

THE FIRST F

BY GLEN ANDERSEN

A limitless source of energy lies waiting to be discovered in homes, buildings and factories across the nation. It produces zero emissions, creates huge savings for consumers and industry, and is far less expensive and quicker to employ than any type of new power generation.

This invisible resource is energy efficiency, or “the first fuel.” And it is usually the best approach to meeting energy demand—the logical first step before building expensive power plants or laying transmission lines. Energy efficiency is also the quickest and easiest approach to reducing greenhouse gases.

“Most official energy forecasts assume massive growth rates in energy demand,” says Hunter Lovins, president of Natural Capitalism Solutions, a firm that provides sustainable energy solutions to numerous corporations and government entities worldwide. “This growth cannot be met cost effectively without energy efficiency, our least-cost energy resource,” she says.

These issues are a primary concern for economists and policymakers, who know the strength of the U.S. economy depends on stable, affordable energy supplies. The energy choices we make now will affect the economy and environment far into the future.

“We must get energy demand down to a sustainable range, or it’s not going to make much difference whether we bring renewables into the supply chain,” says Bill Prindle, deputy director for the American Council for an Energy-Efficient Economy. A proposal considered by Congress, which requires utilities to get 15 percent of their energy from renewable sources by 2020, would not satisfy

ENERGY EFFICIENCY VS. CONSERVATION

The difference between energy efficiency and energy conservation often confuses people. Energy efficiency is about doing the same amount of work—often in a better, cleaner and cheaper way—with less energy.

Wearing a sweater and turning down the thermostat, running the air conditioner less or driving less are all valid ways to reduce energy consumption, but these are conservation, not efficiency approaches.

the projected growth in energy demand. This means that more coal- or gas-fired power plants would have to be built and greenhouse gas emissions would continue to rise—unless energy efficiency is implemented in tandem with renewable energy requirements.

“Renewables won’t succeed unless we do efficiency first and in parallel,” says Prindle.

“Energy efficiency is simply the wisest business choice,” says Lovins. Adopting energy efficiency programs lowers business operating costs, freeing up funds for capital investments, expanding the workforce and pleasing shareholders.

“In general, investing in energy efficiency generates three times as many jobs as investment in supply-side projects such as power plants,” says Prindle. “Energy efficiency is more labor intensive while plant construction is more capital intensive.”

THE RESULTS ARE IN

States and corporations are already seeing enormous returns on their investments in energy efficiency. Connecticut’s Clean Energy Fund helps utilities pay for programs that reduce natural gas and electricity con-

sumption. Lifetime savings have been phenomenal—\$4 for every \$1 spent in 2006, \$60 million a year in avoided energy costs. Air quality benefits are just as dramatic. Carbon dioxide emissions were reduced by 181,000 tons in 2006, the equivalent of removing 31,200 cars from the road. There was also a 442-ton reduction in NO_x and SO_x (pollutants that cause smog and acid rain) that year.

Today’s technology is helping states and businesses decrease the amount of energy needed to live or work comfortably at home, in the office or at the factory. A new building with energy efficient design features can use 50 percent less energy, drastically cutting the size and cost of heating and cooling systems, and the energy system needed to power the building. The result is a building that may cost the same to build as a typical one, but offers tremendous energy savings and environmental benefits.

Washington state passed a law in 2005 to improve energy efficiency in publicly owned buildings by using certified contractors to perform upgrades, which are paid for by the energy saved, creating no costs for the school, hospital or state. The program ensures that all work is conducted according to state statutes and guarantees maximum cost and energy savings. As of 2006, the program created \$66 million in avoided energy costs and saves the state 160 million kilowatt-hours per year in electricity consumption. And since most of the projects were started after 2000, much of the savings are yet to be realized.

AN ENDLESS ENERGY SUPPLY?

Between 1975 and 2005, America reduced the amount of energy consumed per dollar of GNP—known as energy intensity—by nearly 50 percent. Much of the reduction was brought about by concerted federal

Glen Andersen tracks environmental issues for NCSL.

UEL

THE CHEAPEST AND CLEANEST
ENERGY IS THE ENERGY YOU
DON'T CONSUME.

efforts to increase energy efficiency in appliances, improve fuel economy in cars, and encourage insulation and weather proofing in homes and buildings. A refrigerator used four times as much energy in the '70s as it does today. A modern double-paned window loses around 10 times less heat in winter than older single-paned windows—a major innovation, since up to 30 percent of a home's heating and cooling energy is lost through windows.

Energy intensity continues to fall 2.5 percent annually, providing more energy than all the new power plants built each year. (Unfortunately, energy demand is growing faster than energy intensity drops.) Much of this progress is propelled by new state policies and by businesses that see the advantages of energy efficiency in increasing growth and profitability.

Lovins believes that energy efficiency could easily cut our current needs in half, while providing immense economic and environmental paybacks. Some experts say it can be 70 percent or more. And the many gains already made do not "use up" energy efficiency potential. As experience grows, greater efficiency opportunities are discovered and supported by new technologies, making energy efficiency a "bottomless cup."

OVERLOOKED AND UNDERSOLD

Despite the major role that energy efficiency has played in creating a prosperous economy, it still is not considered a significant resource by many states and utilities. Markets are full of distortions that work against it.

"Homebuilders who have to front the capital costs for energy efficient homes don't see the economic benefits," says Bill Prindle. "Their goal is to get the most affordable residences



STATES TAP INTO ENERGY EFFICIENCY

State policy can overcome many of the barriers to energy efficiency. Those who have been aggressive with their policies have seen remarkable reductions in the growth of demand. California began its efforts around 1975, improving energy codes and appliance standards, creating system benefit funds and pursuing energy utility decoupling. These and other policies held California's per capita energy consumption flat for the last 30 years, while per capita energy use in the rest of the country increased by 50 percent. California's

actions averted the need to build 24 new power plants, leading to lower prices for consumers and less air pollution. By 2003, building and appliance standards alone had saved the state \$56 billion.

Many other states have adopted policies to increase efficiency. Some require utilities to invest in energy efficiency programs and allow compensation through a charge added to each customer's monthly bill. The amount of money saved in energy costs is often 2 to 3 times higher than the amount spent on energy efficiency.

Minnesota, which already required utilities to spend 2 percent of their gross operating revenues on energy conservation and efficiency, went a step further with the Next Generation Energy Act of 2007. It requires utilities to set energy efficiency savings goals. Utilities must help consumers use energy efficiency measures to reduce the total amount of electricity used by 1.5 percent per year.

Minnesota Representative Bill Hilty, coauthor of the law, says air quality concerns, growing energy demand and cli-

mate change were some of the reasons he pushed for measurable energy efficiency standards.

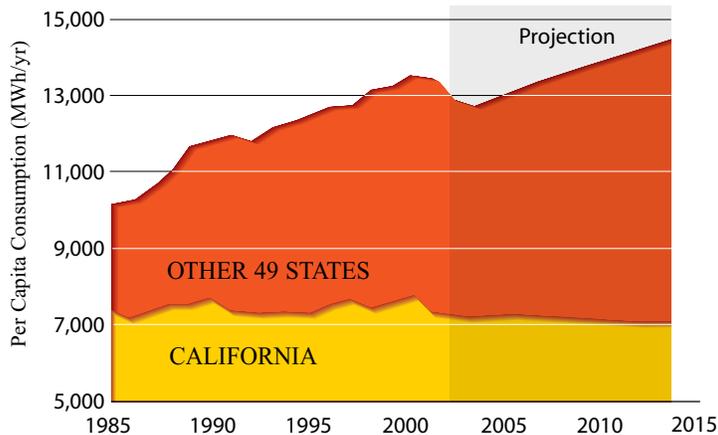
Setting a performance-based standard can ensure that money is spent effectively. "The goal was to ensure that new demand is met by energy efficiency, which will also help us meet our greenhouse gas reduction goals," Hilty says.

He and other sponsors primed the bill for smooth sailing by meeting frequently with environmental groups, utilities and others to help craft a law that satisfied everyone.

Minnesota also launched a new residential building code this year that is among the most energy efficient in the nation. Housing built under it may cost slightly more, but the residences will be more comfortable and the extra cost will quickly be made up by lower energy costs and increased durability.

The new code was developed by state officials, with the support of researchers at the University of Minnesota. It requires better insulation, efficient windows and airtightness in new homes.

PER CAPITA CONSUMPTION: CALIFORNIA VS. OTHER 49 STATES



Sources: U.S. Census Bureau, California Department of Finance, U.S. Energy Administration, Edison Electric Institute, California Energy Commission, California Public Utilities Commission.

SETTING A GOOD EXAMPLE

Some states have chosen to "lead by example," by building green themselves, which can help jumpstart the energy efficient building industry. Connecticut passed a law in 2007 that requires all state facilities costing \$5 million or more, of which at least \$2 million is state funded, to meet or exceed LEED Silver or comparable standards. LEED is a nationally recognized standard used to certify environmental sustainability in building design. The Connecticut law also applies to renovations of \$2 million or more.

"Greener buildings have less impact on global warming and will help fulfill the huge demand for energy while alleviating high prices," says House Speaker Jim Amman, sponsor of the legislation.

Amman says the law will create a demand for energy efficiency technology and skills.

Washington has had a law since 2005 requiring LEED Silver standards for state buildings. The statute applies to public facility projects funded by the capital budget, including those built by public agencies and school districts, and requires facilities to document their operational savings.

"The benefits are obvious," says Washington Representative Hans Dunshee, the legislation's sponsor. "They provide a 30 percent energy savings and green buildings have been found to cut down on absenteeism in state workers and students," Dunshee says.

Twelve other states also require state buildings to be built to LEED or similar standards.



REPRESENTATIVE
BILL HILTY
MINNESOTA



HOUSE SPEAKER
JIM AMMAN
CONNECTICUT



REPRESENTATIVE
HANS DUNSHEE
WASHINGTON

to market. They don't support regulations that impose costs on them when benefits flow to the occupants." The same holds true for commercial developers and rental property owners.

Information is also a barrier. Most consumers and home buyers don't know about energy efficiency options and their long-term financial benefits. They don't have the time to compare data on products and analyze costs of energy savings. For many businesses, energy is considered a fixed cost, so managers don't always consider reducing energy demand as an option.

Nor is energy efficiency a natural choice for utilities, because they make money based on energy sales. Reducing demand will reduce profits.

Energy efficiency tends to be invisible to economists and energy planners whose statistics focus mainly on physical energy supply. The amount of energy produced is easy to calculate while the energy not used goes largely unnoticed. The invisible and dispersed nature of energy efficiency is part of the reason it doesn't receive the attention from policymakers that highly visible new generation facilities do, especially those "green" projects powered by wind, solar or other renewable resources.

THE BUILDING: A TREASURE TROVE OF ENERGY

Schools, government buildings, warehouses, offices, manufacturing plants and homes provide a wealth of energy efficiency opportunities. Buildings (residential, commercial and industrial) consume almost half of the total energy used in the United States and new buildings are responsible for the majority of the growth in energy demand.

In order for the market to work properly, consumers must be aware of alternatives and the benefits of their choices. A poll by the American Institute of Architects, taken in September 2007, found that just 7 percent of U.S. voters realize that buildings are the largest contributor to greenhouse gas emissions, and therefore the largest consumers of energy.

"If you really want to attack the long-term performance of the building stock, you have to go after new construction," says Prindle. Even though it's only a small percentage of our total buildings, it adds up over the years. "Those buildings are going to be there for 50 years or more," he says, "benefits will accrue for decades."

Prindle says building codes and programs that provide mainstream developers, contractors and design firms with the knowledge on how to design and build more efficient buildings with little or no increase in cost are a way to reach home and commercial builders.

It's possible to build energy efficient buildings 30 percent to 50 percent better than national model energy codes require. Some recent research indicates that efficient structures cost the same or just slightly more than inefficient ones. But these high performance buildings are relatively rare. Most people don't know that a high performance building does more than save energy. Well-designed buildings provide a quieter and more comfortable work environment while improved lighting and cleaner air can increase productivity 5 percent to 15 percent. Given that employee costs are at least 100 times energy costs in the typical office, the return from increases in productivity can dwarf the energy savings.

CLIMATE CHANGE

Energy efficiency is a valuable tool for reducing greenhouse gas emissions, and it pays for itself through reduced energy costs and eliminating the need for new power plants.

Although many claim that lowering greenhouse gas emissions will increase costs, the converse has proved true for large companies. The energy giant, BP, used energy efficiency to help cut its greenhouse gas emissions by 10 percent. The goal was achieved 10 years earlier than planned at zero net cost. DuPont plans to reach its goal of cutting greenhouse gases to 65 percent below its 1990 levels while raising output by 30 percent and saving \$2 billion. They will use innovative redesigns of processes and energy efficiency to increase productivity and decrease energy use.

Businesses are acting on their own because they realize the economic risks posed by climate change. Nicholas Stern, former chief economist of the World Bank, says failing to reduce greenhouse gases could cost the global economy 20 percent of GDP.

STATES CAN LEAD THE WAY

Policymakers face critical decisions to make sure their state's short and long-term energy needs are met far into the future. Energy efficiency can help fulfill this goal by providing insurance against rising energy

DECOUPLING SALES FROM PROFITS

Since traditionally regulated utilities typically make their money on how much energy they sell, promoting energy efficiency measures is clearly against a utility's interest. Some states are using "decoupling" to change this.

Here's how it works. State regulators determine every few years how much income utilities need to cover authorized costs and set rates at a level to cover these costs based on forecasted sales. Since the true collection seldom matches forecasts, over-collections are returned to customers through reduced rates and under-collections are paid through small rate increases (usually pennies per month for households). This allows utilities to continue to make a reasonable profit, while consumers pay fewer total costs.

California was the first to decouple electric utility revenue from sales in 1982, freeing up large amounts of money for energy efficiency programs. California then deregulated utilities in the mid-'90s, which eliminated decoupling and resulted in its well-known energy shortages of 2000 and 2001. In 2006, decoupling was readopted and \$2 billion will be spent on energy efficiency between 2006-2008.

Seeing California's success, Maryland, New York and Idaho, recently implemented decoupling for electric utilities and Minnesota and Wisconsin are studying it. Eleven states have applied decoupling to gas utilities.

costs, reduction in greenhouse gas emissions and economic stimulus. Despite these advantages, legislation is often needed to nudge utilities, builders and owners to accept it.

"Although more efficient buildings can cost more up front," says Washington Representative Hans Dunshee, who sponsored a law requiring energy efficiency standards for state buildings, "we've found costs are minimal and easily paid back with energy savings." 

 **CHECK OUT** Delaware's Sustainable Energy Utility, the first in the nation, which is expected to achieve a 30 percent reduction in annual energy use by the end of 2015. Learn about it at www.ncsl.org/magazine.