

Off the grid: America's unique energy regions

Despite a glut of domestic energy resources, several regions in the United States face unique and very geographically specific logistical challenges to energy generation and transmission. As a result, these regions face higher energy costs and/or decreased reliability.

The average retail price per kilowatt hour of electricity in the United States is just under 10 cents, but residents in Alaska and Hawaii pay up to 2.5 times that amount. The upper New England states, which on first glance don't seem to be cut off from the U.S. energy mainland, pay more than 1.5 times the national average because of their geographical isolation from the major natural gas and coal resources on the rest of the East Coast.

Generally, these regions lag behind the rest of the nation in renewable electricity capacity and generation and are more susceptible to fluctuations in energy prices. Yet their very uniqueness makes them ideally suited for energy innovations that might not be cost competitive in other parts of the country.

Hawaii

As of 2010 Hawaii imported 94 percent of its energy and had the highest electricity prices in the nation. According to the U.S. Energy Information Administration, Hawaiians paid as much as 42 cents per kilowatt hour, more than four times the national rate of 9.8 cents. The state, however, is uniquely positioned to increase both geothermal and solar energy capacity.

Government data show that Hawaii's solar photovoltaic electricity generation more than doubled from 2010 to 2011, making it third in

the nation in installed photovoltaic capacity on a per-capita basis.²³⁹ A quarter of Hawaii's net renewable electricity production is derived from geothermal power, and the state boasts the world's largest commercial electricity generation plant—fueled exclusively with biofuels. Yet renewables comprise just 7 percent of the state's total electricity production. About 90 percent of Hawaiian electricity is derived from petroleum (74 percent) and coal (14 percent).²⁴⁰

The cost of solar power in Hawaii is between 20 cents and 40 cents per kilowatt hour, depending on the island, which makes it price-competitive with electricity generated from petroleum. As of August 2012, residential rates for electricity ranged from 34 cents per kilowatt hour in Oahu to 42 cents per kilowatt hour on Molokai.²⁴¹

Geothermal energy only accounts for 1.2 percent of the state's total electricity generation capacity, but state legislators aim to increase geothermal capacity in an effort to reach Hawaii's goal of 70 percent renewable electricity by 2030, as laid out in the Hawaiian Clean Energy Initiative. The state's sole geothermal power plant, Puna Geothermal Venture, is located in Puna, on the island of Hawaii, and currently produces 38 megawatts of capacity each year.

In addition to advancements in solar and geothermal energy, the state is also achieving significant results with converting waste to energy. The HPOWER facility on Oahu will provide between 7 percent and 8 percent of the power to the island, where 80 percent of the state's population resides, and will contribute millions in direct and indirect spending to the local economy.²⁴²

Alaska

Alaska's geography and far-flung population pose significant challenges to the development of energy infrastructure in the state. Although Alaska ranks 39th in the United States in overall annual energy consumption,²⁴³ it ranks fourth in electricity generated from petroleum liquids.²⁴⁴ The average retail price for electricity in Alaska is 14.76 cents per kilowatt hour compared with the national average of 9.8 cents.²⁴⁵ Scattered rural communities, representing more than a quarter of the state's population, rely on individual microgrids powered by diesel generators. Alaska has the highest diesel prices in the country, at \$21.16 per million British thermal units.²⁴⁶ The combined costs of diesel fuel and transportation to remote sites contribute to rural retail electricity prices as high as 10 times the national average (\$1 per kilowatt hour).²⁴⁷

Wind power is emerging as a viable energy source for these regions. Wind towers, installed in freezing winter temperatures so as not to permanently disturb the tundra's permafrost in summer, have begun to displace diesel fuel as the sole energy source. These wind towers, feeding directly onto the microgrids, can cover between 30 percent and 60 percent of the energy needs of rural communities.²⁴⁸ Wind generation projects typically pay for themselves through fuel savings within five years to 10 years.²⁴⁹ The American Wind Energy Association indicates typical payback periods for small wind systems range between six years and 30 years, depending on wind turbine technology, wind quality, and prevailing electricity rates.²⁵⁰

New England

The news is full of stories about America's abundant natural gas supplies, many of which are located in the eastern United States. But New

England is mostly cut off from this natural gas boom. These states—Massachusetts, Rhode Island, Connecticut, Vermont, New Hampshire, and Maine—rely on natural gas for more than half of their electricity generation, yet limited pipeline capacity is forcing the region to import a substantial portion of its fuel from abroad.²⁵¹

Since 2010 up to 20 percent of the region's supply has originated in Yemen, prompting Rep. Ed Markey (D-MA) to ask Secretary of the Department of Energy Steven Chu what impact rising terrorism in that country might have on natural gas availability. Even now, average retail electricity costs in New England are well above the national average, at 14 cents per kilowatt hour—approximately the same as the average cost in Alaska—yet volatility in Yemeni distribution networks has resulted in even higher costs for consumers.

Despite the boom in domestic natural gas production across our nation, limited transmission capacity threatens the regional stability of electricity supply and prices. Although the states in New England have invested proceeds from the Regional Greenhouse Gas Initiative auction heavily into energy efficiency, they generally rank in the lower half of renewable energy capacity and generation in the country.²⁵²

Yet commitments from six states at the New England Governors' Conference in July suggested that the states are increasing their investments in renewable energy to diversify their energy portfolios.²⁵³ Furthermore, renewable energy standards in Massachusetts, New Hampshire, Vermont, Connecticut, Maine, and Rhode Island point to growth in electricity supplied by renewable sources.

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