Solar-Ready
Voluntary guidelines

WHAT ARE "SOLAR-READY" GUIDELINES?

During the planning stages of constructing a new home or commercial building, provisions can be incorporated into the building design that will allow for the building to easily accommodate a solar energy system at a future date. Budget constraints or other factors may have delayed the system from being installed with the building's initial construction. When planning occurs, this is referred to as making a building "solar-ready". Owners of solar-ready buildings can make the decision to install a solar energy system at a later date with less difficulty and at lower cost. The Village does not currently require by code or ordinances that a building *must* be built as solar-ready. The information in this handout is to provide helpful suggestions and guidelines for what to consider if planning a solar-ready building.

WHAT ARE THE KEY ELEMENTS OF SOLAR-READY PLANNING?

When planning to incorporate a solar energy system, consider the building's location on a site, along with what must be provided in the systems of the building. For example, the greatest cost savings occur when a solar system can be installed without having to change a building's roof structure, or open walls for electric cable, or move about installed electrical equipment. The basic planning components of a solar-ready building include the following considerations:

LOCATION OF BUILDING AND SOLAR ORIENTATION OF ROOF SURFACES

The building's location and roof area's solar orientations should be planned to take best advantage of solar gain for energy production. When possible, buildings should be oriented to provide a primary south-facing roof. Plan the overall building form so that the roof area reserved for the solar array can maximize potential sun exposure and avoid shading. The solar array needs to be located so that neighboring buildings and maturing trees do not cast shadows on the intended solar array area. Shade tree species should be selected and planting locations identified that will allow trees to shade windows and walls, but not the intended solar array area.

ROOF DESIGN

As a rough guide, solar panels produce 1 kW of energy per 100 square feet. Most commonly in this area, systems are being installed that are rated for 3 kW production potential, which would be the equivalent of approximately 300 square feet of roof area to be accommodated by solar arrays.

Additionally, the pitch of the roof is a critical factor to consider. In general the pitch of a roof should be equal to the latitude at which the system is installed for maximum solar gain. For example, Lake in the Hills is at approximately 42 degrees north latitude. Therefore, an optimum south-facing roof pitch would be 42 degrees, or the equivalent of a 10/12 to 11/12 roof pitch.

The building's roof structure must be structurally designed to accommodate the weight, wind, and snow drift loads that the system might impose. Solar array systems add 3-6 lbs. per square foot to the dead load of a roof, and up to 45 lbs. at specific attachment points. For a commercial building, a ballasted system installed on a flat roof may add up to 20-30 lbs. per square foot to the roof's dead load. For flat roofs, the area identified for solar collection should be near the middle of the roof, away from any parapets to avoid shading.

INVERTERS, ELECTRICAL, MECHANICAL, AND PLUMBING SYSTEM CONSIDERATIONS

The location of the solar array on the roof has consequences for the routing of the solar electric feed, and distances to the electrical meter and inverter. Reserve a 3 feet x 3 feet area of wall space next to the building's main electrical panel, with an additional 3 feet of clearance space in front of the wall for the installation of the inverter equipment. Metallic conduit at least 1-1/2 inches in diameter should be installed that runs through the building from the area identified for the inverter, to the area identified for the solar collector array. The conduit is capped until used, and is installed in an internal chase connecting the solar panel array to the building's electrical service system area, typically found in basements in single-family homes.

The electrical service panel area must be sized at typically a minimum of 200 amperes in residential buildings and must include the necessary space for a photovoltaic (PV) power input disconnect.

The surface of the roof where the solar array is to be mounted must be free of other obstructions such as rooftop equipment and plumbing vents.

WHAT ARE THE SUMMARY GUIDELINES OF SOLAR-READY PLANNING?

Here is a basic summary checklist incorporating the main design elements to consider:

- ✓ Identify potential placement of future solar arrays when locating a building to minimize future issues with shading from trees and neighboring buildings.
- ✓ Optimize a south-facing roof and construct to the correct pitch to maximize the potential area to install the solar array and energy production.
- ✓ Specify appropriate roof construction for anticipated loading conditions.
- ✓ Locate the building's electrical panel for interconnection, and take into consideration the space needed for the inverter and other components of the system.

- ✓ Provide a chase between the roof and the electrical service area for routing electrical wiring.

- ✓ Plan plumbing and mechanical systems to keep the intended array area free of obstructions such as roof hood vents and plumbing vent stacks.

- ✓ Verify with the utility company any interconnection restrictions for the building's location.

ADDITIONAL INFORMATION AND HELPFUL LINKS

- The International Code Council (ICC) has included helpful solar-ready guidelines in the 2018 International Solar Energy Provisions Code (ISEP) (Appendix CA for commercial buildings, and Appendix T for single-family homes and townhouses).

  For an introduction to the ISEP publication visit:
  https://codes.iccsafe.org/content/ISEP2018

- NREL Solar Buildings Planning Guide: https://www.nrel.gov/docs/fy10osti/46078.pdf

- Let's Go Solar™: https://www.letsgosolar.com/

- Building Codes currently adopted in the Village of Lake in the Hills and applicable to solar photovoltaic projects include:

  2012 International Residential Code (IRC)
  2012 International Building Code (IBC)
  2012 International Fire Code (IFC)
  2011 National Electrical Code (NEC)

  To review these code publications visit: https://codes.iccsafe.org/category/Illinois and https://codes.iccsafe.org/content/IRC2018, residential code, for the latest residential building code information.

- Please also visit the Village of Lake in the Hills Zoning Ordinance for zoning related information: https://www.lith.org/administration/page/municipal-code-zoning

- Please also visit the Village of Lake in the Hills *Solar PV Panels Permitting and Inspection Guidelines* at: https://www.lith.org/cd/page/projects-requiring-permit