

Ypsilanti Grid-Tied Solar Installation Checklist

Version 1.0, February 2017, Dave Strenski

This is a checklist of activities to help the residents of Ypsilanti install solar photovoltaic systems on their home or businesses. A solar contractor can walk you through all these steps. To find one, visit the renewable energy [contractor list](#) at the Great Lakes Renewable Energy Association.

Current Electrical Energy Usage

Determine how much energy your home uses today. Find your last few energy bills and calculate or estimate how many kWh (kilowatt-hours) your home or business consumed in the past 12 months. This is your yearly electrical energy consumption. A typical Michigan home uses about 7300 kWh per year. Divide this number by 365 (days in a year) to calculate your daily average electrical consumption. In our example $7300 \text{ kWh per year} \div 365 \text{ days} = 20 \text{ kWh per day on average}$.

Watts of Solar Panels Needed

Now that we know how much power you need per day, 20 kWh, we need to calculate how many watts of solar panels are needed to make your home or business 100% solar powered. (Net-metering allows you to push excess power back into the grid and get full credit for that power, so if you over produce during the day you can be 100% solar power without batteries.) The National Renewable Energy Laboratory has a [map](#) that shows the number of peak solar hours for every location in the United States. It shows that Ypsilanti and most of Michigan gets about 4 hours of peak sun per day. Divide your daily energy usage by 4 and that's how many watts of solar panels you need to be 100% solar powered. In our example, $20 \text{ kWh} \div 4 \text{ hours} = 5 \text{ kW}$ or 5000 watts. This assumes you are putting the panels on a South facing roof with no shading. If your roof gets some shade during part of the day or it's not facing due South, you'll need some more panels. The program [PVwatts](#) can calculate the exact number of panels needed for a roof facing any direction.

Budgetary price

Before going any further we need to decide if a solar installation is within your budget. Currently a solar installation costs about \$3/watt, so your 5000-watt installation will cost approximately \$15,000. This is the rough price to have a professional installer do everything from pulling the permits, installing the hardware, passing the inspections, and ensuring that DTE Energy commissions the system. The installation might cost more if your roof or electrical system is out of date and needs to be replaced at the same time. The good news is that there is a Renewable Energy Tax Credit that enables residents to claim a dollar-for-dollar reduction in their income taxes for 30% of the total investment in solar property. In our example of a \$15,000 system, a resident could reduce their tax liability by \$4,500 ($\$15,000 \times 0.30$), which would bring the cost of the system to \$10,500. It could be even cheaper if there are any City, State, or Utility company rebate programs active. If the cost of offsetting your entire electricity consumption with solar is prohibitively expensive, there is still an opportunity to install a smaller system and achieve similar benefits. Solar contractors can help determine the payback of various system sizes.

Will it Fit on My Roof?

Most solar installation in Ypsilanti are on the roof. A south-facing roof is optimal, and the higher the better. This will provide panels with maximum exposure to sunlight and generate the most electricity. If a south-facing roof is unavailable, you can install solar on an East or West roof, but panels on those faces will produce about 75% of the electricity as a South facing roof. This will still work, but your return on investment will be a bit longer. Today a typical solar panel is 40” wide and 66” tall and is rated for 285-watts. In our 5000-watt example we would need $(5000\text{-watts} \div 285\text{-watts})$ 17.5 solar panels, or 18 panels. Assuming we put them in an array of two rows of nine panels, the solar installation would measure $(40'' \times 9 \text{ panels} \div 12'')$ 30 feet wide and $(66'' \times 2 \text{ panels} \div 12'')$ 11 feet tall. The solar panels can be arranged in many ways to fit your roof.

If your roof is too small, faces the incorrect direction, or is shaded, the array can also be placed on the ground in a big back yard. Shading cannot be overlooked, so make sure to conduct a shading analysis to determine how much sunlight a specific location will receive throughout a year. You can discuss all sitting options with your solar contractor.

Designing the system

After deciding to go forward with the project, you need to create a design of the proposed system. If you have not yet contacted a solar contractor, this is a good opportunity to enlist professional assistance. You will need a detailed design for the DTE Energy application, Ypsilanti Historic District approval (if needed), and for the building and electrical permits. Specifics you will need to collect as you design the system include:

- A list of makes and models of the solar panels and inverters
- A good idea of how the panels will be attached to either the roof or the ground.
- A wiring diagram showing all the equipment and their location on site.

Remember to consult the [City of Ypsilanti Zoning Ordinance](#) §122-788 “Alternative Energy.” to ensure that the system design meets all municipal requirements.

Getting Started, DTE application

To get started, either you or your solar contractor need to submit the DTE Energy “[Generator Interconnection Application](#)”. This form, along with the fee, alerts DTE Energy that you’re considering a solar installation. They will examine the form and grant their permission to connect your grid-tied solar installation to their grid. You should wait for DTE Energy’s approval before moving forward.

For a solar energy system with an output of 20 kW or less, the DTE Energy “Generator Interconnection Application” requires:

- Manufacturer information for the system (e.g. system type, total generator nameplate DC rating, etc.)
- Installation information (i.e. who is installing the project)
- Fees (\$75 for interconnection only, or \$100 for combined interconnection and net metering program)
- Site Plan
- One-line drawing (for net metering projects)

Historic District Commission Permission

If your home or business is in the [Ypsilanti Historic District \(HDC\)](#), you need to apply for permission to put solar panels on your historic structure. The HDC has an [alternative energy fact sheet](#) that can be used to help design your solar installation.

Building and Electrical Permits

After approval from DTE Energy and the HDC, you'll need to pull the building and electrical permits.

[Building permit](#)

These applications will need the complete design of the system and maybe additional information about the structure in the roof to make sure it can handle the additional load. For reference, a solar installation weights about the same as another course of asphalt shingles.

[Electrical permit](#)

The permit will need a list of parts and information how the system will be attached to the building's electrical system.

Ordering Parts

With the permits approved, it now time to order the parts and start scheduling an installation date. Typically, the solar supplier will deliver the parts to the location, so make sure that if you're not going to install the equipment soon, that you have a secure location to store the material.

Installing the System

The typical home installation can be done in a day, with a few follow up visits to finish the wiring to the service panel and meeting inspectors and/or DTE field engineers.

Building and Electrical Inspections

When the solar panels are installed, you can call/email the City's building department and request a final building inspection.

DTE Energy Commissioning

DTE will not commission the system until they have proof that you have passed the electrical inspection. During commissioning DTE field engineers will test the system to make sure the inverters will shut off if the utility grid loses power. They will then reprogram your utility smart meter to be bi-directional, and measure the power that enters the home, as well as power that is exported by the system. It is not recommended to run the system before commissioning because the meter cannot tell the difference between incoming and outgoing power and it will charge you for power you are exporting to the grid.

Enjoying Lower Utility Bills

Enjoy your solar power. Hopefully the system will come with a solar monitoring portal where you can see how much power you are generating. You'll also see a change to your utility bill with readings for both the incoming and outgoing power. With net-metering, if you ever send out more power then you brought in for a given month, DTE will give you a credit for that power

that can be used on the following billing cycle. Make sure to tell [SolarYpsi](#) about your solar installation so we can put you on the map.