

**Memo to:** Foothills Unitarian Church Finance Team and Board of Trustees

**From:** Foothills Solar Panel Team

**Subject:** Solar Panel installation on church buildings

24 October, 2023

Solar Panel Team members: Suzy DiMont, Randy Kuehn, Peg MacMorris, Janelle McGill, Richard Small, , and Steve Tenbrink (Lead)

### **Solar Panel Initiative**

Since Spring 2023, the Foothills Solar Panel Team has been investigating the installation of solar panels on the roof of our new sanctuary. Our work is motivated by our climate justice values, namely to be less dependent on fossil fuels and to work toward net zero energy consumption. By summer we were convinced that the roof of the new building did not provide space for a large enough solar panel array. Consequently, we propose using not only the new roof but also the roof of the old sanctuary. The new sanctuary and other buildings will be heated and cooled by electric heat pumps. While eliminating the use of natural gas, they will consume more electric power. Having a large enough solar panel system will mitigate the increased use and increased cost of electric power for the Church. The new cost offsets by the Federal Inflation Reduction Act (30-40%) and Fort Collins city rebates of \$0.50/watt make this an ideal time to install panels. These programs will result in nearly 50% cost savings.

Back in April, when we started, we tried to determine how much energy the new HVAC system would consume.. We had predictions from the architect's energy modeler, but no actual consumption data. However, we expect the church to use between 100 and 200 Megawatt hours (MWh) of electric power per year based on the models, current use, the extra space of the new building, and what we think the heat pumps will add to our usage. Given that prediction, we felt that we needed more than the initial proposals for the 50- KW solar panel system that fits on the new roof. A larger system would be beneficial especially in future years as electricity costs increase. Therefore, the Team recommends a 102 KW system as more cost effective and closer to meeting our predicted energy needs.

Team members interviewed four vendors/installers and decided on Custom Solar, from Boulder. They had the best price per KW, were recommended by the City of FC, had extensive experience in Larimer County, and appeared to be flexible, signaling that they would be a good working partner. They have submitted a proposal for a 102 KW system. The Team supports the installation of this array.

The bottom line, however, is this: initial cost for the 102 KW system is **\$194K** (\$244K - \$50K city rebate) spread out during the length of the contract (10 % contract signing, 50% mid-install, 40% final). We will get back in tax credits and rebates about \$97.5K resulting in a net cost to the

church of **\$96.3K**. With this system we can expect to generate about 137 MWh/year of power which will drastically cut our utility bill. (Significant savings should be realized in future years. We expect utility rates to rise about 5% per year over the next several years. With this rise, the saving in utility bills becomes even more pronounced. To see the savings we might obtain over the next several years for three scenarios: no panels, a 64KW system limited to the new roof for comparison) and the preferred 102KW system, see table (1) below. The large array (102KW) will generate more power, closer to the predictions of usage made by the energy modeler for the building project.

The orientation of our roofs was also taken into consideration in our choice. The two roofs have complementary orientations. The new building’s roof faces southeast with a small slope (7 degrees) and will not get as much power from an afternoon sun, especially in the winter. The old sanctuary roof faces southwest with a steeper slope and would benefit from afternoon sunlight, particularly in winter. In addition, the panels on the old sanctuary roof would be more visible than those on the new roof. Visible arrays display to the community our values in action concerning ongoing climate change.

If we sign a contract soon (2023), we can expect the array to be installed in spring 2024 and to start seeing the savings right after the installation. We can’t predict the weather, but we know that our summers are likely to get hotter, which means more use of the heat pumps for air conditioning during summer months.

Finally, Table (1) below shows how we might save in the future on our electric bills for the church such that the system should pay for itself in about 7 years assuming the usage in the model. Note that the table models usage of 150 MWh /year and assumes that the grid-tied array will produce power during the day, some of which is directly used, and excess power that will go onto the grid giving us a credit. That credit will help to balance the cost of power that we will need to purchase (at rates that will increase each year.) We estimate we will use about half of the power produced at the time of production with the other half going back into the power grid and the church getting a credit of about 7 cents/KWh or about \$4,100 per year toward our remaining utility bill. That remaining electric bill for the church will include the charges for electric power used when the solar panels are not generating. We tried to take this into consideration when modeling the power generated and our usage as shown in Table (1).

Table 1: Future electric bill comparison: No solar, a smaller 64KW array (for comparison), and the preferred 102KW array with rebates\*:

By end of year	No solar Panels	64 KW solar	minus credit	Final for 64 KW system	102 KW solar	minus credit	Final for 102KW system
2024	\$17,325	\$12,434	\$2,613	\$9,821	\$9,654	\$4,098	\$5,556
2025	\$18,191	\$13,055	\$2,613	\$10,442	\$10,137	\$4,098	\$6,039
2026	\$19,101	\$13,708	\$2,613	\$11,095	\$10,644	\$4,098	\$6,546
2027	\$20,056	\$14,393	\$2,613	\$11,780	\$11,176	\$4,098	\$7,078
2028	\$21,059	\$15,113	\$2,613	\$12,500	\$11,735	\$4,098	\$7,637

2029	\$22,112	\$15,869	\$2,613	\$13,256	\$12,321	\$4,098	\$8,224
2030	\$23,217	\$16,662	\$2,613	\$14,049	\$12,937	\$4,098	\$8,840
Cumulative 7 year totals	\$141,060	\$101,234	\$18,291	\$82,943	\$78,604	\$28,684	\$49,919

\* -The model we used was for usage of 150 MWh/year, half being used on-site, the rest sent back to the grid with a \$0.07/KWh net metering credit from the city. Then, each year would see a 5% increase in electricity costs. Unfortunately, the city has told me that the credit/rebate would not be increasing, at least for a while.

We know that a plausible way to cover the initial cost of the solar panels is to include it with bank financing via the mortgage. One additional way that we endorse as a Team is to hold a targeted fund raiser to reduce the overall cost and consequent debt. Although we have not sampled opinions of the entire congregation, we do believe that there would be sufficient support from many congregants who want to see solar panels on our facility. Several of us on the Team are willing to “sponsor” a single panel or more. This would build congregational interest in the project as well as support.

## CONCLUSION

The Team strongly recommends installation of a grid-tied solar panel system on our buildings. We propose a 102KW solar array installed by Custom Solar, using both the new and old sanctuary roofs as the most cost-effective approach. With the rebates and tax credits, we can obtain such a system for about (\$96K) which comes down to \$0.94/watt. This number, \$0.94/watt, is quite remarkable for a system that should provide power for at least 25 years. It is also noteworthy that we predict electricity cost savings that would approach full payback (ROI) for the cost of the system in about 6-7 years (See Table (1)). Without panels our model\* shows that after 7 years the total spent on electricity would be \$141K while with the 102KW solar array our total spending on electricity would be about \$49.9K, a savings of \$91.1K, close to the original net cost.