

## Solar Concentrators

There are a lot of ways to use the sun! Solar panels are a staple in solarpunk artwork, but when your goal is to make heat or light, converting sunlight to electricity and back again actually wastes a lot of the energy. Here are a few low(ish) tech alternatives that might be a better fit for the circumstances in your story or artwork:

### Reflectors

With mirrors, a support framework, and established formulas for the overall shape, you can produce incredible heat - up to 3,500 °C. The materials are commonly available, and require very little tech base to produce or assemble, and they can take some of the highest-resource-consuming tasks off the grid. From tiny solar cookers to massive solar furnaces, there are tons of clever formats for this technology. Heating with the sun might not be as reliable as with electric power (assuming a reliable grid), but with the right combination of technologies, and some adjustment of expectations and schedules, a solarpunk society could produce heat for free and significantly drop its overall requirements for the collection and storage and distribution of electricity.

- **Solar Cookers** - there are a ton of ways to cook with sunlight, there's a vibrant DIY community and hundreds of designs to fit almost any circumstance, requirement, or starting materials.
  - Two interesting variants to call out: there are some designs that allow for fairly traditional ovens (most of these are more of a replacement for a camping stove than a kitchen oven, but even that can be done: [This system](#) appears to use a series of reflective troughs on the roof to heat a transfer fluid running through a tube and conveys that down to a fairly traditional convection oven. While a [Scheffler reflector](#) is a huge mirrored dish positioned outside a building to [bounce light through a hole in a wall into an oven](#).
  - Downsides: Less convenient - you generally need clear skies and they get less and less effective at higher latitudes. You also need sunlight - this might seem obvious, but think of how many changes you'd have to make if you could only cook when it's light out. No more bakers hours getting food ready before you open, cook your hot meals during the day rather than for breakfast, etc.
- **Solar Furnaces** - Jumping in at the other end of the scale, solar furnaces are massive constructions capable of reaching up to 3,000 °C, often using both a gigantic parabolic reflector to focus the light and ranks of [heliostats](#) to increase the amount of light collected. These have been used for scientific purposes for decades but they've [recently seen use in steel recycling too!](#)
  - Downsides: They're absolute hell on local birds. They'll burn up anything that flies through the solar flux. They also depend on clear skies, and not just of clouds: airborne dust, smoke, and haze can severely impact their effectiveness. This is a huge downside in our current society where a delay in scheduled output can result in massive consequences, but if a solarpunk society has a different pace and acceptance that the world doesn't abide our plans, it might be more viable. Perhaps the workers would be essentially on-call and if weather is good enough that day, they get on a train to the site, and if it isn't, they get the day off, work at a different site, or perhaps the steel co-op pays them to help with other work in the community.
- **Solar Steam Power** - for most of human history we generated power (electricity or kinetic energy) by using heat to make steam and using steam to spin a thing. Even when humans harnessed the power of the atom they used it to boil water. Solar concentrators can boil water and there have been different designs over the years using solar steam to [pump water](#) or run

freezers, and there's [some niches for generating electricity this way too!](#) Photovoltaic panels have surpassed some of the big [solar-thermal megaprojects](#) in output, reliability and maintenance at this point, but it's interesting to think that these are using a lot of the same principles Augustin Mouchot and [Frank Shuman](#) advocated for, just at a different scale and complexity.

- **Solar Steam Generation** - There are other ways to use steam. Many [industries](#) waste a lot of power/fuel generating steam to sterilize products, seal packaging, or produce chemicals, and there are a handful of systems designed to fill that need primarily using the sun. Even the [oil industry uses these](#) in some cases. Solar steam could also be used in cooking or in the medical field to run [autoclaves](#).

## Lenses

[Fresnel Lenses](#) are a type of large, flat lens designed to focus light. They use a circular pattern of cuts which simulate the surface angles of a much thicker lens while remaining quite thin. This allows for a huge surface area and very low mass, making them very useful in everything from light houses to rear-projection televisions. There are a variety of interesting projects built around these lenses:

- [A 3D printer for sintering sand into glass objects](#)
- [A solar rig for smelting zinc or aluminum](#)
- It seems likely that these could be used for solar forging, glassblowing, or perhaps even CNC sheetmetal cutting with enough focus to narrow the kerf and reduce warp. There are a variety of videos online of people using fresnel lenses from a rear-projection TV to burn through steel skillsaw blades and to melt sand into glass cabochons.

## Other Systems

So far we've mostly talked about using heat, but what about light? There are also some clever ways to collect and redistribute sunlight as illumination:

- **Fiber Optic Daylighting** These systems use solar collector systems outside (usually some sort of multi-lens rig mounted on motors to seek the sun throughout the day, though some are simpler and passive) to redirect sunlight into fiber optic cables, which are used to bring it indoors to simple diffusers that scatter the light at the destination, usually a dark interior room. The advantages over light bulbs are that it's genuinely natural light, and that it lacks the strobing effect you get with most electric lights. It only works during the day, but that's the time when humans are most active. They also make some sense in some kinds of [agriculture](#). Perhaps they'd be a good fit for growing crops in [walipinis](#) or underground during the winter.
- **Light Tubes** If fiberoptic daylighting sounds a little over-complicated for your setting, perhaps a light tube is a better fit. These work in a similar way, but are passive and simpler to maintain. The downsides are that they capture less light and work best when the 'tube' is short and straight.

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