

BEFORE THE WASHINGTON STATE
UTILITIES AND TRANSPORTATION COMMISSION

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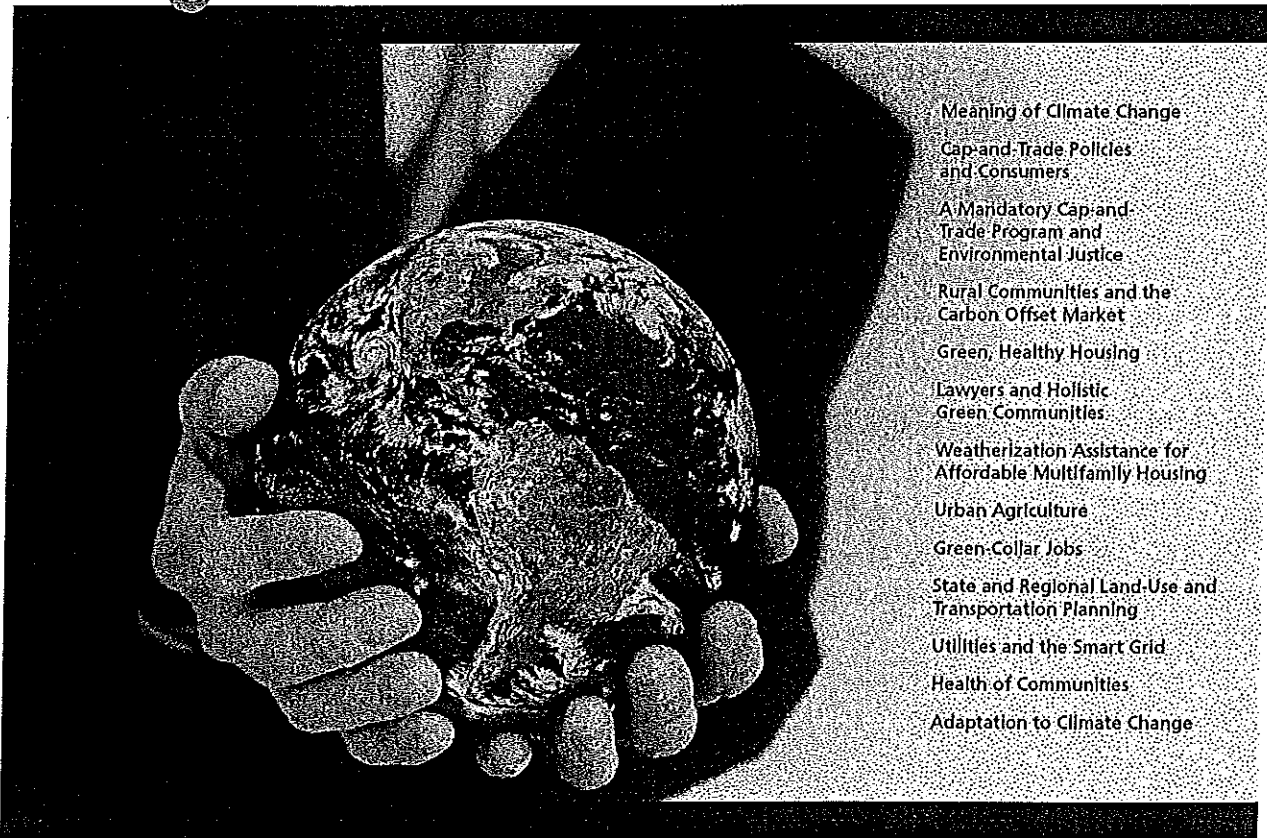
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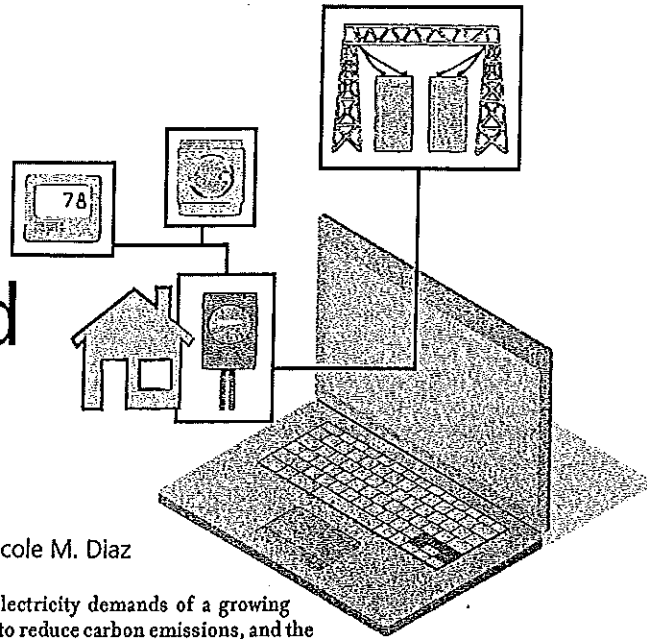
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Climate Change and a Green Economy **NEW ADVOCACY OPPORTUNITIES**



What Is the Smart Grid and Why Should We Care?



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The ever-increasing electricity demands of a growing population, the need to reduce carbon emissions, and the cost of upgrading aging infrastructure are pushing up the price of electricity.¹ In response to those concerns, Congress established a national goal of supporting the development and implementation of a nationwide "smart grid."² A technologically advanced and automated electricity system, the smart grid will increase the efficiency of electricity generation, transmission, and distribution.³ The smart grid will achieve these goals not only through the use of new infrastructure but also by changing consumer demand patterns. The smart grid will encourage consumers to reduce usage at times of peak demand by sending them price signals over the Internet.⁴ Generating and transmitting extra electricity to meet peak demand having a comparatively greater economic and environmental impact, conservation at such times could offer significant benefits.⁵ Smart-grid proponents promise reduced energy consumption and costs, a cleaner environment, better health, new jobs, stimulation of the economy, and more.

But, while the "smart grid" moniker is reassuring and the promised outcomes are seductive, advocates warn that the cost of smart-grid technology and pricing schemes will impose a disproportionate burden on low-income and older people. Pricing incentives designed to encourage conservation will drive up the already high utility bills for those who have inelastic demand or have already reduced their usage to the bare

¹U.S. Department of Energy, *The Smart Grid: An Introduction 8* (2008), http://bit.ly/doe_smartgrid ("As rate caps come off in state after state, the cost of electricity has doubled or more in real terms.") [hereinafter *The Smart Grid*]; U.S. ENERGY INFORMATION ADMINISTRATION, U.S. DEPARTMENT OF ENERGY, DOE/EIA-0383, *ANNUAL ENERGY OUTLOOK 2010 WITH PROJECTIONS TO 2035*, at 66 (2010), http://bit.ly/eia_2010energy ("Electricity prices are influenced by economic activity. In the High Economic Growth case, electricity prices rise to 10.9 cents per kilowatthour in 2035; in the Low Growth case they rise to only 9.3 cents per kilowatthour."). Regarding greenhouse gas emissions, see *The Smart Grid, supra*, at 7 ("If the grid were just 5% more efficient, the energy savings would equate to permanently eliminating the fuel and greenhouse gas emissions from 53 million cars.")

²Energy Independence and Security Act of 2007 § 1301, 42 U.S.C. § 17381, Pub. L. No. 110-140, 121 Stat. 1492 (2007) (statute codified in scattered sections of the U.S. Code).

³*Id.* § 1301. Posting of Gerald Richman, *Smart Grid: The Devil Is in the Details*, *NEW AMERICA FOUNDATION*, http://bit.ly/naf_details (Feb. 23, 2010).

⁴Richman, *supra* note 3.

⁵"Peaker" plants are typically used to meet peak demand. They sit idle for much of the year until needed. The start-up and operation of these plants costs more, spews more pollutants into the air, and is inefficient. See *The Smart Grid, supra* note 1, at 13-14).

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minimum. Those who cannot pay the increased costs will face termination of service, eviction, hunger, health risks, and even death.⁶

Advocates should engage at the earliest stages of smart-grid implementation to ensure that low-income people have access to affordable electricity and adequate protection from disconnection. Already utilities are installing smart-grid technology in many states.⁷ Government funding of smart-grid programs has begun. The U.S. Department of Energy is making grants under its \$3.4 billion smart-grid investment program.⁸ We discuss what advocates can do to protect vulnerable populations.

Smart-Grid Basics

The smart grid will automate and enhance the infrastructure, or "grid," through which electricity is generated, transmitted, distributed, and consumed.⁹ With financial and technical support from the federal government, utilities will upgrade the current transmission grid into an advanced distribution automation system. This system is called "smart" because it will use integrated communications, sensing and measurement technologies, advanced components and control methods, and improved interfaces and decision support.¹⁰ In other words, the system

allows the "two-way flow of electricity and information (that) will be capable of monitoring everything from power plants to customer preferences to individual appliances."¹¹ The advanced distribution automation system will improve the efficiency of the grid by reducing the loss of electricity as it is transmitted and will help avoid overloaded transmission lines, which can cause blackouts that are expensive and present health and security risks.¹² Power companies will be able to detect outages automatically and in some cases remotely repair them.¹³ The smart grid will also enable independent generators of solar, electric, and wind energy to contribute to the grid, helping decentralize energy production, reduce energy loss as electricity is transmitted over longer distances, and reduce the nation's dependency on oil.¹⁴

In order to realize the potential benefits of the smart grid, usage that is stressing the generation and transmission systems must be reduced. A key component of the smart grid, advanced metering infrastructure—often referred to as "smart meters"—will replace individual residential and business meters to enable consumers to reduce their usage in response to signals that the grid is under stress. Smart meters use digital technology and broadband Internet to permit detailed two-way communication between utility

⁶See, e.g., Neal Walters, AARP Public Policy Institute, *Can Advanced Metering Help Reduce Electricity Costs for Residential Consumers?*, *INSIGHT ON THE ISSUES* No. 18, Nov. 2008, http://bit.ly/aarp_adv_meter.

⁷U.S. Department of Energy, *Smart Grid System Report 50* (July 2009), http://bit.ly/doe_smart_g_rpt. ("[Advanced metering infrastructure] composes about 4.7% of total U.S. electric meters. Activity in the use of advanced metering has been increasing rapidly, growing nearly 700% from 2006 to 2008.") In California alone the state's three largest investor-owned utility companies plan to spend \$4.3 billion by 2012 to install millions of smart meters (Posting of Rebecca Smith, *Smart Meter, Dumb Idea?*, *WALL STREET JOURNAL: BUSINESS*, http://bit.ly/wsj_smart_meter (April 27, 2009, 6:50 p.m. EST)).

⁸*Energy.gov/Recovery*, U.S. Department of Energy, *Pillars of Recovery* (n.d.), <http://www.energy.gov/recovery/pillars.htm> (under *Modernizing the Electric Grid*). The *American Recovery and Reinvestment Act of 2009*, Pub. L. No. 111-5, 123 Stat. 115 (2009), in Title IV includes \$4.5 billion to support the development of the smart grid. Specifically the Act makes available \$3.4 billion in grants to utilities and other entities for smart-grid upgrades to the electric grid and \$620 million in new awards for demonstrations of smart-grid technologies and large-scale energy storage. These two program initiatives require public-private cost sharing that represents a \$9.8 billion investment in modernizing the electric grid (see U.S. Department of Energy, DOE/CF-0049, *DEPARTMENT OF ENERGY FY 2011 CONGRESSIONAL BUDGET REQUEST 501* (2010), http://bit.ly/doe_budget).

⁹The Smart Grid, *supra* note 1.

¹⁰*Id.* at 29.

¹¹*Id.* at 13.

¹²*Id.* at 7, 17 (Noting "power outages and interruptions ... cost Americans at least \$150 billion each year—about \$500 for every man, woman and child," *id.* at 5).

¹³*Id.* at 17.

¹⁴*Id.* at 7-9.

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companies and their customers.¹⁵ Each customer's real-time usage data will be relayed to a compatible device, such as an in-home display, computer, phone, or smart appliance that may be programmed to reduce usage during times of peak demand. Usage reduction may be accomplished automatically in response to signals to an appliance from the smart meter itself, in response to remote signals transmitted to a smart meter or appliance from the utility company, or in response to manual or automatic input by the consumer who has gotten notice that there is a peak-demand signal.¹⁶

The smart grid through smart metering will use "demand response pricing" that gives customers a financial incentive to reduce usage during times of peak demand.¹⁷ Most people currently pay a flat rate for electricity but, under smart-meter programs, will shift to time-of-use or dynamic pricing.¹⁸ Electricity rates will vary with the utility's cost of generating the electricity when the consumer uses it. Because electricity is more expensive to produce and transmit during peak demand, higher rates will apply to electricity used during that period—often in the daytime and especially in the summer.¹⁹ Consumers will have to shift their usage to off-peak hours to offset the cost of the meters and to save money on electricity bills.

Disproportionate Burdens on Low-Income People

Low-income people, for whom energy prices are already unaffordable, need advocates to help protect them from the disproportionate burdens that the smart grid—and smart-meter programs in particular—may impose upon them. Advocates must engage early in smart-grid implementation to ensure that low-income people have adequate access to affordable electricity. Because public utilities have been granted an exclusive franchise to provide a necessary service, they have common-law and statutory duties "to serve on reasonable terms all those who desire the service it renders."²⁰ Regulators are obligated to set "just and reasonable" rates.²¹ This is to ensure that all people have access to essential utility services.²²

Advocates should ensure that rate setting for smart-meter programs, which will eventually be implemented throughout the nation, is transparent, accurate, and realistic. Many smart-meter programs planned or implemented to date fail to meet these criteria.²³ Low-income people may have greater difficulty than do wealthier people in responding to pricing signals ostensibly designed to help consumers reduce their usage and their electricity bills. Low-income people are also unlikely to be able to afford energy-efficient or smart-grid-compatible appliances and devices to reduce usage auto-

¹⁵*Id.* at 14. ("People are often confused by the terms Smart Grid and smart meters. Are they not the same thing? Not exactly. Metering is just one of hundreds of possible applications that constitute the Smart Grid; a smart meter is a good example of an enabling technology....")

¹⁶*Id.* at 11 (explaining that the "price signals are relayed to 'smart' home controllers or end-consumer devices like thermostats, washer/dryers and refrigerators—the home's major energy-users"; the devices then automatically increase or decrease power based on "consumers' learned wishes" potentially leading to big energy savings).

¹⁷See FEDERAL ENERGY REGULATORY COMMISSION STAFF, DOCKET NO. AD09-10, NATIONAL ACTION PLAN ON DEMAND RESPONSE 3 (2010), http://bit.ly/ferc_demand_response; Frank A. Wolak, An Experimental Comparison of Critical Peak and Hourly Pricing: The PowerCentsDC Program (draft for Power Conference, March 13, 2010), http://bit.ly/wolak_pricing.

¹⁸For examples of time-based pricing plans likely to be used, see Walters, *supra* note 6, at 3.

¹⁹The Smart Grid, *supra* note 1, at 13–14.

²⁰*United Gas Company v. Railroad Commission*, 278 U.S. 300, 309 (1929).

²¹*Federal Power Commission v. Hope Natural Gas Company*, 320 U.S. 591 (1944). See generally *Principles of Energy and Water Security for All Americans* (May 2006), http://bit.ly/nact_energy_sec.

²²See CHARLES HANAK ET AL., NATIONAL CONSUMER LAW CENTER, ACCESS TO UTILITY SERVICE (4th ed. 2008).

²³See AARP et al., The Need for Essential Consumer Protections: Smart Metering Proposals and the Move to Time-Based Pricing 5 (2010), http://bit.ly/aarp_consumer_prot.

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matically during times of peak demand. Unlike wealthier people, they will have to monitor carefully and reduce their electricity usage manually to avoid incurring higher bills.²⁴

Challenging unrealistic or flawed assumptions, advocates should urge lawmakers to bolster weatherization and energy assistance programs.²⁵ This will help defray the cost of smart-meter programs and ensure that low-income people have universal access to adequate amounts of electricity. Advocates must ensure that adequate safeguards are in place to protect consumers against business practices that make consumers vulnerable to financial, security, and privacy risks. Despite claims to the contrary, very few low-income people will benefit from smart grid-related jobs.

Unaffordable Utilities Pose Significant Health and Safety Threats. When people cannot afford to pay their utility bills, the consequences are far worse than merely darkened homes. With 39.8 million people living below the federal poverty level in 2008, the scope of the problem of unaffordable utilities is such that it threatens public health and safety.²⁶ People who cannot afford to pay for their utilities may resort to heating or illuminating their homes with candles, ovens, or kerosene heaters, which may

increase the risk of fire, poor air quality, and even carbon monoxide poisoning. Those who cannot afford utilities may use inadequate heating and cooling, which may create or exacerbate health conditions.²⁷ Many health conditions—including cardiac and respiratory illnesses from which low-income people suffer at disproportionate rates—are aggravated by extremes in temperature.²⁸ Age, disease, and various medications make it difficult for the body to maintain its own temperature.²⁹ Indeed, lower socioeconomic status means greater risk of temperature-related death, especially for older adults who are particularly vulnerable to temperature extremes.³⁰

Low-income people who face challenges in paying their energy bills are often “food insecure,” meaning that they are at risk of not earning enough income to purchase sufficient groceries at any given time.³¹ In fact, the relationship between hunger and utility costs is predictable. Low-income people in northern states are more likely to experience hunger in late winter and early spring when heating costs are high, while those in southern states are more likely to go without food in late summer due to high air conditioning costs.³² Food insecurity may cause developmental delays in children and increase the use of public health services.³³ More than five million adults

²⁴Wolak, *supra* note 17, at 27 (concluding that “[t]he experimental results demonstrated that the presence of a smart thermostat increased the absolute value of the hourly average treatment effect for all customer types and pricing plans”).

²⁵See Jessica Sklar, *How to Use the Weatherization Assistance Program to Green Affordable Multifamily Rental Housing*, in this issue.

²⁶Carmen DeNavas-Walt et al., U.S. Census Bureau, *Income, Poverty, and Health Insurance Coverage in the United States: 2008*, at 13 (2009), http://bit.ly/walt_census.

²⁷John Howat & Philene Tsormina, *Home Energy Costs: The New Threat to Independent Living for the Nation's Low-income Elderly*, 41 *СЕМАНТИКА РИВЕН* 552, 562 (Jan.-Feb. 2008). See generally Centers for Disease Control and Prevention, *Heat-Related Deaths—United States, 1999–2003*, 55 *МОРБИДНОСТЬ И МОРТАЛИТИТЕТ* 796 (2006), http://bit.ly/mmwl_heat_deaths.

²⁸Synne Page Snyder & Christopher A. Baker, AARP Public Policy Institute, *Affordable Home Energy and Health: Making the Connections* 6, 14 (2010), http://bit.ly/aarp_energy_health; see also HALL ET AL., *supra* note 22.

²⁹Snyder & Baker, *supra* note 28, at 6; Centers for Disease Control and Prevention, *supra* note 27, at 797.

³⁰Snyder & Baker, *supra* note 28, at 11–13. For more on climate change and health, see Marice Ashe & Robin Salsburg, *Using Climate-Change Policy to Improve Low-income Communities' Health*, in this issue.

³¹National Energy Assistance Directors' Association, *The Low Income Home Energy Assistance Program: Providing Heating and Cooling Assistance to Low Income Families* 12 (Nov. 26, 2007), <http://bit.ly/comd2n>.

³²*Id.*

³³*Id.*; Ruth Rose-Jacobs et al., *Household Food Insecurity: Associations with At-Risk Infant and Toddler Development*, 121 *ПЕДИАТРИКА* 65, 69–70 (2008).

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60 or older have experienced food insecurity.³⁴ In a recent nationwide survey of Low-Income Home Energy Assistance Program (LIHEAP) recipients, 32 percent said that they went without food for at least one day during the last five years because they needed to pay their energy bills instead of buying food.³⁵

Low-income and older households spend a greater proportion of their income on energy. This is partly because they use older, less efficient appliances.³⁶ But rising energy costs also consume a greater percentage of their stagnant monthly income.³⁷ Households below the federal poverty level receiving LIHEAP assistance may spend over 16 percent of their monthly income on energy, while wealthier households spend only 3.6 percent of their income on energy bills.³⁸ Moreover, LIHEAP funding levels are not sufficient to meet the need. Only 16 percent of income-eligible households receive any benefits, and funding levels are down.³⁹ The pressure to cut federal spending will continue to grow, putting this and other low-income assistance programs at risk.

Smart-grid implementation will further increase the energy-affordability gap, which is already enormous. Energy bills of low-income households exceeded by \$39.6 billion what they could afford at 2008–2009 winter heating fuel prices.⁴⁰ A contributing factor is that residential

electric rates in the United States rose 24.4 percent between 1996 and 2006.⁴¹ From 2005 to 2009, the price of residential electrical service jumped an additional 22 percent.⁴² When the costs of the smart grid are added to these already high bills, millions more of low-income people may be forced to make difficult choices between paying for electricity and purchasing other necessities such as food, medicine, and shelter.

Recommendation: Advocates should educate regulators about the significant human and societal costs posed by setting utility rates that may become more unaffordable under smart-grid and smart-meter programs. Energy assistance programs for low-income people must be preserved and bolstered. Subsidy programs with onerous application and certification requirements should be simplified to encourage greater participation and protect against loss of service.⁴³

Smart-Meter Expenses and Benefits Should Be Scrutinized. The costs to consumers of participating in smart-meter programs may outweigh the potential benefit of reduced electricity bills. This could discourage many people—regardless of income—from participating voluntarily in a smart-meter program.⁴⁴ Basic smart meters may cost as much as \$600 each, and technology needed to enhance smart meters so that they can be controlled remotely may add

³⁴Understanding Older Adult Hunger: Facts-at-a-Glance, AARP's Digital Newsstand, http://bit.ly/aarp_older_adult_hunger (June 2, 2010).

³⁵NATIONAL ENERGY ASSISTANCE DIRECTORS ASSOCIATION, 2008 NATIONAL ENERGY ASSISTANCE SURVEY 61 (2009), http://bit.ly/heads_corr_m_survey.

³⁶Howat & Taormina, *supra* note 27, at 555–56.

³⁷See Snyder & Baker, *supra* note 28, at 15; Howat & Taormina, *supra* note 27, at 558–61.

³⁸See Snyder & Baker, *supra* note 28, at 14 and fig. 1; see also HAAK ET AL., *supra* note 22.

³⁹OFFICE OF COMMUNITY SERVICES, ADMINISTRATION FOR CHILDREN AND FAMILIES, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, LIHEAP HOME ENERGY NOTEBOOK FOR FISCAL YEAR 2008, at 29 (2010), http://bit.ly/dhhs_liheap_nlbk.

⁴⁰Fisher, Sheehan & Colton, Public Finance and General Economics, On the Brink: 2009: Home Energy Affordability Gap (April 2010), http://bit.ly/energy_gap.

⁴¹Howat & Taormina, *supra* note 27, at 552, 557.

⁴²U.S. Energy Information Administration, U.S. Department of Energy, Electric Power Monthly, Table 5.3, Average Retail Price of Electricity to Ultimate Customers: Total by End-Use Sector (2010), http://bit.ly/doe_elec_price.

⁴³Howat & Taormina, *supra* note 27, at 562–63.

⁴⁴HAAK ET AL., *supra* note 22, at 141.

hundreds more to the price tag.⁴⁶ Utilities have sought to recover the costs of installing smart meters through ratepayer surcharges even before making smart-meter investments or providing benefits to ratepayers.⁴⁶

Regulatory challenges to smart-meter programs based on the expense of smart meters have succeeded throughout the country. State regulators in Indiana found that the projected \$450 million cost to install 800,000 smart meters was not justified by the comparatively low benefits of using the meters.⁴⁷ A smart-meter program in Virginia, where regulators raised serious doubts as to the claimed benefits, has been scaled back and delayed.⁴⁸ In Maryland a proposed smart-meter plan was rejected initially because the costs outweighed the benefits.⁴⁹ Although smart meters have been installed in California, regulators have instituted a formal investigation into over 600 complaints about high bills associated with smart meters and announced an independent study of reported metering problems.⁵⁰

The total costs of smart-grid programs have also come under fire. In Colorado regulators balked at the ever-increasing price tag of a Boulder smart-grid pro-

gram.⁵¹ The utility building the smart-grid estimates that it will cost \$42.1 million to complete the grid, which includes construction of a fiber network as well as smart meters (excluding operation and maintenance costs).⁵² This is nearly three times higher than the \$15.3 million that the utility estimated when the program was announced in March 2008.⁵³

Advocates must scrutinize the full costs and benefits of proposed smart-meter programs to ensure that they are equitable and serve the public interest. For example, the cost to participate in a smart-meter program is not limited to higher utility bills and the cost of buying a smart meter. Consumers will also have to purchase devices that allow the smart meter to communicate digitally within and without the home. These include compatible displays, computers, and smart appliances. The costs of compatible devices are not typically factored into smart-meter program proposals but will have an impact on ratepayers.

Many people will not purchase smart appliances and devices especially if they cannot afford them or if they rent their homes and do not own the appliances.⁵⁴ In fact, regardless of income, the purchase of new appliances is highly cor-

⁴⁶*Id.*

⁴⁷See AARP et al., *supra* note 23.

⁴⁸Posting of John Downey, Duke Scaling Back \$18 Midwest "Smart-Grid" Plan, *CHARLOTTE BUSINESS JOURNAL*, http://bit.ly/charlotte_biz_journ (Feb. 16, 2010, 9:48 a.m. EST); see also Posting of John Downey, Tax Ruling May Clear Duke for \$200M Grant, *CHARLOTTE BUSINESS JOURNAL*, http://bit.ly/charlotte_biz_grant (March 11, 2010, 2:01 p.m. EST).

⁴⁹Virginia Utility Delays Smart Meter Deployment, *SMARTMETERS*, http://bit.ly/smart_meters_va (Feb. 16, 2010); Posting of Holly Martin, Dominion's Smart Meter Rollout Delayed in Northern Virginia, *EXAMINER.COM*, http://bit.ly/examiner_smart (Feb. 20, 2010, 10:31 a.m.).

⁵⁰Alex Dominguez, Associated Press, *Utility: Md. Decision May Kill Smart-Meter Program*, *BLOOMBERG BUSINESSWEEK*, June 22, 2010, http://bit.ly/ap_md_smartgrid. The program was approved recently with improvements for consumers (see AARP et al., *supra* note 23).

⁵¹Structure Consulting Group, PG&E Advanced Metering Assessment Report Commissioned by the California Public Utilities Commission 6 (2010), http://bit.ly/cpuc_meters.

⁵²Posting of Stephen Munro, Regulators Throw a Curve at Xcel Energy's SmartGridCity, *GREENTECH360*, <http://bit.ly/smartgridcity> (Jan 15, 2010).

⁵³Boulder Smart Grid Costs Blow Up—PUC Orders More Transparency. Latest Rate Increase Charges All Colo. Customers for Boulder's Grid, *TRADINGMARKETS.COM*, http://bit.ly/trdg_mkt_sm_gd (Feb. 6, 2010, 19:53:47 EST).

⁵⁴*Id.*

⁵⁵See, e.g., Lucas W. Davis, *Evaluating the Slow Adoption of Energy Efficient Investments: Are Renters Less Likely to Have Energy Efficient Appliances?* (Nat'l Bureau of Econ. Research, Working Paper No. 16114, 2010); see also Wilma Mert, Inter-university Research Centre for Technology, Work and Culture, *Consumer Acceptance of Smart Appliances 30-35* (2008), http://bit.ly/mert_smarta.

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related with the purchase of a new home and with the need to replace appliances that no longer function or are obsolete.⁵⁵ For example, many low-income people have older, less energy-efficient appliances and may not replace appliances even if they are nonfunctioning.⁵⁶ Older people in particular are less likely to buy "smart" appliances which they may deem unnecessary or too "high-tech." Without the proper appliances and devices, many people will be forced to make a much greater direct effort in order to respond to price signals. This will jeopardize the potential of the smart grid to function properly.⁵⁷

Many wealthier and younger households already pay for broadband access, leading utilities not to include this cost in smart-meter program proposals. The persistence of the "digital divide" means that lower-income and older people may also bear additional ongoing monthly expenses for broadband access and devices in order to participate in smart-meter programs.⁵⁸ Broadband Internet service may be unaffordable or, in some areas, unavailable.⁵⁹ Adoption of broadband Internet service stands at only 34 percent in rural areas compared to nearly double that rate in urban and suburban areas.⁶⁰ Broadband Internet adoption also differs among states. One study showed that 91

percent of the variation in the adoption of broadband Internet technology between states was explained primarily by "demographic and economic conditions such as household income, education and, most significantly, income inequality."⁶¹

Recommendation: Advocates should scrutinize the asserted costs and benefits of a smart-meter proposal to ensure that it accurately reflects the full expense to a low-income consumer and does not overstate the likely benefits. To help reduce the smart-meter installation expenses and ongoing higher rates, utility regulators and policymakers should subsidize necessary meters and compatible devices and appliances.⁶² They should also institute complementary energy efficiency measures such as weatherization programs to help low-income people reduce their utility usage and ensure affordable access to energy-efficient appliances.

Employment Opportunities Are Unlikely to Benefit Low-Income People. Some smart-grid proponents may seek to assuage the fears of regulators and others about the burdens that smart-grid programs will impose upon low-income people by claiming, among others, that the smart grid will be a catalyst for creating thousands of new jobs.⁶³ For ex-

⁵⁵Euromonitor International, *Consumer Appliances in the US* (2010), http://bit.ly/euromonitor_app ("Volume sales of major appliances are not only largely correlated with new homes sales, but also home remodeling projects....").

⁵⁶Walters, *supra* note 6, at 5; see AARP et al., *supra* note 23, at 11 n.19.

⁵⁷A U.S. Department of Energy report states that "[d]esigning and retrofitting household appliances ... with technology to communicate and respond to market signals and user preferences via home automation technology will be a significant challenge. Substantial investment will be required..." (U.S. Department of Energy, *Smart Grid System Report 30* (2009), http://bit.ly/doe_smart_g_rpt). The report goes on to state that, unless market signals are communicated and responded to by consumers quickly, "the power system will not be flexible enough to provide the market transparency or the price signals required for a functioning energy market" (*id.*) (citation omitted).

⁵⁸National Telecommunications Information Administration, U.S. Department of Commerce, *Digital Nation: 21st Century America's Progress Toward Universal Broadband Internet Access* (Feb. 2010), http://bit.ly/nita_internet; see Lee Rainie, *Pew Research Center, Internet, Broadband and Cell Phone Statistics* (Jan. 5, 2010), http://bit.ly/pew_internet.

⁵⁹E.g., many rural areas do not have access to the Internet (National Telecommunications Information Administration, *supra* note 58; Rainie, *supra* note 58). For the rural digital divide, see Posting of Nate Anderson, *U.S. Rural Broadband: You Can Get It, But You Can't Afford It, Asx Technica*, http://bit.ly/anderson_broadband (March 6, 2008, 10:06 p.m.), which discusses the Internet industry report by David P. McClure, U.S. Internet Industry Association, *Deployment of Broadband to Rural America* (March 4, 2008), http://bit.ly/usia_rural.

⁶⁰McClure, *supra* note 59, at 15.

⁶¹*Id.* at 16.

⁶²Snyder & Baker, *supra* note 28, at 10.

⁶³KEMA, *The U.S. Smart Grid Revolution: KEMA's Perspectives for Job Creation* (Dec. 23, 2008), http://bit.ly/kema_smartgrid.

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ample, in order to create jobs rapidly for a large number of unemployed workers, the American Recovery and Reinvestment Act earmarked millions of dollars for employee training.⁶⁴ Under the stimulus plan, green job training grants of \$150 million were allocated to support programs "that help disadvantaged populations find ways out of poverty and into economic self-sufficiency through employment in renewable energy industries."⁶⁵

But implementation of the smart grid will likely lead to a net loss of jobs.⁶⁶ Automation will eliminate meter-reading jobs needed for the current grid.⁶⁷ Creation of domestic manufacturing jobs is expected to number only in the hundreds because much of the manufacturing of smart meters and appliances can be automated or accomplished overseas.⁶⁸ Some maintenance positions may be created to service both meters and appliances, but existing maintenance experts will likely fill those positions.

Furthermore, low-income people typically do not have the education for the highly technical positions that the smart grid will create. Low-skilled people are anticipated to have access only to jobs to install smart meters, which can be accomplished by workers with fewer skills after only minimal training.⁶⁹ At current rates, only as many as 10,000 temporary smart-meter installation jobs would be

created, lasting for no more than two years after the stimulus funding runs out.⁷⁰ Current employees are likely to fill these positions, however.

Recommendation: Advocates should ensure that the claims of job benefits for low-income people are not overstated in an attempt to placate the concerns that regulators may have about the burdens imposed by the smart grid.

Pricing Must Be Suited to Usage Needs of Low-Income People. Before additional smart-meter programs are implemented, more information is needed about how low-income people are likely to respond to price signals and what might help them respond to these signals. The assumption that all electricity consumers can shift their usage to off-peak times in order to reduce their energy bills is flawed and unrealistic.⁷¹ This is because low-income people have, compared to wealthier people, fewer appliances that they can turn off, and they may not be able to shift their already minimized usage to off-peak times.⁷² People in single-family homes and homes with central air conditioning respond to price signals more strongly than people in multifamily units and those without central air conditioning.⁷³ The homes of lower-income people are smaller, on average, and tend to have fewer high-energy-consuming devices than the homes of higher-income people.⁷⁴ In fact, half as many low-income

⁶⁴Green Jobs Act of 2007, tit. X of the Energy Independence and Security Act of 2007, 29 U.S.C. § 2916(e).

⁶⁵Press Release, U.S. Department of Labor, U.S. Department of Energy Announces \$150 Million in "Pathways Out of Poverty" Training Grants for Green Jobs (Jan. 13, 2010), http://bit.ly/dol_greenjobs; see Elena Foshey, *An Industry at the Crossroads: Creating Quality Green-Collar Jobs in Energy Efficiency*, in this issue.

⁶⁶Posting of Sunil Sharan, *The Green Jobs Myth*, *Washington Post*, http://bit.ly/sharan_gjobs (Feb. 26, 2010).

⁶⁷Howard A. Scott, *A Call to Action: Implementing the Smart Grid Initiatives in President Obama's Stimulus Plan 4* (2007), http://bit.ly/scott_stimulus_grid; see also Sharan, *supra* note 66.

⁶⁸Sharan, *supra* note 66.

⁶⁹Scott, *supra* note 67, at 2-4.

⁷⁰*Id.* at 3.

⁷¹Walters, *supra* note 6, at 5.

⁷²*Id.*; U.S. Energy Information Administration, U.S. Department of Energy, 2005 Residential Energy Consumption Survey: Energy Consumption and Expenditures Tables, tbl. US8 (n.d.), http://bit.ly/ela_doe_us8; ORION DYNAMICS CORPORATION, CASE LIGHT CONTACT ET AL., MASSACHUSETTS RESIDENTIAL APPLIANCE SATURATION SURVEY, VOL. 1: SUMMARY RESULTS AND ANALYSIS 123-36 (2009), http://bit.ly/mass_survey; Michael McGann & Jeremy Moss, University of Melbourne, *Smart Meters, Smart Justice?: Energy Poverty and the Smart Meter Rollout x-xvi*, 39-46 (2010), <http://bit.ly/mcgannandmoss>.

⁷³See McGann & Moss, *supra* note 72, at 35-36.

⁷⁴ORION DYNAMICS CORPORATION, *supra* note 72, at 123-36.

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households as higher-income ones have central air conditioning, and they use it less frequently.¹⁵ Only 69 percent of low-income households have a clothes dryer and 46 percent have a dishwasher compared to 91 percent and 86 percent, respectively, of higher-income households.¹⁶

Furthermore, demand for electricity in households with people who are unemployed, retired, have disabilities, or act as caretakers for children or older people is likely to be relatively high and inflexible during the peak daytime hours.¹⁷ This is particularly true for individuals whose lives depend on electric medical devices, such as oxygen generators. Accordingly, some pricing models, particularly those with rebates for reducing use rather than sharply increasing rates during peak demand, may be better suited to help low-income people and others save money without burdening those who are unable to shift to off-peak usage.¹⁸

Recommendation: Advocates should press utility companies and regulators to study further how best to set rates to avoid harming low-income people and those who rely on electricity for medical devices.

Protection Against Service Disconnections Must Not Be Circumvented. Some utility companies use smart meters that require prepayment for energy usage or have smart meters with service limiters that automatically shut off service to customers with unpaid utility bills. The use of these kinds of smart meters enables utility companies to circumvent essen-

tial—albeit limited—procedural protections designed to prevent service disconnections.¹⁹ A person who cannot afford to reload a prepaid meter or pay past-due utility bills is forced to self-disconnect.²⁰ Utility companies favor prepaid meters and service limiters because they make it easier to collect outstanding debt and prevent customers from accumulating additional debt.²¹ A utility company can simply shut off service or refuse to reload a prepaid meter until all debts are paid.

The consequences of not having procedural protections in place to guard against the loss of utility service can be devastating. A utility company in Bay City, Michigan, implemented a policy of installing service limiters on smart meters. The service limiters cause a circuit breaker in the smart meter to blow out like a fuse when usage exceeds a prepaid limit. In January 2009 a 93-year-old man froze to death when his service limiter was tripped over the weekend, cutting off his electricity. The victim apparently was never told how the service limiter worked. When a neighbor discovered him, money evidently intended to pay the utility bill was found stacked on the kitchen table.²²

Recommendation: Regulators should ensure that consumer protections are not circumvented by smart-meter features. For example, service should not be disconnected when a customer is unable to recharge a meter, whether due to the time of day, lack of transportation, sickness, infirmity, incapacity, or certain other hardships. Adding age- or disability-based antitermination requirements to protect particularly vulnerable low-income older

¹⁵*Id.* at 126.

¹⁶*Id.* at 128–29.

¹⁷See McGann & Moss, *supra* note 72, at 12.

¹⁸Wolak, *supra* note 17.

¹⁹Kevin Jewell, *Manipulated, Misled, Ignored, Abused: Residential Consumer Experience with Electric Deregulation in the United Kingdom* (Fall 2003), http://bit.ly/jewell_retail_elec.

²⁰*Id.*

²¹*Id.*; Rebecca Smith, *More Utility Bills Go Unpaid: Consumers' Economic Struggles Spur More Power Shutoffs as Firms Step Up Collections*, *Wall Street Journal*, Nov. 3, 2008, at A3, http://bit.ly/wsj_utility_bill.

²²Scott Michels, *Michigan Investigates Freezing Death of 93-Year-Old*, *ABC News*, Jan. 27, 2009, http://bit.ly/abc_mich; Comment of Low-Income Weatherization and Fuel Assistance Program Network, *Western Massachusetts Electric Company, Smart Grid Pilot Plan, D.P.U. 09-34* (Mass. Dept of Pub. Util. June 15, 2009) (prepared by John Howat, National Consumer Law Center), http://bit.ly/howat_comments.

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people, families with children, and people with health risks or medical devices may be necessary. Mandatory prepaid or service-limiting meter programs should be prohibited. Allowing such programs would give companies an unrestrained ability to shut off a household's utilities without proper notice and without access to court proceedings to seek redress.

Imprudent Investment and Deceptive Business Practices in an Evolving Marketplace Must Be Prevented. Because smart-grid technology is still developing, there is a significant risk that utility companies will pass on the costs of imprudent investments in technology (or technology that may soon become obsolete) to their customers and encourage or require their customers to make similarly unwise investments. Ratepayers should not be forced to bear such expense or risk. For example, if a utility markets time-of-usage heating or cooling systems based upon a cost-benefit analysis which assumes that reasonable off-peak daylight hours will be available, the utility should not be permitted to eliminate all off-peak daytime hours.

Recommendation: Advocates and regulators should educate consumers about the risk of investing in the still-evolving smart-meter technologies. Consumers must also be protected from deceptive marketing claims. Incorporating enhanced consumer protections upfront is particularly important in light of consumer complaints against utility companies typically having to be heard by utility regulators. Utility proceedings are not well suited for disputes about residential billing or deceptive practices.⁸³

Privacy and Security Must Be Protected. Advocates should encourage utility companies to resolve privacy and security concerns raised by smart-grid technology before the program is widely implemented. Smart-grid technology inherently has the potential to reveal unprecedented detailed personal information about a utility consumer's personal habits, preferences, behaviors, and whereabouts. Any entity

with access to energy-use information of its customers would be able to determine when customers are at home, what time they cook dinner, whether they use a microwave or conventional oven to do so, and even which television commercials cause them to open their refrigerators. The extremely high value of such data to marketers, debt collectors, scammers, and crammers makes the information particularly susceptible to misuse. Unless access to such data is avidly protected, people's personal and financial privacy and even their physical safety could be at risk.

Recommendation: As smart-grid technology is designed and adopted, advocates must insist that strict safeguards to protect privacy and security are adopted, adhered to, and regularly reviewed for effectiveness.

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Low-income people need advocates to anticipate potential smart-grid implementation's threats to their health, safety, and privacy. Advocacy is needed before smart-meter programs are implemented to prevent harm caused by unaffordable electricity rates and circumvention of consumer protections. In particular, advocates for low-income people should ensure that all the costs associated with smart metering are included in the smart-meter program proposal. Advocates should ensure that, where a smart-meter program is implemented, low-income households receive subsidies to pay for new technologies and receive weatherization assistance. The smart-meter program pricing schemes must not harm low-income people or people with disabilities who may have inelastic demand. And procedural protections against disconnection from smart meters must be enhanced to take into account new technologies.

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⁸³For a full discussion of consumer protection features that are recommended to safeguard consumer interests, see John Howat & Julia Devanthy, National Energy Assistance Directors' Association, Public Service Commission Consumer Protection Rules and Regulations: A Resource Guide (July 2006), http://bit.ly/heads_consumer.