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Solar Trees

While renewable energy is beneficial to the environment, it comes with its own problems. It needs large tracts of land to generate significant power, and these areas can be long distances from the facilities that would use the energy. Storing this energy for long periods of time can be hazardous, while transporting it long distances can be expensive and cause more pollution in the form of carbon dioxide. This is where solar trees come in. Solar trees are a combination of synthetic trees (which absorb CO₂ from the atmosphere) and photovoltaic paint, which will work to solve these problems. Similar to artificial tree cell towers, they would blend in with normal trees in places like parks or near roads. The trunk would be the synthetic tree portion, supporting the “branches” which will be coated in photovoltaic paint to generate solar power. They serve to accomplish three major goals. To remove CO₂, to generate solar power locally, and to be aesthetically pleasing.

The first goal is achieved through the use of artificial tree technology. Large grills are placed on towers going into the sky, and those grills are filled with streamers of sodium bicarbonate. Each of these needles attract and trap CO₂ particles as the wind travels through the grill. The CO₂ can be easily removed with a gentle stream of water. With a regular maintenance crew, and depending on the size of the grill, almost a ton of carbon dioxide could be removed daily. That is the equivalent of the emissions produced by thirty-six vehicles. These “trees” act like normal trees, but are a lot faster at capturing carbon dioxide. Once captured, CO₂ can be used industrially or sequestered underground.

The second goal is to use photovoltaic paint to generate power. This technology is still in development, but is on its way to becoming commercial within a few years. The paint would be placed on “branches” coming out of the top of the artificial tree, without blocking the grill heavily. The paint would be much closer to the sun, generating power more efficiently. Photovoltaic paint will be able to cover our rounded branches, so sunlight will be striking the paint throughout the day. Wires will run internally through the tree to transfer this power to areas locally that need it. Currently, commercially viable photovoltaic paint, especially the lower cost ones, generate at about 10% efficiency. Since photovoltaic paint is a new invention and still developing, better changes can be made to further enhance the solar trees. Once they are out of development and more hit the market, there are projections that higher-end commercial versions will be 20% or even 30% efficient.

The final part is taking all the previous parts and putting them together in an aesthetically pleasing way. The tree itself would have a firm artificial trunk, created of either steel or plastic, and painted to look like a tree. This would be rooted deep into the ground, to provide a sturdy base for the rest of tree, and to prevent damage to the CO₂ or solar components during extreme weather. At the very top of the trunk would be the synthetic tree portion. Shaped like a diamond, it would contain the grill and needed to absorb CO₂ from the atmosphere. Stemming out from the trunk would be the branches. These branches would look very much like branches from a natural tree, with twists, turns, and breaks. These branches are coated with the photovoltaic paint, which creates solar energy. The final part of this facade is a layer of artificial leaves covering the bottom and sides of the tree. This prevents the components from being seen by people on the ground, maintaining the illusion of a tree. The top will be sparse on leaves, so sunlight can still hit the branches, and wind will still go through the grill.

Why is it important that these parts be hidden, and the solar tree looks like an actual tree? Well, then it is more easily accepted. While a CO₂ collecting plant or a solar array can consume space and be an eyesore, these will blend in like a tree in the forest, so to speak. In fact, you can ideally plant solar trees wherever there are trees, so they could be used in most places around the world. You would see these in a park and not think twice about them, even if they are providing power to the lights and cleaning the air around you. This acceptance needs to be the first step in order to get people to start adopting greener energy and environmentally-safe products sooner. These aesthetically pleasing alternatives to large solar grids can have outlets to let anyone charge their devices with clean free energy, or give a little power to the lighting in a school. Putting the trees in public places where people can try them is a good way to get people excited about other developments in environmental tech. These are small additions, but providing many people with clean energy is a good first step to mitigating carbon dioxide in the atmosphere.

The cost of such a product is an aspect where solutions are still in development. The photovoltaic paint is not projected to be very expensive, at least compared to the artificial tree. Accounting for maintenance cost and manufacturing, the original CO₂ cleaning trees sought out today cost about \$20,000. Our solar tree would use a smaller version of that artificial tree, so the cost would be decreased. At the price of a decent car, it's a fair amount to pay. After a few years, these trees will pay for themselves through the generated power and the effects that they have on cleaning the environment. Placing these in parks and schools will be a valuable lesson for the next generation, and encouraging green methods is worth the cost in the long run.

Implementing each solar tree is a substantial amount of investment in the future. They they can be integrated almost anywhere on the globe with trees and sunlight, and will only get more efficient as time goes on. With the benefits described, one day they may be viable to be placed on every street corner. If that happens, a strong step against pollution and rising CO₂ levels will have been taken. Its a step towards mitigation and awareness of the problem. While removing CO₂ from the atmosphere is definitely a temporary solution to a growing problem, we hope that this proposal can pave the way for real change in on our planet.