Green Meetinghouse Proposal (revised 9/30/16)

Background. The Friends World Committee on Consultation Plenary Gathering held in Peru in 2016 called upon all yearly meetings:

1) To initiate at least two concrete actions on sustainability within the next 12 months and minute the progress and results so as to share them with FWCC and Quaker meetings around the world, and
2) To support individuals and groups in their Meetings who feel called to take action on sustainability.

This request was embraced at New England Yearly Meeting at its annual sessions held in August, 2016. Our yearly meeting has, in turn, called upon each of its constituent monthly meetings to discern how God is calling them to act as a community in response to this urgent crisis facing our planet. The proposal below is fully aligned with FWCC and New England Yearly Meeting's request for action at the monthly meeting level.

Intent. Mt. Toby Friends Meeting has expressed its deep concern for the challenges facing our planet due to climate change.

- One of the most important things we can do as a faith community to further address this concern is to lower the carbon footprint of our own building.
- By far the biggest way we can reduce our building's carbon footprint is to replace all or most of the oil we currently use to heat our building by installing new highly efficient cold-climate heat pumps powered with sustainably-generated electricity.
- By far the most cost-effective way to heat the building with heat pumps is to install our own on-site solar array to generate all or most of the electricity required to run these heat pumps.
- We believe the full costs of heat pumps and solar array can be met in approximately twelve years through the Commonwealth of Massachusetts program guaranteeing ten years of Solar Renewable Energy Credits and large reductions in what we are now spending on oil and electricity.

Oil prices are artificially low because the cost of oil in no way reflects the huge costs associated with climate destruction. If we considered the true costs of the oil we are now using, then the payoff period would be much shorter for installing such a system.

Specific request. Our request to Meeting for Business at this time is to:

1) Agree in principle to our meeting's installation of heat pumps and a solar array to provide most of the heat for our building - contingent upon our ability to raise sufficient gifts, loans and grants to carry this out without drawing on the meeting's general or capital funds,
2) Authorize the Climate Witness Committee to prepare and submit a proposal for a grant from NEYM Future Fund to help support these installations and the clerk to sign it,
3) Authorize the Climate Witness Committee in close collaboration with the Finance Committee to begin initial exploratory steps towards a special fund-raising program for this purpose. We are anticipating the need to raise approximately $75-80,000 through gifts, grants, and interest-free loans.
4) Charge the Climate Witness Committee to work collaboratively with relevant committees such as Meetinghouse Committee and Grounds Committee on the final plan.

New Heating System using heat pumps

A heat pump is similar to an air conditioner run backwards, extracting thermal energy from the outside air and transferring it to the inside of the building. There have been enormous changes in heat pump technology in the last few years with new highly efficient heat pumps capable of using electricity to deliver heat at much lower outdoor temperatures than was true previously. We are recommending that we install Mitsubishi heat pumps. In the configuration currently under consideration, one outside unit with multiple indoor head units would serve the south end of the building (meetingroom, foyer, bathrooms, cloak room and nursery.) A second outdoor unit would serve the fellowship room, kitchen, Champney room and other smaller rooms. As a bonus, a heat pump can also be used for air conditioning and dehumidification in very hot or humid weather.

The current heating system connected to our oil burner would remain in place with its own separate existing thermostats. It will function as backup in case one of the heat pumps requires servicing, in extremely cold weather, and also to make it possible to warm the building on short notice. We are proposing the meeting install a heat pump and air distribution system as our primary heat source designed to reduce our oil usage by at least 90%. **We are currently estimating the cost of this system at around $30,000,** reduced somewhat by electric company and Commonwealth of MA rebates. The system would be warranted for twelve years (parts and labor) but would be expected to function longer. Replacing certain components in the future (e.g. an individual heat pump unit) would be much less expensive than the initial overall installation costs.

Solar array

Because of the high cost of grid-supplied electricity, running heat pumps without installing our own solar panels for electricity would be quite costly. The cost of grid-supplied electricity exceeds the cost of oil saved at today's historically low oil prices. If oil prices return to more typical levels, heat pumps might cost less than oil to operate even using grid-sourced electricity, but payoff projections would be much longer. The surest way to obtain low cost electricity and utilize available incentive programs to meet our environmental and climate change goals is to generate our own electricity on-site.

Such a system is warranted for twenty-five years and is expected to last significantly longer. Because of the fact that the system is expected to last two to three times longer than the projected payoff period, the effective cost of onsite produced solar electricity would be two to three times lower than what we are currently paying for sustainably-generated electricity from the grid.

The new solar energy bill recently passed by the Commonwealth of MA reduces significantly the incentive for solar energy production in large arrays but “grandfathers in” arrays rated at or under 10 KW (kilowatts) AC - a measure of the system’s maximum energy production. We propose to install the largest array which will stay under that limit. An example of a 10KW system would be 32 pole-mounted solar panels. We have received proposals from two local providers (Northeast Solar and Pioneer Valley Photovoltaic) who have installed solar arrays for several meeting homes. **We have received two initial bids for such ground-mounted systems for roughly $50,000. One engineer consultant feels these are high.**

We propose that the panels be installed in the field south of the meetinghouse, close enough to keep transmission losses down but far enough to avoid significant shading. Specific system design and location will be determined at a later date as we raise the funds to pay for it.

Raising initial costs of construction

New England Yearly Meeting established a Legacy Gift Committee in 2014 to distribute grants up to $10,000 to NEYM meetings with a priority towards projects related to climate and racism concerns. A

number of grants have already been made to meetings of $5,000 or more for solar power projects in the first two granting cycles. The next application deadline is November 1, 2016. These grants will continue to be available for three additional cycles (through spring 2018). Once the funds run out these grants will no longer be available. Chances of receiving such a grant may be higher if we apply sooner.

We will also carefully explore any other possible rebates or grants for installations of this kind.

We propose to raise the remaining the cost of installing the heat pump system and solar panels through earmarked contributions and interest-free loans. We will work with the Finance Committee to draw up a detailed plan for implementing this campaign. We propose that this fund-raising plan encompass the following steps:

- An initial survey of meeting members indicating willingness and ability to provide gifts and/or loans for this project
- A proposed annual contribution by the meeting to pay off loans from savings in oil and electricity expenditures over what we have paid over the past decade
- Finalizing the overall fund-raising goal for the campaign
- Setting a prudent threshold of donated and loaned funds at which firm commitments can be made to contractors
- Specific procedures for documenting loans to the meeting, including the development of written loan agreements that specify repayment terms
- Solicitation of specific concrete pledges (loans and gifts) for this project
- Setting up a specific meeting fund for holding loans and gifts until the funds are spent

A firm final decision to proceed would require raising sufficient available funds (in accordance with the prudent threshold). Once the Finance Committee signals readiness, the meeting would sign contracts with a heat pump (HVAC) provider and a solar provider.

Projected payoff period for construction costs

SRECs: Solar Renewable Energy Credits (**SRECs**) are tradable commodities, each representing one KWH of solar energy generated by an eligible Solar Renewable Energy system such as our solar panels. **SRECs** can be bought, sold, or traded on the open market**.** The Commonweatlh of Massachusetts guarantees 10 years of SRECs for energy produced in small (under 10 KW AC) systems at a floor rate averaging $210/megawatt of renewable energy produced. It is estimated that the type of system we are proposing will earn the meeting about $3000 per year for ten years.

Savings in oil: We are projecting that our oil usage will be extremely low, probably under 5% of our current oil usage. This significant reduction in what we have actually spent on oil over the past decade could easily exceed $2500 per year.

Savings in electricity: Some of our current electric bills involve fixed hookup charges and demand charges that will not go away entirely even if we were able to generate sufficient power to meet our entire heating and other electrical needs. We do, however, anticipate significant reductions in electric bills, in the range of $1200 per year.

We estimate that the total construction costs of the heat pumps and solar arrays will be met over a period of roughly 12 years. If a significant portion of initial construction costs are met by grants and gifts as opposed to loans, then the meeting's interest-free Green Meetinghouse loans could be paid off more quickly than 12 years. Once the payoff period is complete and the initial construction costs are met, our actual costs of producing energy for our building will be much lower from then forward.

Timeline:

- Seek general approval of this proposal, in the October meeting for business. This approval is required in order to make a grant proposal to the NEYM Futures Fund.
- Apply to NEYM Futures Fund by 11/1/16 (The next and perhaps final deadline is 3/1/17.)
- Develop a fund-raising plan in collaboration with Finance Committee, as outlined above
- Carry out additional heat load calculations to confirm required size of heat pumps and their electrical usage (Bart is intending to do this using the meetinghouse's architectural plan.)
- Finalize specific design recommendations with our consultant engineers and potential installers
- When sufficient funds are pledged (as donations and interest-free loans), select an installer for each piece (heat pump system and solar array) of the project
- Sign formal construction contracts and begin the installations

The earliest we could foresee beginning construction would be March 2017. Obviously it could well take longer depending especially on the fund-raising process. If we wait too long we risk losing both NEYM assistance and the Commonwealth of MA SREC program at current rates.

Expert assistance in preparing this proposal:

Steve Jones is a retired mechanical engineer (holding a BSME in alternative energy) who currently conducts volunteer consulting on sustainability for nonprofits in our area. He is a member of Amherst South Congregational Church and played a lead role in their 2013 conversion of a much larger building to near-net zero energy through installation of heat pumps and solar panels. Steve has conducted (gratis) a detailed analysis of the economics and environmental impact of installation of this same approach on our building utilizing a site visit and analysis of meeting oil and electricity expenditures. This report is available to any meeting members who wish to read it.

Bart Bales has been active in Mt. Toby for a number of years. He is registered professional energy engineer (with an MS in mechanical engineering) whose business (Bales Energy Associates) provides energy engineering and green advising consultations for buildings in our region. He is a facility and energy advisor under state-wide contract with the Commonwealth of Massachusetts. Bart teaches professional all-day workshops for architects and engineers on heat pumps and other renewable thermal heating systems across eight states in the northeast region. He is assisting in Mount Toby in configuring a system that maximizes environmental and economic efficiency based on our building, site, use patterns and in support of the purposes of these measures for our meeting's environmental and economic goals.

Two local solar installation companies, **Pioneer Valley Photovoltaic** and **Northeast Solar** have already installed solar panels for many meeting homes. PV2 installed the solar panels at South Amherst Church. Both companies have visited our building.

Pioneer Heating and Cooling (Florence MA) is the HVAC company which installed the heat pump and air distribution system at South Amherst Church. They are providing us with a detailed proposal for what they believe is the most appropriate heat pump/air distribution installation for our building and the intentions of this project. **Surner Oil** also had a salesman view our building and discuss options with us for an HVAC system. PHC has also offered to do a more detailed heat load analysis (which projects expected electrical requirements to run the system) for us in the future at no cost if we contract to do the installation with them, or at $300 if not.

Both these mechanical engineers and all the installers above agree in the broad recommendations of Steve's proposal – i.e. heat pumps will greatly reduce our carbon footprint, that they will only be economical if combined with an onsite solar array, and that the entire system will pay for itself through SRECs and savings in what we now spend on oil and electricity.

Relevant Minutes

Living Sustainably and Sustaining Life on Earth (FWCC "call" from gathering in Peru, Feb. 2016)
fwcc.world/fwcc-news/living-sustainably-and-sustaining-life-on-earth-the-minute-from-the-plenary
2016 NEYM Minute on Climate Change neym.org/news/2016-yearly-meeting-minute-climate-change