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[Back](#)

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The Weekly Planet: See the sun in the moon

By ALAN BETTS

Back in the late 1970s, during the first oil and energy crisis (when Presidents Nixon and Carter called for energy independence by 1980!), I coined the term "solar moon" for the full moon in midsummer. This is because the full moon near the summer solstice shows us the path of the sun near the winter solstice.

How can this be? The moon is full when it is on the opposite side of the Earth from the sun. It then rises in the east just as the sun sets in the west. On June 21, the summer solstice, the sun's position in the heavens is in the constellation of Gemini, opposite where it is on Dec. 21 in the constellation of Sagittarius. At the full moon in June, as the sun sets in the northwest, the moon rises in the southeast in Sagittarius and traces roughly the same low path across the southern sky that the sun follows at the winter solstice.

This year's solar moon falls next week on Wednesday, June 18. Watch it carefully, because it can give you a sense of how much or how little solar energy enters your house in winter. For a day or two near the full moon, your south-facing rooms will be filled with light in the very late evening.

You can see whether trees will shade the sun in winter. Even without leaves, the branches block quite a bit of the sun's energy. The moonlight won't heat your house, but is strong enough to give you a powerful visual sense of the sun in winter. Go outside in the summer warmth, and see where the winter shadows lie.

If you are going to build a house, or put in a solar water heating system, or install solar panels to make electricity, you especially need to know where the sun will be in winter, when it is lowest in the sky. At the solar moon in June you can see both the summer sun, and at night the path of the winter sun: a glimpse of the whole year in one day!

If it is cloudy for several days around this coming full moon, try again next month, when the moon is full on July 18. It won't be quite as low in the sky, since then it will roughly trace the path of the sun in mid-January. (The moon will in fact be at its lowest in Sagittarius in July a couple of days before it is full.)

We love the warmth of summer, when the sun is high in the sky. We will have to rediscover the warmth and light of the sun in winter - it didn't matter when we had cheap fossil fuel, but those days are gone. This means large, insulated windows that face south and let in the low winter sun, with overhangs that shade the windows from the summer sun, when it is high in the sky. And homes must be well-insulated to keep the heat in through the long winter nights. Homes built like this are called passive solar homes.

Of course, the sun gives us more energy in summer, when the days are longer and often less cloudy. This makes heating water an easy task in the warm season.

Solar panels that make electricity are called photovoltaic panels. They can be mounted on south-facing roofs, or on poles driven into the ground. In sunlight, they convert about 20 percent of the sun's energy directly to electricity. Typically these systems are connected to the power grid, and the utility buys back the power generated in the daytime.

For the home or business owner, this arrangement reduces utilities bills, as the owner may only have to buy power at night, especially on sunny days in summer. For the utility, this solar power is very valuable, as it is traditionally very costly to buy power to meet the daytime peak electrical load. And there is a large environmental benefit. The sun provides renewable, sustainable power - a far more preferable option during the daytime peak to fossil-fuel generation, which puts greenhouse gases into the air and changes the climate of the earth.

It is important to start thinking ahead, even if your plans take a few years to come to fruition. We must plan more carefully, because the cost of heating water and drafty houses with fossil fuel has been steadily rising. It is not just the dollar cost to us personally, but the cost to life on earth.

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