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Earth Day 2010: Five Technologies That Could Help Save the Planet

At the Copenhagen summit last summer, the G8 countries set a goal to dramatically limit global warming -- a feat that would require the world to cut its carbon emissions by at least 50% from 1990 levels, a study by the Potsdam Institute for Climate Impact Research found. Other studies call for even bigger emissions cuts.

But how does the world go about achieving such a lofty goal? On the 40th anniversary of Earth Day, the stream of new and innovative ways to curb carbon emissions and (hopefully) curb global warming seems never-ending these days, making it all the more difficult to figure out which environmental technologies will truly help to save the planet.

DailyFinance spoke with several environmental and clean technology experts to find out which methods they think will have the biggest impact on carbon emissions. Of course, these technologies alone won't be enough. "There's no single Holy Grail; there's no silver bullet. It's going to take many different technologies, used in thousands of creative ways, to save the planet," says Ron Pernick, principal at research firm Clean Edge.

That said, here are five of the most promising environmental technologies that could help save the planet:

Solar Power

Commercial solar power has been around since the 1970s, but it's only just now starting to become affordable enough to make a real impact on energy use. After a years-long supply shortage, prices have plunged in the last two years. Solar production boomed after manufacturers scrambled to add capacity during the shortage, and that led to a huge boost in supply right when the growth in solar installations began slowing thanks to the recession and slashed government subsidies.

The double whammy of the excess supply and slower growth has brought the price of solar to a total cost of less than 18 cents per kilowatt-hour in sunny climates, according to Photon Consulting. That compares to retail electricity prices that last year ranged from an average of 6.08 cents per kilowatt-hour in Wyoming to 21.21 cents per kilowatt-hour in Hawaii.

"The way the price is coming down is so extraordinary that if it keeps on this

pace, solar will be a cheaper way of producing power than conventional fuels in five to 10 years," says Ethan Zindler, head of U.S. research at Bloomberg New Energy Finance. The Pew Center on Global Climate Change estimates the installation of between 200 and 400 gigawatts of new solar capacity by 2020, bringing solar up to 1.5% to 3% of total electricity output and reducing carbon emissions from electricity by 0.3% to 0.6%.

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Still, Robert Wilder, CEO of WilderShares, which manages several clean-energy indexes, says while solar is not likely to exceed 4% to 5% of the world's energy supply in the next 20 years, it's got plenty of potential in the longer term. "In 50 to 100 years, I'd say, hands down, solar's the Big Kahuna," he says. "[Sunlight] is free and abundant, and could provide much more electricity than we need."

Wind Power

Wind power is the cheapest and the most widespread renewable energy today, providing about 1% of U.S. electricity. If wind generated 20% of the country's electricity by 2030, it would eliminate some 25% of the expected carbon-dioxide emissions, the Department of Energy says. And it's already cost-competitive with natural gas in many regions.

In the U.S., wind power costs between 6 and 13 cents per kilowatt-hour, including tax incentives, the Pew Center on Global Climate Change estimates. (Rather than selling directly to end customers, like most solar projects, wind projects usually deliver wholesale power to the grid. In 2007, the latest year for which averages are available, U.S. wholesale electricity sold for between 4.86 cents per kilowatt-hour and 7.10 cents per kilowatt-hour.)

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However, while wind is the most economically competitive renewable energy source today, the price for wind turbines haven't fallen much in the last five years, thanks -- in large part -- to high steel prices, Zindler says. Because wind-turbine prices haven't shown the kind of downward trend that solar prices have seen, solar may be the safer bet, he says.

Grid Storage

The sun doesn't always shine, the wind doesn't always blow and neither of those events can be controlled by the utility companies. And that's a major -- and growing -- challenge as these renewable energies become a larger part of the energy mix.

Currently, utilities need to back up large amounts of wind power with carbon-emitting coal- or natural-gas power plants when the wind isn't strong enough to meet the electricity demand. Some companies are hoping to solve this problem

with batteries and other technologies that can store huge amounts of energy for the grid.

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Energy-Efficient Buildings

Reducing the amount of energy consumers and businesses use offers the quickest and cheapest ways to cut carbon emissions, according to U.S. Energy Secretary Steven Chu. Consulting firm McKinsey & Co. in July estimated the U.S. could cut its energy consumption from homes, businesses and factories by 23% with things like better insulation, as well as more energy-efficient lighting, heating and cooling systems, home appliances, office equipment and industrial processes. That would eliminate 1.1 gigatons of greenhouse-gas emissions annually and generate a net savings of \$680 billion.

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Nuclear Power

No list of carbon-reduction technologies would be complete without nuclear power, say Chris Gadowski, lead nuclear analyst at Bloomberg New Energy Power. Unlike solar and wind power, nuclear power can generate steady amounts of electricity all the time. Also, nuclear-generated electricity is baseload power that could potentially replace dirty coal, which answers for 20% of the world's carbon emissions and 27% of U.S. emissions.

While it's a controversial choice, nuclear power emits no carbon and supplies far more electricity than solar or wind power – about 15% of the world's electricity, as well as 45% of the world's carbon-free electricity. "There's no comprehensive solution to addressing emissions without nuclear power," Gadowski says. "You'd be missing the world's largest source of carbon-free energy."

The Obama administration supports more nuclear power in the U.S. and big investors like Microsoft (MSFT) Chairman Bill Gates are also backing the technology. Gadowski expects global nuclear capacity will more than double by 2030, with most of that growth coming from China and India.

But make no mistake: Plenty of experts, including many environmentalists, remain highly skeptical. First of all, there's the huge upfront cost of building a nuclear plant and the related financing issues. Estimates have reached \$4 billion to \$6 billion per gigawatt of capacity, which would make a new plant an expensive proposition for risk-averse utilities, Gadowski says. And disposing of nuclear waste and countering safety concerns continue to pose real challenges.

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