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Running It All On Clean Energy: "A Question Of Social And Political Will"

February 25th, 2014 by Sandy Dechert

Stanford Woods Institute for the Environment Senior Fellow Mark Jacobson says the United States has the technology and logistical ability to convert to all-

renewable energy sources by 2050—if we can manage to exercise the social and political will to do so. He's the guy who told David Letterman we already have enough wind to power the entire world "seven times over." Now he has proven his point with a groundbreaking roadmap to clean energy for all 50 U.S. states.

With colleagues from academia and industry, Jacobson—a professor of civil and environmental engineering at Stanford and a senior fellow at the Precourt Institute for Energy—recently developed detailed plans that three states (New York, 2/18/13; Washington, 1/14/14; and California, yesterday—2/22/14) could use to switch over their energy infrastructures from conventional fuels to 100% renewable resources by 2050. As Jacobson uses the term, "infrastructure" includes electric power, transportation, heating/cooling, and industry uses. "Renewable power" is derived primarily from wind, water, and sunlight (WWS), generating electricity and electrolytic hydrogen.

Some findings of research behind the plans:

- Powering the U.S. with only wind, water, and solar energy sources would save the average consumer $3,400 per year.
- Over 15 years, driving an electric car could save $20,000-$40,000 in energy costs.
- In 2013, states endowed with greater wind power had energy costs increase 3 cents; all other states (except Hawaii) saw costs increase 4 cents.
- Large offshore wind farms could reduce hurricane storm surges up to 80% and wind speeds up to 50%.
- Powering the country solely with WWS could generate a **3% GDP uptick.**

Jacobson presented details in the context of a roadmap for all 50 states to renewable energy. He spoke at the American Association for the Advancement of Science Annual Meeting in Chicago last week. His talk was part of a three-hour symposium titled "**Is It Possible to Reduce 80% of Greenhouse Gas Emissions from Energy by 2050?**"

Jacobson's complete interactive roadmap, available **online**, shows how each state can maximizes its own renewable resource potential. "Hovering a cursor over California, for example, reveals that the Golden State can meet virtually all of its power demands (transportation, electricity, heating, etc.) in 2050 by switching to a clean technology portfolio that is 55% solar, 35% wind (on- and offshore), 5% geothermal and 4% hydroelectric."

"The new roadmap is designed to provide each state a first step toward a renewable future. It provides all of the basic information, such as how many wind turbines and solar panels would be needed to power each state, how much land area would be required, what would be the cost and cost savings, how many jobs would be created, how much pollution-related mortality and global-warming emissions would be avoided."

Last week, with Oscar-nominated actor Mark Ruffalo, film director Josh Fox, Mosaic co-founder and president Billy Parish, and others, Jacobson launched the 50-state roadmap on the website of **The Solutions Project**, as part of their national public outreach effort to raise awareness about

the possibilities of switching to clean energy produced entirely from renewable resources. Solutions Project member Leilani Munter, a professional racecar driver, also publicized the 50-state plan at a Daytona National Speedway event she participated in.

Says Jacobson:

> *"Global warming, air pollution and energy insecurity are three of the most significant problems facing the world today. Unfortunately, scientific results are often glossed over. The Solutions Project was born with the vision of combining science with business, policy, and public outreach through social media and cultural leaders — often artists and entertainers who can get the information out — to study and simultaneously address these global challenges."*

Several years ago, Jacobson teamed up with Mark A. Delucchi (a research scientist at the Institute of Transportation Studies at the University of California, Davis) to publish an article showing that the **entire world could actually be powered by renewable energy**.

Earlier this year *CleanTechnica* editor Zach Shahan also summed up some **key points** on clean energy and the electric vehicle revolution that Jacobson made at a Google talk.

You find more information about the Stanford doc's work here.

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Tags: 2050, air pollution, all-renewable, American Association for the Advancement of Science, and sunlight, artists, average consumer, Billy Parish, CA, clean energy, clean technology portfolio, cultural leadership, David Letterman, Daytona National Speedway, electric car, electric power, Electricity, electrolytic hydrogen, Emissions, Energy, energy insecurity, GDP, geothermal, Global Weirding, greenhouse gas, heating/cooling, hurricane, hydroelectric, industry, infrastructure, josh fox, Leilani Munter,

mark jacobson, mark ruffalo, NY, offshore wind, Precourt Institute for Energy, Renewable Energy, renewable power, roadmap to renewable energy, Social Media, solar, solar panel, Stanford, stanford woods institute for the environment, The Solutions Project, Transportation, WA, water, Wind, wind farms, wind turbine, WWS

About the Author

Sandy Dechert covers environmental, health, renewable and conventional energy, and climate change news. She's worked for groundbreaking environmental consultants and a Fortune 100 health care firm, writes two top-level blogs on Examiner.com, ranked #2 on ONPP's 2011 Top 50 blogs on Women's Health, and attributes her modest success to an "indelible habit of poking around to satisfy my own curiosity."

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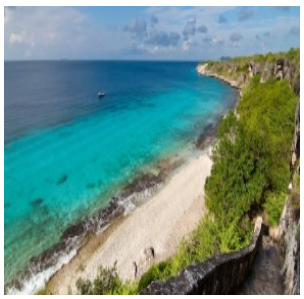

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Will E • a year ago

from the Netherlands

since a year I pay no more energy bill and produce no more co2.
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works perfectly. easy and clean.
and makes me a lot of dollars every year. 3000 euro is 5000 dollars a year

for the car an EV electric car and solar on the garage

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Omega Centauri • a year ago

There seems to be a contradiction between powering all of it by renewables, and an 80% emissions reduction. Shouldn't it be a 100% emissions reduction?

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Dave2020 • a year ago

"Large offshore wind farms could reduce hurricane storm surges up to 80% and wind speeds up to 50%."

Reducing a storm surge by 80% seems a little over-optimistic, but you could take a lot of energy out of the waves if the turbines were floating on WECs.

Most of a storm surge is caused by

LOW pressure, not just wind.

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Omega Centauri
Dave2020 • a year ago

The array of turbines would look like frictional forces to the hurricane, and slowing the near surface winds would allow the pressure to fill in.

However such a massive turbine farm would be exceedingly expensive and overbuilt. You'd never do it for the energy, it is too much energy, and because of the reduced wind speeds, the output per WT would be low. More modest offshore WT farms would have a much more modest effect on storms (assuming they were designed to not shut down in extreme conditions).

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truther • a year ago

the cost projections in this research are a total lie. Compare this study's wildly optimistic projections with the real world costs and consumer rate increases experienced since 2000 just to achieve 25% clean power: http://www.voanews.com/content...

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Bob_Wallace
Top Commenter truther
• a year ago

What that link fails to report is that Germans pay about the same for electricity and distribution as do people who live in New York and Connecticut. Far less than people in Hawaii pay.

Now, along with that ~21c/kWh they also pay taxes that go into the general fund and money to pay for renewable subsidies

renewable subsidies.

In the US we pay our general taxes and renewable subsidies when we pay income tax.

In other words, the monthly German and US utility bill comparison is not an apples:apples comparison.

1 ^ | v • Reply • Share ›

Guillaume ➚ truther
• a year ago

States with the highest wind power penetration have seen their rates go down between 2008 and 2013 while the other states combined went up by ~8%.

Check out the following study --> http://awea.files.cms-plus.com...

2 ^ | v • Reply • Share ›

Rogier F. van Vlissingen
• 10 months ago

Besides political will, and regulatory changes, the single biggest factor is sloppy economic/financial analysis. Most energy solutions are sold to unsuspecting property owners based on payback for the equipment from marginal energy savings, which results in not taking into account the long term value add from renewable energy to the building, and on that basis, renewable energy is literally being marginalized because it requires a greater investment. However once people do 30 year capital budgets for energy, it can be seen that every renewable technology brings with it a long string of zero energy bills. 30 years of no energy bills beats 10, 15, or 25% marginal energy "savings" in most cases.

^ | v • Reply • Share ›

Bob_Wallace
Top Commenter ➦ Rogier F. van Vlissingen
• 10 months ago

Right. But you need to take it out further than 30 years. Panels lose about 0.5% output per year. Inverters last 20+ years.

A new inverter and a few more panels to replace the 10% 'first 20 year' loss and you've got a couple decades of very cheap power. At the end of 40 add a few more panels and replace the inverter and you're good for 60 years of cheap electricity.

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