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Renewable energy projects will devour huge amounts of land, warns researcher

- Analyst argues wind farms and biofuels are not green
- Report's look at negative aspects aims to end 'taboo'

- [Tan Sample](#), science correspondent
- [The Guardian](#), Wednesday 25 July 2007
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Large-scale renewable energy projects will cause widespread environmental damage by industrialising vast swaths of countryside, a leading scientist claims today. The warning follows an analysis of the amount of land that renewable energy resources, including wind farms, biofuel crops and photovoltaic solar cells, require to produce substantial amounts of power.

Jesse Ausubel, a professor of environmental science and director of the Human Environment programme at Rockefeller University in New York, found that enormous stretches of countryside would have to be converted into intensive farmland or developed with buildings and access roads for renewable energy plants to make a significant contribution to global energy demands.

Prof Ausubel reached his conclusions by ranking renewable energies according to the amount of power they produce for each square metre of land. The assessment allows direct comparison between the different approaches, based on the impact they will have on the surrounding landscape.

The analysis showed that damming rivers to make use of hydroelectric power was among the most harmful to the landscape, producing around 0.1 watts of power per square metre. The world's largest dam, the Three Gorges power station on the Yangtze in China, stores nearly 40bn cubic metres of water, submerging land that was previously home to more than 1 million people.

Biofuel crops and wind energy fared better in the study, with both generating around 1.2w to a square metre. Leading the renewable energy sources were photovoltaic solar cells, which use sunlight to create electricity, at around six to seven watts to a square metre.

Prof Ausubel investigated how much land renewable energies would need to provide electricity for large populations and compared them to output from nuclear power stations.

In one example he showed that damming rainfall and flooding the entire Canadian province of Ontario would generate hydroelectric power equivalent to 80% of that produced by the country's 25 nuclear power plants.

Another calculation revealed that to meet US energy demands for 2005 with wind power would require constant winds blowing onto wind farms covering more than 780,000 square kilometres of land, the area of Texas and Louisiana combined. A comparison of solar energy with nuclear found that a hectare of photovoltaic cells was needed to produce the same amount of power as one litre of fuel in the core of a nuclear reactor.

The report breaks what Prof Ausubel calls the "taboo of talking about the strong negative aspects of renewables", by focusing on examples that highlight their limitations. "When most people think of renewables and their impact, they're mistaking pleasant landscaping with what would be a massive industrial transformation of the landscape," he said.

"A fundamental credo of being green is that you cause minimal interference with the landscape. We should be farming less land, logging less forest and trawling less ocean - disturbing the landscape less and sparing land for nature. But all of

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These renewable sources of energy are incredibly invasive and aggressive with regard to nature. Renewables may be renewable, but they are not green," he added.

The report, which appears in the International Journal of Nuclear Governance, Economy and Ecology today, also criticises plans for widespread farming of biofuels. With current technology, Prof Ausubel estimates that one to two hectares of land would be needed to produce fuel for each of the world's 700m cars and other motor vehicles. "From an environmental point of view the biofuels business is a madness," he said.

Prof Ausubel said that despite technical and political concerns, nuclear power plants still ranked as the most environmentally-friendly for large conurbations. "The good news about nuclear is that over the past 50 years all of the forms of waste storage seem to have worked."

Power compared

Dams

Hydroelectric energy is the least efficient way of using land to produce power. One square metre on average produces 0.1 watts.

Biofuels

A generator burning biomass requires crops from 250,000 hectares to match the electricity output of a nuclear power station.

Wind energy

Wind farms generate around 1.2 watts for every square metre of land.

Solar power

Photovoltaic cells covering an area of 150,000 square kilometres would be needed to meet US electricity needs for a year. To power New York city would take 12,000 square kilometres, about the size of Connecticut.

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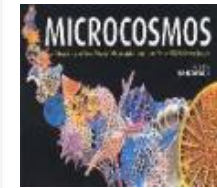
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