## The Background

In 2021 the church council was surprised to see the increasing monthly cost of our electricity bill. This started a conversation about budget sustainability and sustainable energy. After casual conversation with church members who have solar panels installed on their homes, then council president, Jon Kroschel, began investigating what it might be like to install solar panels on our church building. This is the second time a church leader has researched this path as the concern over the price of electricity is not a new issue.

Throughout the year a group formed to talk and learn more about solar energy. The learning came through visits and conversations with area churches; Bethel Lutheran Church, Northfield, MN and St. Anthony Park Lutheran Church, St. Paul MN, (find their testimonies at the end of this document), and meeting with solar energy companies. Three bids were received and an initial report was brought to the council and the decision to move forward with All Energy Solar was made.

In mid-January 2022 we held an information meeting with All Energy Solar and brought it to the congregation for a vote at the annual meeting in early February 2022. Upon reflection the church council felt that the project had moved too quickly and not enough time was given to communication and information sharing in our church family. We have spent March gathering questions and information from our church community discovering more and more people with expertise in the area and/or who have solar panels currently on their home.

## The Proposal from All Energy Solar

All Energy Solar is proposing that we install a roof mounted solar panel system with 110 Hanwha 400w panels. The system features:

- 25 year panel warranty
- □ 12 year inverter warranty (option to increase to 20 years for \$450 total)
- 5 year installation warranty though using Collective Sun would increase warranty through AllEnergy to 10 years.

### Estimated Environmental Benefits of Going Solar

Using average emissions factors over the next 25 years, our solar energy will help to avoid 896.1 metric tons of CO2. This is equivalent to...

- 190 passenger vehicles taken off the road for a year
- □ 101,022 gallons of gas consumed

 33,361 incandescent light bulbs changed to LEDS.

Online monitoring of the system

□ Grid-Tied

## The Cost of the System

The overall cost of the project is based on the quote from December 2021 which was \$114,700. Then we add the anticipated price increase communicated to us late this past December (\$5735). The approximate total cost in 2022 would be \$120,435. Assuming we use Collective Sun, we eliminate 12% of cost and get to \$106,000.

All Energy Solar asks for 15% of total project cost at time of permitting, typically 4-5 weeks from a signed agreement. 35% is due upon equipment delivery, and 38% upon completion. The remaining balance of 12% would come from Collective Sun.

## Q&As

### **Companies and Organizations Involved in the Project**

What are the roles & relationships of the companies in the Solar Panel Proposal? The companies we have been in conversation with include: All Energy Solar, Collective Sun, and Spire Financial. All Energy would install the system, providing materials and construction. Collective Sun would own and manage the system for 6 years (details below). A few conversations with Spire to learn about financing the project through a program called PACE (Property Assessed Clean Energy).

**Why would Collection Sun "own" the system at all?** Collective Sun would 'own' the system for the first 6 years in order to receive a 26% tax credit, in return, Collective Sun will discount the price of the project by 12%. This agreement is a mechanism for tax exempt organizations to receive some financial incentive enjoyed by a tax paying individual/organization. Because Memorial is a non-profit organization and not eligible for federal tax credits. Based on recent legislation, the Federal Tax credit will drop from 26% to 21% in 2023.

During this 6-year time frame, All Energy, Collective Sun, and Memorial would be partners in monitoring and maintaining the system. After 6 years, Memorial will take over responsibility and ownership for the system. Collective Sun would no longer be a participant, but All Energy solar would still maintain the warranty.

What can Memorial do to simplify the list of companies involved? We can fundraise to the full amount of the project! This would eliminate the need for a financing organization such as Spire.

## **Financing the Solar Panel Project**

**How was the 2021 turnkey price total computed?** The total system cost of \$112, 652 which was presented at the February 2022 Annual Meeting reflected 2021 pricing. All Energy Solar (as well as Sun Badger and Wolf River) have all raised their pricing for 2022. We will need to seek new formal bids to get final numbers and anticipate a higher amount now that we are well into 2022.

\*We are still working with All Energy Solar to determine if the PV Demand Credit Limits are included in the savings model or if being conservative covers it. In order to qualify to opt out of being demand billed (General

Service A14 Rate), we'd have to be able to show 12 consecutive months of demand readings <25 kW, which would qualify us for Small General Service Rate. Based on our billing history, our demand fluctuates seasonally between 15kW – 35kW, largely driven by A/C loads and also they were consistently higher across all months pre-COVID, which we may experience again soon with hopes of our building activity/use returning to normal.

**How does installation of the proposed system impact Memorial's property insurance?** Our insurance provider has advised that projects bring approximately a \$500 annual increase for insurance coverage. We will also need to verify the impact on roofing of installation of panels.

The pandemic has had a significant impact on Sunday attendance. Can Memorial afford this solar panel project at this time? Yes, this is a hard reality to accept and we are trying to live with it along with every other church in the country. No one can predict the health of the congregation or what our financial future looks like even a couple of years from now. And yet - we have experienced increased energy in our community and have received new members to our church family each time MLC has done something outside of the building and community such as "Meet Our Neighbor with the Islamic Society", or "Worship in the Park". During these events we have sparked the attention of our community. Utilizing sustainable energy could be a wonderful way to say to the wider community, "We care about the earth we were given - we're doing our best to steward our resources." Additionally, this could be an energizing project for the congregation!

The 2021 church budget had a smaller than projected budget deficit, related to the open positions we had. What happens to the budget when all open positions are filled? The 2022 budget anticipated remaining short-staffed for half of the year. We hope (and pray!) we will be fully staffed for the second half of the year and our budget reflects that. The current pastoral transition will actually relieve a little pressure on our operating budget. Though we anticipate the solar panel project being funded through a special appeal and gifts that are outside our operating budget. Also, Memorial was well supported by the committed people of our church family. Even as attendance at worship and other church functions has been lower than we are used to, regular giving has remained steady.

**When would we start fundraising?** The 2019-2020 Special Appeal to fund the repaving of the parking lot, parking lot lighting, and hook up to the city sewer system ran for about 8 months and raised roughly \$118,000. The church council laid out a timeline of 1 year for fundraising with a kickoff event at the annual meeting in 2019, a groundbreaking celebration in spring of 2019, and a conclusion of the project in January of 2020. The fundraising was completed <u>in full</u> ahead of schedule, the events happened as planned.

We hope to begin fundraising for <u>this</u> exciting project in May of 2022 - though we fully acknowledge that this project requires more discernment time and that a pastoral transition may complicate this timeline. If the congregation can raise 25 to 50% of the project cost estimate, we would clear initial hurdles.

# **Technical Specs and Impact on Building**

What impact does the proposed project have on the current roof / shingles? In November 2008 we shingled our church roof with 30-year shingles. Based on input from our roofing contractor, All Energy and church members with solar panels, we believe there will be a minimal impact of installing solar panels on our

roof. Solar panels may very well protect the shingles that they cover! All Energy Solar will come out to the church to assist with that work at an estimated cost of \$25k - \$30k to have the 110 solar panels removed and reinstalled to facilitate re-shingling. Therefore it's prudent to have the roof re-inspected before installation to ensure it's in top condition prior to having the solar panels installed.

**Was construction of the church's roof done to assume future solar panels?** One church member, who was on the building committee for our sanctuary remembers solar panels being anticipated and considered.

How will batteries be used in the system proposed at Memorial? There are no batteries in the system we are learning about with All Energy Solar.

What connection to the electrical grid does the proposal from All Energy Solar utilize? The proposal generates excess energy during the summer months that will be returned immediately to the grid. It does not dissipate. Excess energy created is sold to Xcel and they pay Memorial. During winter months, when we experience less sun, the panels would lower our electrical obligation to Xcel.

### Are bi-directional meters to be installed at Memorial to sell electricity back to Xcel (the energy

**grid)?** Meters are there to record energy used by the customer. In some cases (solar panels), the customer is creating energy, thus resulting in the meter spinning the opposite direction. When Xcel comes to read your meter, they will realize you actually created energy this month based on the meter reading. You then get paid for creating this energy. At times of excess energy production, we would see our meter spin backwards.

How was data from Xcel Energy used to settle on the current proposal of (# of panels) and the

**overall size of the system?** Xcel allows individual customers to construct a system that allows for up to an extra 15% of anticipated use. Xcel will then purchase that electricity back from the provider. All Energy was provided with 3 years of Memorial electrical billing. The plan is generated, based on our annual usage, with an additional 12 - 15% added.

All Energy Solar then created a proposal after visiting the church, taking photos of the building, boxes, wiring, and many measurements. Our expectation is that the bid meets our needs and is safe and up to code in all aspects of the project. Their process for coming up with their quote is done according to their business standards.

Please explain the percentage of panel degradation? Memorial's Draft proposal has .55 %, other members have estimates of .25% in their own solar panel installation. Per the spec sheet for the panels: at least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years. Industry standard at 25 years is about 80%.

What is the maintenance needed for such a system? Who is able to care for the upkeep of the solar panels, roof, etc? What is the estimated cost? The team is still working on an answer to this question.

How frequently do the panels need to be cleaned (boxelder bug messes, pollen, dirt & dust, etc)? The panels will not need to be cleaned as natural rain will take care of them!

What is the expected time for a snowfall to melt & clear the solar panels, so energy creation is **minimally impacted?** Based on advice from All Energy Solar and the experiences of several members with solar panels currently on their roofs, snow would melt easily as the panels heat up when exposed to sunlight. The pitch of our roof would only speed the process along and we do not anticipate snow cover to be an issue.

In the event of a system failure, how would the church be able to access electricity? We will still be hooked up to the grid and will receive electricity as we always have. Solar Panels would not provide real time electricity to the church building.

Who provides the warranty, and for what period of time? What specifically is covered and not covered by the warranty? Warranty length and providers are listed above. The warranty is provided by the manufacturer and the panels are covered for 25 years, coverage includes hail damage. Additionally, there is an installation warranty for 5 years through All Energy. Inverters are covered for 12 years, we have an option of extending coverage for up to 20 years for an additional \$450 (total cost).

Panels are covered and would be serviced by AES. Inverters are also covered for a period of either 12 or 20 years and would also be serviced by AES. Other details are available in the agreement, but those are the two main items that are critical.

What manufacturer makes the solar panels, their components, and where are they located? The panels are made in Dalton, GA.

Would the church receive periodic reports of performance so the effectiveness of the system can be monitored? The system will be constantly giving data to All Energy and they provide an app so that we can track the effectiveness of the system every single day. Additionally, we will be able to receive reports from All Energy.

### **Environmental Impact of Solar Panels**

There is no doubt that during a solar panel lifecycle, production of greenhouse gases occurs in the manufacturing process. With the solar manufacturing process becoming more efficient, the amount of carbon footprint has already reduced significantly. When installing a solar panel in the roof to produce electricity, it is 100% renewable, free from any emissions and pollutions. Furthermore, it will be impacting your carbon footprint directly as well as your entire community.

There is no perfect source of electricity, solar panels included. However, compared to other sources of electricity, the solar panel offers a positive impact on the environment and a great financial impact. There is no doubt that a large amount of energy is needed to manufacture a solar panel with toxic chemicals being used during the process. However data points us to the good far outweighing the bad. Usually, the amount of energy used in constructing a solar panel is recouped within a period of 2

years. In addition, solar panels have reduced greenhouse gas emissions compared to fossil fuels, such as coal; this makes it extremely beneficial. (www.ablison.com/are-solar-panels-toxic-or-bad-for-the-environment)

Regarding the recycling of solar cells: 75% of solar cell is glass with well known recycling ability. (<u>www.epa.gov/hw/solar-panel-recycling</u>)

Other sources to consider: <u>www.c2es.org/content/regulating-power-sector-carbon-emissions</u> <u>www.cooleffect.org/solar-carbon-footprint</u>

#### **Testimonies from area Churches**

The head of the solar panel project at Bethany Lutheran in Northfield today gave Russ Vogt and Jon Kroschel a tour of their system last fall and had a follow up phone call in late March. During the visit he shared that the project and [financially] 'turned the corner in year 7. However, during the phone call he doublechecked his notes and remembered the system was paid off in year 5 through a combination of Xcel savings and contributions! They now save their earnings for potential solar upgrades and other church needs. They are currently in year 7 and the system has met all of their goals.

At St. Anthony Park Lutheran the system is paid off in year 4 thanks to a combination of Solar Rewards and contributions, and it has met all of their expectations. The head of this solar panel project did acknowledge an issue with microinverters in year 1, but it was taken care of and there have been no issues since.

#### Memorial's Solar Team

George Clements, Bob Chezik, Cathy Gjermo Greg Hayes, Dave Kadrie, Liz Kroschel, Anna Mitchell, Russ Vogt

Blessed be the name of the Lord from this time on and for evermore. From the rising of the sun to its setting the name of the Lord is to be praised.

