FAQs: Solar PV

Why is solar PV important for the Town?

Lincoln needs to significantly reduce its fossil fuel emissions. Reducing our fossil fuel emissions is cost effective, good for our economy, and good for our planet. The Green Energy Committee recommends that we take three important actions in Lincoln to reduce our fossil fuel emissions:

- Reduce overall energy consumption
- Switch from fossil fuel combustion to high efficiency electric systems
- Increase the amount of electricity that we generate onsite or purchase from renewable energy sources

Installing local solar PV systems is the most cost effective solution for Lincoln to increase its use of electricity generated from renewable energy. In 2016, Lincoln convened a solar PV task force to identify the most promising sites in town to support large-scale solar PV installations. The Solar Task Force's Solar Blueprint report (see link below) identified the school campus as one of the largest and best sites, but recognized that such a project had to wait until the school building project could proceed.

https://www.lincolntown.org/DocumentCenter/View/26877/Solar-Working-Group-Report---2016?bidId=.

Why is solar PV important for the school building project?

The public schools are the largest energy consumer in town. Building a Net Zero school, one that generates from solar PV as much electricity as it consumes, will make a big difference in the Town's carbon footprint. In addition, solar PV helps the school meet the Town's Energy Performance Standard for municipal buildings.

Is solar PV cost effective?

Solar PV panels are expensive. However, the price for solar PV panels has dropped significantly in the past 10 years and Federal and State tax and solar PV program credits reduce the price per kWh for solar PV to near or below the price per kWh for investor-owned utility company electricity.

Can the school roofs support solar PV?

Yes. Although some roofs cannot support solar PV panels installed using a "ballasted" design (uses concrete blocks to hold the solar PV panel system in place), the design development team's solar consultant identified two solar PV support systems with much lower roof weight that the school can install.

At what angle should Solar PV be tilted?

Using panels that follow the angle of the roofs, whether flat or pitched, is acceptable for solar PV installations given the angle of the sunlight at our latitude. For the detailed considerations on this design issue, see the following page.

Considerations for choosing the installation angle of solar panels:

Lincoln resident and solar PV professional Ed Kern advises that:

"As always, when you dig carefully into the details things do get complicated. In the early days of PV when panels were very expensive, designers aimed to make the most electricity possible with each panel. For FIXED angle panels that usually meant pointing them to the south and tilting them at the latitude minus 15 degrees (NOT latitude, the reason being there is much more sunlight in the summer, so design for when the sun is high in the sky). Early on in PV (1970s) there was (and actually still is) interest in mechanically tracking the panels to increase energy produced from a single panel, as much as 40% more than the best FIXED orientation. However any time a panel is tracked or tilted to the south (or north in Australia), the panels need to be separated so that they don't shade one another. So when the objective is to get the most amount of energy from a limited horizontal area (acres of land, square feet of roof) the ideal is to lay panels flat on the roof to minimize self-shading. In this case the area of the PV panels equals the footprint area of the land/roof. (At the other extreme, to get the 40% boost per panel, panels need to be placed far apart, so that the panel area is only about 20% of the footprint area. So from an energy production perspective the calculation is 140% gain * 20% utilization = 28% change, a significant loss.)

In Lincoln's case, comparing the ideal ~25 degree FIXED south tilt with flat panel mounting the difference is not as extreme, so addressing aesthetic and other considerations may not dramatically effect cost and performance issues. Other considerations:

- Snow cover: flat panels will stay snow covered for weeks in the winter, but since there is hardly any sun in the winter this is not a big loss (certainly not worth shoveling the snow off!)
- Panel temperature: colder panels work better, so tilted panels with air flowing on both sides are somewhat better than flat panels (20 F drop improves performance about 5%)
- Shading: Flat panels may be a little better than tilted since they capture more sunlight when the sun is high and are less likely to be shaded

Bottom line is that don't make too much of the tilted versus flat issue. Many competing cost and performance factors are at play here; don't expect to find the "perfect" design. Pick among the many "good" ones that appeals to the aesthetic sensibilities of the Town."