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## US Energy Labs Together Engineer New Grid

### Doing Laundry When the Wind Blows

Dan Arvizu and Steven Ashby

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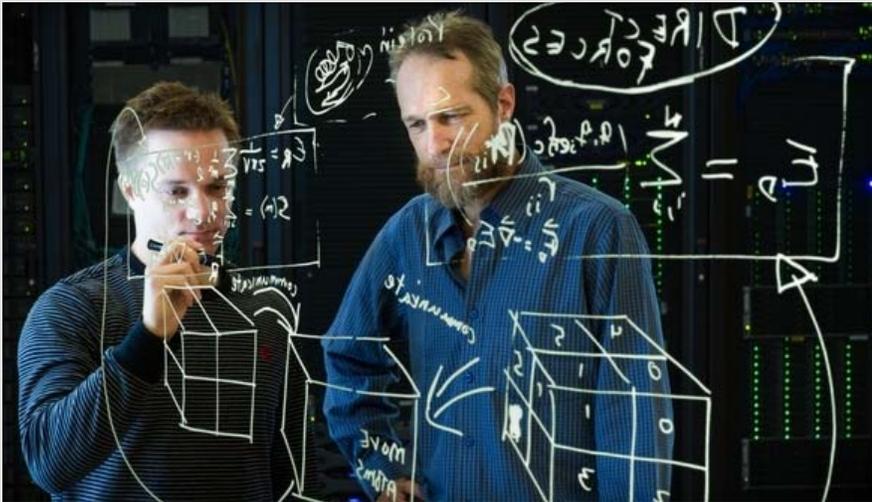
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Scientists working at NREL facilities.

Dennis Schroeder / NREL



There's a big energy challenge on our hands and the need for a solution is imminent. The electric grid — which hasn't had major design advances in decades — needs a transformation to meet future needs and opportunities.

Great strides have been made in advancing the cost and performance of clean energy technologies and new possibilities to see and control the grid like never before.

So, the time has come to engineer a flexible electric grid that can handle these technologies, deliver whatever a user wants and support whatever an innovator can create. This includes everything from renewable energy, to electric cars, to energy-smart buildings — all of which are managed with new data and devices that would have seemed out of this world when the grid was first built.

Revamping the grid is no small challenge. In fact, the grid could see more changes in the coming years than it has seen since the days of Thomas Edison and Nikola Tesla. However, since



**Dan Arvizu**

we've relied so long on the grid to get along with outdated technology, updating it will likely require \$2 trillion in total investment over the next two decades. It's a big number, but cost shouldn't overshadow the need for a flexible grid that is a platform for innovation, prosperity and energy security, all while continuing to provide reliable and affordable electricity.

We believe that building this smarter, cleaner, and more resilient energy grid poses a great opportunity to create something that will have a profound impact on our day-to-day lives. In fact, so many believe in the opportunity, that a team has already been assembled involving unprecedented levels of national collaboration. The U.S. Department of Energy's Grid Modernization Laboratory Consortium

has brought together 14 national labs and nearly 70 experts to identify the challenges and create the solutions for grid modernization.

Consortium members are working with DOE to develop a five-year program plan that outlines an integrated approach to grid modernization across DOE's offices of Electricity Delivery and Energy Reliability, Energy Efficiency and Renewable Energy, and Energy Policy and Systems Analysis, consistent with the Quadrennial Energy Review released in April. DOE plans to use this single strategy and annual program plan to determine its entire grid R&D portfolio of activities, informed by the consortium's work.

In addition to delivering advances in grid-related technology, knowledge and tools, the national labs will play a key role in engaging their respective regional stakeholders. The labs will conduct technology demonstrations, co-funded by industry, to help push innovations from the laboratory bench to the market. Coordination among labs ensures that intellectual and scientific assets deliver maximum impact for the research dollar.



**Steven Ashby**

Fast forward to tomorrow's power system and you see a world that is more distributed, more digital, and more decentralized. You'll see a world where your home is smart enough to talk to the grid, and vice versa. Instead of starting laundry or dishes immediately when you close the door and push the start button, your appliance finds the optimal time of day to run when the wind energy becomes available and a signal is sent to your home. Imagine this happening several times each day at homes and

workplaces all across the country, and suddenly an integrated energy system leveraging a smarter grid opens up worlds of possibility.

That's the research focus of the consortium. Working side-by-side at national labs, with DOE, industry, academia and with regional stakeholders, we will deploy new tools and practices that will help transform the grid to empower whatever innovations the future may hold.

*Dan Arvizu is director of the U.S. National Renewable Energy Lab and Steven Ashby is director of the U.S. Pacific Northwest National Lab.*