

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

Draft November 6, 2020

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)

WHY?

We are part of a capitalist system; this is a fact, not a political concept. Quakers have been deeply embedded since they opened Barclay’s Bank, founded the iron industry, set up the train system in Great Brittan and organized Lloyd’s Insurance of London. We also introduced price tags, accountability in banking, and trustworthiness in business people. (Don’t think we have a lock on the last? Check out how

many businesses use Quaker or Amish names or images when they have no connection to us.) Current Quaker business people continue seeking to be godly while doing well.

But Quakers are not much, not even more than a tiny sliver of the capitalist culture of our world. Throughout the world, thieves wearing royal ermine, have been privileged to write the laws of their countries to enrich themselves and to build a social hierarchy that made rising above your birth rank very difficult.

A major tenet of this system – world wide - has ALWAYS been that a person is entitled to use the resources of the world without having any responsibility to manage all the effects of that use. Poop, slag from mining, fertilizer runoff, smoke from factories, GARBAGE – the un-useful-to-me products of my work, was not the responsibility of the person who created it. It could and was poured into the water, the air, the ground at will without objection from anyone who mattered.

In 1858, in London, the government of England ran head on into one small consequence of this principle. Poop was a personal problem, for each family to take care of themselves, which they did – into the Thames River that runs through London. In the summer of 1858 there was so much poop in the river that The Great Stink drove anyone who needed to breathe from the banks. Guess where the ruling class had built Parliament? They could not have been closer and they finally realized that removing poop from the city of London was a public good, worthy of public expense. It had been making the rest of the city sick for centuries; it wasn't a public function until it affected the ruling class directly.

So it is today. We, the people of the Earth, have been spewing carbon and methane into the air without concern for the carrying capacity of the air, or the water (where most of carbon is actually being stored). We have been warned for decades now, but the consequences weren't in the face of the ruling classes. Now we are all facing the consequences in our own backyards. All of the yards, from north to south and east to west – there is nowhere you can go where the consequences aren't happening now.

There are still members of the ruling class trying to say “not my problem” and our global response is feeble. The planet needs a global response, but we are Quakers. We do not wait for direction from secular leaders before we can act. We are not stopped because we are alone in our chosen direction. We have traditionally – and I mean from the beginning – have looked directly at the issues of our day and said “what can we do?”, “what are we called to do?”. Tiny as we are, what is our part to play?

When there was to be a Law of the Sea, Sam and Miriam Levering went to the conferences every year and became the single most reliable memory of what was in the Law and what effect that would have on your personal country. They offered their expertise to every tiny, young or impoverished country in the world – cost free. Because of their tiny, personal effort the Law of Sea is one of the most fair, equitable global laws ever.

What tiny and effective work can we do in the face of climate change? What are we called to do?

The problem is carbon and methane, which comes from fossil fuel and cattle. Coal, Oil, Gas, Cattle. We need to stop using them all. Now. Not tomorrow or in ten years. Today. Actually, yesterday 30 years ago, but it is too late for that.

How can we personally reduce our use of fossil fuel and cattle?

- Own a car that runs on electricity, not gas
- Live in a home, operate a business from a building, worship in a building heated and cooled by electricity created without the use of coal, oil or gas
- Stop eating meat from cattle – steaks and hamburger

- Eat organic food, the more local the better
- Wear clothes and shoes that are made from cloth that minimizes the use of coal, oil or gas
- Consider all the consequences of our use of any resource – embrace the idea there is no garbage. There are only effects of resource use that we have not addressed yet – what are they and how shall we address them?

God has given us the Garden of Eden, a wonderful, amazing place for us to live in. The contract is similar to our contract with CFS – rent free but we are responsible for the maintenance. The problem is global and we do not rule the world, but we are responsible for our corner of the world. We are responsible to do what we can do, to be the pattern in the world that we believe God wants us to be.

Individually and collectively as a Meeting – what are we called to do?

PROPOSAL

The Solar Subcommittee recommends that Chapel Hill Friends Meeting (CHFM) install solar panels on the Schoolhouse to generate electricity for both the Meetinghouse and the Schoolhouse. We have interviewed and compared the proposals from three firms. See the [comparisons here](#). One of the three companies was authorized to lease, but the cost from that company for both leasing and purchase was much higher than for the other two companies. 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 based on the size of the inverters for installed solar energy as authorized by the NC Legislature. For the proposed inverter size of 34.2 kilowatts, the rebate would be \$25,650. 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 \$25,650 rebate, the net project cost will be approximately \$45,350. 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.

To maximize solar efficiency, the cost also includes the expense of reducing two trees to spars (masts) at the southeast corner of the Schoolhouse. Although we will lose the carbon sequestered by those trees, the project will avert carbon emissions many times greater than the carbon sequestered by the two trees. Each year, according to [data and calculations](#) from the USDA and the EPA, the proposed rooftop solar project will avert emissions of 26.9 metric tons of

CO₂ and thereby eliminate greenhouse gas emissions equivalent to the carbon sequestered by 35.1 acres of forests, or 0.18 acres preserved from conversion to cropland, or 444 tree seedlings grown for 10 years. 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. There is an option to extend the warranty for the inverters to 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 of \$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 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 0.56% 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 \$25,650 from Duke Energy upon a down payment of 10% (\$6,850) of the total project cost. The down payment will cover the application fees for the Duke Energy interconnection and rebate.

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 and removal of two trees at the southeast corner of the Schoolhouse will be approximately \$45,350. The Chapel Hill Friends Meeting and Carolina Friends School will together save approximately \$5,000 per year in Duke Energy costs.

Budget Summary

8MSolar Solar System turnkey project of \$68,500 includes all permits, includes the initial cost for the Duke Energy interconnection and rebate applications, and the estimated cost of electrical connections of \$3,750 including the trenching at \$12 per foot x 125 feet = \$1,500.	\$68,500
Utility Rebate @ \$0.75 per watt x 32.8 kw inverter capacity	(\$25,650)
Solar system (8MSolar) with Duke Energy Rebate	\$42,850
Tree trimming to spars (masts) at southeast of the Schoolhouse	\$2,500
Total system cost with tree removal and Duke Energy rebate	\$45,350
Down payment of 10% to 8MSolar to get the Duke Energy interconnection, the rebate and launch the project	\$6,850
Remaining funds to raise after down payment	\$38,500

We propose that Chapel Hill Friends Meeting

- Initially apply for the Duke Energy interconnection in December and rebate in January by making a 10% down payment of \$6,850 of the solar system cost of \$68,500 to 8MSolar,
- Approve 8MSolar as the contractor,
- Approve in principle the total project of \$45,350 with rebate and with tree removal to provide rooftop solar energy to meet all energy needs of the Meeting House and the Schoolhouse.
- Make plans to raise the remaining amount of the project cost of \$38,500.

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

- Google Reviews: On the [Google website](#), 8MSolar has received to date 110 reviews from customers. 110 reviews out of 110 reviews were Five Star, top rated reviews.
- SolarReviews: On the [SolarReviews website](#), 8MSolar has received to date 51 reviews. 51 out of 51 were Five Star, top-rated reviews. Needless to say, 8MSolar far exceeded the ratings of all 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 Wehmüller
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 (NO_x), 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 35,391 KWh (Duke Energy invoices July 2018-July 2019). Since 26 percent of our energy comes from coal, our annual coal based energy is 35,391 kWh x .26 =9,202 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 9,202 kWh/ 2,460 kWh per ton = 3.74 tons or 7,481 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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PROJECT BUDGET

Going Green Project Budget	Schoolhouse And Meetinghouse
Updated 11/6/2020	
Solar Panel capacity: Kilowatts DC	35
Solar Panels type and brand: monocrystalline with up to 20.1% efficiency	Qcell Duo G6+ 340W
Number of Solar Panels	103
Solar Panel Product Materials Warranty (replacement cost approximately \$500 each panel)	12 years extendable to 20 years
Solar Panel Linear Performance Warranty is 97% 1st year, then performance loss of 0.0056 per year, for a performance guarantee of 85% after 25 years. Initial usage coverage of 107% declines to about 92% in 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 (3 inverters x 11.4 kW = 34.2 kW)	34.2kW
Inverter product warranty 12 years (Replacement cost each inverter is approximately \$2,100 + \$200 labor) Optional 25 Year Warranty Extension available at \$316 each inverter	12 years
Mounting Racking	IronRidge XR100
Solar Production Estimate kWh	38,073
Utility Usage kWh, one year for Meetinghouse + Schoolhouse	35,563
Solar Production Percentage of Utility Usage	107%
Net system cost with rebate per KW DC of system size	\$1.25
8MSolar Solar System turnkey project of \$64,750 includes all permits, includes the initial cost for the Duke Energy interconnection and rebate applications. We estimate the cost of electrical connections at \$3,750 including the estimated cost of trenching at \$12 per foot x 125 feet = \$1,500 for a total of \$68,500. There will be a deduction of the sales tax on equipment once the project is installed.	\$68,500
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