

Energy

Efficiency 101



In the United States, decades of inexpensive energy resources have led to an abundance of inefficiencies and waste in our use of energy. With 4% of the world's population, the US consumes 25% of the world's energy resources. Worldwide energy demand is expected to triple within the next three to four decades. At the same time, many of the resources that have traditionally supplied our energy needs are shrinking at an alarming rate. As we face increasingly volatile energy costs, ageing and vulnerable energy delivery infrastructure, and growing human health and environmental consequences attributable to our insatiable thirst for energy, reducing our dependence on fossil fuels is more than a virtue – it's a necessity.

Many people confuse efficiency -- doing more with less – with discomfort or hardship – doing less or doing without. Misconceptions about the cost, payback, and availability of energy efficient technologies, as well as a general lack of public awareness limit their enormous potential for curtailing our energy supply needs.

In fact, energy efficiency has a proven track record. Since 1973, focused efforts on improving the efficiency of energy use have reduced America's rate of energy consumption. Today we use 47% less energy per dollar of economic output than we did 30 years ago. That equates to less air pollution and related respiratory ailments, reduced greenhouse gas emissions, nuclear waste, and mining operations.

Yet, we still have a long way to go. The U.S. buildings sector is number one in electricity consumption; number one in greenhouse gas emissions production and the sector with the greatest potential for improvement in these areas through the use of energy efficiency and on-site renewable energy generation. Energy efficiency is the most economical and immediate, but overlooked and misunderstood way to provide future energy resources.

There remain ample opportunities to increase our energy efficiency with readily-available, proven technologies. Energy efficient products – once thought to be out-of-reach or too expensive for many consumers – are now widely accessible and affordable. In fact, today's energy efficiency technologies and practices are bringing greater benefits at a lower cost than ever before. Compact fluorescent lamps that cost \$20 two decades ago are now less than \$3. Window coverings that reflect heat now cost one quarter what they did just five years ago. The costs of many energy efficient appliances are coming down to the range of inefficient ones. When life cycle costs are considered, energy efficient products are a far better value than their inefficient counterparts.

Energy Efficiency as a Resource

In 1976, Amory Lovins coined the term “negawatt” to denote energy efficiency as a resource, a unit in watts of energy saved. In other words energy efficiency “generates” power capability, by doing as much or more with less energy, thus reducing demand on existing power plants.

"Every negawatt generated has the potential to increase our wealth and health as few other investments can," says Lovins, world-renowned energy guru and CEO of the Rocky Mountain

Institute (RMI). “The opportunities are almost boundless. Energy efficiency is the great new energy resource of our future.”

Because energy is lost at every stage of the generation lifecycle – from mine to plant to the end-user - even small reductions in the home are amplified in upstream reductions in energy consumption.

According to the Alliance to Save Energy, if over the next 15 years Americans bought only Energy Star products we would shrink our energy bills by more than \$100 billion and eliminate greenhouse gas pollution equal to the emissions of 17 million cars for each of those 15 years. Refrigerators in the U.S. alone use the equivalent of the output of about 60 300-MW power plants. If all the nation’s households used the most efficient refrigerators available, electricity savings would eliminate the need for about 30 average-sized power plants.

Even the smallest energy efficiency improvements can lead to huge benefits if they were widely adopted. A study by the Lawrence Berkeley National Laboratory calculated that home electronics such as TVs, VCRs and cable boxes, even when idle, account for 5 percent of total domestic energy consumption. If this equipment were plugged into power strips that were turned off when not in use, we could reduce our annual energy costs by more than \$3 billion and carbon emissions by 18 million tons.

If you replaced just four 100-watt incandescent bulbs that burn four or more hours a day in your home with four 23-watt fluorescent bulbs, you’d get as much light and save at least 1,356 kilowatt-hours of electricity and \$108 over three years. In Colorado this avoids the release of 1400 lbs. of greenhouse gas emissions into the atmosphere.

The Benefits of Energy Efficiency

Energy efficiency saves consumers money. According to the RMI, preventable energy waste – from the power plant to losses in the home – costs Americans hundreds of billions of dollars a year. In 2003, before energy prices began a steady upward trend, the average American household paid \$1500 a year in home energy costs. Reducing the amount of energy we consume in our homes has an immediate impact on utility bills. Even very small changes, like sealing air leaks, switching to more efficient light bulbs or using a programmable thermostat shows up in reduced energy bills. Higher investments energy efficiency measures, such as adding insulation, energy efficient windows or a more efficient water heater can reduce utility bills by hundreds of dollars annually.

Some additional, less obvious benefits to energy efficiency include:

- Energy efficient equipment is typically higher quality and more reliable.
- Energy efficient homes are more comfortable homes. When the building shell is well-sealed to air leaks and heating and cooling systems are tuned and sized to needs of the home it is more comfortable.
- Studies have shown that natural light (“day-lighting”) improves mood and productivity in work and learning settings.
- Energy efficient motors are often more quiet, reliable and controllable than their less efficient counterparts.
- Home insulation and high efficiency windows not only keep the internal temperature comfortable, but also shields the home from outside noise.

- Using energy efficiency in our homes now buys time while cleaner energy generation technologies can be developed and implemented.

Energy efficiency reduces negative impacts on the environment. The U.S. has 4.6% of the world's population but produces roughly 25% of the world's greenhouse gas emissions. The U.S. EPA estimates the energy consumption of the average American house creates 22,000 pounds of carbon dioxide (CO₂) annually compared to a typical car's 11,500 pounds of CO₂. Residential energy consumption is expected to increase 7.5% by 2010. According to the Energy Information Administration, by 2025, U.S. energy consumption will increase 40% -- an amount equivalent to the current consumption of California, Texas, New York, Ohio, Pennsylvania and Illinois.

The negative environmental impacts of energy production are well-known: pollutants from fossil fuel generation are showing up in our food chain and are known to cause a host of human health problems; coal fired electricity generation causes 37% of greenhouse gas emissions - the leading cause of global warming; as of 2003, 54,000 tons of spent nuclear fuel had accumulated in the U.S., with no available solution for its storage or disposal; the electricity power industry accounts for 39% of fresh water use; the safety and security of our nation's power infrastructure is highly vulnerable to disruption – through accident or malice. Every kWh saved reduces these impacts. In Colorado, where 92% of our electricity comes from burning coal, each kWh saved prevents about 1 lb. of CO₂ from being pumped into the atmosphere.

Energy efficiency enhances national security. Many experts believe that our civilization's dependence on fossil fuels represents the greatest threat human kind has ever faced. Conserving energy supports national security by prolonging the availability of finite domestic energy resources, reducing the environmental impacts that are weakening our planet's ability to support us, and reducing our dependence on imported resources, such as natural gas and oil, from socially, politically and economically unstable, foreign regimes. A distributed and diverse energy supply system may be our greatest defense against the health, economic, social and security threats to our country. Treated as a resource, megawatts not only reduce the need to import our energy supplies and build new power plants but help to create a diversified energy resource base.

Energy efficiency promotes economic growth. Energy efficiency provides a number of national and local economic benefits. Reducing our reliance on fossil fuels provides a hedge against rising fuel costs. It also helps to keep our energy dollars invested at home instead of exporting them overseas to oil and gas suppliers. Investments in energy efficiency tend to create more local and in-state jobs than comparable spending on energy consumption. More importantly, the money saved on energy allows consumers to spend more of their income on other products and services, thereby stimulating economic growth in other areas. At the state level, an investment in cost-effective energy efficiency is an investment in the state's infrastructure that improves Colorado's competitiveness in a global economy.

THE CENTER FOR RESOURCE CONSERVATION

The CRC offers assistance to homeowners and businesses on improving the energy efficiency of their homes and buildings, including **classes and training seminars**, **information resources**, a **contractor referral network** and a **low cost residential energy audit program**.

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