

# Executive Summary

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The way electricity is produced and sold in the United States is undergoing an historic change. The changes being debated and enacted across the country are intended to lower electricity prices by encouraging competition among power companies. But what are the implications of electricity deregulation for the environment and public health?

The answer depends on what the rules governing the new electricity market will be. If they ignore threats to the environment and public health, then the overall quality of American life will be diminished by increased pollution, global warming, and other looming problems. But if new market rules are designed to promote cleaner, renewable energy sources such as wind, solar, biomass, and geothermal energy, then we could see lower prices, robust competition, and environmental improvement.

This primer describes seven practical measures to switch America to renewable electricity sources:

- Renewable portfolio standards
- Public benefits funding
- Net metering
- Fair transmission and distribution rules
- Fair pollution rules
- Consumer information
- Putting green customer demand to work

## Public Benefits of Renewable Energy Use

Renewable energy can supply a significant portion of the United States' energy needs, creating many public benefits, including environmental improvement, increased fuel diversity and national security, and economic development. These benefits, however, are

often not reflected in the prices paid for energy, placing renewable energy at a severe disadvantage when competing against fossil fuels and nuclear power.

**Environmental Benefits.** Renewable energy provides immediate benefits by avoiding the environmental impacts of fossil fuels. Using fossil fuels to make electricity dirties the nation's air, consumes and pollutes water, hurts plants and animal life, creates toxic wastes, and causes global warming.

Air pollution is an especially serious problem for which electricity generation bears substantial responsibility. One pollutant, fine particles, may be responsible for 64,000 deaths each year—more than the number of people killed in automobile accidents. Other important pollutants include sulfur dioxide, nitrogen oxides, and toxic metals.

Electricity generation is also a leading source of carbon dioxide emissions, the key heat-trapping gas that is causing global warming. Although scientific uncertainties remain about the timing and size of impacts, there is strong evidence that global warming is occurring and that its effects could be severely damaging to both people and wildlife. The warming that is predicted for the next several decades (without action to reduce carbon emissions) could destroy many coastal wetlands, cause more frequent storms and other extreme weather events, put crop production under great stress in some regions, and disrupt public health and ecosystems.

Renewables can also help replace nuclear generation and reduce its safety, environmental and economic risks.

**Reducing Pollution Helps the Economy.** The pollution and other problems associated with fossil fuels place a burden on the American economy as well as on the environment. The greatest economic



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impacts take the form of higher health care costs, missed work, and lost lives. According to several studies, such health costs may amount annually to hundreds of billions of dollars. Increasing renewable energy use can help reduce these health costs and also lower the costs to industries and consumers of complying with environmental regulations.

**Diversity and Energy Security.** By broadening the mix of electricity sources, renewables can make the United States less vulnerable to volatile fuel prices and interruptions to the fuel supply. Renewables like wind and solar that do not depend on fuels are not subject to price fluctuations, such as the huge leaps and falls in oil and gas prices seen in the 1970s and 1980s. And since they are locally produced, they are not as vulnerable to supply interruptions from outside the region or country.

**Economic Development.** Renewable energy technologies can help create jobs and generate income. A number of state and national studies have found positive net job impacts from increasing renewable energy use. Renewable technologies also have enormous export potential.

**Other Nontraditional Benefits.** Some renewable technologies can be sited in or near buildings where electricity is used. This practice, known as distributed generation, can avoid costly expenditures on transmission and distribution equipment. Distributed generation can also improve power quality and system reliability.

## The Costs and Benefits of Increasing Use of Renewable Energy

Current levels of renewable energy use represent only a tiny fraction of what could be developed. Several major studies show that the United States can meet a large share of its electricity needs from renewable resources at a modest cost, while reducing harmful air emissions, easing pressure on natural gas prices, and greatly diversifying the electricity mix.

### Making Renewable Energy the Standard.

A 1999 UCS study of federal proposals (*A Powerful Opportunity: Making Renewable Electricity the Standard*) found that achieving a standard of 20 percent (nonhydro) renewables generation by 2020 would freeze electricity-sector carbon dioxide emissions at

year 2000 levels. Under business as usual, these emissions would increase by 24 percent. The carbon dioxide reductions would cost \$18 per ton. Consumer electricity prices would fall 13 percent between 1997 and 2020, compared to 18 percent under business-as-usual. A typical (500 kilowatt-hours per month) household electricity bill would still be \$4.57 per month lower in 2020 than in 1998, compared with a \$5.90 per month reduction without the added renewables. The study also showed that the competition from increasing renewable energy use would help restrain natural gas price increases.

**Department of Energy Analysis.** A 1998 study by the Energy Information Administration (*Annual Energy Outlook 1998*) found that with a standard of 10 percent nonhydro renewables by 2010, electricity prices would be 17 percent lower than in 1996, compared to 20 percent reductions with business as usual. In the renewables scenario, typical households would see still their electricity bills reduced by at least \$6.25 month by 2010, compared with \$7.74 month with business as usual. When the effect of the added renewables restraining natural gas price increases is counted, along with electricity conservation induced, there would be a net savings of \$1.8 billion from the renewables standard in 2010.

## Barriers to Renewable Energy

If renewable energy sources are such a good deal for the country, why haven't they been more successful? Four problems are mainly responsible:

- **Commercialization barriers.** Like all emerging technologies, renewables must compete at a disadvantage against the entrenched industries. They lack infrastructure, and their costs are high because of a lack of economies of scale.
- **Distortions in tax and spending policy.** Studies have established that federal and state tax and spending policies tend to favor fossil-fuel technologies over renewables.
- **No value is placed on the public benefits of renewables.** Many of the benefits of renewables, such as reduced pollution and greater energy diversity, are not reflected in market prices, thus



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eliminating much of the incentive for consumers to switch to these technologies.

- **Other market barriers.** Lack of information by customers, institutional barriers, the small size and high transaction costs of many renewables, high financing costs, split incentives among those who make energy decisions and those who bear the costs, and high transmission costs can also be barriers to renewables development.

**Green Market Limits.** Surveys show that many customers are willing to pay more for renewables. But given the barriers to renewables competing fairly in the marketplace, “green markets” are likely to develop slowly. Pilot programs have shown promising results, with some commercial customers choosing renewables, though in smaller numbers than residential customers. Participation levels to date have been far below positive survey responses and customers’ switching to “green” suppliers in California is off to a relatively slow start. The most optimistic green marketers expect that 20 percent of residential customers and 10 percent of commercial customers will choose green suppliers within five years of customer choice.

## Seven Ways to Switch America to Renewable Electricity

Over the years, state and federal governments have taken a number of policy actions to encourage renewable energy production. In states committed to seeing them through, the policies have been very successful. New policies are needed if renewables are to compete successfully in deregulated electricity generation markets.

We identify seven effective ways to encourage the wider use of renewable energy:

**1. Renewables Portfolio Standard.** The renewables portfolio standard (RPS) would use market mechanisms to ensure that a growing percentage of electricity is produced from renewable sources. By establishing tradable “renewable energy credits,” the RPS would function much like the Clean Air Act emissions allowance trading system. Five states have enacted minimum renewables requirements during restructuring; three others have set pre-restructuring state minimums. Together these bills are likely to

preserve 1,650 MW of existing renewables and lead to development of 2,100 MW of new renewables. Connecticut has the highest overall state target; Arizona the highest solar support. Six 1998 federal bills contain RPS provisions.

An RPS can ensure steady, predictable growth of the renewable energy industry. That would enable the industry to obtain lower-cost financing and achieve economies of scale and production that would make the technologies more competitive. The RPS would ensure that the lowest cost renewables are developed by creating competition among renewable developers. The RPS would have low administrative costs, since the market would decide what kinds of renewable energy would be produced.

**2. Public Benefits Funding.** Another way of encouraging a switch to renewable sources is to fund renewable energy development with a small charge on all electricity sold. Such a charge could fund specific activities to overcome market barriers and help commercialize new technologies. Seven states have adopted renewables funds totaling about \$1 billion over ten years. California has the highest level of total funding; Connecticut the highest per customer.

Public benefits funds can be allocated where they are most needed. For example, they can be directed toward technologies that have great long-run potential, like solar photovoltaics, but are not competitive today even with other renewables. They can also be used for other purposes, including funding programs to increase energy efficiency, public benefits research and development and to ensure electricity service to low-income customers. Moreover, public benefits funds, unlike tax credits and other incentives, allow the level of funding to be precisely defined.

**3. Net Metering.** Net metering is an important way to eliminate penalties for households and small businesses that elect to generate their own power from renewable sources (with, for instance, small wind turbines or rooftop solar systems). It allows customers who produce more electricity than they are using at a given moment to feed the surplus back to the utility and only pay for net electricity used over an entire billing period or year. As of November 1998, at least 21 states required net metering, with utilities in two other states also using net metering.



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**4. Fair Transmission and Distribution Rules.** Some renewables can be sited in or around customer buildings where they can not only replace conventional generation, but help avoid transmission and distribution costs. An important issue is whether these technologies are credited for these savings. In some cases, distributed renewables generation can become cost-effective when these transmission and distribution savings are counted.

New regulations or incentives are needed to encourage distributed generation where it is economic. Options include integrated resource planning for distribution systems and performance-based ratemaking. Massachusetts and Connecticut have required consideration of distributed technologies.

Renewable energy producers, like other generators, need access to the transmission grid and the ability to sell power whenever it is available. New federal rules and regional independent system operators (ISOs) could increase access to customers for renewable generators, and reduce transmission costs for remote facilities. Some proposals for transmission service pricing, however, could unfairly penalize intermittent renewables like wind and solar, by requiring generators to specify sales a day or more in advance and pay penalties for deviating from the amount purchased. Other transmission pricing issues could also affect renewables adversely. An analysis by the Lawrence Berkeley Laboratory shows that charging only for energy transmitted by renewables will produce the least-cost electricity system.

**5. Fair Pollution Rules.** Under the Clean Air Act, older power plants are allowed to emit more pollutants than newer plants and, therefore, do not have to spend as much money on pollution controls. On average, these rules save older plants nearly one cent per kilowatt hour compared to new plants, giving them an unfair competitive advantage. Northeast states are especially concerned that deregulation could increase electricity imports from these dirtier, less expensive plants in the Midwest, unless older plants are required to clean up to new plant standards.

Several proposals have been made to reduce the disparity in emissions allowed at different plants. Connecticut and Massachusetts directed their

environmental regulators to develop emission performance standards for retail supplier portfolios. Another approach is to develop an overall emission cap in the area affected by a specific pollutant, and to allow trading among companies to meet the cap. The US Environmental Protection Agency has proposed a nitrogen oxides trading scheme for Eastern states. Several federal proposals would create caps for multiple pollutants. A third approach would be to tax emissions, a policy that has gained some favor in other countries.

**6. Customer Information.** To exercise their preference for clean energy sources, customers need reliable information about products they are offered. To address this issue, electricity suppliers can be required to label their products. These disclosure labels for fuel sources and emissions would be analogous to nutrition labels on food. A number of states have required disclosure, and others are considering it. In addition, education programs about environmental impacts and choices available in the marketplace, as well as certification of renewable electricity services by an independent organization, can provide important information.

**7. Putting Green Customer Demand to Work.** Many surveys have shown that customers are willing to pay more for electricity from clean and renewable sources. At least 40 programs offering customers renewable energy choices were available by mid-1998. Results from initial pilot and marketing experiments are mixed, with low initial participation rates but some signs of long-term promise.

Supportive market rules are important for allowing effective customer choice. Electricity customers who switch suppliers need to receive a shopping credit that includes avoided retail overhead costs, as enacted in Pennsylvania.

Aggregation of small customers can reduce overhead and marketing costs, and facilitate choice of green products. Municipal aggregation, authorized by Massachusetts law, where a city or town votes to purchase electricity for all its residents and businesses, may be especially promising. Government purchases of renewable electricity is another approach to stimulate development.

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## Conclusion

The deregulation of electricity generation presents both risks and opportunities for renewable energy. The main risk is that renewables will be at a competitive disadvantage against fossil fuels. If this occurs, the result could be even less use of renewable energy for electricity generation than we see today, with corresponding higher levels of pollution, greenhouse gases, and other problems.

However, the new market also creates potential opportunities for renewables *if* appropriate policy steps are taken. This report has described seven practical measures that would greatly increase the contribution of renewable sources to the nation's electricity supply. These measures are complementary and can be enacted together. Policymakers should consider them as an integral part of increasing competition in the electricity industry.

