# Solar inverter design

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This is a the third installment in a three-part series on residential solar PV design. The goal is to provide a solid foundation for new system designers and installers.  This section is dedicated to the basics of inverter sizing, string sizing and conductor sizing.

This post is specifically focused on basic technical understanding of solar PV projects. However, more and more we’re getting questions from contractors who need to understand how to finance commercial solar projects.

We also get a lot of questions about NABCEP certification from people looking to design solar projects.

Click here to learn what is NABCEP and whether or not you should need to get the certification. If you’re serious about the solar industry and you want to get the NABCEP Certification, but you need to understand how exactly to apply, you can read more about getting the NABCEP certification here.

The goal of the article is to convey the basic process for sizing an inverter, strings, and the conductors. You may not be an expert at the end of the post, but you’ll have a better understanding of how to do these things.

As always, having specific numbers is the most useful for examples, so we’ll continue with the example from part 2 on sizing an array and estimate power production. The house was located in Houston, TX and the roof, given local shading conditions, has enough room on the roof for 20, 205 watt modules. (Read Part 2 to see how we arrived at this number.)

Here is the specification sheet on the Sanyo HIT 205 module we’ll use for the example.

So, the largest possible size of the array we can fit on the roof at STC is 4,100 watts. We can go lower then this but not higher.

Given that we know how many modules can fit on the roof, how do we use this data to size the inverter? The size of the inverter is driven by answering two questions:

1 – What is the capacity of the existing electrical service?

Per NEC 690.64B2 (2008) 705.12 D2 (2011), an existing electrical service is only allowed to backfed up to 120% of the rated capacity.

100 amp service X 20% = 20 amp backfed breaker allowed

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