heliodyne
SOLAR HOT WATER

Regarding solar storage to collector area ratio:

The optimal ratio of water storage to collector area used is 1.5-2 gals. of solar water storage per square foot of collector area used. For example, 2 Gobi 410s which are about 40 square feet each, will be best paired with a 120 gal. solar storage tank. 80 x 1.5 = 120.

From our Head Engineer:
[Mike Starkey] The collector efficiency curve looks like a log function, where the efficiency benefit of adding more storage levels off at about 1.5-2 gal / ft^2 depending on system configuration, load, weather, etc. In other words, less than 1.5 gal / ft^2 affects the performance significantly.

Under-sizing the storage will cause the collectors to stagnate while there is still sun available, make the Financials look undesirable, and system maintenance due to overheating, like glycol degradation, etc. Recovery rates are used when selecting backup heating systems, and are not applicable in solar water heating systems, where the whole concept is to utilize the entire day's worth of energy. Since the solar is contributing to the rise in temperature of the water, no how minimal, that is a few degrees the backup heater doesn't have to make up, which is the whole concept behind the solar fraction.

In rare cases, Heliodyne designs with under-sized storage: commercial applications with a large, heavy day use load (storage no less than 1 gal / ft^2); commercial water heating in buildings that contain a recirculation loop holding a large volume of water (storage tank size could be reduced up to 30%). I recommend consulting Heliodyne with any designs where you choose to implement these cases.

The opposite also holds true, i.e. oversizing the storage. In these cases, the customer will end up with a lot of luke warm water that would require more input by the auxillary/back-up heat source. The customer will not see a significant reduction in their fuel bills and the ROI will be longer.

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