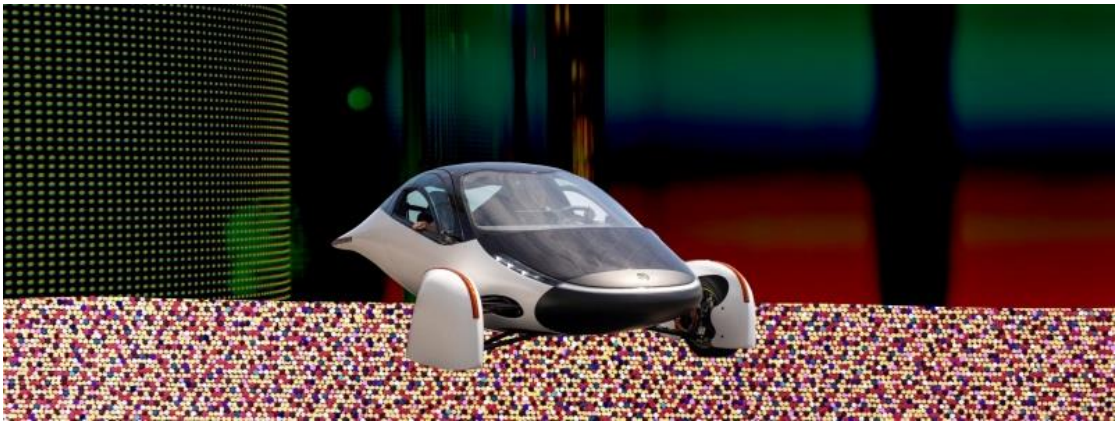
Solar powered cars could soon hit the streets — but can they be efficient enough to go mainstream?

If they work, solar-powered cars could be great for the environment. Here's the startups working to make that happen.

By Jennifer Walter December 23, 2021 https://www.freethink.com/technology/solar-powered-cars

Source: Freethnk.com



Credit: Aptera

Solar-powered cars aren't new — they've been racing in the Australian Outback for nearly 30 years. But in order to go mainstream, the cars will need to get way more efficient with their energy use to be able to compete with fully electric or fossil-fueled cars.

Now, a growing number of startups are working to make that happen; and if solar powered cars become more practical, they can have a role in helping us build a more sustainable world.

Why it matters: The transportation industry is the greatest polluter of greenhouse gases in the U.S., with a single passenger vehicle emitting 4.6 metric tons of CO_2 per year. It's no surprise car manufacturers are on the hunt for solutions that can slowly wean us off of our finite supply of fossil fuels, while still getting us where we need to go.

The EV market is getting more crowded every year, with multi-billion dollar companies like Tesla seeing competition from up-and-coming startups like Rivian and Lucid. And legacy automakers are rolling out more of their own hybrid and electric models, such as the Ford Mach-E and the Nissan Leaf.

But instead of powering all EVs with plug-in electric charging, some automakers are experimenting with a tried-and-true source of renewable energy: solar. Sure, electric cars can be powered by plug-in electricity that's generated *from* solar panels, but what if the car could do the work of generating that electric power itself?

Benefits of all solar: Solar-powered cars promise a future where a vehicle can be self-sustaining. They wouldn't rely on traditional energy resources, and drivers wouldn't have to wait for the energy grid to make massive infrastructural changes away from coal or gas power. Instead, they would bring a new kind of sustainability to the transportation sector, moving away from greenhouse emissions completely.

Solar powered cars could soon hit the streets — but can they be efficient enough to go mainstream?

"Particularly if the vehicles become more and more efficient, you really can have a car that for six months of the year you may not need to charge it unless you're doing a larger trip," Bonna Newman, a senior scientist at the Netherlands Organisation for Applied Scientific Research (TNO) and co-founder of the Alliance for Solar Mobility, told the Wall Street Journal.

We're nowhere close to cars fully powered by solar, but the technology we have now could benefit electric vehicles. By incorporating solar cells onto the exterior of electric vehicles, reliance on charging stations could be cut by 15%, according to Dr. Newman. This means, if technology continues to improve, solar energy could help reduce an electric vehicle's reliance on the energy grid.

A growing market: With three wheels and a sleek, aerodynamic body, the concept solar electric vehicle created by California-based startup Aptera looks straight out of a sci-fi film. It boasts the ability to collect up to 40 miles worth of charge per day from the sun alone, thanks to embedded solar panels all over the vehicle.

The company says its funky design reduces drag, and the vehicle is supposed to continuously charge as you drive. It's preorder price is $25,900 for a base model — more than $19,000 cheaper than the average new car in September 2021. Other startups have opted for a more traditional 4-wheel design, such as Lightyear and Sono Motors.

Both Lightyear's Lightyear One and Sono's Sion are solar-electric vehicles, meaning they rely on wired charging *and* solar power from panels on the cars. Sono says that the Sion can generate an average of 69.5 miles per solar charge per week, while Lightyear One boasts the ability to generate roughly 7.45 miles for every hour of solar charging.

Lightyear and Sono are based in the Netherlands and Germany, respectively, with their vehicles currently available on pre-order. Current price for the Sion is 28,500 Euros ($32,261), and Lightyear One is 150,000 Euros ($169,767).

While the concepts seem promising, these solar-powered models are all in the pre-order and testing stage. Lightyear plans to start deliveries in 2022, while Sono Motors expects to begin production on the Sion in 2023. And Aptera is creating its second round of prototype vehicles as of November 2021 for more safety testing.

Only time will tell how these vehicles will perform once they hit the streets — with ordinary drivers at the wheel.

Why solar is tough to wrangle: Solar-powered vehicles all incorporate solar panels in some way. But the process of baking them in is more complicated than just taking a rigid array of squares and slapping them to the roof of a car.

For starters, car roofs are curved, and panels need to be flexible enough to wrap around those curves. And the conditions that cars find themselves in are different than that of a stationary

house or solar farm — panels need to be weatherproofed and protected for high speeds, while still appearing aesthetically pleasing.

Solar panels will collect much more energy in bright, sunny conditions than on an overcast day. If you park your car in the shade, you could risk losing out on a charge while you're running errands. And the car's mileage and efficiency also depends on a driver's habits.

The trade magazine *Assembly* reports that there are three main challenges for solar cars to overcome: making vehicle solar technology cost-effective and reliable to produce, finding a way to store extra energy after the car battery is full, and overcoming environmental factors such as shade and clouds that can cause the car's energy generation to be less efficient than predicted.

Hybrids FTW: But there's one way to minimize these challenges as technology catches up, and that's to rely on solar as just one part of a car's energy source.

"Simply put, only so much energy from the sun is available per square meter, and solar panels can only capture a portion of that energy," Mark Hanchett, the CEO of Atlis Motor Vehicles tells *Assembly*. Atlis is producing an electric pickup truck that will have a solar roof to generate some of the car's power — but will also rely on electric charging to keep it running.

One car on the market right now is the 2020 hybrid Hyundai Sonata, which runs on a mix of gasoline, electric power, and solar. Its panels alone generate enough solar power for 2 miles of travel each day. But according to a review from Green Car Reports, the technology still has miles to go, especially in less-sunny areas.

Even if today's solutions aren't perfect, research into better solar tech could bring about better applications in the future. In the same way that engineers are working to build longer-lasting EV batteries, there are also teams working on creating more efficient solar technology.

One group from Linkoeping University in Sweden recently created a prototype solar cell from organic materials. That's another new horizon being explored in solar tech: making the energy-generating parts sustainable themselves.

How emerging technology gets applied to new vehicles remains to be seen. But in the long run, solar energy represents a future where cars can be truly sustainable.

Learn more at
Lightyear https://lightyear.one/
Sion https://sonomotors.com/en/sion/