accomplished –i.e., interviews, surveys, questionnaires or question on guest registration.
3) Set S.M.A.R.T goals (**S**pecific, **M**easureable, **A**ttainable, **R**elevant, **T**imely) regarding expansion (e.g., cultivate additional 1 acre for perennial berries by May 2018). The measurability of the goal will allow progress to be quantified.
4) Canvass WFC contacts for advice and potential future partnerships.
   a) Would Temple-Wilton Farm be interested in sharing resources with WFC?
5) Utilize resources available on the University of New Hampshire website for varietal selection and planning. Another aspect to keep in mind during planning is how the harvesting season aligns with occupancy. The implication being better crop utilization when peak harvest times overlap with peak occupancy.

ROADMAP

WFC can implement the initiatives described within this action plan using the roadmap outlined below. The roadmap describes initiative objectives and a schedule to implement the recommended initiatives.

Initiative	Objectives	Schedule
Adopt Environmental Policy Statement	NH Green Hospitality Program (NHGHP) prerequisite; define WFC's sustainability vision.	June 2017
Adopt Purchasing Policy	NHGHP prerequisite; Standardize procurement decision rules.	June 2017
Designate environmental representative or team	Manage implementation of sustainability initiatives; NHGHP prerequisite.	June 2017
Submit NHGHP membership application	Sustainability Branding; 3rd party verification of sustainability practices.	June 2017
Agriculture Expansion – Survey	Gauge guest interest in participating with gardening.	June-August 2017
Low-flow pre-rinse sprayer	Conserve water; reduce propane used for heating water.	July 2017
Sustainability Capital Reserve	Capture savings from sustainability initiatives for future green projects.	August 2017
Solar Hot Water Feasibility Study	Provide financial analysis, design specs for SHW installation.	August 2017
Rain Barrel Installation	Model of sustainable practice; conserve water.	September 2017
Energy Tracking	Record energy consumption, monitor and reporting on performance.	Initiated. (Ongoing data entry)
Water Heater insulating blankets	Improve water heater performance; reduce propane usage.	October 2017
Lighting upgrades	Reduce electricity used for lighting.	Initiated and ongoing.
Lighting Controls for new construction	Reduce electricity used for lighting.	Contemporaneous with construction planning.
Guest Garden Beds	Pilot garden expansion project.	May 2018
Solar PV Installation	Renewable energy source. Resiliency against energy price volatility.	May 2020

Addendum A

Example of Environmental Policy/Mission Statement:

World Fellowship Center is committed to protecting the environment, the health and safety of our employees, and the community in which we conduct our business. It is our policy to seek continual improvement throughout our business operations to lessen our impact on the local and global environment by conserving energy, water and other natural resources; reducing waste generation; recycling and; reducing our use of toxic materials. We are committed to environmental excellence and pollution prevention, meeting or exceeding all environmental regulatory requirements, and to purchasing products which have greater recycled content with lower toxicity and packaging, that reduce the use of natural resources.

Environmentally Preferable Purchasing (EPP) Policy

Sample 1

Preference will be given to purchasing products and services that have the following environmentally friendly attributes with acceptable parameters for price, quality, and delivery:

- Maximizes post-consumer recycled content.
- Minimizes packaging and other wastes.
- Minimizes toxicity.
- Are durable and reusable.
- Are more locally available to minimize transportation.
- Are made from sustainably produced materials.
- Are compostable or biodegradable.
- Conserves energy, water, and other natural resources.

Sample 2

The goal of this policy is to ensure that products and services purchased or contracted for conform to the goals of our company's environmental policy. We will strive, where feasible, to purchase environmentally preferable products and services to meet the company's office and operational needs. We will also favor suppliers who strive to improve their environmental performance, provide environmentally preferable products, and who can document the supply chain impacts of their efforts.

Wherever possible, purchasing decisions will favor products and feedstocks that:

- Reduce greenhouse gas emissions.
- Are made with renewable energy.
- Reduce pollution from all discharges (releases to air, water, and land).
- Reduce the use of toxic materials hazardous to the environment, employees and public health.
- Contain the highest possible percentage of post-consumer recycled content, followed by percentage of recycled content.
- Reduce packaging and other waste.
- Are energy efficient.
- Conserve water.
- Are reusable and/or durable.
- Minimize transportation (local sources, concentrated products).
- Serve several functions (for example, copiers/printers, multipurpose cleaners) to reduce the overall number of products purchased.

Environmentally preferable products and services that are comparable in quality to their standard counterparts will receive a purchasing preference. In situations where the most environmentally preferable product is unavailable or impractical, secondary considerations will include production methods and the environmentally and socially responsible management practices of suppliers and producers. Environmentally preferable purchasing is part of our long term commitment to the environment. By sending a clear signal to producers and suppliers about this commitment, we hope to support wider adoption of environmentally preferable products and practices.

Addendum B

Energy Tracking (Electricity and Propane usage)

Electricity Consumption

Building & Year	
Month	**kWh**
January	0
February	0
March	0
April	0
May	0
June	0
July	0
August	0
September	0
October	0
November	0
December	0
Total	

Propane Consumption

	Propane (gallons)
December – January 20xx	0.0

Total Campus Electricity Consumption

Year	
Month	**kWh**
January	0
February	0
March	0
April	0
May	0
June	0
July	0
August	0
September	0
October	0
November	0
December	0
Total	

In Excel, totals will populate from ***Building & Year*** monthly entries, using Excel formula: *=sum(number 1, number 2, . .)*

Addendum C

World Fellowship Center where social justice meets nature

2017-2018 Sustainability Report

World Fellowship Center believes in a sustainable world where people are deeply rooted in their shared humanity and the pursuit of justice.

Sustainability Vision

At WFC, sustainability is part of strategic development plan – but it does not stop there. Sustainability is ever-present in our thoughts, shaping our decisions, and resulting in creative solutions and new initiatives. For WFC, sustainability is a process of continuous improvement. How can we use less energy? How can we reduce our water use? What can we do to reduce waste? We ask these questions in the context of expanding capacity and improving our guest's experience.

Benefits

Our commitment to sustainable operations pays us back in a multitude of ways. We have discovered and implemented initiatives to lower operating expenses, which also help us build resiliency and self-sufficiency into operations. Savings from these initiatives allows us to do more. From improving amenities and our physical campus to providing financial assistance to kindred organizations with limited funding – the savings permits more action on our behalf, while emphasizing efficient and responsible use of resources.

By modelling sustainability, we are taking a leadership position to help others uncover the rewards of a sustainable lifestyle. This goes beyond promoting cost savings from switching out light bulbs - - we are challenging ourselves, and our community to think about the implications of our actions in a broader context.

Achievements

WFC has been busy putting sustainability into action! Here is a rundown of what we have been doing:

Applied to New Hampshire Green Hospitality Program (NHGHP) – this great program will validate all of our sustainability initiatives and efforts. WFC will appear on their website as a "Green Hospitality Provider" and can use the NHGHP logo for advertising.

Adopted an Environmentally Preferable Purchasing Policy – to standardize our procurement processes and formally incorporate sustainability as part of this decision-making mechanism.

Established a baseline for current energy consumption – we crunched the numbers to provide a starting point for setting energy efficiency improvement goals. You can see the numbers in the *Accounting* section.

Created a Sustainability Capital Reserve – also referred to as a Green Revolving Fund, this accounting tool tracks operational cost-reductions resulting from our sustainability projects, and appropriates this savings to finance future sustainability improvements.

Installed a rain barrel at Lloyd Lodge - this allows us to use even less well water in caring for our native, draught resistant landscaping around our main lodge. If you are interested in installing your own rain barrel, here are some simple plans to get you started.

Initiative Criteria

We have a simple methodology for selecting which initiatives to implement, aimed at reducing waste, conserving water and energy, and minimizing the impact to our natural surroundings. Our Environmentally Preferable Purchasing Policy reinforces our commitment to minimize negative social and environmental impacts of our sourcing.

	Initiative	Impact
Waste reduction	Bulk purchasing	Reduced packaging waste
	Cloth napkins	Reusable- reduced paper napkins in waste stream
	Reusable utensils	Eliminates plastic utensils in waste stream
	Recycling	Facilitated by prominent placement of collection bins
	2nd-life furnishings	Re-use donated furniture, divert from waste stream
	On-site composting	Divert from waste stream, recycle food scraps into soil
	LED & CFL lights	Longer life = fewer burnouts/year
Water Conservation	100 % low-flow showerheads	Reduced water usage
	Rain barrel	Reduced fresh water usage for landscaping
	Native and drought resistant landscaping	Reduced fresh water usage for landscaping
	Towel and linen reuse program	Reduced water for laundering
	Bio-degradable cleaning products	Preserve water quality
	Nature trails maintained to minimize erosion	Preserve water quality
Energy Conservation	Encourage carpooling	Reduce driver only trips, increase passenger miles/fuel unit.
	Energy efficient lighting	Reduced energy consumption for lighting
	Towel and linen reuse program	Reduced energy consumption for laundering
	100 % low-flow showerheads	Reduced energy consumption for heating water

*"WFC uses **only** what is necessary, in an efficient and thoughtful manner, always looking for new ways to improve."*

Goals

55%	**Total food expenditures grown/processed within 200 miles of WFC by 2020.**
10%	**Reduction in Scope 1 & 2 greenhouse gas emissions by 2030.**
50%	**Energy from renewable sources, by 2030.**
100%	**Organic matter composted, by 2020.**
Zero	**Compostable matter sent to landfill, by 2020.**

Performance Summary

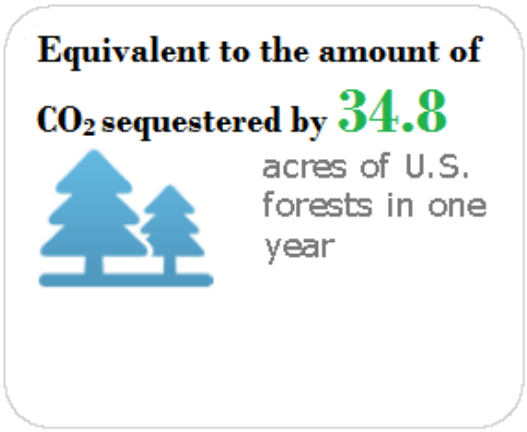
We have set some ambitious goals to help us get where we want to be. We are tracking our progress using 2016 as our baseline year, and the key performance indicators (KPI) summarized below.

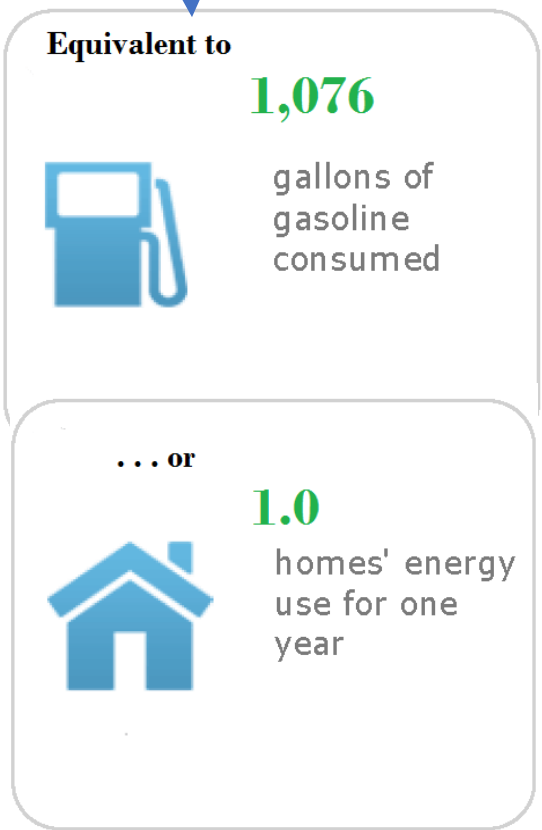
Total Electricity Consumption – 32,335 kWh

Total Propane Consumption – 2045 gallons

Scope 1&2 GHG Emissions – 36 metric tons of CO_2 equivalent ($GtCO_2eq$)

Renewable Energy – 122.7 mmBTU (29% of total)





Our Path Forward. . .

We have plans for implementing new initiatives that will help us reach our goals. We will continue the process of verifying that these initiatives are working as intended, using KPIs. In some cases, we will pilot initiatives before implementing them more broadly. We also will be developing new mechanisms to track and monitor progress when and where they are needed (i.e., water metering, waste audits). Below is summary of what we plan to do next.

	Initiative	Impact	Key Performance Indicator
Waste Reduction	Agriculture Expansion	Reduced packaging waste	Total food expenditures/year/guest
	LED replacements for Fluorescent tubes	Longer life = fewer burnouts/year	# of burnt out bulbs/year
Water Conservation	Low-flow pre-rinse sprayer	Reduced water usage	Annual water consumption*
Energy Conservation	Solar PV installation	Reduce transmission losses. Renewable energy source	Solar PV kWh/year as % of total consumption
	ENERGY STAR upgrades	Reduced energy consumption	kWh/year
	Solar Hot Water System	Reduced energy consumption for heating water	Propane use (gallons/year)
	Water heater insulating blankets	Reduced energy consumption for heating water	Propane use (gallons/year)
	Lighting controls	Reduced energy consumption	kWh/year

*Currently, our wells are not metered - - but we are looking into solutions to provide the needed metrics. We are also looking into waste auditing protocols to provide a reliable mechanism to track our waste generation and diversion.

We look forward to sharing our progress, and lessons learned in the upcoming 2020 Sustainability Report!

If you have questions, feedback, or ideas, please drop us a line at:
sustainability@worldfellowship.org

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