National Labs Report on RPS Costs and Benefits

A new report by the U.S. Department of Energy's Lawrence Berkeley National Laboratory and National Renewable Energy Laboratory summarizes the impact of renewable portfolio standards (RPSs) at the state level.

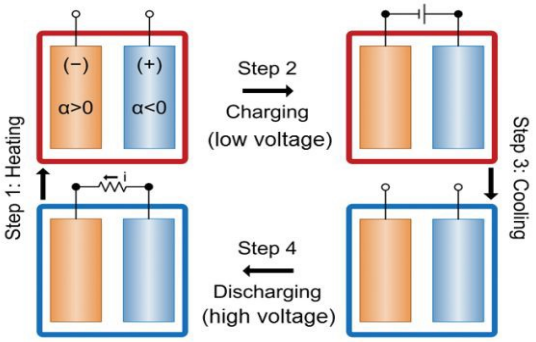
The report, "A Survey of State-Level Cost and Benefit Estimates of Renewable Portfolio Standards" draws upon a variety of data sources, including estimates developed by utilities and public utility commissions as well as renewable energy certificate pricing, to summarize the net costs incurred by utilities to comply with RPS requirements. It also surveys recent studies that have assessed the magnitude of potential broader societal benefits.

Key findings from this study include the following:

- Among the 24 states for which the requisite data were available, estimated RPS compliance costs over the 2010-2012 period were equivalent to, on average, roughly 1 percent of retail electricity rates, though substantial variation exists across states and years.
- Expressed in terms of the incremental (or "above-market") cost per unit of renewable generation, average RPS compliance costs during 2010-2012 ranged from -$4 per megawatt-hour (i.e., a net savings) to $44 per megawatt-hour across states.
- Methodologies for estimating RPS compliance costs vary considerably among utilities and states, though a number of states are in the process of refining and standardizing their methods.
- Utilities in eight states assess surcharges on customer bills to recoup RPS compliance costs, which in 2012, ranged from about $0.50 per month to $4.00 per month for average residential customers.
- Cost containment mechanisms incorporated into current RPS policies will limit future compliance costs, in the worst case, to no more than 5 percent of average retail rates in many states and to 10 percent or less in most others.
- A number of states have separately estimated the value of RPS benefits associated with avoided emissions (ranging from $4 to $23 per megawatt-hour of renewable generation), economic development ($22 to $30 per megawatt-hour), and/or wholesale electricity price suppression ($2 to $50 per megawatt-hour).

Important caveats and context for the findings cited above are explained fully within the report, which can be freely downloaded online: 1.usa.gov/1hDXYli.

Funding support came from the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (Strategic Programs Office and Solar Energy Technologies Office). — **GALEN BARBOSE, LAWRENCE BERKELEY NATIONAL LABORATORY**



MIT

MIT, Stanford Teams Test Thermogalvanic Waste Heat Device

Researchers at MIT and Stanford University have found that a thermogalvanic effect can turn low-temperature waste heat into electricity.

A paper published in the journal *Nature Communications*, by postdoc Yuan Yang and professor Gang Chen at MIT, postdoc Seok Woo Lee and professor Yi Cui at Stanford, and three others, notes that the voltage of rechargeable batteries depends on temperature. Their new system combines the charging-discharging cycles of these batteries with heating and cooling, so that the discharge voltage is higher than charge voltage. The system can efficiently harness even relatively small temperature differences, up to about 100°C (212°F).

To begin, the uncharged battery is heated by the waste heat. Then, while at the higher temperature, the battery is charged; once fully charged, it is allowed to cool. Because the charging voltage is lower at high temperatures than at low temperatures, once it has cooled the battery can actually deliver more electricity than was used to charge it. That extra energy, of course, doesn't just appear from nowhere: it comes from the heat that was added to the system. In a demonstration with waste heat of 60°C (140°F), the new system has an estimated efficiency of 5.7 percent. — **DAVID CHANDLER, MIT**

ARMIN KUBELBECK

Germany Sets Record: 74 Percent Renewables on May 11

On May 11, electric power demand was modest in Germany, even for a Sunday. Comfortable weather meant minimal use of heating and air conditioning — the day saw highs around 14°C (57°F) and lows around 10°C (50°F). Power demand peaked at 55 gigawatts at midday, compared to 65 GW on Friday, May 9.

Midday power production by wind turbines averaged 20 GW, about 36 percent of demand. Photovoltaic (PV) production reached 17 GW, about 31 percent of demand. Together with hydro power and biomass, renewables provided roughly 74 percent of power consumed between noon and 2:00 p.m. The episode put electricity prices in a tailspin. The day-ahead price for peak power went negative: generators paid 1.7 cents per kilowatt-hour to offload excess power.

It wasn't even the biggest production day for solar in May. That fell on May 5, when German PV peaked at 22 GW. Renewables accounted for 27 percent of all German electricity generation in the first quarter of 2014.