

TOP 7 ALTERNATIVE ENERGIES LISTED

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<http://www.newscientist.com/article/dn16419-top-7-alternative-energies-listed.html>

The US could replace all its cars and trucks with electric cars powered by wind turbines taking up less than 3 square kilometres - in theory, at least. That's the conclusion of a detailed study ranking 11 types of non-fossil fuels according to their total ecological footprint and their benefit to human health.

The study, carried out by Mark Jacobson of the atmosphere and energy programme at Stanford University, found wind power to be by far the most desirable source of energy. Biofuels from corn and plant waste came right at the bottom of the list, along with nuclear power and "clean" coal.

Watch a video of Jacobson discussing his findings. http://news-service.stanford.edu/news/2009/january7/videos/407_flash.html

The energy sources that Jacobson found most promising were, in descending order:

- Wind
- Concentrated solar power (mirrors heating a tower of water)
- Geothermal energy
- Tidal energy
- Solar panels
- Wave energy
- Hydroelectric dams

To compare the fuels, Jacobson calculated the impacts each would have if it alone powered the entire US fleet of cars and trucks.

He considered not just the quantities of greenhouse gases that would be emitted, but also the impact the fuels would have on the ecosystem - taking up land and polluting water, for instance. Also considered were the fuel's impact on pollution and therefore human health, the availability of necessary resources, and the energy form's reliability.

"The energy alternatives that are good are not the ones that people have been talking about the most," says Jacobson.

"Some options that have been proposed are just downright awful," he says. "Ethanol-based biofuels will actually cause more harm to human health, wildlife, water supply, and land use than current fossil fuels."
Biofuel concerns

Jacobson says it would take 30 times more space to grow enough corn to power the US fleet than would be needed to erect enough wind turbines, while bioethanol would produce more greenhouse gases than wind power.

Biofuels have received a considerable amount of political backing in recent years with the US and Europe setting targets to phase in their use and gradually replace oil.

Energy and wildlife experts have expressed concerns about biofuels and the EU last year appeared to reconsider its position.

Nuclear is another energy source whose merits have been debated by European and US leaders alike in the past 12 months. "It results in 25 times more carbon and air pollution than wind," says Jacobson. Half of those emissions are caused by the time it takes to plan and build a nuclear power plant - time during which fossil fuels have to be burnt for energy.

"Clean" coal - the process of burning coal then capturing the emitted carbon dioxide and storing it underground - is another political favourite. Jacobson's calculations show that building and using enough clean coal power plants would emit up to 110 times more carbon than building and using wind turbines only.

Focused efforts

"The philosophy that we should try a little bit of everything is wrong," says Jacobson. "We need to focus on the technologies that provide the best benefit. We know which these are."

Jacobson acknowledges that politicians are calling for a massive jobs programme to pull the economy out of recession, but says investment in renewable energy is one way to do that.

"Putting people to work building wind turbines, solar plants, geothermal plants, electric vehicles, and transmission lines would not only create jobs but also reduce costs due to healthcare, crop damage, and climate damage - as well as provide the world with a truly unlimited supply of clean power," he says.

Jacobson presented his results to the chairman of the Senate energy and Natural Resources Committee in October last year. They are published in Energy and Environmental Science this month (DOI: 10.1039/b809990c).