

ISSUE BRIEF

COLORADO'S PATHWAY TO CUTTING CARBON POLLUTION

The Clean Power Plan, finalized by the U.S. Environmental Protection Agency, is a game changer because it sets the first-ever limits on carbon pollution from power plants, the nation's largest source of the pollution that is driving dangerous climate change. We need to act now because we already are seeing its effects in extreme weather, deeper drought, and more wildfires. The EPA's carbon pollution limit for power plants in Colorado is achievable, largely through increasing the state's clean and renewable energy sources, along with improving the energy efficiency of its homes and businesses.

The EPA standards set a limit on power plant pollution in each state. The carbon pollution limit is expressed in two ways: as a mass-based standard designating a maximum number of tons of carbon dioxide (CO₂) that may be emitted by covered plants and allowing for some load growth over the years; and as a rate-based standard expressed as a number of pounds of CO₂ per megawatt-hour (MWh) of generation from covered plants for each time period. The standards allow each state the flexibility to design its own cost-effective pathway toward a cleaner electricity system. Under a mass-based standard, Colorado would reduce its carbon pollution from all power plants from almost 42 million tons in 2012 to less than 32 million tons in 2030. In limiting its pollution, Colorado will benefit from the expansion of its clean energy sources, adding jobs to its clean energy economy, which already employs more than 23,400 workers.¹ The actions that Colorado takes now will move it toward a healthier, economically productive, clean energy future.

THE EPA'S CLEAN POWER PLAN PROMISES GREAT BENEFITS FOR COLORADO AND THE NATION

The Clean Power Plan will reduce the nation's carbon pollution from fossil-fueled power plants 32 percent below 2005 levels by 2030.² As we curb carbon pollution, the nation will reap major health and environmental benefits, and by 2030 the average household will save about \$85 a year on its energy bills.³ Colorado is already experiencing the effects of climate change, such as record-breaking rains,

extreme heat, and wildfires.⁴ By decreasing the impacts of climate change and reducing the burden of health costs associated with power plant pollution, altogether the EPA standards will provide benefits of up to \$54 billion in 2030.⁵ That includes preventing up to 3,600 premature deaths, 1,700 heart attacks, 90,000 asthma attacks, and 300,000 missed work and school days.⁶ These benefits far outweigh the estimated national compliance costs of \$8.4 billion in 2030.

POLLUTION LIMITS ARE READILY ACHIEVABLE

The EPA set carbon pollution limits for each state's power plants based on three pollution-reduction approaches, or "building blocks." However, these blocks are not prescriptive; they are simply the EPA's method for estimating achievable pollution cuts from power plants. The Clean Power Plan gives states ample flexibility to meet these standards in any way they choose. NRDC encourages Colorado to be creative and think "outside the blocks," drawing on resources like demand-side energy efficiency. Colorado can now decide on its own path to reduce carbon pollution from power plants in the state—a path that will determine the level of economic, environmental, and public health benefits to Colorado residents.

The adoption of a flexible, market-based framework in combination with complementary state clean energy policies will allow Colorado to cost-effectively meet its carbon pollution limit largely by expanding renewable wind and solar energy and improving the energy efficiency of its buildings and industry.

FIGURE 1: PATHWAY TO MEETING COLORADO'S CARBON POLLUTION LIMITS¹¹

Figures 1A and 1C demonstrate the electricity generation mix and carbon emissions as a result of Colorado's existing clean energy policies and planned changes. By ramping up its energy efficiency, building more wind and solar, and relying less on natural gas, the state's power sector can meet its emissions limits, as shown in Figures 1B and 1C.

FIGURE 1A: ELECTRICITY MIX, BUSINESS-AS-USUAL

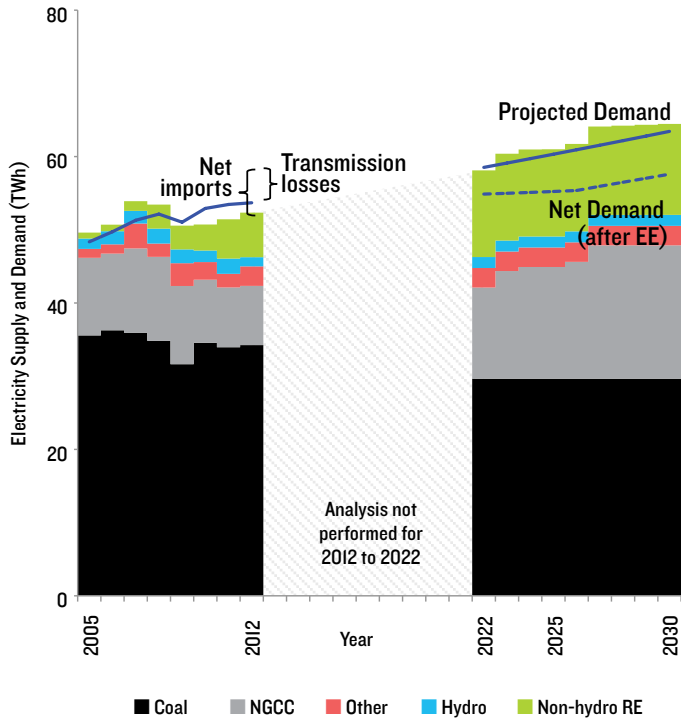


FIGURE 1B: ELECTRICITY MIX, CLEAN POWER PLAN SCENARIO

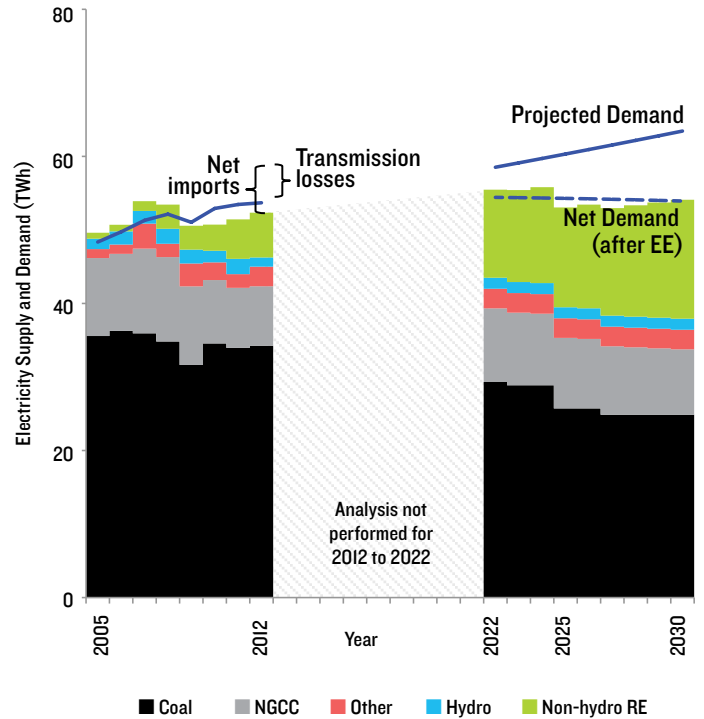
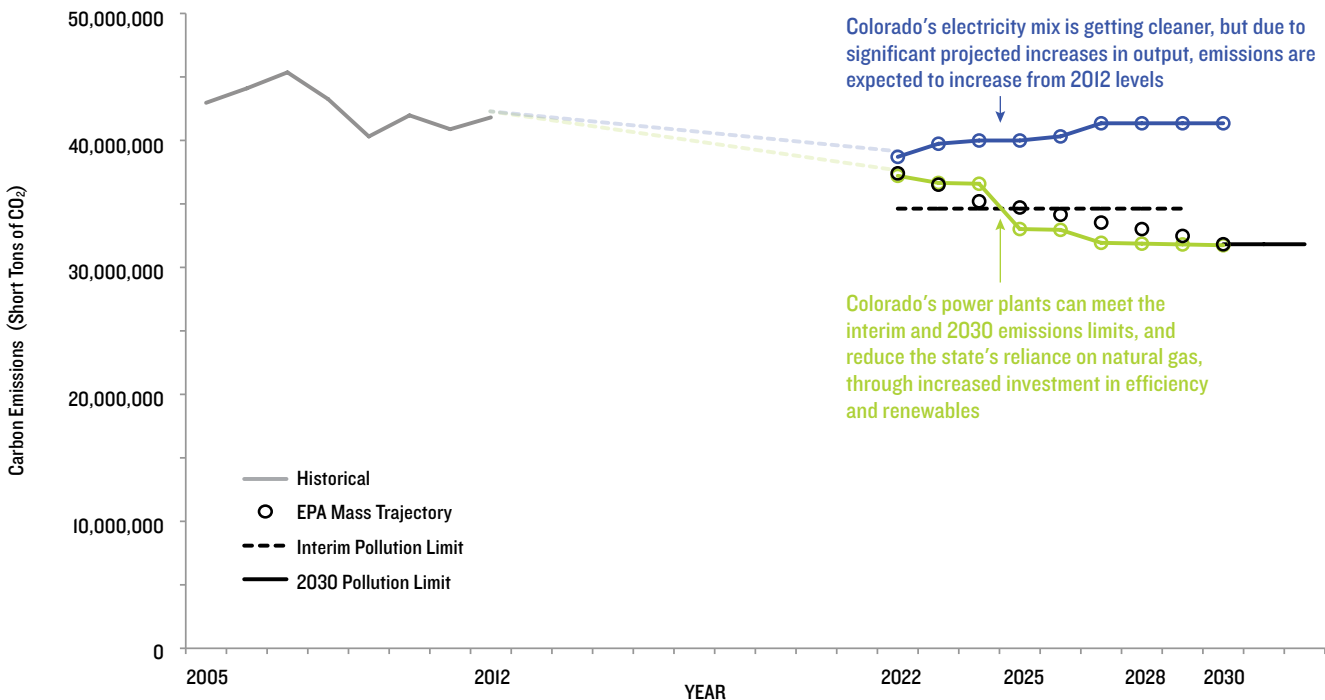


FIGURE 1C: CARBON EMISSIONS PROJECTIONS, BUSINESS-AS-USUAL



With Colorado's current clean energy standards, renewable energy will account for 30 percent of the state's electricity sales by investor-owned utilities and 10 to 20 percent of sales by electric cooperatives and municipal utilities by 2020.⁷ Utility energy efficiency programs should reduce energy waste and peak demand by 5 percent from 2006 levels by 2018.⁸ Xcel alone will save more than 2,400 GWh by 2020—enough to power 280,000 Colorado households for a year—through its programs.⁹ Colorado also has retired or plans to retire more than 900 MW of its oldest and dirtiest coal plants.¹⁰ However, Colorado's utilities are also planning to add large amounts of new natural gas capacity, resulting in significant increases in emissions. Much of that proposed natural gas capacity can instead be replaced with greater amounts of renewable energy and energy efficiency, allowing the state to meet its emissions limits and reduce its reliance on natural gas, as shown in Figure 1.

PRIMARY POLICY OPTIONS

States can pick from a number of policy approaches to reduce carbon pollution. The following are key conclusions from extensive analyses of state plan options under the Clean Power Plan.¹²

- Significant pollution reductions can be achieved at very low cost with energy efficiency and renewable energy. Energy efficiency is the most cost-effective option, and these clean energy investments have been found to reduce customers' energy bills.
- Because regional approaches that create larger trading markets significantly reduce costs, states across the country are exploring regional policy approaches and trading, from developing a regional plan to writing individual plans with common elements and trading across borders. Regional consistency also reduces market distortions and pollution "leakage" across state borders.
- The lowest-cost policy choice is a mass-based approach, as long as the allowance value or permit revenue is paid for by polluters and reinvested for customer benefit.

The best compliance approaches are simple, tested, and low-cost. They have high environmental integrity and are easily interconnected across states and regions. A mass-based approach—paired with essential, complementary clean energy policies—would fulfill all these criteria.

WHY ARE COMPLEMENTARY POLICIES IMPORTANT IN A MARKET-BASED FRAMEWORK?

As Colorado has demonstrated, clean energy policies can drive economic gain and reduce emissions. While these policies need not be included in a state plan to demonstrate enforceable limits on carbon emissions, they can complement a market-based compliance strategy to ensure the lowest-cost and most effective carbon pollution reductions.

Investment in energy efficiency and renewable energy can provide numerous benefits to customers, including lower wholesale prices, reduced energy bills, and less reliance on volatile fuel markets.¹³ These investments can also lower the overall costs and maximize the benefits of a market-based emissions reduction program. A recent analysis of states participating in the Regional Greenhouse Gas Initiative (RGGI) found that net economic benefits and job creation were highest in states with the greatest levels of reinvestment in energy efficiency.¹⁴

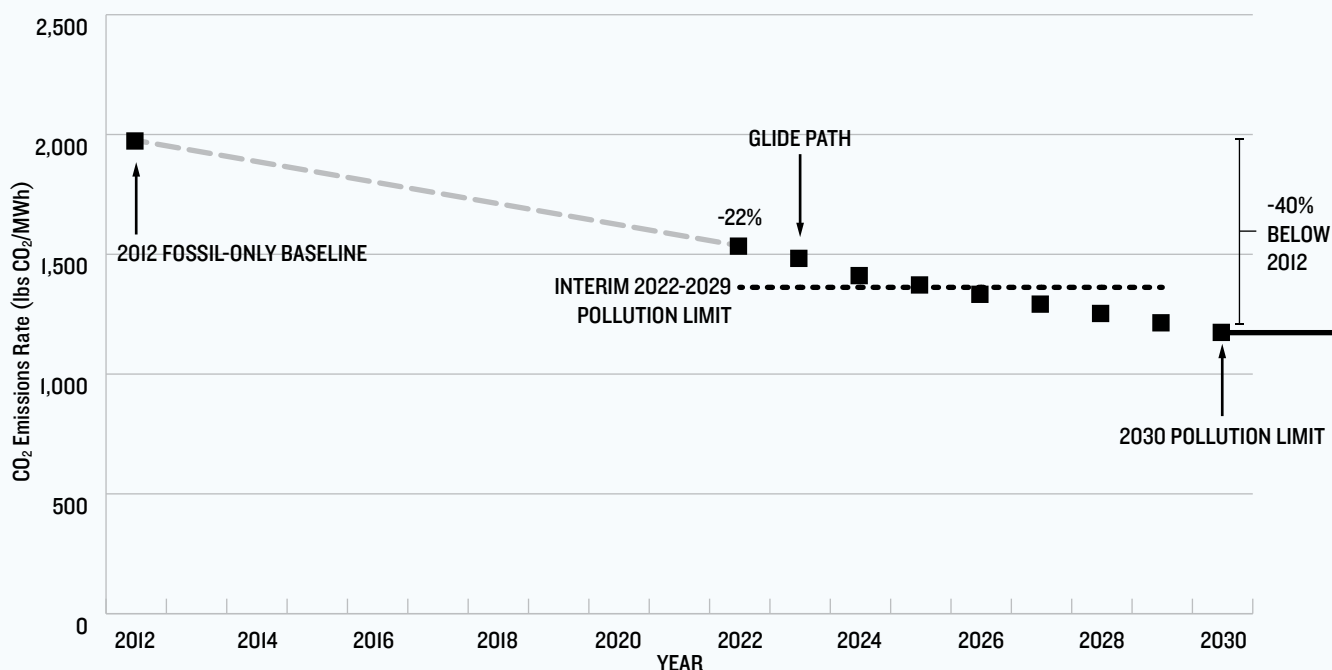
WHAT IS THE CARBON POLLUTION LIMIT FOR POWER PLANTS IN COLORADO?

After unprecedented stakeholder outreach and a review of millions of public comments, the EPA carefully reconsidered and revised its emissions limits to be more consistent nationally and to incorporate the interconnected nature of the electric grid. The EPA set separate, nationally uniform rates for coal and natural gas power plants, and Colorado's rate target is based on the share of each of those resources within the state. The final (2030) emissions rate limit for power plants in Colorado is 1,174 lbs CO₂/MWh. The EPA has also converted rate targets into mass-based emissions limits, and NRDC has analyzed compliance with Colorado's mass-based limit (covering existing and new sources) in Figure 1 on page 2.

Table 1: Carbon Pollution Limits for Colorado's Power Plants

Period	Rate-based limit (lbs CO ₂ /MWh)	Mass-Based Limit, All Sources (short tons)
Baseline (2012)	1,973	41,759,882
Interim Period 2022-2029	1,362	34,627,799
2030 & Beyond Target	1,174	31,822,874

FIGURE 2: CARBON POLLUTION LIMITS FOR COLORADO'S POWER PLANTS



INCENTIVES FOR EARLY INVESTMENTS IN RENEWABLES AND ENERGY EFFICIENCY

Early investments in renewables and energy efficiency can help states comply in two ways. First, in a rate-based policy approach, a power plant can purchase credits from energy efficiency, wind, solar, and other renewable energy projects developed after 2012 and still generating electricity in 2022 and beyond. In a mass-based approach, non-emitting energy efficiency and renewable energy will also contribute to meeting the emissions goal and reduce costs.

In addition, the final Clean Power Plan creates the voluntary Clean Energy Incentive Program (CEIP). The CEIP is designed to recognize emissions reductions that occur before the compliance period begins in 2022. It would allow states to give bonus allowances or credits—which have monetary value—to qualifying renewable electricity generation and energy efficiency investments in low-income communities in 2020 and 2021. Renewable energy and energy efficiency projects are eligible if they are initiated after the state submits its complete state plan—creating an incentive for states to complete their plans early.

NEXT STEPS FOR COLORADO

While states have flexibility to decide on any pollution reduction pathway, some approaches will result in more benefits for the environment, the economy, and electricity customers. Table 2 outlines key decision steps for Colorado to consider as the state designs a plan to meet the carbon pollution limits for its power plants.

These policy options work with many available cost-effective programs that deliver clean energy benefits and keep electricity affordable for everyone, including

low-income communities.¹⁵ Prioritizing investment in energy efficiency and renewable energy will keep costs down and avoid overutilizing natural gas.

As Colorado considers the full range of options to reduce carbon pollution from power plants operating in the state, an open and transparent process is essential to crafting a strong state plan that meets all of Colorado’s goals. Robust engagement with the full range of interested stakeholders will ensure that Colorado chooses the best path forward, reducing its reliance on fossil fuels and moving toward a clean energy future.

Table 2: Three key decision steps for developing a state plan

Decision Steps	Description	
Choose a rate-based or mass-based approach	Option 1: Rate-based, Blended Rate Each generator must meet the state-wide emissions limit in pollution per unit of electricity generated (lbs CO ₂ /MWh). Fossil power plants that pollute above the intensity standard must buy credits from generators or efficiency providers that operate below the standard.	Option 3: Mass-based, Existing Sources Only The state has a total emissions limit (tons CO ₂) that is a fixed amount. The state limit includes some amount of load growth above 2012 levels. Existing power plants have to hold an allowance, issued by a state agency, for every ton of CO ₂ emitted. These allowances could be auctioned, with the value returned to customers or used to expand complementary programs.
	Option 2: Rate-based, Dual Rate Each generator must meet applicable emissions rate limit (steam or NGCC) in pollution per unit of electricity generated (lbs CO ₂ /MWh). Fossil steam units that pollute above the steam rate must buy credits from new non-emitting resources (including efficiency) or incremental NGCC generation (above 2012 levels). NGCC units can only purchase credits from new non-emitting resources (including efficiency).	Option 4: Mass-based, All Sources (Existing and New) A state may choose to include new power plants in the mass-based standard, which has the advantage of treating all power plants the same in electric power markets, regardless of when they were built. Under this approach, the limit is adjusted upwards to account for the emissions of new power plants meeting any load growth that was not already covered in the limit for existing sources, above.
Opt for an individual state plan or a plan linked with other states	The state can submit its own individual plan or coordinate with neighboring states on common policy approaches. Regional approaches include both formal multistate plans and agreements to link, such as adopting common elements to facilitate trading. Linkage and trading are likely to be much easier under a mass-based approach. Benefits of regional coordination include: <ul style="list-style-type: none"> • LOWER COST—A larger market is more efficient and reduces costs. • IMPROVED ENVIRONMENTAL OUTCOME—Regional approaches avoid different price signals across state boundaries, which also helps avoid emissions leakage and higher-than-anticipated national emissions. • STRONGER ELECTRIC GRID—A larger market and additional flexibility reduce concerns about electric grid reliability. • EQUAL TREATMENT—Generators, market participants, and customers face more consistent market signals, costs, and benefits. 	
Formulate state plan details and complementary policies	<ul style="list-style-type: none"> • In a mass-based approach, the state has to decide how to distribute allowances and either return the value to customers or give away the value to emitters. If pollution allowances are auctioned to emitters, the state will generate revenue that can be reinvested to reduce customers’ electricity bills through energy efficiency investments, rebates, or other state programs. • Complementary measures like clean energy standards and improved utility rate designs can also help address market barriers to investment. • Complementary policies can also address important equity issues for workers in transition, people of color, low-income communities, and others. Complementary policies may include worker retraining, investments in energy efficiency, and direct bill assistance. 	

ENDNOTES

- 1 Environmental Entrepreneurs, *Q4 and End-of-2014 Jobs Report*, March 2015, http://cleanenergyworksforus.org/wp-content/uploads/2015/03/2014_Q4_Report_FINAL.pdf.
- 2 U.S. Environmental Protection Agency (EPA), *Fact Sheet: Overview of the Clean Power Plan*, August 2015, www.epa.gov/airquality/cpp/fs-cpp-overview.pdf.
- 3 Ibid.
- 4 Natural Resources Defense Council, *Extreme Weather Map 2012*, <http://www.nrdc.org/health/extremeweather/>.
- 5 EPA, *Regulatory Impact Analysis for the Clean Power Plan Final Rule*. August 2015. <http://www2.epa.gov/cleanpowerplan/clean-power-plan-final-rule-regulatory-impact-analysis>.
- 6 Ibid.
- 7 Database of State Incentives for Renewables & Efficiency, *Colorado Renewable Energy Standard*, last updated October 2014, www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CO24R&re=1&ee=1.
- 8 Database of State Incentives for Renewables & Efficiency, *Colorado Energy Efficiency Resource Standard*, last updated November 2014, www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CO24R&re=1&ee=1.
- 9 Ibid.
- 10 The retirement list for Colorado compiled by the consulting group MJ Bradley & Associates includes the following coal units (939 MW total): Arapahoe 3 and 4; Cherokee 1, 3, and 4; and Valmont 5).
- 11 The Natural Resources Defense Council has analyzed Colorado's compliance trajectory using the Clean Power Plan compliance tool developed by MJ Bradley & Associates. This tool, designed to perform a simple resource analysis for each state, is available at www.mjbradley.com/about-us/case-studies/clean-power-plan-evaluation-tools. Note: the BAU (blue) and CPP Compliance (green) emissions projections in Figure 1B correspond to the "Achieved" line in the tool for the different scenarios. In the BAU scenario, over 2,200 MW of natural gas capacity is added to the state's electricity mix (based on utility IRP data), resulting in significant increases in emissions from 2012 levels. It is assumed that new natural gas generation, as well as energy efficiency and renewable energy coming online as a result of the state's clean energy policies, contributes to new demand or is exported to neighboring states. In the Clean Power Plan scenario, the NGCC capacity already under construction (567 MW) is assumed to operate, but additional incremental NGCC capacity is not assumed to be needed, given EE and RE investments. Instead, additional clean energy beyond the RPS, equivalent to ~1200 MW of new wind capacity, comes online and displaces in-state fossil generation on a pro-rata basis, with an additional 680 MW of aging coal generation being retired. Energy efficiency also ramps up to reach 15% cumulative savings by 2030. Other assumptions: New NGCCs run at a capacity factor of 40%; new power plants are covered by the emissions limit. IRP data based on: Public Service Company of Colorado, 2011 Electric Resource Plan. Tri-State Generation and Transmission Association, Inc., 2014 Electric Resource Plan Annual Progress Report.
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- 13 Lawrence Berkeley National Laboratory, *A Survey of State-Level Cost and Benefit Estimates of Renewable Portfolio Standards*, 2014. Union of Concerned Scientists, *How Renewable Electricity Standards Deliver Economic Benefits*, May 2013, www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_energy/Renewable-Electricity-Standards-Deliver-Economic-Benefits.pdf. Regulatory Assistance Project, "Recognizing the Full Value of Energy Efficiency," October 2013, <http://www.raonline.org/event/recognizing-the-full-value-of-efficiency-theres-more-layers-in-the-layer-cake-than-many-account>.
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- 15 Natural Resources Defense Council, *Bridging the Clean Energy Divide: Affordable Clean Energy Solutions for Today and Tomorrow*, April 2015, www.nrdc.org/energy/files/clean-energy-benefits-vulnerable-comms-report.pdf.