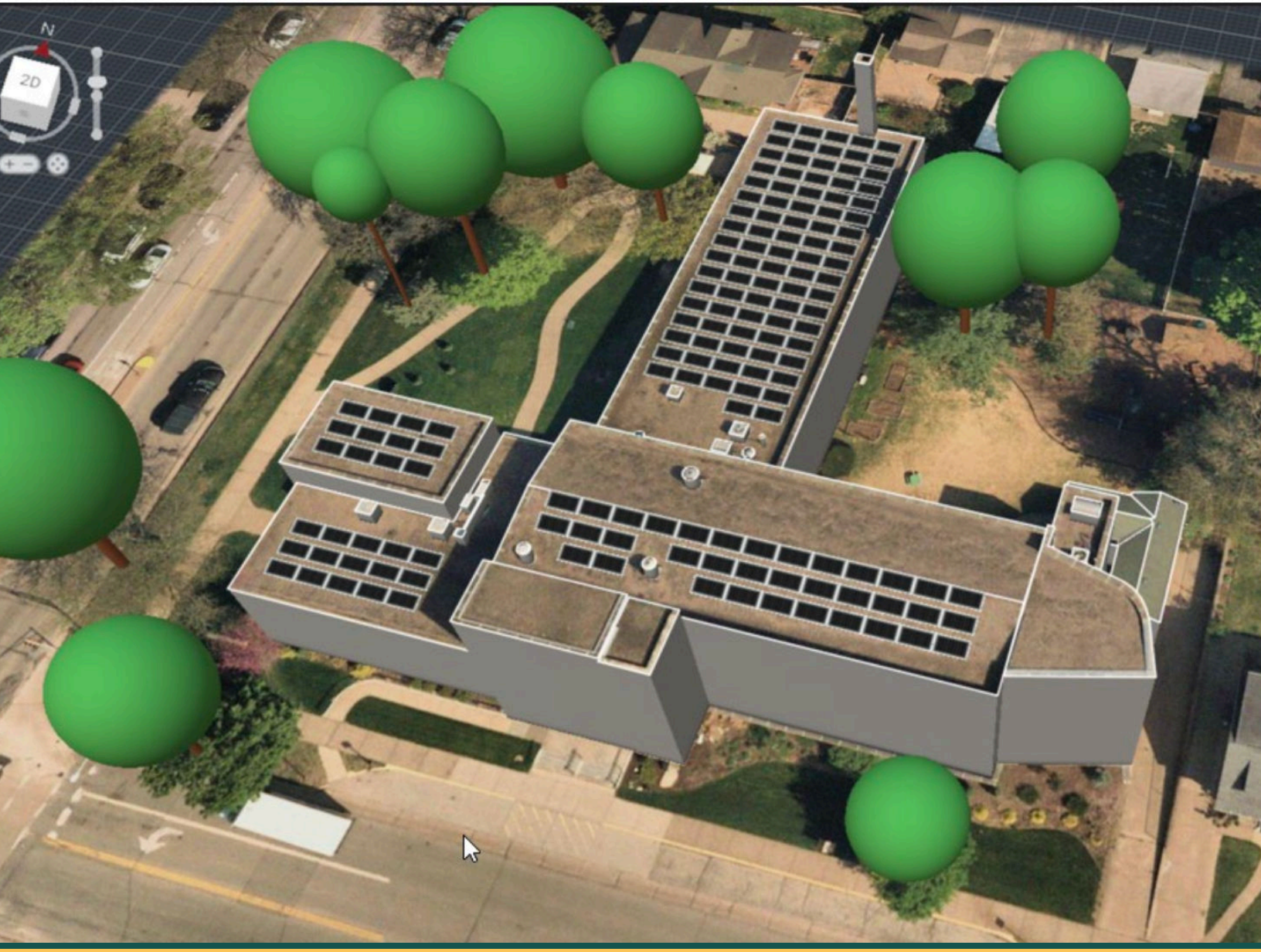

ELECTRICAL NEEDS & ENVIRONMENTAL STEWARDSHIP

OPTIONS FOR FIRST CONGREGATIONAL

OUR COMMITMENT

First Congregational has a good track record of seeking ways to lower its energy costs while also being a good steward of the environment. These concerns are still at the forefront of our congregation's vision, and indeed, have grown much stronger given our increasing climate crisis and higher energy costs. But new opportunities now exist for addressing these concerns.

2011

Michaels Energy completed an energy assessment for the church, and a number of significant energy conservation initiatives were implemented, including installation of LED lighting and significantly improving the church's heating system.

2020

A Creation Care Committee was formed and among other things completed a carbon footprint for the church. This showed the two major sources of carbon emissions come from its use of natural gas (for heating the church) and electricity.

2021

The Creation Care Team recommended to the church that we enroll in Xcel's Renewable *Connect electricity program to reduce our carbon footprint. Xcel charges a fee (approximately $1,000 annually for our church), which it uses to add additional wind and solar electricity to the grid. Xcel follows established protocols to verify that 100% of the Church's share of electricity from the grid can be attributed to wind or solar sources. By enrolling in the program our carbon emissions from our use of electricity are effectively eliminated. It does not however, reduce the church's electricity expenses.

2023

An informal cross-ministry "alternative energy workgroup" formed to explore options for the Church to consider that (1) reduce our carbon emissions from burning fossil fuels used to produce our electricity and heat our building, and (2) also reduce our annual energy costs. With the agreement of the Church Council, Michaels Energy was contracted to examine several environmentally friendly, cost-saving options for our congregation to consider.

2024

In May 2024, Michaels Energy completed an "Electrification Study" that evaluated the costs (and potential savings) from various energy-related options, such as installing solar panels to generate electricity, heating the church with heat pumps rather than with natural gas, etc. The study also estimated subsequent reductions in the Church's carbon footprint afforded by each. The full report is available upon request by contacting Beth Moore: ebmoore1@live.com

EVALUATION

Our workgroup evaluated the energy options identified in the Michaels Energy report and concluded that some options, while offering environmental benefits, should not be pursued at this time. For example, one option identified in the report is to install a heat recovery system in our church, though given our venting system this seems impractical. Another option–a geothermal heating system, which would reduce our carbon footprint from the use of fossil fuels–is quite expensive ($1,352,200). Because of its high cost, a geothermal system may not be appropriate to include in a capital campaign, though it could perhaps be funded by a generous gift or bequest from a highly motivated donor. Options for addressing our electricity usage were considered in some detail in the Michaels Report.

RECOMMENDATION

We are recommending that the church consider installing a 75 kW solar panel system on the roof to offset 100% of our annual usage (about 92,000 kWh). This would effectively eliminate carbon emissions from our electricity usage, which enrollment in Xcel's Renewable *Connect also accomplishes. However, the solar panel system has the added advantage of reducing our annual electricity costs from about $13,660 to $7,000 – a savings of about $6,600 per year.

OPTIONS

TO ADDRESS OUR CURRENT ELECTRICITY USAGE (~92,000 kWh PER YEAR)

	CONT. RENEWABLE *CONNECT	ROOFTOP SOLAR PANELS	PARKING LOT SOLAR PANELS
EMISSION REDUCTION (TONS CO2/YEAR)	45	45	45
ANNUAL SAVINGS (2023)	$0	$6,600	$6,400
INSTALLATION COST	N/A	$190,000 (LOWER W/INCENTIVES- SEE NEXT PAGE)	$320,000 ($220,000 W/REBATES)

COSTS & FINANCING

Michaels Energy estimates the overall cost for installing solar panels to be about $190,000. (A similar cost has been received by a solar installation company). The $190,000 cost would be lowered to approximately $100,000 by applying the following three incentive programs:

- 30% refund of costs through the Inflation Reduction Act (IRA) - Federal program
- Rebate from Focus on Energy of $3,750 - based on KW capacity of system installed
- Competitive Grant application through Solar for Good - which would cover up to 50% of cost of panels not to exceed 75 panels valued at a cost of $25,000.

Note: Because the reimbursement from the first two incentive programs comes after project completion, a source of construction financing would be needed for a period of time. One possible source is the UCC Cornerstone Loan Fund.

Ideas for funding remaining project costs (approximately $100,000):

- A Capital Campaign - this project part of a wider campaign
- A focused fundraising effort just for this project
- Designating all or part of the cost to come from Memorial and Endowment Funds

POSSIBLE TIMELINE & NEXT STEPS

- Summer/Fall 2024 - Share this information with ministries, council, and congregational groups and receive feedback.
- Fall 2024 - Assessment with Council of readiness to move forward with project and mechanisms for financing costs
- Winter 2025 - Congregational Decision on proposal from Council
- Winter/Spring 2025 - Raising Funds for project/ Request for Proposals Designed/Bids solicited
- Summer/Fall 2025 - Construction

QUESTIONS?

SEE THE FOLLOWING FAQS & ENGAGE WITH A WORKING GROUP MEMBER

WORKING GROUP: ALLAN BEATTY, KRISTI KOCH, BETH MOORE, MIKE SCHULTZ, ROB TYSER, RICK WANIGER, MAURY WEILAND, LAURA WRIGHT

FREQUENTLY *Asked* QUESTIONS

1 What are the primary reasons for considering the possibility of installing solar panels on the church rooftop?

Solar is being considered for several reasons: As stated in the UCC resolution “Urging Planning for and Implementing Electrification”, which our congregation endorsed, we have an urgent call as stewards of the Earth to reduce carbon emissions and protect all of God’s creation. In 2018 a UN report concluded that “we must reduce carbon emissions 50% by 2030 in order to avoid the most catastrophic effects of climate change.” Around 40% of carbon emissions in the US come from residences and the vehicles we drive.

Secondly, under the Inflation Reduction Act, nonprofits, such as churches, can receive 30% back on the cost of solar once the project is completed making solar more affordable than ever.

Finally, installation of solar panels would result in a substantial reduction in our annual electricity bill. Michaels Energy estimates that our annual electricity bill would be reduced by about $6,600. This could be compared to investing $100,000 in a CD at 5% interest yielding @ $5,000 annually.

2 How does this project fit our church’s purpose & mission?

Installing solar panels allows us to reduce our carbon footprint and be good stewards of the earth. The church has already increased our energy efficiency by making improvements of sealing gaps, changing all light bulbs to LED, and replacing the office air conditioners with more energy efficient ones. These changes seem to have lowered our electric bill about 3%. By reducing our annual utility expense, we can better our concerns and commitments in other budgetary areas. Reducing our annual expenditures makes our church more sustainable for the future.

3 Can the roof hold the weight of solar panels?

A structural engineer has done the calculations that indicate the roof is capable of the added weight of solar panels.

4 Will the installation of a solar system damage the roof?

The panels will be on tilt racks that are weighed down. There will be no holes in the roof.

5 When in the future will we need to install a new roof?

The roof will need to be replaced between 2036 and 2041. The panels can be disconnected and moved to another area of the roof away from the roof maintenance. Any roof problems are likely to be at the edges, in the seams and connections, which would be distant from where the solar panels are located.

More QUESTIONS

6 What about maintaining the solar panels?

According to Olson Solar, there is no need for cleaning or other care of the panels. Snow can cover the panels, but that is the lowest production time of the year anyway. He also noted that pigeons should not be a problem, especially since we have a flat, or nearly flat roof.

7 Would installing solar panels pay for all our annual electricity costs?

No. Michaels Energy estimates that installing solar panels would reduce our annual electricity costs by about $6,600. However, our annual electricity costs are about $13,660. Thus, the solar panels would cover about half of our electricity bill. About half of our electricity bill comes from other costs, including a cost for being hooked to the grid, which would not be affected by solar panels.

8 If the panels can produce enough kWh of electricty to match what we use, why will we still have an electric bill?

Xcel charges differing rates for commercial accounts, which includes our church. If our church's need exceeds 25kW during peak demands, then we pay a very substantial premium. While the solar panels are expected to cover 50% of the church's annual electrical costs, there are times when our kW demand will exceed 25kW. It is those time periods when the church will be billed at a higher rate for the excess usage. In addition, utility companies charge a monthly rate to be hooked into the grid.

9 What about payback time?

Assuming (a) the total cost of installing solar is about $190,000, and (b) the annual savings in our electricity bill is about $6,600, Michaels Energy estimates the payback time to be about 20 years. Applying incentives would lower this cost, and payback time would be shorter, perhaps 15 years. However, because donations would cover 50% of installation costs, and incentives/rebates the other 50%, there would be no money to be “paid back” to anyone. This means that the full annual reduction of about $6,600 in our electricity bill would start immediately after they are installed, not after 15 or 20 years.

10 Don’t solar panels also generate their own carbon footprint?

While operating, emissions from solar panels are minimal because they don’t produce emissions while generating electricity and require virtually no maintenance. Manufacturing panels does produce some emissions footprint from mining of metals and rare earth minerals. This is still a fraction of the emissions caused by fossil fuels like natural gas and coal. The total carbon footprint emission from PV systems was found to be in the range of 14–73 g CO2-eq/kWh, which is 10 to 53 orders of magnitude lower than emission reported from the burning of oil, calculated as 742 g CO2-eq/kWh from oil. The total offset on all emissions is 3 years. (Science of The Total Environment Volume 759, 10 March 2021).

Even MORE QUESTIONS

11 Isn't it more important to reduce our energy consumption before installing solar panels?

Yes. After 2020 we did reduce our energy consumption by making improvements to installation, sealing gaps, and changing to LED lighting. These changes seemed to work – see FAQ #2 above.

12 How quickly do solar panels degrade?

As a rule, the life expectancy of solar panels is about 25-30 years. However, this doesn't mean that they stop producing electricity after 25 years – it just means that energy production has declined by what manufacturers consider to be a significant amount. Solar panels (also called solar modules) will continue to work for many decades, given they aren't physically damaged by extreme weather, wind, debris, or any other external factors. This is primarily because solar panels don't have any moving parts – they rarely break from within and are usually only damaged by outside forces like a poor racking setup or inclement weather conditions.

A 2012 study by the National Renewable Energy Laboratory (NREL) found that, on average, solar panel output falls by 0.8% each year. Solar panel degradation rates are constantly improving as solar panel technology improves over the years, and degradation rates below 1% are now common throughout the industry. In the years since this 2012 study was conducted, more efficient technologies have been developed, and many newer panels have just a 0.5% yearly decline in energy output (or better!).

So, what does panel degradation rate mean exactly? For the above example, a 0.8% degradation rate means that in year two, your panels will operate at 99.2% of their original output; by the end of their 25-year "useful lifespan," they will still be operating at 82.5%. A slightly more durable panel with a degradation rate of 0.5% will likely produce around 87.5% as much solar power as it did when it was first installed (Energy.sage.com).

13 Are solar panels hail proof?

Solar panels undergo various hail and hurricane tests from the manufacturers. Most manufacturers and industry experts agree most solar panels can withstand golf sized hail (Alba Energy). The National Renewable Energy Laboratory tested 50,000 solar systems between 2009-2013 and only 0.1% of all PV systems were reported as damaged or underperforming. After 140 mile per hour winds in Hurricane Sandy, New Jersey reported little to no damage to their extensive solar systems. After 160 mile per hour winds during Hurricane Maria, a hospital with roof top solar was operating at 100% capacity due to the racking system (Energysage.com).

14 Will this project negatively impact annual giving to support the operating budget?

Not likely, as giving typically increases following a capital campaign.

Still MORE QUESTIONS

15 What is the likelihood we can raise enough money?

Several members have already expressed their commitment to this project. While we don't know for sure that we can raise the needed funds, the history of this congregation with funding past capital and mission related fund-raising campaigns is strong. We are a generous congregation.

16 Will there be an increase in our incurance rate because having of solar panels on the roof?

Our insurance company, Church Mutual, estimates it will be an approximate $160/year increase.

17 What changes will we need to make with our current electrical system? Does our current electrical system support the addition of solar?

Yes, the current electrical system will support the addition of solar.

18 Will the panels be visible from the street?

Not likely as they will be at a low angle/grade.

19 Would we want to install a battery system at some point?

As mentioned in the response to question 8, approximately 50% of our electrical bill is related to our kW demand charge. It has been suggested to us that if we can keep our demand under 25kW, we may be able to reduce the rate we are being charged. The months with the least sun are those in which it is harder to produce the electricity we need. If we have a battery in which to store excess energy to draw from, it means we are not drawing electricity from Xcel.

20 How many panels will be on the roof?

This depends on the size (wattage) of the panels that are used. There would be from 150 to 170 panels located on the roof.