

FIRST UNITARIAN SOLAR OPTIONS

Background

At the Board's February 2019 retreat, Operating Budget deficits for the next two years and beyond were projected: 2020 - '21 at \$20K, 2021- '22 at \$50K. Based on work by Phil Krape from the year 2017, it appeared that yearly savings of about \$7,000 could be realized by installing solar panels,. At the time, the Library property was the preferred site for panels, but the Board is now actively seeking to lease the lot for commercial use. Accordingly, the Board decided to form a team to investigate the feasibility of achieving these savings with a rooftop or parking lot installation. Bill Hardham formed and leads the team, which first met at the end of May 2019, consisting of Ray Iannuzzelli, Phil Krape, Marty Perez, Richard Speck, and Jim Weddell.

The team solicited bids from 3 local, companies CMI, Clean Energy, and Imani/ KW Solar. All of them are long established and produced solid references. The 4 churches we have consulted so far confirm that results have met expectations.

Findings

We can install a 50 KW rooftop system that would furnish 40% of our electricity for between \$64,000 and \$69,000 net, after taking credit for the maximum state grant. The companies have somewhat different approaches to using the available flat roofs: all 3 use the new classroom wing. Two of them also use some of the others: Youth Center, and office wings. The roof of the old classroom wing is scheduled for renovation in 5 - 6 years, so placing panels there is not feasible yet. This does highlight that a future cost of replacing out roofs every 25 or so years will be increased by the need to remove and store the panels to do the work.

We received proposals from all 3 vendors for a future Phase 2 installation that would provide 30 to 51 KW of additional power, but a second state grant would not be available.

Rather conservative calculations for Phase 1, using various financing techniques are shown in the table.

Financial Results

Financing Method	Yearly Financing Outlay	Yearly additional Insurance	Reduction in Elec. Cost (1 st Year)	Cash Flow, 1st Year	Cash Flow, First 5 Years
1) Capital Campaign	\$0	\$1,200	\$4,507	\$3,307	\$16,953
2. Bonds or Loans from members @1.5%	\$4,035	\$1,200	\$4,507	-\$728	-\$2,958
3. Bonds or Loans from members @2.0%	\$4,380	\$1,200	\$4,507	-\$1,073	-\$4,683
4. State Subsidized Loan @3.25%	\$4,728	\$1,200	\$4,507	-\$1,421	-\$6,687
5. Borrow from Maint. Fund @2%*	\$4,212 + \$1,728 = \$5,868	\$1,200	\$4,507	-\$2,657	-\$12,867
6. Combine 2 & 4	Depends on the relative amounts borrowed at the 2 interest rates	\$1,200	\$4,507	Between -\$728 and -\$1,421	Between -\$2,958 and -\$6,687

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*This also carries a lost opportunity cost of \$1,728/yr. because the amount borrowed is not earning the returns it normally would (over 6%/year in the UUCEF).

Option 1 would clearly improve Church finances, starting with a positive cash flow of \$3,307 the first year and totaling nearly \$17,000 in five years. This would rise as the cost of electricity rises (2% per year), offset by solar panel degradation (-0.5% per year), to a yearly benefit of \$4,200 in the 20th year. See Appendix C for details.

None of the other options offer any financial benefits during the first 5+ years of service; Options 2 and 3 show small positive cash flows only after 12 and 16 years respectively. Thus, these options, which use various types of financing, would require a subsidy from the operating budget.

Two factors that could improve these projections are obtaining lower insurance rates and realizing additional savings in the Peak Demand portion of our bill (see Appendix A). Attempts to clarify these possibilities by further discussions with other local churches that have solar installations have not borne fruit yet - Appendix E.

Conclusions

While there are still some uncertainties in the projections, it is clear that the only way to capture significant savings and approach the original objective of about \$7,000/year is to purchase an installation with about \$70,000 raised in a capital campaign. The yearly savings can safely be projected to be about half the Board's original target, but securing lower insurance costs and realizing Peak Demand savings could result in reaching the target of \$7,000/yr.

Recommendations

The Board should consider whether to **undertake a capital campaign** to finance a solar installation. This has the twin benefits of improving Church finances and producing environmental benefits (see below). This would be our clear choice, but we realize that having just completed a campaign to help finance the major inside renovations means that this may not be attractive option at this time.

If the decision on the preferred alternative is no, we could borrow to finance the solar installation. This option would add to the church outlays by an amount of between \$700 and \$1,400 per year. There are important reasons for doing this despite the cost that the Board needs to weigh. It saves 50 tons of carbon dioxide emission/year, reduces pollution, and a significant and visible solar facility signals our support of sustainable living for all to see - a strong example of living up to our 7th Principle. If the Board wants to pursue this approach, we'll continue our work to verify references, refine the finances and recommend a vendor.

Details

- 1) Appendix A – Delmarva Power Data
- 2) Appendix B – Aerial View of First U Roof
- 3) Appendix C – Financial Results Calculations
- 4) Appendix D – Outline of Bond Sale Proposal
- 5) Appendix E – References

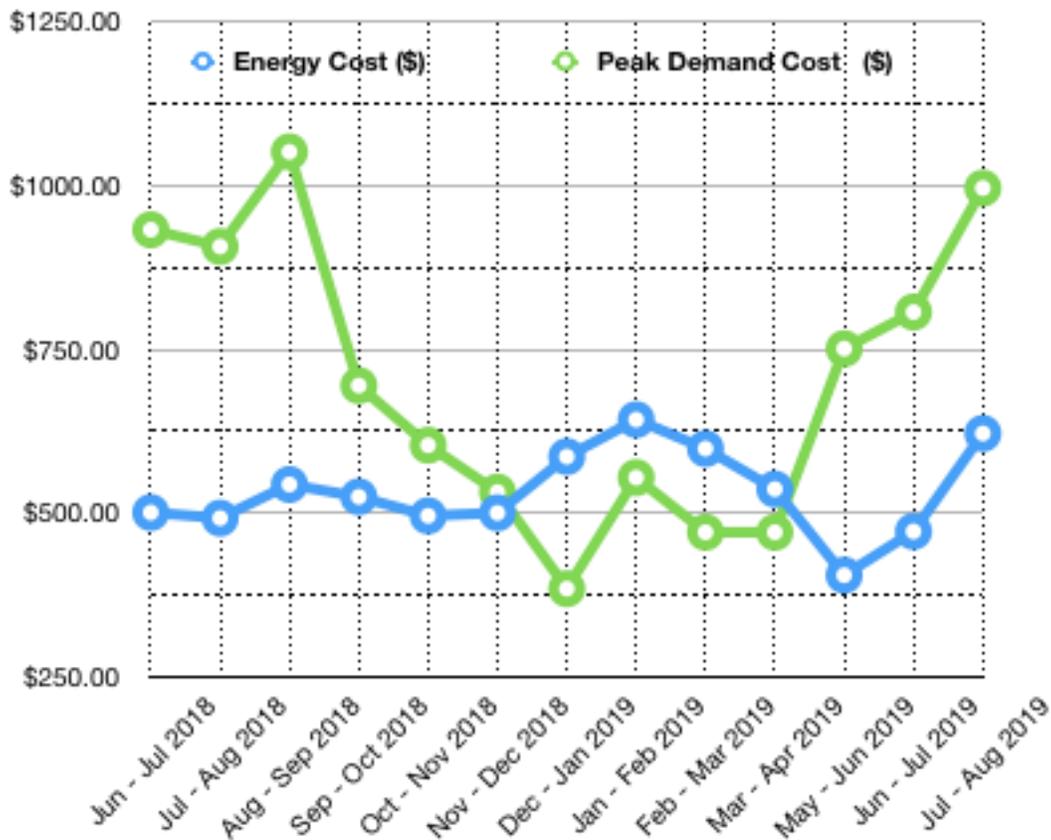
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Appendix A - Delmarva Power Data

1) Our Delmarva Power bill for 14 months between May 2018 and August 2019 (Apr-May bill is missing) adjusted to a 12-month basis:

- Total cost \$15,532
- Cost of Energy used (this is what we can reduce with solar panels) \$6,275. The proposed installations for Phase 1 can cut this by about 40%.
- Peak Demand cost of \$9,257 is significant, but savings here are not certain and are hard to predict, so are not included (see below).
- Taxes, fees, etc. \$1,530

2) The graph shows how the *Energy Used* and *Peak Demand* charges vary over time. The former is based solely on the amount of energy we use the previous month. *Peak Demand* has a very complicated formula that is based on the highest usage during any 1-hour period during “peak hours” of the previous month from June through September. However, from October through May it is 25% of the measured demand for that month, plus 75% of the average of the peak demand for the most recent billing months of June through September. The difficulty in capturing any Peak Demand savings comes from the need to have good sunshine during the one hour of peak demand for the month.



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Appendix B – Aerial View of First U Roof



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Appendix C– Financial Results Calculations (Ray Iannuzzelli)

Assumptions and Considerations

- Savings in the amount of energy used; the vendors supplied this value.
- Possible savings in the “Peak Demand” part of our bill are not certain and hard to predict, so are not included. However, they could be significant (see Appendix A).
- Sale of Solar Renewable Energy Certificates in an annual auction run by the State of Delaware.
- Added insurance costs of about \$1200/year, based on Marty Peres’ discussion with our broker.
- Loan payments using standard tables for 20-year loans of \$69,000.
- The 3.25% loan referred to as a State subsidized loan is offered by Energize Delaware, “...a program of Delaware’s Sustainable Energy Utility, which is a non-profit organization created by the State of Delaware to foster a sustainable energy future through conservation efficiencies, and the use of renewable energy sources...”

Cumulative Cash Flow Table – Phase I, 30 Years

Year	Capital Campaign	1.5% Loan/Bonds	2.0% Loan/Bonds	3.25% State Loan	6% Self-Loan
1	\$3,307	-\$728	-\$1,073	-\$1,421	-\$2,657
2	\$6,655	-\$1,389	-\$2,079	-\$2,801	-\$5,273
3	\$10,045	-\$1,982	-\$3,017	-\$4,139	-\$7,847
4	\$13,478	-\$2,505	-\$3,885	-\$5,434	-\$10,378
5	\$16,953	-\$2,958	-\$4,683	-\$6,687	-\$12,867
6	\$20,473	-\$3,340	-\$5,410	-\$7,895	-\$15,311
7	\$24,037	-\$3,650	-\$6,065	-\$9,059	-\$17,711
8	\$27,645	-\$3,887	-\$6,647	-\$10,179	-\$20,067
9	\$31,300	-\$4,048	-\$7,153	-\$11,252	-\$22,376
10	\$35,001	-\$4,135	-\$7,585	-\$12,279	-\$24,639
11	\$38,749	-\$4,144	-\$7,939	-\$13,259	-\$26,855
12	\$42,545	-\$4,076	-\$8,216	-\$14,191	-\$29,023
13	\$46,389	-\$3,929	-\$8,414	-\$15,075	-\$31,143
14	\$50,283	-\$3,701	-\$8,531	-\$15,909	-\$33,213
15	\$54,226	-\$3,392	-\$8,567	-\$16,694	-\$35,234
16	\$58,221	-\$3,001	-\$8,521	-\$17,427	-\$37,203
17	\$62,266	-\$2,526	-\$8,391	-\$18,110	-\$39,122
18	\$66,364	-\$1,965	-\$8,175	-\$18,740	-\$40,988
19	\$70,515	-\$1,319	-\$7,874	-\$19,317	-\$42,801
20	\$74,720	-\$584	-\$7,484	-\$19,840	-\$44,560
21	\$78,980	\$239	-\$7,006	-\$15,580	-\$40,300
22	\$83,294	\$1,153	-\$6,437	-\$11,266	-\$35,986
23	\$87,666	\$2,158	-\$5,777	-\$6,894	-\$31,614
24	\$92,094	\$3,256	-\$5,024	-\$2,466	-\$27,186
25	\$96,580	\$4,449	-\$4,176	\$2,020	-\$22,700
26	\$101,125	\$5,737	-\$3,233	\$6,565	-\$18,155
27	\$105,729	\$7,123	-\$2,192	\$11,169	-\$13,551
28	\$110,394	\$8,607	-\$1,053	\$15,834	-\$8,886
29	\$115,121	\$10,191	\$186	\$20,561	-\$4,159
30	\$119,910	\$11,877	\$1,527	\$25,350	\$600

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Appendix D – Outline of Bonds or Loans Proposal

These options need to be researched further. Sale of Bonds may require a professional underwriter/agent, but we shall certainly need legal counsel to advise on bonds or loans. In either case, interest (say 2.0%) would be paid regularly, 1 to 4 times per year, and the Church would create a sinking fund designed to accumulate funds to repay the bonds/loans after 20 years. Initially, electricity savings could fund the interest payments and about 2/3 of the required payments to the sinking fund. Initially about \$1000 in Church operating funds would be needed to supplement the payments to the sinking fund.

Some possible issues and things to watch out for:

- Provision would be included to allow the Church to pay off the bonds/loans at any time after say 5 years.
- Beginning after 5 years members would be offered the chance to forgive the loan or redeem the bond for a token payment.
- The Church would want to avoid having to put up security for the instruments, to preserve its financial flexibility.
- Administering the payments and records could become an unwelcome/expensive burden, and would depend on the number of bondholders/loaners – a reason to establish a sizable minimum denomination.

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Appendix E - References

We have made some initial contacts with references regarding other church installations provided by the 3 vendors, but results are still being received and evaluated. So far, feedback has been positive. Two findings of note to date are that various financing schemes have been used – self loans, capital campaigns and loans from the denomination; and none of the churches have dug deeply into peak demand or insurance costs. The effort will be accelerated if a decision is made to proceed. The questions posed to the churches:

Questions Re. Solar Installations

How many panels do you have, and what is the output?

How did the predicted savings in power and cost stand up?

Did the installation go smoothly?

Have there been any maintenance issues?

How responsive have they been post installation?

Have you seen any savings in “peak demand”?

How did you finance the installation?

How much did your insurance rise as a result?

Local Churches with Solar Installations

Imani/KW Solar

Silverside Church, 2800 Silverside Road, Wilmington: 66 kW Ground installation

Newark United Methodist Church, 69 E. Main Street, Newark: 31 kW Roof installation

CMI

Limestone Presbyterian Church, Wilmington: 36 kW Roof installation

St. Mark’s United Methodist Church, Wilmington: 107.1 kW Roof installation

Westminster Presbyterian Church, Pennsylvania Avenue at Rodney Street, Wilmington: 15.3 kW Roof installation

Clean Energy

St James Episcopal Church, 2106 St James Church Rd, Wilmington: Roof installation

Saint Albans Episcopal Diocese, 913 Wilson Rd., Wilmington: Roof installation