

## COMPARISON OF VARIOUS COLLECTORS (evacs and flat plates)

**PURPOSE:** To use SRCC data to help decide which low priced collector will be best for my application. The application is a large residential array approximately 190 sq.ft that will be used for a) DHW and b) some supplemental space heating. Though not ideal from a solar perspective, this is the system I am working with, that will often have high delta Ts, higher than typically encountered for solar DHW. I am looking for the collectors to be able to pump supplemental solar btus into an already hot (120ish to 160ish degree) wood fired tank. So I am looking for collectors that will still be able to work in the winter at delta Ts often around 100 and even higher, in mixed sunlight conditions.

**METHOD:** 5 collectors under consideration were evaluated. Gross area was listed for each collector that will be used to calculate output per sq.ft. For 3 categories of delta Ts, SRCC output data per collector is copied from their tables, and averaged for the 3 sunlight conditions SRCC lists (clear, partly cloudy, fully cloudy). The intent is to simulate an equal mix of those conditions.

Unfortunately, 3 of the lower priced collectors are not SRCC rated yet, so rather than not consider them at all, for comparison purposes, I used data from other SRCC rated collectors that I considered comparable and noted these numbers as estimates and printed them in gray.

Prices and outputs were worked out, per 1 sq.ft. and per 190 sq.ft array.

Additionally, I worked out prices per sq.ft, total prices for a theoretical 190 sq.ft array, and total output for a 190 sq.ft array to aid with the comparison.

Make model	Notes Availability	Size	Cost/ collector  Cost/ sq.ft  Cost for 190 sq.ft	36 Delta T (typical summer)		90 Delta T (typical winter)		90/144 Delta T (winter with a very hot tank)	
				Kbtus/day clear to cloudy  Avg. kbtu/day  Kbtus/ Sq.ft./day  Kbtus/day from 190 sq.ft array	Collector cost per Kbtu/day	Kbtus/day Clear to cloudy  Avg. kbtu/day  Kbtus/ sq.ft/day  Output/day from 190 sq.ft array	Collector cost per Kbtu/day	Kbtus/day Clear to cloudy  Avg kbtu/day  Kbtus/ Sq.ft/day  Output/day from 190 sq.ft. array	Collect or cost per Kbtu/dy
SunMaxx Black chrome flat w/ fiberglass insulation	Not srcc rated yet. Only one size available. Available on Ebay. I used btu numbers from the Rheem which makes.	39" w x 80" h  21.7 sq.ft	\$325 ea. On Ebay  \$15/sq.ft  \$2,850 for array	23/16/9  16 Kbtu/day (avg)  737btu/sq.ft/day  140 Kbtu/array/day (estimate)	\$20/ Kbtu/day	14/7/2  7.7 Kbtu/day (avg)  355 btu/sq.ft/day  67 Kbtu/array/day (estimate)	\$42 Kbtu/day	14/7/2/4/0/0  4.5 Kbtu/day (avg)  207btu/sq.ft/day  39 Kbtu/array/day (estimate)	\$72 Kbtu/dy
SunEarth Empire EC 32 Black chrome flat w/ foam & fiberglass insulation	King Solar has the EC32 for \$822 retail. EP model (painted absorber) on ebay store, priced \$600 ea. for 12. I estimate \$725 bulk price for black chrome EC model	48" w x 98" h  32.7 sq.ft	\$822 ea. KingSolar Less by the pallet  \$25/sq.ft  \$4,750 for array	34/24/13  23.7Kbtu/day (avg)  740btu/sq.ft/day  141 Kbtu/array/day	\$31/ Kbtu/day	23/13/4  13.3 Kbtu/day (avg)  416btu/sq.ft/day.  79 Kbtu/array/day	\$55 Kbtu/day	23/13/4/13/4/0  9.5 Kbtu/day (avg)  296btu/sq.ft/day  56 Kbtu/array/day	\$77 Kbtu/dy
Apricus AP-22 Evacuated collector w/ 22) 59mm x 1800 mm tubes	On line price at Shop.solardirect.com This collector is not one of my serious contenders due to its high price, but I put it in for comparison.	Approx 65" w x 78" h  34.8 sq.ft	\$1,305 each.  \$38/sq.ft  \$7,220 for array	26/19/12  19 Kbtu/day (avg)  540 btu/sq.ft/day  103 Kbtu/array/day	\$70/ Kbtu/day	22/15/9  15.3 Kbtu/day (avg)  440btu/sq.ft/day  84 Kbtu/array/day	\$86 Kbtu/day	22/15/9/19/12/5  13.6 Kbtu/day (avg)  390btu/sq.ft/day  74 Kbtu/array/day	\$89 Kbtu/dy
SunMaxx 25 Evacuated tube collector w/25 59mm. 1800 tubes.	Not SRCC rated yet. Appears similar to Apricus, except wider spacing and 3 more tubes. Output may be about 10% greater than AP22. These outputs are just ESTIMATES	Approx 85" w x 80" h  47.5 sq.ft.	\$800 each.  \$17/sq.ft  \$3,200 for array	20.9 Kbtu/day (avg)  440 btu/sq.ft/day  84 Kbtu/array/day (estimate)	\$38/ Kbtu/day	16.8 Kbtu/day (avg)  353 btu/sq.ft/day  67 Kbtu/array/day (estimate)	\$48 Kbtu/day	15 Kbtu/day (avg)  315 btu/sq.ft/day  60 Kbtu/array/day (estimate)	\$53 Kbtu/dy
SunFlower SB304715 Wearesolar.com sells this smaller dia and shorter length evac tube collector.	Not SRCC rated yet. Since I am aware of no similar tube size SRCC rated collectors, for comparison, I am assuming sq.ft. output is same as SunMaxx evac.	Approx 86" w x 65" h  38.8 sq.ft	\$640 ea.  \$16/sq.ft  \$3,140 for array	440 btu/sq.ft/day  84 Kbtu/array/day (estimate)	\$37 Kbtu/day	353 btu/sq.ft/day  67 Kbtu/array/day (estimate)	\$47 Kbtu/day	315 btu/sq.ft/day  60 Kbtu/array/day (estimate)	\$52 Kbtu/dy

## NOTES:

Gross sq.ft vs net sq.ft.: Evacs, with their top manifolds and the spaces between tubes, have a smaller ratio of net aperture to gross area compared to flat plates. Mixing net and gross numbers can get confusing. So, to compare apples to apples, I used gross sq.ft. through out. Both flat plates and evacs had total SRCC output of collectors divided by gross sq.ft. to get output per sq.ft.

King Solar <http://kingsolar.com/> seems to have the most extensive selection I could find of many types of flat plates and many types of copper absorbers, some of them pretty reasonably priced.

SunMaxx <http://solarhotwater.siliconsolar.com> seems to have the most dirt cheap flat plate collectors I have found on the market – available in only one size. Also they have discount priced evacs.

<http://www.wearesolar.com/> is another good source for discount priced evacs, not yet SRCC rated. Bill Fitch there offers prompt service and is very knowledgeable. The evacs he carries use smaller 47mm x 1500 mm tubes, as opposed the 58mm x 1800mm tubes used on Apricus and SunMaxx, although I understand Bill is starting to carry some of the larger tube sizes. One should take tube size into account when comparing evacs, as it may take 30 of the smaller tubes to equal the collector area from about 20 of the larger tubes.

## CONCLUSIONS:

This analysis based on SRCC data for Apricus and Empire, and estimates for the non-rated brands, leads me to the conclusion that, if the data is correct, for all general DHW conditions, flat plates would be the way to go. In my unusually high delta T situation, this is where an evac may legitimately be the best route. After also considering aesthetics, size availability, and summer overheat avoidance, I am planning to use SunMaxx evacs, which will be one of the lower cost options and should be able to keep working effectively at high delta T's. They will probably churn out less useful heat than the flats in the heating shoulder seasons, which is a minus, but they will churn out less excess heat in the summer which should makes summer overheating a little easier to control.

If anyone has any corrections, comments, or questions please feel free to contact me. I am trying to learn solar thermal as best I can and to help others with it.

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