

PITTSBORO PRESBYTERIAN CHURCH



SOLAR PROJECT

**A faithful local response to a
life-threatening global problem**

April 2017

“Houston, we have a problem!” (Earth, we have a problem!)

When Jim Lovell and his fellow astronauts strapped in for the Apollo 13 mission, little did they know 2 1/2 days later, the goal of the mission would change from a moon landing to survival.

It was human error in the production of a liquid oxygen tank many years in advance of the Apollo 13 launch that had already sealed the deal for the ill fated lunar mission before the spacecraft ever left the launching pad in April of 1970.

The “**problem**” reported to mission control in Houston was the crew’s primary need to conserve energy (power) and control excess carbon dioxide buildup in their spacecraft following an oxygen tank explosion. If they were to have any hope of returning to planet Earth to breathe its fresh air once again, it would take critical thinking, sound science, higher math and an “all hands on deck” rapid response from mission control to get them back. All that plus the crew’s cool heads, brave hearts and Capt. Lovell’s well honed navigational skills were needed to pull off the near impossible mission of splashing down safely in the Pacific Ocean. With help from mission control, Lovell was able to orient the spacecraft so it was aligned using the Sun as a navigation star. This was critical to cutting the time it took to return to Earth.

The story of the Apollo 13 mission gone wrong and its epic ending is a metaphor for the problem now facing spaceship Earth and all its crew (inhabitants). Through human error beginning centuries ago and elevated to new heights of blunder in the late 20th and early 21st centuries we are altering Earth’s biosphere as to render it incapable of sustaining life for generations to come. We need to abort a misguided mission in which modern human civilization treats the finite natural resources of the planet as though they are infinite.

Like the crew of Apollo 13, we must immediately begin to conserve our energy (power) sources and control the build up of carbon dioxide (and other green house gases) if we are to live long and prosper on this earthly Paradise that the Lord our God has gifted us. We need critical thinking, sound science, rapid response, cool heads, brave hearts... AND we need to navigate our way home using the stars. We need to make better use of the power of the Sun to help get us safely home in the short time allotted us.

Today, 47 years after the Apollo 13 odyssey, we now know that every living thing on this planet is an imperiled passenger on space ship Earth whose life support systems are being rendered inoperable due to our ongoing “human error” (or as we call it in Church language, “SIN”). Our unrelenting use of dirty, finite fossil fuels as our primary energy source is choking the life out of the planet. We must transition to clean, renewable energy sources such as solar (wind, wave, geo-thermal, etc.) in order to solve the greatest planetary problem we have ever experienced. Unless we immediately stop being the problem and start becoming the solution, we will have failed in our mission as wise stewards of Creation to faithfully manage the gift of abundant life granted by our Creator God.

Such a critical moment in the history of civilization calls for the Church to take the lead in bending the arc of the moral universe toward justice. The fierce urgency of now challenges the Church to lead humanity to the moral high ground through witness and service. PPC’s Solar Project won’t qualify as a “giant leap for mankind,” but we will be taking one small but prudent and faithful step for our congregation to lead in the journey away from fossil fuels and toward a more renewable and sustainable future.

Here Comes the Sun - Renewables to the Rescue

“Be praised, my Lord, through all your creatures, especially through my Lord, brother Sun, who brings the day; and you give light through him. And he is beautiful and radiant in all his splendor. Of you, Most High, he bears the likeness.” ~ Saint. Francis of Assisi

Knowing the critical urgency of the planetary problem, challenged by such calls to witness and service as Pope Francis’ encyclical “[On the Care for Our Common Home](#)” and inspired by the witness of congregations that have already “gone solar,” PPC’s Eco-Justice group made a leap of faith a few years ago to pursue our own local solar response to the pressing need to transition quickly to clean, renewable energy.

The United Church of Chapel Hill (UCCH) was a neighboring shining example and stellar witness of a faithful local response to a global crisis when in 2015 they installed 326 roof top solar panels including a solar trellis at their entrance. Kathy Shea, a member of the congregation’s United Earth Ministries team stated in an interview, *“We were very impressed with the flexibility and creativity of (the installer’s) approach to this project, especially their enthusiasm for the trellis array. **This highly visible part of the installation will be a permanent reminder to all who visit United Church of the importance of addressing climate change and caring for God’s creation as an integral part of our faith and practice.**”*

(The UCCH project is featured later in this report as part of the presentation our Eco-Justice group made to Session in 2016.)

Back here in Pittsboro, the Eco-Justice group partnered with [NC Interfaith Power and Light](#), [NCWARN](#) and Central Carolina Community College (Pittsboro Campus) in the “[Solarize Chatham](#)” initiative, the most successful solar initiative in the state. We chose [Southern Energy Management \(SEM\)](#), a certified B corporation completely vetted by our sponsoring organizations to conduct an initial feasibility evaluation for the installation of rooftop solar panels. We passed with flying colors! With that green light spurring us on, we began to research optimal options with SEM for the project and also began investigating financing options. After some months of preparation, we finally presented a report to Session that stated the WHY (rationale) for the solar project as well as the HOW (means to the end).

After a few more months of providing answers to questions raised by Session, the solar project was ultimately passed by vote of Session and the Eco-Justice group continued to work with Session to iron out the details and receive an updated report and cost estimate from SEM. Then in April of 2017 after further discussion within Session (which now had some new members) the project was again affirmed by Session vote and the contract with SEM was finalized and signed.

The remaining pages of this report will consist of a sample of a report initially given to Session and a series of informative resources that have been shared with Session.

WHY: Honoring God and Preserving the World for Future Generations

An invitation/proposal to Session for PPC to “Go Solar”

The Story of an Inspiring Solar Journey

With the following words the people of United Church of Chapel Hill (UCCH) conclude the story of their “Solar Journey,” with the hope that it may inspire other congregations to begin their own faithful journey to reach for the star (sun), and in so doing bring honor to God by helping to preserve the world for future generations:

UCCH’s solar energy system includes a highly visible and beautiful portion with 76 panels on a trellis that spans over 120 feet across the front of the church. It is a daily reminder to all who enter the building of the congregation’s commitment to sustainability and future generations. UEM hopes that this work will “go viral” and many other congregations will commit to help our world transition to truly clean, renewable and sustainable energy, honoring God and preserving the world for future generations.



On the back of this sheet is the full summary of UCCH’s Solar Journey that has been posted on their congregation web site: <https://unitedchurch.org/united-church-of-chapel-hills-solar-journey/>

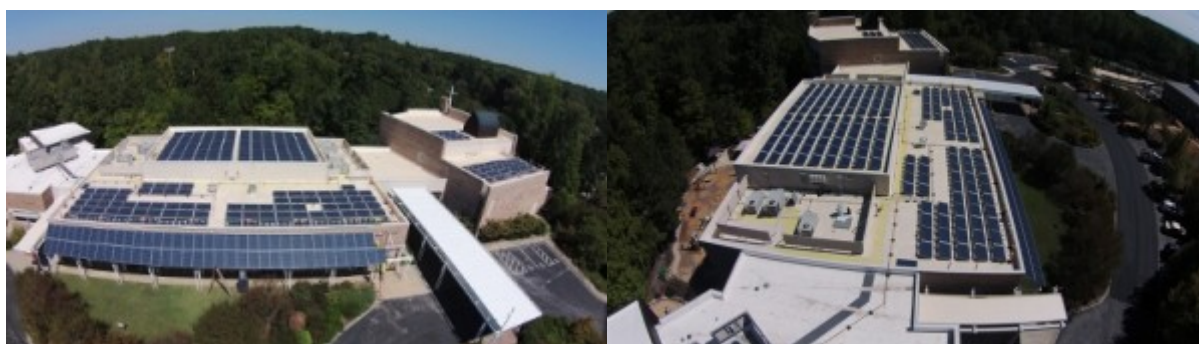
UCCH’s Solar Journey was led by their United Earth Ministries (UEM) group. UEM is a committee of the Board of Justice, Outreach and Service dedicated to promoting care of God’s creation through spiritual, individual and collective practices. Here at PPC our Eco-Justice small group is also dedicated to this same mission, and has for many months been discussing and researching the potential for installing solar panels on our church facility. Now we come before the Session to invite you to join with us in considering WHY and HOW PPC should pursue the journey of “going solar.”

The Answer to WHY?

While there are ample “practical” financial incentives for installing solar panels in regards to the short and long term return on investment (reduced power bills now, locked in kw/h rate and eventual payback of initial investment), it is first and foremost the faith-based, mission-driven realization that UCCH came to that dictates why any faith community would embark upon this solar journey. The third paragraph of CCCH’s summary rightly answers the “WHY.”

After many months of research and discussion UEM realized that a “return on investment” (ROI) calculus was the wrong metric to prioritize and that care of God’s creation was/is part of their congregation’s call to faith and mission. As a congregation UCCH’s decisions on mission work has always been based on what is right to do. Once the church discerns what is right, they figure out how to fund the mission. UEM realized they needed to think of the solar project in the same way. UEM proposed a large-scale project that would reduce the church’s carbon footprint substantially and act as a “billboard for care of God’s creation” and hopefully as an inspiration for other churches, synagogues, mosques and temples in the state.

United Church of Chapel Hill's Solar Journey



On November 6, 2015, the latest photovoltaic array on a North Carolina house of worship went online. The 84.76 kW, 326 panel system will generate 60% of the annual electricity needs at United Church and reduce the church's overall carbon footprint by a minimum of 44% next year and for years to come. The project was funded as part of a congregation-wide, multi-purpose capital campaign using a "donation model" with the option for individual donors to receive North Carolina state tax credits for the portion of the campaign devoted to the solar project.

UCCH's solar journey began in 2011 when a subcommittee of United Earth Ministries (UEM) formed to explore significant energy saving and renewable energy options for the church. UEM is a committee of the Board of Justice, Outreach and Service, housed in this board because of the intersection of care of God's creation, and both social and intergenerational justice. Prior to the solar project, UEM had laid ground work with the congregation by sponsoring education and devotional programs for adults and youth, and by working with the building and grounds volunteers and staff toward sustainability by going after the "low hanging fruit" of energy efficiency. By 2011, with the science of climate change strengthening, UEM began to think beyond energy efficiency, and began fact-finding and brainstorming about renewable energy sources and financing.

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HOW: Faithful Financing of PPC's Solar Project

Researching all the various approaches that congregations in NC and throughout the country had used to finance their own solar projects led the Eco-Justice group to the conclusion that we are blessed to already have the monetary resources needed to complete the project. Unlike United Church of Chapel Hill, we had no need to try to form a special LLC through a complex process to which individuals could contribute as part of a Capital Campaign and thus receive Federal tax credits. Session concurred with our recommendation and decided to borrow a small portion of the Nooe Fund and pay it back on a regular basis through savings in the church's electric bills.

This financing option created a “win-win” scenario:

- It enabled the solar project to launch immediately without the long delay of a financing campaign.
- It alleviated the need to place an increased demand on individuals to contribute to a new project while also contributing to general operating expenses.
- It provided a way for the congregation to lock in current electric rates, thus alleviating rate increases while also reducing electric bills and our carbon footprint at the same time.
- It provided for a strong mission based use of the Nooe funds to help our congregation address the practical and moral problem of global warming/climate disruption on a local level and serve as a visible faithful witness and model for others to follow.

Jesus' parable of the talents ([Matthew 25:14-30](#)) reminds us that while the Master was gone on a long journey, his servants were entrusted with various sums of money that they were to manage in such a way that the Master's “property” would benefit. The “property” in the story should not be thought of as a plot of land, but rather as the Kingdom of God. The idea was to use the money (talents) to prosper the Kingdom of God, that is to further the purpose (mission) of the Kingdom (reign of God).

While two of the servants actively and boldly sought ways to advance the Kingdom through their faithful use of the resources they were gifted, the third servant dug a hole and buried the treasure in the ground out of fear and timidity. He did nothing to prosper the work of the Kingdom. For him there was no praise from the Master, “Well done good and faithful servant; enter into the joy of your Master”. That kind of joy was known and felt by the other two servants.

It is this kind of joy and satisfaction that the congregants of Pittsboro Presbyterian Church can know as a result of the faithful decision to invest a small portion of the gift of the Nooe monies to further the work of the Kingdom through local response to the critical environmental justice problems that threaten the very existence of life on earth.

[Facts about Presbyterians and the Environment: According to a study by PC(USA) Research Services, 98% of Presbyterians agree that “God has given humans responsibility to care for the earth.” 90% also feel that environmental issues are appropriate social concerns for the church. To protect the environment Presbyterians say they would pay much higher prices (69%), accept cuts in their standard of living (65%) and pay much higher taxes (61%).]

PPC's Solar Project Environmental Impact



numbers represent impact over 30 years

(Environmental Impacts are all equivalents)

Graham Alexander of Southern Energy Management responds to questions regarding solar panel installation for Pittsboro Presbyterian Church - October 2016

Q: What are the measurements of 40 modules?

A: At approximately 17 sq ft per module, the total array footprint is 680 sq ft. Each panel is 40" x 66"

Q: What is the total weight that would go on the roof and how was it determined it would not be too heavy for our roofs?

A: The array will be approx. 4 lbs per sq ft. A structural assessment will be completed prior to work beginning as both a structural and electrical permit is required for the installation. Should any issues be found (although it is not common) at that time we can re-evaluate the project. We could also go ahead and complete the structural and electrical feasibility study under a \$1,500 Limited Work Authorization if you would like.

Q: Would it be feasible/practical to consider mounting panels on the ground if it was determined that roof mounting would be problematic?

A: We could certainly consider a ground mount system. Cost is typically 15-20% higher depending on the distance from the array to the point of interconnection.

Q: Should the roof be re-shingled prior to solar panel installation?

A: The general rule is that if the shingles need to be replaced in the next 4-5 years then you should go and re-shingle now. If there is more life left in them then go ahead and install the solar. When it is time to re-shingle there is the opportunity to re-shingle around the solar array as the shingles underneath have been protected from the sun.

Q: How are the panels attached to the roof, and is there potential for leakage:

A: Panels are installed using attachments through the shingles into the rafters below. All attachments are mechanically attached and sealed without using any caulk that could dry rot over time. All attachments are warranted for 10 years.

Q: Would there likely be a need for extra cleaning/maintenance of the panels in areas of high vehicular traffic such as ours, and if so how would this be accomplished?

A: Not likely. We do not expect any of our clients to clean the modules. On a pitched roof rain will perform all the necessary cleaning.

Q: Will Duke give us a guarantee they will accept energy from our panels for full 30 years? How is the permitting done?

A: The Duke Energy interconnection agreement is written year-to-year. Unfortunately, there is no guarantee however, the risk is very low for several reasons. 1) To correct what Diana presented to the session – as of 3-4 years ago technology changed that she was not aware of. With the new proposed system, the church will consume directly off the solar panels and only the excess will go back to Duke. Since we are only planning on a system to meet 65% of our demand very little will actually be available to go back to Duke for credit. That small portion is the only part that is at risk if Duke does not renew the agreement each year. 2) Technology changes are happening quickly. It is predicted within 5-8 years' low cost battery storage will be available for the church to store the excess and keep any from returning to Duke. Battery cost are now prohibitive (\$20,000) but the expected cost 5-8 years from now will be around \$5,000. Only if Duke does not renew will we need to explore this option. 3) Currently Duke is much more concerned with the large 40,000 panel operators than a 40 panel operation from a small church. The publicity of Duke refusing to accept excess power from a small church would not be in their best interest. 4) We have seen other states change their interconnection agreement for new systems, but grandfather existing systems into their current agreement to receive a retail credit for all energy that is produced.

Q: What is the end-use cost to remove and dispose of the panels after 30 years?

A: Not sure. There is certainly some scrap metal value, but there is no clear indication on what the recycling process will be for these types of panels.

Comments from Andy Sessoms, January 2, 1016:

I would suggest that for three new session members that have not had the benefit of the discussion and the financing and all the questions that are obvious for this kind of commitment that there should be significant discussion of this issue. Lets start with a presentation of what company and why? And then let's proceed to: What is the system , collectors converters, battery storage and maintenance, location of all devices and who is the on site expert with oversight and why did we choose the generation mix and what are the backup resources? That is all basic! Now, the he real stuff. What is the generation rate and how does it match our peak non peak loads and what are those loads and where did we determine what our peak was for summer and winter? These will get the discussion started if there is someone to answer them and several others. As you may know there are [*remainder of sentence lost*].

Graham Alexander of Southern Energy Management responds to questions from Andy Sessoms, January 3, 2016

Southern Energy is a privately held local company that has been doing business in NC for 15 years. We perform the full turnkey service with our in-house team. I have attached a quick reference sheet about our Solar Services.

The major components of the system are 40ea. 275 watt modules mounted to the roof and 1ea. inverter mounted to the side of the building by the meters. The system will also have web monitoring to allow the church to see the production as well as Southern Energy to perform any necessary diagnostics from off site.

There are no batteries in the system. All energy that is produced is either used on site or sent out to the grid at a retail credit.

No planned maintenance.

The exact layout of the modules and inverter location to be determined by walk through with SEM Construction Manager and Church facilities manager.

The interconnection of the system is designed both to provide the best economic return as well minimize maintenance.

The size of the system is designed to cover the maximum amount of the historical energy usage without overproducing based on the utility energy year (I can go into more details on Wednesday).

EXHIBIT A

SOLAR PV SPECIFI CATIONS

1. LOCATION

- a. ARRAY: SOLAR MODULES TO BE INSTALLED ON SOUTH FACING ROOF PARALLEL TO ROOF DECK
- b. INVERTERS: The array's SolarEdge 11.4 inverter will be located adjacent to the point of interconnection.
- c. WIRING AND CONDUIT: ALL WIRING AND CONDUIT LOCATION TO BE DETERMINED AFTER ON SITE MEETING BETWEEN C

2. PRODUCTS

- a. MODULES: Southern Energy Management will install 40ea. Q Cell 275 watt modules for a total system size of
_11____kW DC.
- b. INVERTERS: Southern Energy Management will install inverters designed to maximize lifetime production.
- c. RACKING: Southern Energy Management will install roof mounted racking.

d. MONITORING: Southern Energy Management will install Egauge monitoring system.

3. INTERCONNECTION

Southern Energy Management will complete the utility interconnection process on behalf of the client. This includes compiling and submitting an interconnection request and/or interconnection agreement and providing all supporting materials to obtain initial interconnection approval. After installation is complete, the interconnection process will be completed by sending the required Certificate of Completion to the utility following the local jurisdiction's final inspection approval. The Certificate of Completion will prompt a review of the system by the utility, the utility's final interconnection approval, and the installation of any required metering equipment by the utility.

Sample Solar Installation Schedule [see next page]



This concludes the printed/electronic report prepared by members of the Eco-Justice group. Persons interested in seeing solar project contracts, insurance certificates, product specifications etc. may contact the Clerk of Session (Joelle Brummitt-Yale) to access a portfolio of these documents.