

**Bethel College Mennonite Church Creation Care Committee (CCC)
Creation Stewardship Note # 42, December 17, 2011
CCC Outcomes Report: To: Long-Range Planning Team (LRPT) and Facilities Commission**

RECOMMENDATION: That the Long-Range Plan (a) include projects that minimize usage of energy & water and production of waste and (b) encourage all BCMC groups to practice stewardship of resources.

We recommend three interrelated components: (A) outcomes, (B) procedures, and (C) projects.

A. OUTCOMES. In light of increased percentage of budget for utilities from 4.8% to 6.3% in the last 15 years, the church should seek to return to no more than 4% or less of budget.

Recommended target outcomes (percentage decrease with reference to average annual 2006-2010 usage):

1. Gas - decrease MCF by 30% by 2014; 40% by 2020.
2. Electricity - decrease kWh by 25% by 2014; 45% by 2017; 70% by 2020.
3. Electricity - decrease weekday use June 1 to Sept 30 by 30% (currently 2.5x all other rates). By 2020 have a photovoltaic array of 18.4 KW and produce more than 1/2 our current kWh consumption.
4. Water (interior) - decrease ft³ by 10% by 2014; 20 % by 2020; 30 % by 2030.
5. Water (exterior) - decrease ft³ by 10% by 2014; 40% by 2020; 50 % by 2030.
6. Waste recycling – decrease by 30% landfill waste by 2014.

B. PROCEDURES FOR ACHIEVING OUTCOMES

1. Facilities Committee (FC) and Creation Care Committee (CCC) meet jointly at least once per year to review actual outcomes and readjust future target outcomes as needed.
2. FC and CCC chairs present results of outcomes review annually to the church Board; the Board then adjusts practices and budget as needed to remain on track.
3. Congregational members should seek to include stewardship practices in their own lives, residences, and workplaces.

C. PROJECTS TO ACHIEVE OUTCOMES = \$250,000 OVER EIGHT YEARS (2012-2020)

Cost estimates are tentative and should be viewed as recommendations to Facilities Commission, which submits authoritative cost estimates. Schedule and mix of technologies are to be determined.

1. Replace 1950-era boiler with a high-efficient boiler (90-95%) if we can be convinced that we'll achieve a significant (30%-40%) decrease in actual fuel usage. Payback period is very uncertain (10-25 years). \$120,000 - \$150,000)
2. Consider heat-pump/geothermal H/C system as alternative to new boiler or supplement to old with increased electrical usage supplemented by our own photovoltaic system.
3. Computerized Monitor and Control system to better manage temperatures in rooms to match usage of rooms. (\$15,000-\$30,000) by 2014
4. Insulation. Add for higher R-values where possible by 2018. Dormer rooms on second floor are targeted. (Rough ball park estimate: \$5,000 every two years 2012-18 = \$15,000)
5. Windows. Double-cell shade coverings of selected windows. Add storm windows where lacking; improve where needed. (Rough ball park estimate: \$5,000 every two years 2012-20 = \$20,000)
6. Photovoltaic pilot project, with added panels every 2 years. (Rough ball park estimate: \$17,000 every two years 2012-20 = \$68,000)
7. Lighting. Decrease wattage where possible by 2015. (Rough ball park estimate: \$2,000)
8. Water reduction technologies/practices. Interior: on-demand hot water; aerator faucet heads; dual-flush toilets. Exterior: reduce irrigated areas by 50%; replant with drought-resistant grass. \$5,000.
9. Waste streams. Identify needed improvements by 2014. Increase recycling signage and container visibility. Reduce printed bulletins and printed church newsletters. (\$1,000)

ENERGY EFFICIENCY: NATURAL GAS AND ELECTRICAL USAGE AT BCMC (John Pannabecker/Lee Wheeler)

This report summarizes BCMC recent history of fuel usage in order to (a) compare BCMC to other institutions, (b) determine measurable outcomes through 2020, and (c) propose projects to help BCMC achieve those outcomes.

Summary

We now have a baseline from which to focus on options in more detail, prioritize them, and construct a model and schedule of an appropriate mix of solutions that includes traditional and alternative technologies and retrofits. Developing a comprehensive plan for an appropriate mix would take at least a year, in conjunction with Facilities. We think it makes sense now to implement a pilot project of photovoltaics that is expandable incrementally because it will provide BCMC with both practical results and continuing congregational education on sustainability.

Options for improved efficiency include: (a) more efficient boiler and/or combined heat pump/geothermal system; (b) photovoltaic pilot project with incremental additions every two years; (c) computerized monitor/control system; (d) insulated window treatments and wall insulation where possible; and (e) improved lighting efficiency.

Natural Gas Usage/Cost (4-year history)						Electrical Usage/Cost (4-year history)				
Usage	Gas	Gas				Electricity	Electricity			
Year	MCF	kBtu	Cost			KWH	kBtu	Cost		
2007	1,082	1,103,436	\$12,567			62,720	214,063	\$5,083		
2008	1,263	1,288,158	\$14,407	4-yr mean	4-yr mean	62,960	214,883	\$5,599	4-yr mean	4-yr mean
2009	1,243	1,268,166	\$12,118	kBtu	\$/MCF	67,600	230,719	\$6,520	kBtu	\$/KWH
2010	1,144	1,166,982	\$10,453	1,206,686	\$9.136	72,720	248,193	\$6,286	226,965	\$0.086

Relative Efficiency

Energy Star has developed an online model to measure relative efficiency of various types of institutions, including houses of worship, using the variables shown in the table below. We ran three scenarios for the existing BCMC design and one target rating assuming a decrease in usage of 40% in natural gas and 10% in electricity.

BCMC parameters used for Energy Star Target Finder & Performance Rating Results				
	Scenario 1	Scenario 2	Scenario 3	Target Save40%g10%e
Zip code	67117	67117	67117	67117
Gross floor area	24,232	23,232	24,232	24,232
Seating capacity	600	600	600	600
Weekday operation	5	5	5	5
Weekly operating hours	50	50	40	50
No. of computers	4	4	4	4
Cooking facilities	yes	yes	yes	yes
Commercial refrigeration units	1	1	1	1
Electricity usage 4-yr mean kBtu	226,965	226,965	226,965	204,206
Natural gas usage 4-yr mean kBtu	1,206,686	1,206,686	1,206,686	724,012
Results				
Energy Star Performance: Design Rating	70	68	68	88
Notes: Change of 1,000 sq ft = rating difference of 2 (3%).				
Change of 10 weekly operating hours - rating difference of 2 (3%).				
Notes: Scenario #1 is our baseline, with a current Energy Star rating of 70 out of 100, with 50 being the median. So we are starting out relatively efficient, better than 70% of comparable institutions. Scenarios #2 and #3 illustrate the sensitivity of the Energy Star model to a change in one variable: (#2) 1,000 sq. ft. and (#3) 10 operating hours. Scenario #4 shows that how a decrease in fuel usage will improve our rating from 70 to 88.				
http://www.energystar.gov/index.cfm?c=new_bldg_design.bus_target_finder				

INSULATION REPORT (*Glen Ediger*)

Summary of existing insulation: Minimal R-13 batt insulation in exterior wood wall construction, such as sloped walls and dormers in original upper level construction. Better R-19 batt insulation exists in wood wall surfaces in newer additions, with R-7 foam insulation on new addition exterior surfaces that have stone exterior. The original construction with exterior stone facing has no insulation.

The sanctuary ceiling insulation was upgraded during the interior resurfacing project in the 1980s. It now has blown in insulation above the existing insulation filling the entire 5-1/2", plus there is an additional 1" rigid foam insulation added behind the sheetrock, total of R-20.

There are no insulation pads behind external wall electrical outlets.

Summary of existing window insulation: There are over 240 storm windows in the existing structure. The storm windows are in place on all but bathroom windows. Storm windows are of minimal quality. There is no foam gasket insulation around swing-out windows. Some windows in the education wing have vertical blinds that provided minimal insulation value.

Thermal Imaging: Digital thermal images were taken of the building, providing minimal useful data due to weather conditions, but images do confirm that most heat is lost through the windows.

Conclusion/Proposal: There is no easy way to add insulation to most exterior surfaces.

1. Reasonable opportunities for adding additional insulation only exist in the flat ceilings on the upper levels.
2. Additional rigid insulation may be able to be added to the exterior roof surface of the sanctuary when re-shingling.
3. New foam gasket insulation could be added to existing swing out windows and doors.
4. All storm windows could be replaced with new and better storm windows, but this may prove cost prohibitive, what we have is much better than nothing.
5. Electrical outlet gaskets could be added to outlets that are located in wood construction exterior walls, the stone-faced walls may show little advantage with this insulation.
6. Thermal interior window blinds could be added to all non-sanctuary windows - these will only be effective if left closed in cold months when the room is not in use. This requires education and participation to be effective.

Water Usage Report (*Glen Ediger/John P. Kliewer*)

Summary of internal water usage: The church is metered at two separate water rates. Internal usage is metered at a current rate of \$0.105 ft³ (including sewer). The rate has increased by 28% over the last 5 years, but actual annual water usage has gone down slightly over the last 5 years with a 5-year average of 15,340 ft³/year (114,800 gallons/year).

The church is used daily with peak usage on Sundays and regular daily use with office staff; and maintenance and Community Play School five days a week for nine months of the year. Additional spikes may occur with special events such as funerals, weddings, and special events with use of bathrooms and dishwashing.

Summary of external water usage: External water usage is metered at a lower rate - the current rate is \$0.037 ft³. The external rate has increased by 28% over the last 5 years with annual water usage fluctuating as much as 300% depending on the weather conditions from year to year. The 5-year average is 21,900 ft³/year (164,000 gallons/year).

The peak usage of exterior water comes primarily during the warm and dry months for the lawn irrigation and landscape watering. The front, north and south sides of the church are equipped with a sprinkler system operated with an automatic timer. Monica says they water sparingly. The lawn behind the church (which is primarily the playground) does not have a sprinkler system and receives minimal to no additional watering.

Internal water Conclusion/Proposal:

1. Hot water at distant locations from the hot water tank may waste considerable water. Removing the hot water lines to remote bathrooms and installing "On-Demand" hot water heater under the sinks can save considerable use of water and also the demand on the hot water tank would be reduced.
2. Systematic education of church membership could aid in minimizing internal water usage.
3. Assure that aerator heads are installed on all bathroom faucets since they have been proven to reduce water consumption.
4. In the process of restroom upgrades, low-water consumption, or even dual-flush toilets could be used to reduce overall water consumption

External Water Conclusions/Proposals

Opportunities for reducing exterior water usage primarily exist with the front lawn area.

1. One option is to replant the lawn with a more drought resistant grass variety. Options include Soysia Grass Bermuda Grass, or Buffalo Grass.
2. Another additional option is to reduce the irrigation square footage. A proposal has been developed that could reduce the irrigated area to 50% of current area. This proposal includes additional mulched and/or rock covered areas, along with a large common area being created in the central front lawn area. This area could include a new direct path to the front door from the college, multiple small seating areas for outside gatherings, and a creates an ideal location for a newly created sculpture that could add intrigue and distinction to the front lawn area. Even with the 50% lawn reduction significant surface area would still retain the green lawn look. Additionally, the area north of the church could be used to create a butterfly garden. This area could proved unique aesthetic opportunities, as well as be an educational opportunity for Community Play School, and also be advantageous for the biodiversity of the area. (Three landscape images have been produced and are available separately). It could be anticipated that with 50% lawn reduction, the sprinkler system would require reconfiguration, but that a possible 50% reduction in water usage could be obtained.

BCMC Waste Stewardship Report (*Jason Schmidt/Nat Dick/Lorna Harder*)

Waste to Landfill: Bethel College Mennonite Church contracted with Waste Connections out of Wichita in 2001 for a dumpster. There is a monthly fee of \$89.76 for this service. The City of North Newton also charges \$12 per month for Solid Waste. Monica Lichti did not think the dumpster normally reaches capacity. Further research could evaluate whether the dumpster is routinely filled each month and whether a smaller dumpster could reduce monthly fees. Also, further investigation could quantify the composition of the landfill waste to establish areas of possible improvement for reducing and recycling.

Waste to Recycling: Generally, BCMC does a good job at recycling. Recycling containers are distributed throughout the building, and the church office makes a concerted effort to recycle all office paper and plastic products. The church has contracts with South Central Recycling, and the recycling fee is not tied to volume of recycled waste. Monica thought that between 3 to 6 trash bags are picked up for recycling every other week. Wednesday evening meals generally double weekly recycling. Bulletin recycling could be improved. Monica noted that very few bulletins are deposited in recycling containers. Nat Dick noted that better labeling of containers and more strategic locations for recycling containers could increase the recycling of bulletins before the bulletins go home with individuals. Also, the biodegradable cups used during the fellowship time after church could be recycled.

Waste Reduction: The church has exhibited a commitment to waste reduction. Generally, the kitchen and office paper are thought to be two of the leading sources of church-generated waste. The kitchen has eliminated much of the disposable tableware through the use of non-disposable dishes and cups, the elimination of Styrofoam tableware, and encouraging individuals to bring their own tableware for Wednesday evening meals. The Funeral Committee has returned to using disposable tableware due to aging committee members who need more convenience.

The church office continues to strive to reduce paper use. Monica attempts to print as close to the number of bulletins as are used on Sunday. She also offers the receiving of the church newsletter via email, but few people opt to receive e-newsletters. Also, of the 375 bulletins that Monica prints every week, nearly every bulletin is picked up, which means every individual is using a printed bulletin. More education is needed to encourage couples to share bulletins and for people to opt to receive the e-newsletter.

Composting: Kitchen waste is assumed to be one of the leading sources of church waste. Composted food waste and biodegradable fibers can be a rich soil amendment. There is already an informal network of individuals who take home kitchen food waste for either composting or chicken feed. A more formal composting program could increase the volume of composted materials, be a potential educational opportunity for home composting, and lead to potential partnerships with the community garden.

Electronic Waste: Lorna Harder will have recommendations for e-waste by January

Radon: The church has never tested the basement for radon, and individuals living within close proximity of the church have discovered high levels of radon in their basements. With the community preschool located in the church basement, there is a health incentive to have the church tested and any ventilations systems installed to remedy potential high levels. Test kits are available from the Harvey County Health Department for \$4.50/kit; electronic testing units could be rented at about \$100 for multiple units; or a professional could be hired to test for radon.

Asbestos: In the early 1980s, former BCMC Pastor John Esau was made aware that the ceiling material in the fellowship hall contains small amounts of asbestos. He shared this information with a number of responsible individuals in the church but no action was ever taken. Because of the health risks associated with asbestos, the church may want to explore testing the ceiling tiles and removing as necessary.