GOING GREEN: A PROPOSAL TO CHAPEL HILL FRIENDS MEETING FROM THE SOLAR SUBCOMMITTEE FOR ROOFTOP SOLAR

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WHY "GO GREEN" NOW? – FISCAL YEAR 2020-2021: REASONS FROM THE HEART

"The planet is warming because of the growing level of greenhouse gas emissions from human activity. If this trend continues, truly catastrophic consequences are likely to ensue from rising sea levels, to reduced water availability, to more heat waves and fires." Australian Prime Minister, Malcolm Turnbull.

"Twenty-five years ago people could be excused for not knowing much, or doing much, about climate change. Today we have no excuse." Desmond Tutu

"What you do makes a difference, and you have to decide what kind of difference you want to make." Jane Goodall

"Don't expect to see a change if you don't make one." Anonymous

We do not inherit the earth from our ancestors, **we borrow it** from our children. Native American Proverb

"I have a dream that people……start treating this crisis like the existential emergency it is." Greta Thunberg

"Hope is not something that you have. Hope is something that you create with your actions. Hope is contagious. Other people start acting in a way that has more hope." Alexandra Ocasio-Cortez with Greta Thunberg

SOLAR SUBCOMMITTEE

On November 17, 2019, the Meeting approved the formation of a subcommittee for the purpose of investigating the possibility of rooftop solar, with representatives from Carolina Friends School (CFS), Buildings & Grounds Committee (B&G), Peace & Justice Committee (P&J), Quaker Earthcare Witness (QEW), Finance and other interested members. Members of the subcommittee are David Curtin (Quaker Earthcare Witness), Hank Elkins (Peace and Justice), John Hite (Resident), Tom Ludlow (Finance), Wendy Michener (Building and Grounds), Mark Shanahan (Carolina Friends School), Tom Smith (Quaker Earthcare Witness)

PROPOSAL

The Solar Subcommittee recommends that Chapel Hill Friends Meeting (CHFM) install solar panels on the School House to generate electricity for both the Meetinghouse and the Schoolhouse. We have interviewed and compared the proposals of three firms. Our choice for a

contractor is 8MSolar because of their expertise in both engineering and construction, their competitive price, their experience supported by references, and their prompt and helpful responses to our inquiries. (See below the Note on the Qualifications of 8MSolar.)

As a non-profit organization, we have an opportunity to obtain a rebate from Duke Energy of 75 cents per watt of installed solar energy as authorized by the NC Legislature. For the proposed system of 33.3 kilowatts, the rebate would be $24,600. On January 2nd of this year, within a few short minutes, applicants applied for and exhausted the entire amounts of rebate offered for residential and commercial entities. In contrast, rebates for non-profit organizations for 2020 were available until August 2020. CHFM could apply on January 4, 2021 for the 2021 calendar year. Since non-profit organizations were slow to apply for rebates in 2019 and 2020, we think we will have a good chance of obtaining a rebate if we apply on January 4, 2021. If past history is an accurate indication, we should hear within 24 hours whether our application is successful.

After a $24,600 rebate, the net project cost will be approximately $44,620. This cost includes the estimated cost of a connection via an underground cable to transfer energy from the Schoolhouse to the Meetinghouse and the cost of appropriate electrical modifications in both buildings. Duke Energy pays the rebate after the contractor installs the solar panels.

The contractor, not the Meeting, will obtain all necessary permits.

The cost also includes the quoted expense of removing trees at the southeast corner and side of the School House to maximize solar efficiency. There will be no need to remove trees near the Meetinghouse, either on the front or sides.

The solar panels proposed are of premium quality, with high efficiency monocrystalline cells. They are designed in Germany and manufactured in the state of Georgia. The panels have a performance warranty for 25 years. The contractor will install watertight flashing for the panels and guarantee the installation against leaks. The contractor's guarantee will supplement the 40-year warranty from Baker Roofing Company. For leaks of undetermined origin or leaks occurring beyond the time limits of 8MSolar or Baker Roofing warranties, the Meeting will work in good faith with Carolina Friends School to cover costs of roof and interior repairs. The inverters to convert the direct current produced by the panels to alternating current are string optimizers to allow monitoring the performance of both the system and of individual panels. Performance monitoring will be available on site as well as remotely via the internet. The contractor will monitor the system performance and perform all maintenance. Multiple members of the Meeting can also monitor the performance via the internet.

With the exception $18 per month for connection fees to the Duke Energy grid, we anticipate that the project will generate sufficient energy to offset the entire energy costs for both the Meetinghouse and the Schoolhouse. For one full year of usage, the Duke Energy those costs were calculated as $3,412 for the Schoolhouse and $1,849 for the Meetinghouse for a total of $5,261 for both buildings. We earn credit for the energy we send to the grid on sunny days and can use that credit when we need it throughout the year. Each year, on the last day of May, we give to Duke Energy and to the planet any credit for energy we have not used.

We anticipate that CHFM and Carolina Friends School will together save over $5,000 per year and that the project will repay the investment in approximately ten years. We expect that the annual loss of panel efficiency of only 0.6% per year will be less than anticipated future Duke Energy rate increases. Under those assumptions, and considering the 25 year linear performance guarantee for the panels, the product warranties of 12 years for the panels and the inverters, and the relatively low cost should we need to replace an inverter or a panel, we estimate the project will generate over 25 years net savings for the Meeting and Carolina Friends School of at least $80,000.

The contractor 8MSolar is willing to perform all the engineering and design for the application for the rebate of $24,600 from Duke Energy upon payment of $1,500 toward the total project cost.

CONCLUSION

We have an opportunity to contribute to the health of the planet as well as to the financial health of both the Meeting and Carolina Friends School.

Each year, the project Going Green will save 3.8 tons of coal (See Note on Emissions from Coal). By reducing the amount of coal burned by Duke Energy in western North Carolina and thereby reducing the particles blowing eastward, Going Green will improve the air quality of Orange, Durham, and Chatham Counties.

The net cost of Going Green, after the rebates from Duke Energy will be approximately $44.620. The Chapel Hill Friends Meeting and Carolina Friends School will together save approximately $5,000 per year in Duke Energy costs.

We propose that Chapel Hill Friends Meeting

- Approve in principle the total project of $44,620 after rebate to provide rooftop solar energy to meet all energy needs of the Meeting House and the School House,
- Approve 8MSolar as the contractor,
- Apply for the Duke Energy rebate in January of 2021 by making a payment of $1,500 to 8MSolar, and
- Make plans to raise the remaining amount of the project cost of $43,120

NOTE ON QUALIFICATIONS OF 8MSOLAR

8MSolar is one of only three companies in the entire state of North Carolina with the following qualifications:

- Unlimited Commercial Contractors: meaning that the State of North Carolina has vetted 8MSolar's project portfolio, company financial strength, and licenses to allow 8MSolar to perform projects of unlimited financial scope. Most companies have a limited or intermediate license.

- In House Professional Engineers: 8MSolar also has in house licensed engineers, meaning that 8MSolar conducts all engineering designs and reviews in house. Unlike many firms, 8MSolar does not send designs and reviews out to external engineers (who might or might not have solar experience). 8MSolar has a Chapter 87 Engineering Firm qualification because the company has both construction and engineering licenses in house.

- 8MSolar is certified by the North American Board of Certified Practitioners (NABCEP)

- Reviews: On the website <https://www.solarreviews.com/installers/8msolar-reviews>, 8MSolar received 47 reviews. 47 out of 47 were Five Star, top-rated reviews. Needless to say, 8MSolar far exceeded the ratings of other solar installers.

- A Review by Z.G from Raleigh: Rating 5.00, 7/21/2020:

  "A Pleasant Process to Get a Solar System: I didn't know much about a residential solar system and how to get one installed. I learned some basics from EnergySage website and received 4 bids at their website including 8M Solar's. I also contacted several other local solar companies. Bryce from 8M was very clear about the processes, system size, solar panels, rebates/tax credits, and pricing for various options. After comparing 8 bids for a same size system, I choose 8M that offered the latest model panels and explained the steps and timeline of getting the system installed. They followed it in a timely fashion. Installation was done very professionally and in less than 8 hours. I have been using the system for a month now and very happy with it! It was pleasure to work with Bryce, Sal, Luke and their partner Zuber electric."

- A review by DePhiant from Zip code 27616: Rating of 5.00, 7/4/2020

  "I enjoyed my experience with 8MSolar. They were very professional and understanding when I was comparing them to comparators. The customer service was the difference maker. They made everything painless and completed installation within hours of the date of my choice. They were also a great resource for receiving the federal tax credit and Duke Energy rebates."

- A review from Vern and Lori Schryer, Zip code 27312, Rating of 5.00, 5/19/2020

  "Worked with 8M Solar and had a 10.23 kW solar system installed last fall. Every step of the process was seamless- very professional, always on time, responsive to all our questions. Our electric bill with Duke has gone from an average of $170 per month to $16 for the last couple of months. Our goal was to provide about 93% of our power. The online monitoring system is also very helpful. We had talked to 4 other solar companies but felt that 8M provided the best value for the cost-both in product and personnel!"

- Additional reviews: The Subcommittee solicited positive reviews from three additional customers:
  - Chapel in the Pines Presbyterian Church - 34 kW system.
    (near Governor's Club)
    Gerald Wehmueller
    jerryweh@bellsouth.net
    919-968-4230

- Apex Mosque - 68 kW system.
  Asif Ansari
  ansari5150@gmail.com
  919-760-5044

- College Park Baptist Church - 26 kW
  Kevin Shortt, PE
  shortt.kevin@gmail.com
  336-253-2908

Tesla: Why not Tesla? On June 19, 2020, Tesla introduced their lowest guaranteed cost for solar panels. One catch, Tesla solar panels were not available in North Carolina. In July, Southern Energy Management (SEM), one of the contractors from whom we solicited a bid, installed their first Tesla solar panel. However, SEM states on their website, "We are installing our first Tesla solar panel (not roof tile) system this month, but we aren't sure when those panels will be widely available." SEM continues, "Waiting for Tesla solar products to be available in North Carolina will put you at risk of missing out on the Federal Tax Credit" (Southern Energy Management 2020).
Tesla reviews: On Solar Reviews website, Tesla received a rating of only 1.64 versus 4.83 for 8MSolar (See the reference below on how Solar Reviews uses a Bayesian calculation to weight both the number and the date of the reviews, No company can achieve a perfect 5.00 rating. Solar Reviews Rating Explanation 2020).

"Although solar is very reliable, things do go wrong and where Tesla and other large corporate solar installation companies have fallen down is in a lack of after-sales service."

"You only need to read through the reviews of companies like Tesla, Sunrun and Vivint to see that residential solar is really a business much better handled by smaller, local solar companies who are able to offer better after-sales technical support."

"We remain hopeful that Tesla will find a way to improve this facet of their business but until such time as this is reflected in their consumer reviews, our advice remains that you should look for a well established local solar company when buying solar panels for your home" (Solar Reviews for Tesla. 2020).

NOTE ON EMISSIONS FROM COAL

Burning coal is not healthy for either humans or the planet (EIA 2020). Combustion of coal produces

- Sulfur dioxide (SO2), which contributes to acid rain and respiratory illnesses,
- Nitrogen oxides (NOx), which contribute to smog and respiratory illnesses,
- Particulates, which contribute to smog, haze, and respiratory illnesses and lung disease.

26 percent of the energy that Duke produces comes from coal (Duke Energy 2019). Each year the combined Duke invoices for the Meetinghouse and the Schoolhouse show we use 35,563 KWh (Duke Energy invoices July 2018-July 2019). Since 26 percent of our energy comes from coal, our annual coal based energy is 35,563 kWh x .26 =9,246 kWh. Burning one ton of coal produces 2,460 kWh (Science, How Stuff Works 2020). Therefore, to produce electricity for us, Duke Energy burns each year 9,246

kWh/ 2,460 kWh per ton = 3.8 tons or 7,600 pounds of coal. The pounds of coal burned would be much higher if Duke Energy burned coal to obtain 100% instead of 26% of the energy produced. For 38 percent of the remaining energy, Duke Energy burns natural gas and emits even more greenhouse gas emissions from the methane associated with the gas (Duke Energy 2019).

REFERENCES IN TEXT

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Science, How Stuff Works. 2020. https://science.howstuffworks.com/environmental/energy/question481.htm#:~:text=A%20typical%20500%20megawatt%20coal%20power%20plant%20produces,1.43%20million%20tons%20of%20coal.%20It%20also%20produces%3A

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Going Green Project Budget	**Schoolhouse And Meetinghouse**
Updated 9/15/2020	
Solar Panel capacity: Kilowatts DC	33.3
Solar Panels type and brand: monocrystalline	Qcell Duo G6+ 340W
Number of Solar Panels	98
Solar Panel Product Materials Warranty (replacement cost < $500 each)	12 years
Solar Panel Linear Performance Warranty is 97% 1st year, then loss of 0.6% per year, for a performance guarantee of 83% after 25 years	25 years
String Optimizing Inverters	SolarEdge HD Wave
System & Panel Level Monitoring is built in with the inverters	SolarEdge built in
Inverter capacity in KW	32.8 KW
Inverter product warranty (Replacement cost approximately $2,100 + $200 labor)	12 years
Mounting Racking	IronRdge XR100
Solar System turnkey cost including all permits, 8MSolar ($1.91 per watt x 33.3K = $63,500 fixed. The component of trenching in this quote is estimated at $12 per foot x 125 feet = $1,500)	$65,000
Utility Rebate @ $0.75 per watt x 33.3 33.kw	($24,600)
8MSolar with Duke Energy Rebate	$40,400
Net cost per KW DC with Rebate and without tree removal	$1.21
Tree removal southeast of the Schoolhouse, (Bartlett Tree Service, additional quotes may be solicited)	$4,220
Net system cost with tree removal and Duke Energy rebate	$44,620
Net cost per KW DC with tree removal and Duke Energy rebate	$1.34
System cost 8MSolar with Tree removal without Duke Energy rebate	$69,220
Net cost per KW DC with tree removal and without Duke Energy rebate	$2.08
Solar Production Estimate kWh	36,085
Utility Usage kWh, one year for Meetinghouse + Schoolhouse	35,563
Percentage Solar Production Coverage of Usage	101%
Initial Payment to cover application for rebate	$1,500
System Cost with tree removal and rebate after initial $1,500 payment	**$43,120**

PROJECT IMAGE