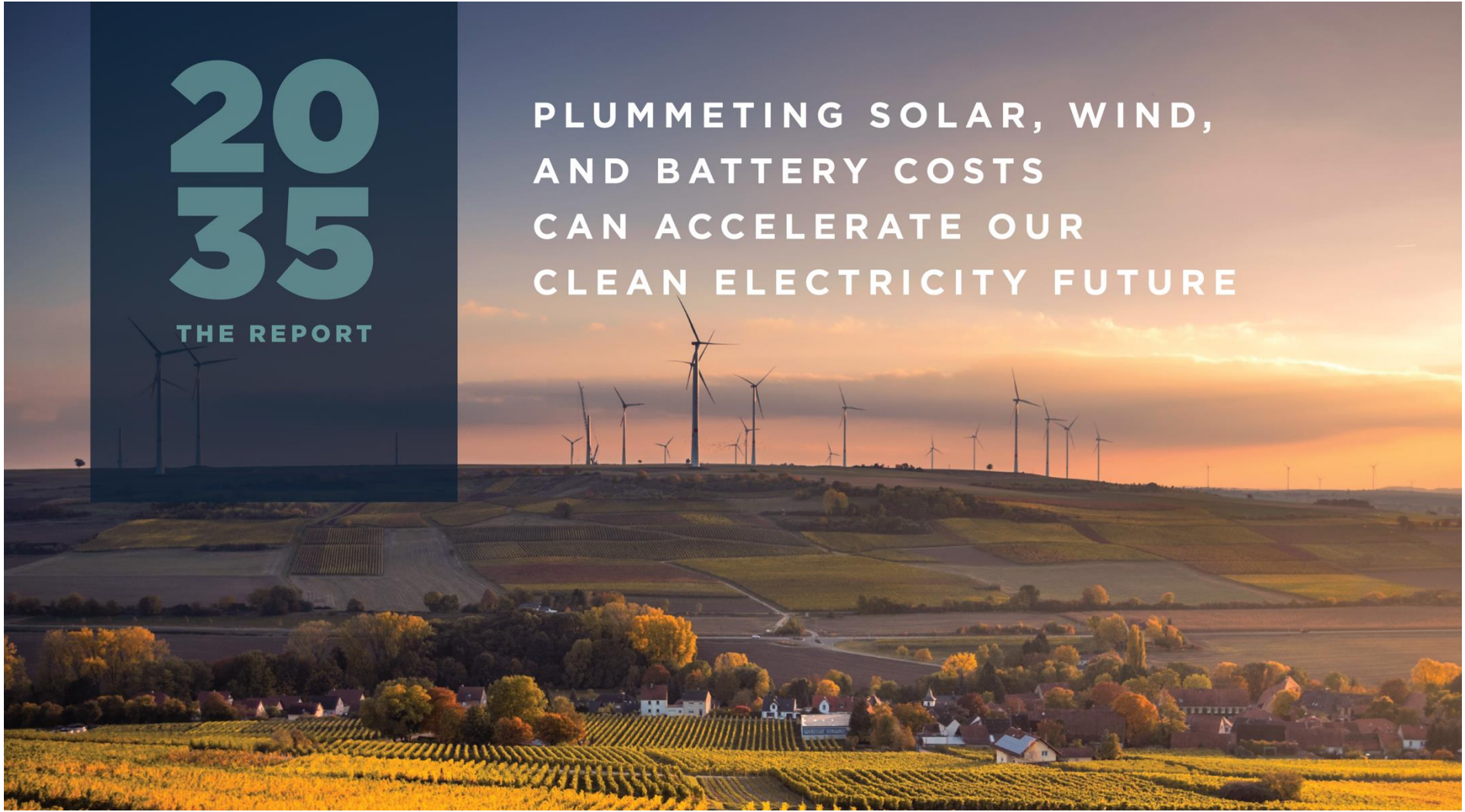

2035
THE REPORT
PLUMMETING SOLAR, WIND,
AND BATTERY COSTS
CAN ACCELERATE OUR
CLEAN ELECTRICITY FUTURE

CLEAN ELECTRICITY IS THE ROAD TO RECOVERY

- Economic recovery opportunity
- Jobs and infrastructure
- No increased costs for customers

INVESTMENT AND TAX CREDITS ALONE WILL NOT GET THERE

Adopt a national clean energy standard of:

- → **55% by 2025**
- → **75% by 2030**
- → **90% by 2035**
- → **100% by 2045**

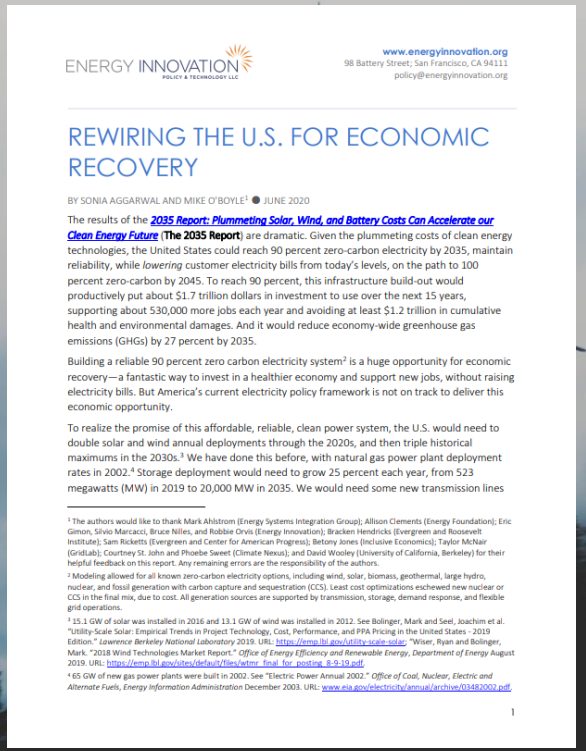
ADDITIONAL POLICY LEVERS NEEDED

Challenge:

Ramping up deployment of renewables to triple historical maximums by the 2030s.

Solutions:

- Increase domestic manufacturing capacity by reinstating the advanced manufacturing tax credit.
- Interconnection queue reform and proactive transmission expansion.
- Shift utility business models to reward decarbonization.
- In the absence of clean energy standard, reinstate federal support for wind, solar, storage.



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REWIRING THE U.S. FOR ECONOMIC RECOVERY

BY SONIA AGGARWAL AND MIKE O'BOYLE[1] ● JUNE 2020

The results of the ***2035 Report: Plummeting Solar, Wind, and Battery Costs Can Accelerate our Clean Energy Future*** (**The 2035 Report**) are dramatic. Given the plummeting costs of clean energy technologies, the United States could reach 90 percent zero-carbon electricity by 2035, maintain reliability, while *lowering* customer electricity bills from today's levels, on the path to 100 percent zero-carbon by 2045. To reach 90 percent, this infrastructure build-out would productively put about $1.7 trillion dollars in investment to use over the next 15 years, supporting about 530,000 more jobs each year and avoiding at least $1.2 trillion in cumulative health and environmental damages. And it would reduce economy-wide greenhouse gas emissions (GHGs) by 27 percent by 2035.

Building a reliable 90 percent zero carbon electricity system[2] is a huge opportunity for economic recovery—a fantastic way to invest in a healthier economy and support new jobs, without raising electricity bills. But America's current electricity policy framework is not on track to deliver this economic opportunity.

To realize the promise of this affordable, reliable, clean power system, the U.S. would need to double solar and wind annual deployments through the 2020s, and then triple historical maximums in the 2030s.[3] We have done this before, with natural gas power plant deployment rates in 2002.[4] Storage deployment would need to grow 25 percent each year, from 523 megawatts (MW) in 2019 to 20,000 MW in 2035. We would need some new transmission lines

[1] The authors would like to thank Mark Ahlstrom (Energy Systems Integration Group); Allison Clements (Energy Foundation); Eric Gimon, Silvio Marcacci, Bruce Nilles, and Robbie Orvis (Energy Innovation); Bracken Hendricks (Evergreen and Roosevelt Institute); Sam Ricketts (Evergreen and Center for American Progress); Betony Jones (Inclusive Economics); Taylor McNair (GridLab); Courtney St. John and Phoebe Sweet (Climate Nexus); and David Wooley (University of California, Berkeley) for their helpful feedback on this report. Any remaining errors are the responsibility of the authors.

[2] Modeling allowed for all known zero-carbon electricity options, including wind, solar, biomass, geothermal, large hydro, nuclear, and fossil generation with carbon capture and sequestration (CCS). Least cost optimizations eschewed new nuclear or CCS in the final mix, due to cost. All generation sources are supported by transmission, storage, demand response, and flexible grid operations.

[3] 15.1 GW of solar was installed in 2016 and 13.1 GW of wind was installed in 2012. See Bolinger, Mark and Seel, Joachim et al. "Utility-Scale Solar: Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States - 2019 Edition." *Lawrence Berkeley National Laboratory* 2019. URL: https://emp.lbl.gov/utility-scale-solar; "Wiser, Ryan and Bolinger, Mark. "2018 Wind Technologies Market Report." *Office of Energy Efficiency and Renewable Energy, Department of Energy* August 2019. URL: https://emp.lbl.gov/sites/default/files/wtmr_final_for_posting_8-9-19.pdf.

[4] 65 GW of new gas power plants were built in 2002. See "Electric Power Annual 2002." *Office of Coal, Nuclear, Electric and Alternate Fuels, Energy Information Administration* December 2003. URL: www.eia.gov/electricity/annual/archive/03482002.pdf.

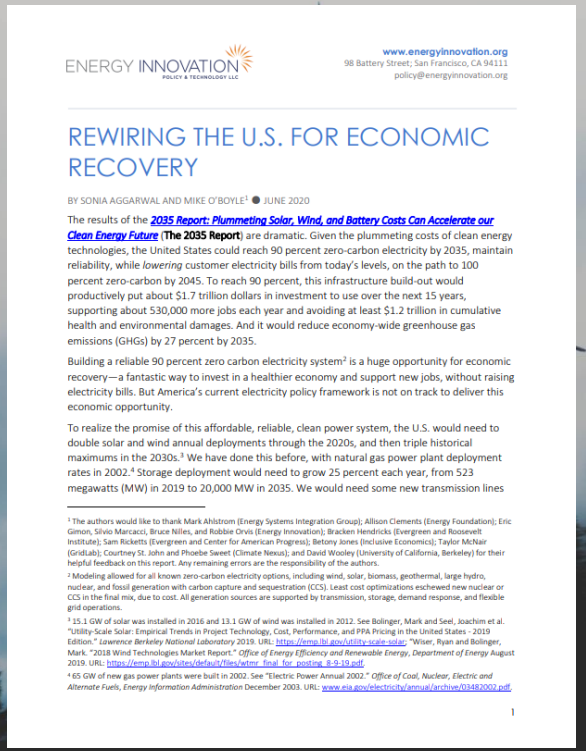
ADDITIONAL POLICY LEVERS NEEDED

Challenge:

Facilitating prompt and efficient coal retirements, investment in flexible resources.

Policy Solutions:

- Wholesale electricity market reform – reduce self scheduling, restructure or eschew capacity markets, new products and price reform to support flexibility resources, including price responsive demand.
- Federal utility debt financing and ratepayer backed securitization.
- Support for coal communities.
- Utility business model reform: Performance-based ratemaking and competitive all-source procurement.



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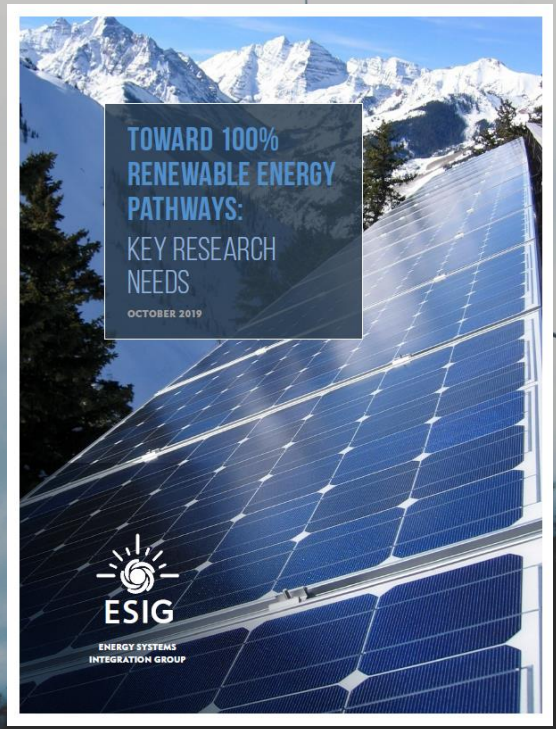
ADDITIONAL RESEARCH NEEDS - SUPPORT FROM DOE, LABS

"There are known unknowns, that is to say, we know there are some things we do not know." – Donald Rumsfeld

- Develop new resource adequacy frameworks & metrics.
- Develop and commercialize the most promising technologies providing dispatchable, long-duration zero carbon energy
- Improve and standardize dispatch and planning tools
- Conduct research in conjunction with utilities and RTOs into grid-forming inverters and other technologies to support system stability and security.



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