

REPORT FROM THE CENTER # 8

WHAT EVERY WESTERNER SHOULD KNOW ABOUT ENERGY EFFICIENCY AND CONSERVATION

A GUIDE TO A NEW RELATIONSHIP

Patty Limerick • Howard Geller

With the assistance of Jason Hanson, Claudia Puska, and Mark Ruzzin

CENTER OF THE AMERICAN WEST

SOUTHWEST ENERGY EFFICIENCY PROJECT



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CONTENTS

- preface** A Personal Letter to the Reader
- 1** The Appeal to Reason: Save Energy and Save Just about Everything Else
 - 4** A Dating and Investment Guide: What is Energy Efficiency and What is Energy Conservation?
 - 7** Taking Action: Choosing Wisdom Over Waste in the Privacy of Your Own Home
 - 11** Competitive Conservation: Taking Action in the Workplace
 - 15** Energy Efficiency: A Resource That Keeps Growing
 - 16** Energy Consumption in the West: How Do We Stack Up?
 - 19** The Future of the West and Energy: The Big Picture
 - 23** Grounds for Optimism: What the West Could Save
 - 25** Grounds for Pessimism: What the Critics Say
 - 28** Abandon Hope (Temporarily) All Ye Who Enter Here: Barriers to Greater Energy Efficiency and Conservation
 - 30** The Appeal to Pride: How Slow Can Your Electric Meter Go, How Far Can You Drive on a Tank of Gas, and Other Fun Ways to Outshine Your Neighbors
 - 32** A Little Help from Our Friends: What We Can Ask of Our Public Officials and Utility Companies
 - 43** Now for the Tough Part: Transportation and Energy Efficiency, or Can a Real Cowboy or Cowgirl Drive a Hybrid Without Compromising Dignity?
 - 49** Looking Beyond the Local: The Global Context
 - 51** Historical Cheer: Our Current Energy Habits Have Shallow Roots and Could Change Fast
 - 52** The Appeal to Pleasure: Saving Energy Can Be Fun
 - 55** Conclusion: An Energy Declaration for the Twenty-First Century
 - 56** Appendix A – Where to Begin: Resources for Consumers and Businesses
 - 57** Appendix B – Energy Efficiency Tax Advantages and Other Incentives: Favorable Federal and State Policies
 - 61** Endnotes
 - 65** Acknowledgements
 - 65** About the Center of the American West and the Southwest Energy Efficiency Project



A PERSONAL LETTER TO THE READER

Dear Westerner,

We may not know your name, but we already know one pretty private thing about you. You have been involved in a tempestuous relationship, pursuing a mad romance with fossil fuel. But now, thanks to a spectrum of big changes, from global climate change to rising energy prices, your love affair with petroleum is winding down. It's time to go in a search of a new relationship, one with better prospects for long-term happiness.

We need to talk.

You are now positioned to move on – joyfully! even electrically! – to a new relationship, one that you will find far more satisfying and trustworthy. By the time you finish reading this report, we want you to be in that condition technically labeled “head-over-heels,” enchanted with energy efficiency and conservation.

Let's be clear: fossil fuel is not going to disappear from your life any time soon. The intense combustion of the romance will die down, but you will remain good friends. It may even be useful to think of this transition as an unusually good-natured triangle, in which you, fossil fuel, and conservation and efficiency live congenially together until one roommate finally moves out and renewable energy moves in. You and fossil fuel have had, after all, thousands of good times together, and there is no justification for ingratitude or for the denial of those pleasant memories. There is certainly no reason to waste time in bitterness, condemnation, or recriminations over the ending of a relationship that has delivered so much pleasure.

Scolding and nagging have tested many relationships to the breaking point, and we are simply not going there. Seduction will, we think, be more rewarding and certainly more fun. We will never ask you to turn your back on progress and retreat to a primitive, uncomfortable, ascetic, and abstemious past. Far from forcing us to retreat backward from the present, energy conservation and efficiency are the cutting edge – you could even say the frontier – of a dynamic future, and they are far more likely to increase your comfort than to diminish it.

We are well aware that the most robust romance can fall apart over financial troubles. And, to put this more positively, wealth is widely understood to be an aphrodisiac. So even if you have encountered energy conservation and efficiency before, this is probably your first chance to see this enterprise in all its charm, magnetism, appeal, and, especially, profitability.

We've had a great ride with fossil fuels. But it's time to face the fact that our love affair with oil, natural gas, and coal is showing wear and tear. We are on our way to an entirely different future, relying on renewable energy sources, a destination we need to reach by the middle of this century. In the meantime, in energy conservation and efficiency, the incentives converge: financial gain, emotional satisfaction, physical comfort, and a license for smug self-congratulation come in the same package.

Our recommendation to you: accept delivery of this package. Live with it. Embrace it. Let it serve as the center of a new, more satisfying way of life, with or without sex appeal.

In American society, when we are bored by a topic, even a topic that we know deserves our attention, we have a custom of dismissing it with the declaration that it is “not sexy.” Actual human beings put a goofy amount of personal energy (speaking of energy inefficiency!) into the project of achieving an appearance, shape, dress, walk, and manner that will qualify as “sexy.” If getting certified as sexy can be such a demanding enterprise for human beings, imagine how difficult it must be for a light bulb, a refrigerator, or a social policy to qualify as “sexy.” This is too deserving a cause to languish because people don't find it sexy and fun.

Efficiency and conservation are the girls or boys next door, the neighbors we take thoroughly for granted, never imagining their power to arouse us. Efficiency and conservation sit on the margins of our national dialogue about energy, quietly doing good work while advocates of more visible energy resources proclaim, declare, shout, and plead. The energy delivered by efficiency and conservation has the disadvantage of seeming invisible and immaterial. Efficiency does not come in barrels. You can't pipe conservation across state or national borders. We do not have highly publicized, acrimonious legal disputes over the siting of energy conservation plants on ecologically sensitive public lands in the West. We do not endure public flaps about the negative visual impact that energy efficiency will have for residents living along coastlines. Energy efficiency and energy conservation do not stir up the pulse or cause the heart to soar. They are silent, unobtrusive, and all too often ignored.

On the other hand, energy efficiency and conservation present one of our best opportunities for creating a sustainable energy future that will both reduce our own troubles and earn us the admiration and gratitude of posterity.



So this report is about the many satisfying, even exhilarating opportunities we have to avoid waste and to use energy more wisely. In a collaboration between the Center of the American West and the Southwest Energy Efficiency Project (SWEET), we have undertaken to give you information about technologies and practices in energy efficiency and conservation, the benefits of embracing efficiency and conservation, and strategies for overcoming the barriers to more efficient energy use.

When it comes to the use of electricity and natural gas in households and workplaces, we can accurately reassure you that the improvements you make will not inconvenience you. We can, in other words, invite you into a world in which the material and emotional pleasures you find in life may well increase, and certainly will not decrease.

Alas, we cannot offer you a similar reassurance when it comes to the territory of transportation. While no one will be asking you to return to the days of the pioneers trudging alongside your covered wagon in order to avoid burdening your oxen, a true application of energy conservation and efficiency to transportation can ask for a greater change in your habits and practices than the same application to household heating or lighting. Waiting for a bus or train is simply a different matter from hopping (an interesting verb) into your car for a trip and shifting into motion at the exact instant you wanted to be moving (assuming that you are not headed into a traffic jam). Changing an enormous national fleet of gas guzzlers into an enormous national fleet of gas sippers is part of the task before us, but it is only part.

When it comes to energy efficiency and conservation in transportation, we will have to work hard to distinguish our needs from our desires. But the good news is this: when we get that distinction in hand, improving our energy use in transportation will be as emotionally and financially rewarding as improving our energy use in our homes and workplaces. You won't have to surrender material comfort and take up a noble but annoying life of austerity. Plus, you'll get the smug self-satisfaction of doing your part to save the planet, boost the economy, and make the nation more secure. What's not to like?

The region of the West and the nation as a whole have already taken major steps in the cause of energy efficiency and conservation, and an abundance of good news already surrounds the subject. Over the past three decades, through a variety of energy conservation and efficiency measures, we have greatly reduced the amount of energy required to generate each unit of our GDP. This is a substantial and significant achievement that allows us to begin this report with congratulations for a job well begun.

Nowhere in this report will we drag down your spirits with a declaration condemning the Western United States for its wickedness. On the contrary, we have started off with the good news that this region has already made fine progress in the territory of energy conservation and efficiency. We write to reinforce and encourage you: Keep it up, stick with it, take it further. The stars are aligned, and the time is right to embrace a new way of conducting ourselves in the use of energy. Do not feel that your individual actions are insignificant: in taking up energy efficiency and conservation, you ally and align yourself with one of the most important and compelling causes of our time.

Fellow Westerner, as our society and our economy undertake to reduce our dependence on fossil fuels, we are glad to have your company and we thank you for reading this report. We believe that the adventure ahead of us truly carries satisfactions that will outweigh the burdens. Energy is, in direct relationship to its importance, one of the most controversial environmental topics of the twenty-first century. If engineers could invent a way to generate electricity from the friction and heat of the debates over its production and consumption, we could power the entire country! The workforce for disputing and squabbling seems very fully staffed, and so we have opted for a tone of tranquility and cheer. But we have no reason to exempt ourselves from commentary and criticism, and so, as always, we invite your comments, suggestions, additions, ideas, declarations of heartfelt gratitude, expressions of dismay, confessions of disappointment, or recommendations for future work. Let's keep the lines of communication open on this crucial issue. Our contact information follows our signatures.

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THE APPEAL TO REASON

SAVE ENERGY AND SAVE JUST ABOUT EVERYTHING ELSE

Energy efficiency and conservation should appeal to the three main dimensions of human motivation: Reason, Pride, and Pleasure.* We will begin here with the Appeal to Reason, the most common justification for increasing energy efficiency and conserving energy. We later move on to an Appeal to Pride and then we will make our Appeal to Pleasure. Reason is not necessarily the most powerful force of the three, but when considered in a rational framework energy efficiency and conservation get high marks. Unleash and exercise your powers of Reason, and you are an instant convert to our cause. Here's why.

- Reducing your energy use saves you money. Your energy bills shrink because you buy less of the product that energy companies sell. The savings can be substantial on every scale: for private homeowners, for renters paying their own energy bills, for small businesspeople, and owners and stockholders of large corporations.¹ And there is a special value for low-income families: energy efficiency and conservation reduce the burden of high energy costs, increasing a family's capacity to live comfortably, pay their utility bills, and avoid shutoffs.²
- Reducing energy use, individually and collectively, leads to similar savings on a larger scale. For individuals, communities, and governments, saving energy will cost less than producing and distributing it. As you will soon learn from our toast story, turning natural resources – coal, oil, natural gas, biomass, geothermal heat, sunlight, and wind – into energy is an involved and expensive prospect. To fully calculate the cost of energy, to the expenses of finding and extracting the natural resources we have to add the expenses of transporting and transmitting the energy, the losses at

each stage of energy conversion, the cost of building and maintaining the energy infrastructure, and the burdens of dealing with “externalities” (costs usually left out of the price paid for a commodity), including environmental damage, the human health consequences created by this whole process, and the protection of energy supplies from distant and in some cases hostile and unstable lands. Energy efficiency and conservation save money at every level by reducing all these costs.

- Conserving energy means less environmental disruption and disturbance in the West. Diminish our electricity use, and we need less coal mining and natural gas drilling. Reducing power plant operations reduces sulfur dioxide, nitrogen oxides, and mercury emissions, thereby cutting the air pollution and haze that affect public health and impair our views. Reducing the use of gasoline and diesel fuel improves urban – and rural – air quality. Less burning of fossil fuels of all types lowers our carbon dioxide emissions and thus the contributions we are making to global climate change. And less energy demand also means less water consumption by power plants and in our homes and workplaces.³ In the most down-to-earth way, energy efficiency and conservation will reduce our opportunities to quarrel, litigate, and accuse each other of bad behavior. Life in the West could, thereby, become more pleasant and less characterized by noise and clamor.

* In truth, neither we nor anyone else on the planet has a solid and reliable understanding of what moves and drives human beings. But this threesome is our best guess!

SO YOU WANT TO MAKE TOAST?

A TALE OF CONNECTEDNESS

Responding to our earlier report, *What Every Westerner Should Know About Energy*, many readers declared a lasting enthusiasm for the following essay. Our gifted colleague in environmental engineering, Mike Hannigan, came up with this as a way of helping laypeople understand how closely and immediately their day-to-day choices connect to the big picture of energy production and consumption in the region. When it comes to an awareness of the connection between our own use of energy and the sites where this energy originates, “out of sight/out of mind” is the operative concept. Thus an effort to persuade Westerners to become more engaged with energy efficiency and conservation rests on exactly the sense of connection that Mike Hannigan’s toast parable puts forward.¹

What happens inside that little metal box, attached to the wall by a black tail, when you stick two slices of bread inside? The mysteries of the bread-to-toast phenomenon will now be revealed.

First, we will assume that you made the bread and raised and ground the wheat, which will allow us to leave aside for now the discussion of the role energy plays in food production.

Most probably, coal is the reason your slice of bread becomes a piece of toast.

When you depress the lever on the side of the box into which you placed your bread, several rows of small wire coils, made red-hot by the conversion of electric energy into thermal energy, heat the bread. The electricity comes to the toaster through the power cord attached to the wall. Inside the wall is a set of wires which – traced far enough through electric meters, distribution lines, transformers, substations, and transmission lines – lead back to a power generation plant. The connection between a wall outlet and the power plant supplying the electricity is as short as a mile or as long as several hundred miles and sometimes crosses state lines and tribal lands. The electricity is generated by burning the fuel that enters the plant. More precisely, the electricity (electrical energy) is generated by large, spinning turbines of wound copper wire (mechanical energy), spun by high temperature and high-pressure steam (thermal energy). The steam is produced by burning fuel (turning potential chemical energy into thermal energy) to boil water. The chain doesn’t end here.

So far, browning your bread to crispy perfection has required the help of several different companies and the conversion of chemical energy to thermal energy (to produce steam), thermal energy to mechanical energy (to spin the turbines), mechanical energy to electrical energy (to produce an electric current), and electrical energy back to thermal energy (to toast the bread). These conversions have not occurred without losses.

- Reducing energy use can increase productivity in the workplace. Energy purchases account for a portion of the cost of manufacturing goods in factories, developing natural resources, and operating offices, schools, and retail establishments. Conserving energy and improving energy efficiency reduces these costs and lowers overall production costs accordingly. Businesses that consume less energy are more competitive in the national and global market.

- Reducing energy use can create more jobs. Producing, marketing, and promoting energy efficiency measures prove to be relatively labor-intensive activities, while coal mining, natural gas production, and electricity generation and distribution employ comparatively few workers. And when a family or business spends the money it saved by conserving energy, it bolsters the economy and supports more jobs. Thus putting effort into energy efficiency and conservation, rather than expanding conventional energy supplies, can lead to a net increase in jobs in a community, state, or region.⁴

- Reducing energy use limits the destructive power of disasters, both natural and technological. In our current circumstances, the balance between energy supply and demand is a precarious one, and the slightest disruption in supply, such as that caused by hurricanes Rita and Katrina, will cause energy prices to shoot up. Reducing energy dependence will help us cope more effectively with these disruptions.



By the First Law of Thermodynamics, energy is a constant and can neither be created nor destroyed. But it can (and does) change form. The Second Law of Thermodynamics dictates that while the amount of energy in a closed system remains constant, the quality of that energy deteriorates over time. Basically, as energy changes form, the amount of usable energy in a closed system (say, our universe) decreases. Our troubles begin.

The only one-hundred-percent-efficient form of energy conversion is from potential or kinetic energy to thermal energy. All other forms of energy conversion occur at significantly lower efficiencies. Power plants, for example, convert the potential chemical energy of coal or other fuels into thermal energy at very close to 100 percent efficiency but have typical thermal energy to electrical energy conversion efficiencies of only 33 percent. The remaining thermal energy is normally discharged into the atmosphere as heat and not put to use.² Energy loss (“entropy”) continues to occur after the electric energy leaves the plant. Transmission and distribution lines do not conduct electricity with 100 percent efficiency. Ninety-two percent is the average; longer power lines have lower efficiencies. Compounding the conversion and transmission inefficiencies is the net energy loss that occurs between the extraction of the fuel resource and its arrival at the power plant. The Goliath-sized draglines, bulldozers, and dump trucks that extract the coal, and the railroads that transport the coal (over an average distance of 483 km) are heavy users of energy themselves, which has to be subtracted from the net production of

usable energy. Some coal draglines are powered by an “extension cord” six inches in diameter, and require a separate, smaller onsite plant to supply enough electricity to the dragline.

What does this mean for our piece of toast? Let’s add up the efficiencies. Between the amount of energy invested in the equipment used to extract and transport the energy resource, the Second Law of Thermodynamics, and transmission losses, only about 27 percent of the energy extracted from the ground reaches your toaster. And within your toaster there is a final inefficiency: as heat wafts out of the slots and through the sides, only a small portion of the energy flowing through the glowing coils actually warms your bread to that desirable toasty state ready to melt a pat of butter and satisfy your palette.

There is nothing direct and simple in the modern chain of toast production. At each stage, some energy produces work, and a significant amount of energy is also lost. There is, decidedly, no free breakfast! The processes of extracting, transporting, and turning oil and coal into energy usable by consumers require fuel to run railroads, pumps, refineries, and generating plants. When you look at the numbers on your monthly utility bill or gasoline pump, you fail to see the much larger story of the movement of energy and matter around the surface of the earth. And every time you use energy, you are an actor – and an actor of consequence – in this very large-scale drama.

- Reducing energy use will play a crucial role in enhancing our national security in an age of terrorism and instability, decreasing our dependence on energy imports and thus making us less vulnerable to the actions within unstable and unfriendly nations.⁵ Our demand for fossil fuels, particularly oil, puts our nation’s security at risk. We import most of the oil we use, and much of it comes from unstable and volatile OPEC nations in the Persian Gulf. We are now importing twice as much oil as we did back in the 1970s, and it looks like this growth is set to continue into the future, even if we tap new domestic sources in Alaska, the Gulf of Mexico, and elsewhere.⁶ The Energy Information Administration projects that imported oil will account for 64 percent of the nation’s oil supply by 2030.⁷ Increasing energy security is the bedrock of the nation’s future well-being. Of all the practices that we can honor with the term “real patriotism,” energy efficiency and conservation occupy a position right at the top.

OK, Reason, we have touched on nearly everything you care about: saving money, both individually and collectively; reducing social and political friction; keeping people employed; minimizing the effects of disasters; keeping the nation safe and secure.

We know Reason loves a good argument, and we expect it to come back with objections, challenges, and grounds for skepticism. In a civil society, spirited and civil argument moves and fuels our public discourse the way oxygen moves through and fuels the bloodstream. Stay tuned, and we’ll show argument in full and free circulation.





A DATING AND INVESTMENT GUIDE

WHAT IS ENERGY EFFICIENCY AND WHAT IS ENERGY CONSERVATION?

Energy efficiency and energy conservation are siblings, the closest of relatives on the best of terms. But they are not interchangeable, and you will get on better with both if you can distinguish between them.

Let's say you were going to take energy efficiency out to dinner on one night, and energy conservation out to dinner on the next night. On your first outing, you will need to remember to bring your wallet. Energy efficiency is not a cheap date; you will have to make an investment to get this relationship off the ground. But, in short order, after you have paid for the first dinner or two, and maybe for theater or concert tickets, the terms will shift and energy efficiency will begin treating you. Each time you reach for your wallet, energy efficiency will snatch the check and say, "No, really this one's on me." In no time at all, energy efficiency will pay you back – and more! – for the investment you made at the start of your relationship.

With energy conservation, you will have to prepare for a different sort of outing entirely. You will not have to remember to stop by the ATM machine to make sure your wallet is well-stocked. But as you head out to dinner with energy conservation on your arm (and we ask for one more round of your forbearance with this analogy), you may have to make your peace with a less-than-sterling restaurant, or perhaps, if it turns out that neither of you are really all that hungry, with no restaurant at all. Perhaps you will have to settle for salad or sushi, or for some other item that does not require the expenditure of energy to cook the meal. You will be proud to be seen with your admirable new companion; your life will be improved by the chance to get to know each other better; but you may have to settle for less choice and convenience than you enjoyed on your outing with energy efficiency (though neither sushi nor salad really involve much sacrifice).

Had enough of these analogies, and ready for the straight scoop? Energy efficiency means reducing the amount of energy you need to perform a particular task by investing in more effective systems of delivery. When you practice energy efficiency, you increase or maintain your given level of service, but you decrease the energy used to provide that service. Efficiency usually requires an up-front capital investment in the use or installation of energy-saving devices. Usually, your savings will soon pay off that initial expense. Efficiency reduces the demand for, say, electricity without lessening or interfering with the performance of an electrical appliance and without reducing the comfort or convenience that that appliance provides. For example, to increase your energy efficiency you might:

- Replace incandescent light bulbs with compact fluorescent lamps (CFLs).
- Buy Energy Star appliances, light fixtures, and windows rather than their less efficient, ordinary counterparts.
- Drive a vehicle that gets 30 or 40 miles per gallon (MPG) rather than a 15 MPG vehicle that proclaims to the world, with every turn of its tires, that the practice called "conspicuous consumption" is alive and well.

Energy conservation, by contrast, means that you reduce your use of energy. Period. Unlike energy efficiency, conservation may mean a reduction in your level of service and possibly a reduction in your comfort and convenience. Energy conservation usually will not cost you money up-front, so when you reduce your energy use, you will reap immediate financial savings. But it does require you to change your habits and, possibly, to make some sacrifices. For example, to conserve energy you might:

LOCATION, LOCATION, LOCATION. . . AND ENERGY EFFICIENCY

WESTERN GROWTH AND THE ADVANTAGE OF NEW HOMES

The subject of many laments and complaints, the West's rapid population growth carries a big, if slightly ironic, advantage in the context of energy efficiency and conservation. "Building it right the first time" – building energy efficiency into new construction – is much easier and much more cost-effective than taking existing homes and retrofitting them. Rapidly-expanding Western cities like Las Vegas and Phoenix, where the housing market is as hot as the desert sand, present an excellent opportunity to build a high level of energy efficiency into new homes and apartment buildings.

Buyers of new homes can reach a high level of energy efficiency by seeking and buying a house that boasts the Energy Star designation, which signifies that the efficiency features of these homes have been certified by independent inspectors according to the standardized Home Energy Rating System. Energy Star homes have gained considerable recognition and market success in certain parts of the West, including Arizona and southern Nevada. In fact Nevada was the state with the highest market share for Energy Star new homes (42 percent) in 2005. According to the Environmental

Protection Agency, new Energy Star homes typically use 20 to 30 percent less energy for heating and cooling than homes built to the current model energy code adopted by many local governments. This performance is on its way up: the criteria for qualifying as an Energy Star new home were strengthened in 2006.³

Designers and builders have a variety of methods at their disposal to make new homes more efficient: carefully sealing the building envelope; increasing levels of insulation; sealing and insulating air distribution ducts; installing energy-efficient heating and cooling equipment; and using Energy Star windows, light fixtures, and other features.⁴ In such energy-efficient construction, human beings exercise the mental power that characterizes their best work: they simultaneously think about the past, the present, and the future. They think about the energy components of a building, not as an afterthought, but right at the start of the design process. And they make the sale. Intelligent homebuyers know that greater energy efficiency means less cost over the life of their home and less impact on the environment, making these energy-efficient features attractive selling points in the competitive real estate markets of the West.

- Turn down the thermostat in the winter (show off your favorite sweaters) and turn it up in the summer (show off . . . well, whatever you've got).
- Switch off the lights when you leave a room.
- Take public transportation, walk, or bike – rather than drive – when you aren't lugging around eight bags of groceries or half a junior soccer team.

Efficiency and conservation often present two different paths to the same goal of using less energy, which means that you have a plethora of options (and a paucity of excuses) when it comes to reducing your energy consumption. Whether your preference is to invest in efficiency or be diligent about conservation, there are a variety of ways to get from here to there. You could:

- Purchase and install a dozen or so high-efficiency CFLs, or make better use of natural light in your home and turn on your lights less often.
- Install motion sensor lights in less-frequently used spaces like the bathroom or laundry room, or be vigilant about turning off the lights when you leave a room.
- Put in a low-flow shower head, or just take shorter, cooler showers.
- Get a programmable thermostat, or assiduously turn down the heater at night and while you are normally out of the house.



IN PRAISE OF CLOTHESLINES

Whether you subscribe to the wooden slip-on, spring action, or modern plastic variety, chances are you share something in common with a vast and diverse community that appreciates the importance of a good clothespin in the art of drying clothes on a line. The elegance of that straight line stretched across your backyard or between apartment buildings inspires you to let your pants dance in the wind and turns your sheets, kitchen towels, and underwear into an art installation that Christo might applaud. And you deserve the highest praises for your efforts, defying subdivision covenants and seeing through the empty promises of laundry products that claim to make your shirt “clothesline fresh.” We would present you with a medal, but we know that snuggling your nose into a crisp, cool pillowcase fresh off the clothesline as you slip dreamily to sleep is reward enough!

- Install an efficient cooling system such as an evaporative cooler and keep the shades or blinds drawn, or install ceiling fans throughout the house and ask a friend to fan you with a palm branch.

Each option will reduce the amount of energy you use. They are not mutually exclusive. Efficiency and conservation measures often complement one another – even with efficient CFLs in your most-used light fixtures, you should still diligently switch them off when you leave the room. Implementing a blend of efficiency and conservation measures will maximize your energy savings.

It’s important to understand the difference between efficiency and conservation so that you have realistic expectations of each. Energy efficiency requires you to make improvements and upgrades in technology. Happily, many energy-efficient technologies are already on the market, convenient, accessible, easy to use, and cost-effective. But they do require an up-front expenditure of money. This is not, to return to our opening theme, a “sexy” use of disposable income (unless you have the type of friends who get weak in the knees over resource-saving, front-loading washers – we know a few). It may feel a little more punishing than gratifying while you are paying for new equipment. But keeping your eye on your shrinking expenditures for energy should bring the gratification to the fore. In the same spirit, taking up with energy conservation may entail a degree of inconvenience. But the simple exercise of asking yourself (and answering yourself honestly!), “What do I need, as opposed to what I can have?” should make the inconvenience more than bearable. (And if that doesn’t help you, shift your attention back to the money that conservation measures will save you.)





TAKING ACTION

CHOOSING WISDOM OVER WASTE IN THE PRIVACY OF YOUR OWN HOME

This next section may make you wonder, at first, what's gotten into your genial authors. We have promised that we will not reprimand or scold you, and we will stick by that promise, maintaining a tone of cheer, encouragement, and even celebration. But let's be honest with ourselves. None of us, authors included, are total energy conservers or ideal practitioners of energy efficiency. Most of us have failed to insulate our homes properly. Sometimes we forget to turn down the heat when no one is at home or turn out the lights when we leave the room. Most of us have relied on a dryer when the sun was standing by ready to evaporate moisture from our clothes on a clothesline, if only we had a clothesline. We all can do better. So please join us as we catalog the actions we all can take to be wiser and less wasteful.

Ladies and Gentlemen, Fellow Westerners, we now present clever and practical things we can do to reduce our expenditures and to earn the good opinion of both our contemporaries and posterity. Some of these opportunities are as mundane as washing clothes in cold water or turning off computers when we're not using them. Others involve "high tech" devices such as state-of-the art CFLs, hybrid gas-electric vehicles, or instruments that detect and seal leaks in air ducts. All of them are actions you can take by your own choice and will. You do not need to wait for society to catch up with you before you act. You are a free agent, and you are free to move ahead of your friends and neighbors. You do not need Congress – or your state legislature or your city council – to pass a law or regulation to goose you into action. When it comes to choosing wisdom over waste, you are ready to be a leader.

RITUALS OF THE HOME

To cease to waste energy, homeowners and renters in the West can choose to put into practice an abundance of energy conservation

and efficiency measures. Listed below are some of the simple, low-cost-to-no-cost conservation options that will make you a leader and save you energy and money. (Appendix A lists further sources of information on way to save energy in the home.)

- Activate the power management features such as sleep mode on personal computers, and turn off computers, printers, and other electronic devices when not in use.
- Wash clothes in cold water rather than warm or hot water, and dry clothes using a clothesline – and sunlight and fresh air! – rather than a clothes dryer.
- Reduce shower time (and, for an invigorating change, reduce shower temperature).
- Make better use of natural lighting and ventilation, and use window shades, screens, or awnings to reduce solar heat gain in the summer (or think long-term and plant shade trees around your home, especially on the south and west sides).
- Unplug and get rid of old refrigerators or freezers that may have found an undeserved sanctuary in your basement or garage.

In some cases, such as junking an older refrigerator or freezer or washing clothes in cold water, the energy savings may be substantial. In other cases, the energy savings will be more modest. But given that these actions involve little or no up-front cost, the "return on investment" (or, in the case of the departing refrigerator or freezer, "disinvestment") is very high. The challenge upon

ENERGY TIPS IN SEVENTEEN SYLLABLES

We are keenly aware that lists can get tedious, and that the creative packaging of information can often reach a deeper part of the memory off limits to such relentless catalogs of good advice (and it is good advice). Clearly, the literary genre known as “lists of energy-saving tips” has not yet reached the transcendent levels of some of the literate world’s most celebrated written forms. Yet, with such a great deal of our future wellbeing resting upon it, there is no reason for such worthy material to remain confined to bulleted lists. In the world of poetry, the haiku form is the very model of efficiency. What better format for presenting the artistic side of energy efficiency and conservation?*

Live in an old house?
Insulate the attic first.
Just don’t live up there.

With frigid bedrooms
But a fire-lit central space
Families grow closer.

Live near your office,
Save on car and gasoline.
Then buy real estate.

Appliance shopping?
Insist on Energy Star,
Spend savings on beer.

Low flow shower heads
Display strengths in character.
More sex will follow.

* The author of this inspired series is, contrary to what readers might think, an accomplished environmental scientist.

you is to disavow energy waste, stick with the program, and make the changes in your behavior into regular habits, not fitful demonstrations of erratic good intentions.

You can achieve much greater and often longer-term energy savings through energy efficiency measures. These actions cost more initially, but they are sensible and rewarding moves, delivering considerable savings over time. Here are some primary home energy efficiency measures to apply to the homes of Westerners:

- Seal and insulate leaky air distribution ducts, seal air leaks in the building shell, and put more insulation in attics, walls, foundations, and crawl spaces – as many a parent has rightly said, you shouldn’t be paying to heat (or cool) the outdoors.
- Buy high-efficiency water heaters, furnaces, boilers, and evaporative cooling systems rather than mechanical compressor-based air conditioning units, when an older model needs to be replaced.
- Purchase Energy Star appliances, light fixtures, windows, and other products whenever the opportunity presents itself.
- Replace incandescent light bulbs with compact fluorescent lamps (CFLs).
- Replace older faucets, showerheads, and toilets with low-flow models.
- Make energy efficiency a selling point when it comes to your home (see sidebar on page 5). Ensure that all of these features are part of a new home by insisting that it is an Energy Star-certified home. And when buying an older home, get an energy audit done and upgrade energy efficiency where justified as you prepare to move in (or shortly after).

Some of these actions are easy for homeowners and renters to take on their own. Energy Star appliances and compact fluorescent lamps are readily available in stores throughout the Western states. Other actions, such as insulating walls or sealing and insulating air ducts, usually require a contractor to implement. Before you get into a major insulation or air sealing project, it might be a good

CRUNCHING THE NUMBERS

To give you a better sense of how much you gain by replacing your ordinary light bulbs with CFLs, we offer the following example.

A kilowatt-hour (kWh) is a unit of a energy. For households in the West, the price of electricity (including taxes) ranges from around \$0.08 to \$0.12 per kWh. We split the difference and plugged \$0.10 into the equations below, but if you actually know your rate you can use that to calculate with greater accuracy.⁵

Let’s assume you paid \$6 for the CFL at you local hardware store (buy a CFL six-pack and you can cut the cost to around \$2 or 3 per lamp). You will save \$36 in electricity over the lifetime of the CFL, six times the first cost. So your net savings will be about \$30. Used three hours per day on average, the CFL will save you

about \$5 per year – roughly an 80 percent annual return on your \$6 investment.

ELECTRICITY COST (FOR COST OF \$0.10 PER KWH)



Incandescent

$$(60 \text{ watts}) \times (8000 \text{ hours}) \times \left[\frac{\$0.10}{1000 \text{ watts} \cdot \text{hours}} \right] = \$48$$



CFL

$$(15 \text{ watts}) \times (8000 \text{ hours}) \times \left[\frac{\$0.10}{1000 \text{ watts} \cdot \text{hours}} \right] = \$12$$

ENERGY SAVINGS AND COST EFFECTIVENESS OF VARIOUS HOUSEHOLD ENERGY EFFICIENCY MEASURES IN WESTERN STATES*

	Energy Star Refrigerator	Energy Star clothes washer ⁺	Compact fluorescent lamp (CFL)	Programmable thermostat [□]	Attic Insulation	High efficiency furnace
Additional cost (\$)*	30-50	200-600	0-5	50-75	500-750	400-600
Electricity savings (kWh/yr)	100-200	500-800	30-75	100-500	0-250	—
Natural gas savings (therms/yr)	—	25-40	—	10-50	25-100	40-100
Water savings (gallons/yr)	—	3000-5000	—	—	—	—
Value of energy and water savings (\$/yr)	8-20	40-100	2.5-8	50-75	50-150	50-150
Simple payback period (yrs)	1.5-5	3-6	0-2.0	1	3-15	3-10
Lifetime (yrs)	18	15	8	20	30	25
Value of net lifetime savings (\$)	100-320	300-900	20-60	950-1425	750-3500	750-3250

Table Notes:

- * Range of values across the various Western states and climatic conditions.
- + An Energy Star clothes washer produces electricity savings if used in a home with an electric water heater and gas savings if used in a home with a gas water heater.

- Assumes the programmable thermostat is used in a home with both central air conditioning and space heating.
- ❖ Full first cost in the case of attic insulation and the programmable thermostat; additional first cost in the case of the Energy Star refrigerator and clothes washer, CFL, and high efficiency furnace.

idea to have an energy audit to help you target your actions for the greatest potential gains. Reputable energy auditors and contractors can be found in all major metropolitan areas, but might be harder to find in smaller towns or rural areas. Remember, as when you're dealing with any professional, to speak up and describe your circumstances, preferences, habits, and hopes to the auditor; don't wait for him or her to ask.

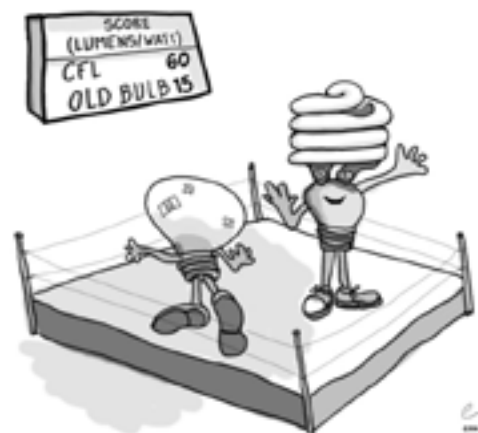
Energy efficiency measures are generally very cost-effective, as you can see in the table below. In five years or less in most cases, energy bill savings will pay back the initial cost for CFLs, programmable thermostats, or the extra first cost for buying an Energy Star appliance or high-efficiency furnace. For some people the payback comes in two years or less. In fact, over the lifetime of an energy efficiency measure, the first cost is usually paid back many times over. Thought of as an investment, energy efficiency pays an annual return of 20 percent to 200 percent – quite an astonishing gain compared to the returns on a savings account at the bank, a money market fund, or even a big venture in playing the stock market. And many utility companies offer rebates or other financial incentives that make energy efficiency investments even more cost-effective for consumers (check with your utility company about rebates in your area).

We have before us plenty of small-scale, comparatively modest choices that in aggregate would have a measurable impact in reducing our regional energy use. In contrast to the party line of defeatism by which the choices of individuals register as insignificant in the big scale of energy, modifications in your personal daily habits can make a difference.

Upgrading to a high efficiency furnace or water heater is a quiet act of heroism, overflowing with virtue but earning little acclaim. We admire modesty as a virtue, but we believe utterly in the principle that people who do the right thing in avoiding the waste of energy should get a lot more admiration and applause than they are currently getting. We stand by, ready to admire and applaud.

THE GLORY, DRAMA, JOY, AND SENSUALITY OF THE COMPACT FLUORESCENT LAMP

Speaking of small actions that can add up to big savings, there is no better example than the compact fluorescent lamp (CFL). CFLs have been around since the 1980s. After more than two decades of refinement the current generation boasts high-performance varieties designed to fit most lighting fixtures and nearly every lighting need you may have. Although CFLs can cost five to ten times more than common incandescent bulbs, they last roughly ten to fifteen times longer (typically 6000 to 10,000 hours) than incandescents and use significantly less electricity to produce the same amount of light. The savings on your energy bill can amount to between \$30 and \$75 over the life of each CFL you install. With numbers like that, it does not take much quality time with a calculator to recognize that paying the higher up-front price for CFLs is the money-saving strategy.⁸ As you go around your home replacing the light bulbs, just think about what you might do with the savings – ice cream sundaes for the entire family, new clothes, a night at the movies for you and a friend, dinner for two at the neighborhood restaurant. Every month! Installing energy-efficient CFLs is like giving yourself a raise without having to plead with the boss.



TRY ME AGAIN

Though it is very likely that she had something else in mind, Trisha Yearwood's poignant song "Try Me Again" seems to have been written as the theme song for the CFL. If you tried, in the past, to have a loving relationship with fluorescent lights, and the relationship turned bitter and came to an end, then imagine a choir of brightly lit bulbs singing this song to you:

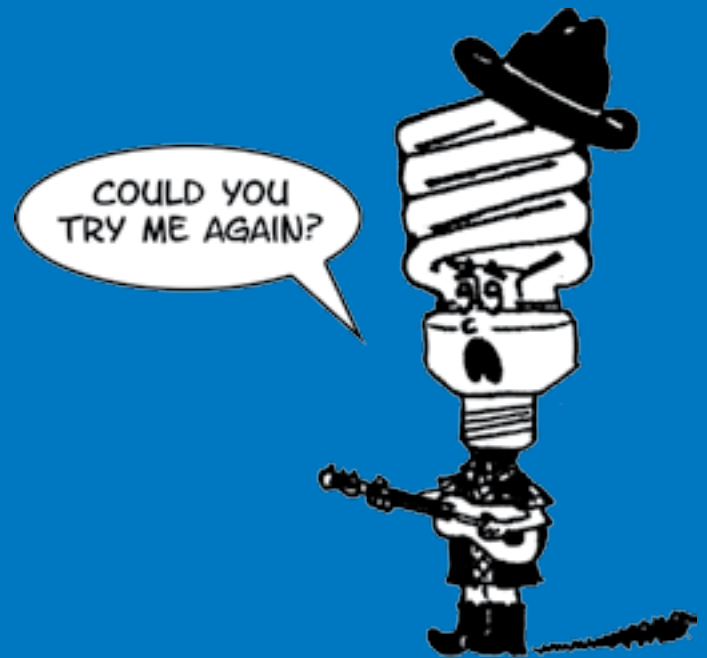
Lately, I ain't been feelin' right
And I don't know the cure, . . .
Still I can't keep from wonderin'
If I still figure in your life

Could you take me back
And try me, try me again?
Could you try me again?

And yet, CFLs got off to a rough start in life and still struggle with a bad reputation. For people of a certain age, the words "fluorescent light" conjure up a maddening flicker, a sickly bluish cast, and an irritating buzzing sound. But with CFLs it is time to let bygones be bygones, to forgive and forget. Today's CFLs have been through a spectacular reformation. They have faced up to and conquered their earlier flaws. They have earned a second chance from consumers who had their reasons for becoming vexed and giving up on them in years past. With today's CFLs, the color is good, the quality of light is easier on the eyes, and the humming and flickering are now things of the past. In every way, the sinuous shaping of the CFL makes an incandescent bulb look clunky and out of shape by comparison.

Do not give up on your CFLs, despite bad memories you may have of fluorescent lighting's early years. Try them again. And yet, to earn your trust, we must forswear cheerleading and boosting, and acknowledge that CFLs still present a few disadvantages:

- It is increasingly rare, but occasionally you may discover that certain CFLs are a bit larger than conventional incandescents and will not fit in a particular light fixture.
- Most CFLs cannot be used with a dimmer switch. You can buy a dimmable CFL, but you will pay more for it.
- CFLs are not compatible with all electronic timers.
- Some CFLs need time to warm up and can take 30 seconds or more to reach their maximum brightness (though we are hard-put to imagine many domestic activities in which a desired outcome is lost because of this delay).
- The light output of some CFLs is reduced when used outdoors in colder temperatures. You can get CFLs specifically designed for outside use; just be sure to check the package so you get the right light.



- CFLs are not yet available at all stores (but enough dismayed consumers declaring their dismay and disappointment – and the intensity of their desire to spend money – could change that).

So CFLs have two things in common with human beings: they, like we, are not perfect, and they, like we, deserve forgiveness and a second chance. Unlike human beings, CFLs have improved dramatically in the last couple of decades, giving them a considerable advantage over human beings when it comes to earning the right to a second chance.

And in case you are still in doubt, consider this: Wal-Mart, the largest retailer in the world, has jumped on the CFL bandwagon. On Nov. 29, 2006, Wal-Mart announced a campaign to sell 100 million CFLs by the end of 2007. In announcing the campaign, Wal-Mart vice president Andy Ruben stated, "Over the life of those bulbs, \$3 billion can be saved in electrical costs and 20 million metric tons of greenhouse gases can be prevented from entering the atmosphere. This change is comparable to taking 700,000 cars off the road, or powering 450,000 single-family homes."⁹ When Wal-Mart sees the light, you're really out of excuses.

An Invitation. As we have now said repetitively, these are not your parents' fluorescent lights – today's compact fluorescent lamps are far better devices than their predecessors of a decade or two ago. It is our assumption that they have been around long enough, with sufficient improvement of light quality, that they may now even be considered capable of creating and maintaining a romantic atmosphere. Among the readers of this report must be a significant number of individuals who have fallen in love with their life partners while gazing upon their beloved, bathed in the warm glow of CFL light. And, with a little less intensity, we imagine that many readers have attended wonderful parties and dinners, and taken part in life-changing conversations and encounters, in spaces brightened by CFLs. To make the point of the wonderful improvement of CFL light quality, we invite your testimony on episodes of warm human congeniality, affection, and bonding that have been hosted and made possible by the warm light cast by a new-style CFL. Please send brief but poignant narratives to info@swenergy.org or info@centerwest.org.



COMPETITIVE CONSERVATION

TAKING ACTION IN THE WORKPLACE

The appeal to reason is not limited to the confines of our homes. Companies can improve their bottom line by increasing energy efficiency and reduce energy waste. And public institutions like schools and government facilities can expand their basic services by slashing the utility costs line in their budgets through energy efficiency and conservation actions.

There are a plethora of ways for businesses and governmental agencies to save energy through adoption of cost-effective energy efficiency measures, including but certainly not limited to:

- High-efficiency fluorescent lamps and other efficient lighting devices.
- Better windows, reflective roofing materials, and other measures that reduce the cooling load in a commercial building or factory.
- High-efficiency air conditioning equipment.
- Refrigeration equipment with more efficient compressors, better heat exchangers, and better controls.
- Energy management and control systems that cut down unnecessary lighting, heating, and cooling throughout a building or factory.
- Better design and control of pumping, compressed air, conveyor, and other motor-driven systems.
- State-of-the-art technologies for manufacturing

chemicals, cement, metal products, and electronic devices, as well as for mining and food processing.

As you have heard from us several times before, increasing energy efficiency usually requires an up-front cost, but the energy savings will pay back this cost in two or three years on average. And since the return on investment is typically 30 percent or greater, energy efficiency measures are a very good investment for businesses. Energy efficiency in the workplace is not just about efficient lighting and air conditioning. There are a variety of cost-effective techniques for reducing energy use in high-tech and normally energy-intensive laboratories, data centers, and clean rooms, for example. In addition to saving energy, companies that perform more efficiently tend to enjoy other benefits such as improved control of operations and processes, less down-time, and reduced operating costs.¹⁰

Saving energy brings a host of other benefits which may outweigh the value of the energy savings.¹¹ For manufacturing firms, increasing energy efficiency through better lighting or improved control of industrial equipment often provides gains in productivity worth more than the energy savings. Similar results can occur in the public sector. For example, a review of thirty energy-efficient “green” schools built between 2001 and 2006 found that the addition of energy efficiency and other resource-conserving measures added about \$3 per square foot to the initial cost. However, thanks to the 33 percent average annual energy savings produced by these measures, the schools are expected to save \$9 per square foot over a twenty-year period. But the schools will also experience less illness among student and teacher due to improved air quality and better temperature control. The more congenial classroom space is expected to reduce absenteeism and

enhance learning. These non-energy benefits are estimated to be worth \$65 per square foot on average.¹² Not too shabby!

Many businesses and public sector institutions in the West have seized the opportunity to enhance their bottom line by adopting energy efficiency measures and practices. Here are some examples spanning a variety of sectors and states.¹³

University of Colorado: Beyond NIMBYism – Doing It in Our Own Backyard. Impressive work in energy efficiency and conservation can be going on right under our noses, improving the world despite our inattention. In recent years, the University of Colorado at Boulder has taken remarkably effective steps to reduce campus energy use even as campus enrollment and research activity have climbed. As impressive as these achievements are, we knew little about them until we began work on this report. The Campus Resource Conservation Program, launched in 2002, combined public education – targeted at making adjustments in behavior – and small-to-modest investments in energy-saving devices. A spirited University of Colorado official named Moe Tabrizi has shown great creativity and endless dedication in finding places on campus where energy was being wasted and in finding a remedy to that waste.

The results are impressive. University of Colorado energy use has declined significantly over the past four years, and is now well below projections made before this program took effect. In fiscal year 2004-05 alone, the campus reduced its electricity use by nearly 5 percent per square foot, avoiding \$670,000 in energy costs. Furthermore, electricity use in 2004-05 was cut about 15 percent from previous projections, thanks to efficiency projects undertaken during 2000-05. Inaugurated in 2006, the new 180,000 square foot Wolf Law School building has achieved LEED gold certification, meaning it is highly energy and resource efficient (see sidebar on page 41). Moreover, the University’s Blueprint for a Green Campus has established a goal of reshaping its energy use to eliminate any contribution to global warming by 2025.¹⁴

Kennecott Copper: Transforming an Old School Mining Company to a Progressive Land Developer. Kennecott Utah Copper (formerly Utah Copper Co.) has been operating the Bingham mine, the world’s largest open pit copper mine, for over a century. Gigantic shovels now scoop up rock at nearly 100 tons a bite. In addition to copper, the rock contains gold, silver, and molybdenum in quantities large enough to extract and process at a profit. The hole in the ground at Bingham is now so large – two-and-a-half miles across and three-quarters of a mile deep – that it is one of two man-made structures that can be seen by astronauts circling the globe (the other being the Great Wall of China).

Mining is a polluting as well as a profitable endeavor. After decades of operations harmful to the environment, Kennecott is now engaged in environmental restoration – cleaning up older smelter operations, removing mining wastes, restoring disturbed land, and treating contaminated groundwater. Kennecott is also transforming itself into a more diversified business that takes energy efficiency and sustainable development seriously.

In addition to its mining operation, Kennecott owns 93,000 acres of land on the western side of the Salt Lake Valley. Kennecott Land is starting to develop this land with an eye towards long-term

sustainability. Kennecott is requiring home builders to construct only Energy Star (or better) homes in Daybreak, the first community under development in this vast area. Other environmentally-friendly features include:

- Parks and open space are being woven into developed areas,
- Residential and commercial areas are within walking distance of each other, making the community pedestrian-friendly,
- Construction waste is being recycled, and
- Storm water and snow melt runoff are captured and reused.

Last but not least, Kennecott is advocating construction of public transit (light rail lines) from downtown Salt Lake City to Daybreak and its future new communities.

Kennecott has discovered that conserving energy and being environmentally responsible can also be good for the company’s bottom line. As of September 2006 there was a waiting list for new homes in Daybreak.¹⁵

Silver Creek School: Reading, Writing, and Saving Energy. Open since August 2001, Silver Creek Middle/High School is home to 1200 students and staff in Longmont, Colorado. Designed from the beginning with energy efficiency in mind, this 180,000 square foot facility features floor-to-ceiling energy-efficient windows that maximize daylighting opportunities. Individual classrooms are equipped with sensors and photocells that automatically sense occupancy and light levels, and use electricity for lighting only when necessary. The school’s cooling system is designed to allow flexible operation and to prevent the need to run a large chiller when only a portion of the building is occupied, typically during summer months. Chilled air is provided by multiple rooftop units, allowing cooling to be done by building zone.

These design strategies provide a comfortable climate for students and teachers, creating a pleasant and effective learning environment while reducing energy and maintenance expenses. In its first year of operation, Silver Creek’s energy costs were \$0.69 per square foot, approximately 30 percent less than typical school facilities in the region.

The approach taken at Silver Creek Middle/High School is an extension of St. Vrain Valley School District’s commitment to energy efficiency and conservation. The district’s energy management and education program initially focused on conservation, primarily through intensive education campaigns. Since 1997, attention has shifted to retrofitting older schools through a performance contract with an energy service company (ESCO), in addition to constructing highly efficient new schools. This dual approach – investment strategies that focus on energy efficiency improvement and education campaigns aimed at energy conservation – has produced a \$4.1 million in energy savings districtwide since the program’s inception in 1993.¹⁶

University of New Mexico Hospital: Treating a Sick Energy Bill. People who run hospitals might be forgiven for thinking more

about the health of their patients than the well-being of their energy systems. But the University of New Mexico Hospital offers a good example of the compatibility of these concerns. The hospital, first constructed in 1951, today consumes only 23 kWh and 110,000 Btu of natural gas per square foot. This level of energy consumption compares favorably to other hospitals in the Albuquerque area.

The hospital's managers collaborated with Rebuild New Mexico, a public-private partnership focused on increasing energy efficiency in the state, to identify steps in energy efficiency that the hospital could take. They identified nine measures, including installing capturing waste heat from the boilers, installing variable frequency motor drives on chilled storage pumps, replacing all T12 fluorescent lamps and magnetic ballasts with T8 lamps and electronic ballasts, replacing incandescent lamps with CFLs, and adding occupancy sensors in intermittent-use areas.

By 2002, the hospital had implemented major upgrades to its air exchange systems, and had completed a facilitywide lighting retrofit. The cost for installing these two projects was \$450,000, but the investment cut energy costs by nearly \$320,000 per year. This represents a 70 percent annual return on investment and a payback period of just seventeen months.¹⁷

Chas Roberts Air Conditioning: Growing the Family Business Through Energy Efficiency. Still not convinced that energy efficiency sells? Read on. Founded in 1942, Chas Roberts Air Conditioning has grown to become the largest residential heating, ventilating, and air conditioning installer in Arizona. How big are they? Their crews completed almost 32,000 new residential installations in 2002 – about 75 percent of all new air conditioners installed in Phoenix and close to 50 percent in Tucson.

But Chas Roberts isn't just about big. They're also about better – and by better, we mean air conditioners that are designed as a system and properly installed, time after time, to make them as energy-efficient as possible. Designers use computer software to conduct room-by-room cooling load analyses to choose proper air flows, duct sizes, and specify the appropriate air handler for the job. Careful attention is paid to duct design and sealing. Larger-than-normal diameter ducts are installed in order to keep air velocities and static pressures down, thereby ensuring that the ducts are more efficient at transferring energy to the conditioned space and that fan motors consume less electricity. All of these techniques are rather unique in an industry not known for attracting America's "best and brightest."

Here's the connection to profitability: Chas Roberts' whole-house approach to the HVAC system – and the system performance, energy savings, and occupant comfort that results – has served to differentiate the company from competitors and establish it as the premier HVAC installer in Arizona. This drives more and more business to the company.

So is air conditioning system efficiency and performance just a tool for business growth? For Chas Roberts, not quite. "It's the right thing to do – it makes houses work better. We have fewer customer complaints and fewer warranty calls," says Jim Colgan, the company's Vice President for Sales and Engineering. "There's nothing better than a happy homeowner."¹⁸

ENERGY EFFICIENCY AND WATER CONSERVATION

Some energy-efficient products cut water use directly. For example, energy-efficient Energy Star clothes washers and dishwashers use less water and less energy. Energy Star washers in particular save about fifteen gallons of water per laundry load, or about 5400 gallons of water per washer per year. Low-flow showers and faucets also use less energy and water too.

Good energy efficiency practices also save water. Conventional fossil-fuel-based power plants consume a substantial amount of water for power generation, primarily in their cooling systems. A typical coal-fired power plant in the West consumes about 0.67 gallons of water per kWh produced, while a typical natural gas-fired combined cycle power plant consumes about 0.33 gallons of water per kWh produced.⁶ Thus, cutting electricity use through any type of efficiency improvement also leads to water savings in power generation.

Direct and indirect savings in water can add up. The Western Governors' Association Energy Efficiency Task Force estimated that reducing electricity use in Western states 20 percent by 2020 would save 260 billion gallons of water per year by 2020, equivalent to the water use of approximately 1.4 million households.⁷



SINGING THE PRAISES OF ENERGY EFFICIENCY

We have repeated this refrain – “In energy efficiency, the money you save will soon pay back your up-front cost for more efficient technology” – so often that it seems time to literally turn it into a refrain and set our message to music. Some of our tunefully talented friends at the Center of the American West have composed the lyrics below to the music of “My Favorite Things” from *The Sound of Music* soundtrack. With any luck, this new spin on an old favorite will get stuck in your head.*

My Favorite Initial Investments That Pay Off Quite Soon

Energy savings from actions and choices —
We'll share them with you as we warm up our voices.
If you will take the advice in this tune,
Initial investments will pay off quite soon!

Blue Honda Hybrids so fast and efficient,
Compact fluorescents much more than sufficient,
Appliances rated by Energy Star,
Prove to the neighbors how savvy you are.

Wallets fatten, planet profits,
when you cut your use,
Just simply remember our favorite things
and then you will need— less juice

Families together 'round cozy fireplaces,
No point in heating unoccupied spaces.
Use a swamp cooler in place of A.C.
Clever investments that save energy.

Save your money, feel self-righteous,
help the planet stay cool.
Just simply remember our favorite things
and then you will burn— less fuel

Hot water in the washer, detergents don't need it,
Program your thermostat, just start to heed it,
Long underwear 'neath your Wranglers will do,
Energy savings will come back to you.

Change the lightbulbs,
Bathe together,
Turn the heat down low,
Jump under the blankets and have a
good time,
While watching your say— vings grow!

* If these lyrics do get stuck in your head, you have the creative trio of Roni Ires, Sandra Laurson, and Jack Vernon to thank. We certainly want to thank them for sharing their talents

Freus: Making the Prius of Household Air Conditioners. Freus is a relatively new air conditioner company headquartered in El Paso, Texas. The Freus product uses evaporative cooling to cool the outdoor (heat-releasing) coil of a central air conditioning system. Water is sprayed on the outdoor coil, which leads to much higher cooling efficiency compared to a conventional air-cooled system. The Freus can be twice efficient (ie, use half as much electricity) as a conventional air conditioner at the high temperatures (95 to 110°F) experienced during hot summer days in the desert southwest. Some additional water is used at home, but the unit's increased energy efficiency means that water is saved at the power plant (see the sidebar on previous page).

Freus is setting up distributors and certified installers throughout the Southwest region. Sales are especially strong in the Las Vegas area where the local utility (Nevada Power Company) offers a \$1000 rebate to its customers who purchase a Freus unit. As with other energy efficiency measures promoted by utilities, the cost to the utility for reducing power demand is well below the cost of supplying power from a new power plant.

National minimum efficiency standards on central air conditioners increased 30 percent, from minimum Seasonal Energy Efficiency Rating (SEER) of ten to a minimum of thirteen, in early 2006. This ensures that all new air conditioners will be at least moderately energy efficient. But new products like the Freus keep pushing the envelope on what can be done to save energy in our homes and workplaces.¹⁹

* * * * *

These case studies demonstrate that energy efficiency and conservation are already occurring in numerous homes and businesses in the West. Might they be going on in your own backyard too? Ask the energy or facility manager in the building or institution where you work which of the measures listed above have been implemented, and what other steps have been taken to improve energy efficiency and reduce energy waste. If you discover that significant actions have been taken in your workplace, we are interested in hearing about it. Let us know, via email to info@swenergy.org and info@centerwest.org, if you have a person like Moe Tabrizi hard at work cutting energy waste in your place of employment. And if your company or public institution hasn't gotten “energy smart,” maybe you can help get the ball rolling! Let the owner or manager of your business know that there is good money to be made by aggressively seeking and pursuing cost-effective energy efficiency measures. (For resources on what a business can do to cut its energy waste and increase its profits, see Appendix A.)

ENERGY EFFICIENCY

A RESOURCE THAT KEEPS GROWING

Energy efficiency measures and strategies are not static. Researchers and businesses are continuously testing and developing new techniques for providing heating, cooling, lighting, and other energy services more efficiently. For example, researchers have discovered practical ways of detecting and sealing leaks in the air ducts buried in the wall and ceilings of existing homes and commercial buildings. Contractors are now able to spray an aerosol sealing material into an existing duct system, thereby sealing gaps and holes that otherwise waste energy, reduce occupant comfort, and increase heating and cooling bills.

Other new and emerging technologies for increasing the efficiency of energy use and eliminating energy waste include:²⁰

- Variable speed appliance motors and compressors
- New high efficiency “Super T8” fluorescent lighting systems
- Ceramic metal halide lamps for retail and other color-sensitive light applications
- High-efficiency power supplies that reduce the standby power consumption of TVs, personal computers, and other electronic devices
- More efficient computer components, computers, and servers
- Condensing gas water heaters that extract the maximum amount of heat from combusted fuel
- Heat pump-based electric water heaters that are

PURSUING ZERO ENERGY HOMES

The U.S. Department of Energy’s Building Technologies Program defines a net zero energy building as “a residential or commercial building with greatly reduced needs for energy through efficiency gains, with the balance of energy needs supplied by renewable technologies.”⁸ Zero energy homes (ZEHs) boast a tightly constructed and well-insulated building envelope, highly efficient space heating and cooling systems, “spectrally selective” windows that keep heat out during the summer and keep heat in during the winter, compact fluorescent lighting, hot water heaters that warm water only when the tap is turned on, and rooftop solar photovoltaic systems. By early 2006, the DOE’s Building America Project had integrated such energy efficiency and renewable energy measures into 500 homes and had plans to do the same for 2000 more.

Although adding special features to increase a home’s energy efficiency and conservation can cost up to \$25,000, the hefty extra first cost can be justified by the economic benefits to both the resident and the local utility. The homeowner’s energy bills are cut by 50 percent or more. For example, Nicolas and Loan Gatai, who live in a three-bedroom ZEH in Premier Gardens just outside Sacramento, spent a whopping \$75 total on their energy bill over a ten month period.¹⁰ In addition, peak power demand of the home is greatly reduced during hot days in the summer, thereby helping the utility avoid building costly new power plants. In some cases, a ZEH with its rooftop photovoltaic panels can be a net power generator during a hot summer afternoon. As a result, the federal government offers income tax breaks and some utility companies offer rebates to encourage the construction and purchase of ZEHs.

LED LIGHTING COMES HOME

What do some traffic lights, exit signs, and those bright holiday lights you may have seen this year all have in common? Light emitting diodes, of course! LED lights use high-tech electronic circuitry to produce visible light rather than old-fashioned filaments or the gas

discharge systems used in fluorescent lamps. LED lighting systems are becoming more and more common all around the margins of modern life. And with the advantages they offer, as white LEDs improve in performance and cost these next-generation lights are poised to change the way we see our homes.⁹

two or three times more efficient than standard electric resistance water heaters

- Advanced indirect-direct evaporative cooling systems
- Electrochromic glazing that permits changes in a window's light transmittance
- Highly reflective roofing shingles or coatings to reduce summer heat gain
- New technologies and design strategies for reducing electricity consumption in energy-intensive data centers

- Light emitting diode (LED) lamps that emit white light (see sidebar above)

- High efficiency ventilation systems for laboratories and cleanrooms

- Key card systems to reduce energy consumption when hotel or motel rooms are unoccupied

And more advances are always on the horizon. In short, energy efficiency is based on human ingenuity, technological innovation, and competitive forces in the marketplace. Energy savings resulting from efficiency improvements, unlike energy supply from fossil fuels such as petroleum and natural gas, are an energy resource that keeps growing!



ENERGY CONSUMPTION IN THE WEST

HOW DO WE STACK UP?

We return to the cheerful message that we are off to a good start on energy efficiency and conservation, and with the happy news that the reputations of Westerners have been undeservedly besmirched. Westerners are often characterized as a profligate people, resisting regulation and celebrating our right to make unrestrained use of the earth's bounty. But statistics reveal a more complex and more flattering portrait.

A profligate and wasteful people? Westerners typically use less energy in our homes than do residents in other regions. In 2001 (this is the most recent data available), Westerners consumed 70 million Btu per household, while residents of the Northeast used 107 million Btu, the Midwest 117 million Btu, and the South 83 million Btu. We also used less energy per square foot than residents of the Northeast, the Midwest, or the South. Since 1980,

HOW MUCH IS A MILLION BTU?

A Btu (or British thermal unit) is a unit of energy, specifically the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit. An MBtu is a million Btus. A cubic foot of natural gas contains about 1030 Btus, and homes in Colorado consume about 68,000 cubic feet of natural gas or 70 MBtu per year on average for space heating, water heating, and other purposes. A gallon of gasoline contains about 125,000 Btus. Homes in Colorado consume about 680 gallons of gasoline

or 85 MBtu per year on average for transportation. A kilowatt-hour (kWh) of electricity requires about 10,800 Btus of energy to produce and deliver, including the losses in generation, transmission and distribution. Homes in Colorado consume about 8750 kWh of electricity or 95 MBtu per year for powering lights, appliances, etc. Thus, in total homes in Colorado consume about 250 MBtu of energy on average. And considering energy use by all western states, Colorado is somewhere in the middle – some states such as Utah and Montana consume more energy per household, others such as Arizona and California consume less.

we've consumed less electricity, less natural gas, and less oil per household than other regions, and our energy use per household has actually been on the decline over that period of time.²¹ And we compare favorably in terms of our per capita energy consumption – most of the Western states use less energy per capita than the national average.²²

But there is an element of seasonality in this story of regional performance. The West contains a good share of the nation's Sun Belt. In states like Arizona, New Mexico, and Nevada, average summer temperatures often exceed 100 degrees. Winter temperatures are mild, a characteristic that has made many Western states an attractive option for homeowners in flight from frigid temperatures and heavy winter snows. Less energy is needed for space heating in the West as a whole. But the summers in the West present a distinctive challenge. Directly tied to the population boom and, indeed, playing a key role in making it possible, the West has seen a dramatic increase in domestic air conditioning. Regionally, the number of homes with air conditioning has nearly doubled since 1978. And yet Westerners are still less dependent on mechanically cooled air than folks in other parts of the nation. In 2001 (the most recent data available), only 51 percent of homes in the mountain states – what the census defines as Arizona, Colorado,

Idaho, New Mexico, Nevada, Utah, Wyoming, and Montana – had air conditioning. In the Pacific region, the number is even lower. Only 44 percent of homes in California, Oregon, Washington, Hawaii, and Alaska combined had air conditioning units.

Westerners as a whole are not as dependent on air conditioning as our counterparts in other regions. And because air conditioning is the single most electricity-intensive appliance in our homes, these numbers are particularly significant. Nationwide, nearly 15 percent of residential electricity use goes to keeping ourselves cool, but also, in pursuit of that goal, to keeping ourselves dry. Air conditioners not only lower temperatures, they remove moisture from the air. While the West may be on the hot side, the region's dry air means that many Westerners can stay relatively comfortable without relying heavily on mechanically cooled air.²³

While the region's comparatively modest use of energy may come as a welcome surprise, we should note that energy use per household varies considerably across the Western states, as shown in the table below. The wide range of climates and differences in other important factors such as energy prices and energy conservation efforts join in with the impact of various personal lifestyle choices to explain this variation.

PERCENTAGE OF HOMES WITH CENTRAL OR ROOM AIR CONDITIONING BY REGION¹¹



ENERGY USE PER HOUSEHOLD IN WESTERN STATES (2004)¹²

	Natural Gas Use (cubic feet per year)	Electricity Use (kWh per year)	Gasoline Consumption (gallons per year)*
Arizona	17,972	13,604	539
California	43,348	6969	857
Colorado	67,791	8742	679
Idaho	40,767	14,417	975
Montana	36,305	10,956	1169
Nevada	41,657	12,169	733
New Mexico	48,096	7938	948
Oregon	27,466	12,831	793
Utah	79,762	9653	1122
Washington	29,712	13,595	839
Wyoming	60,947	11,402	1178

IN PRAISE OF MODERN EVAPORATIVE COOLING

IT'S NOT YOUR FATHER'S SWAMP COOLER

“Beating the heat” has been on the mind of many since the early days of civilized society, and evaporative cooling – air blowing over or through water – is one of the oldest cooling techniques known to mankind.

Ancient Egyptians were probably the first to discover that dry, hot air became cool as it blew over water-filled pots or through water-dampened mats. Frescoes from 2500 BC depict slaves fanning pots of water with lotus leaves, cooling the rooms of Egyptian pharaohs. Thousands of years ago Persians placed shafts on the roofs of their buildings to catch wind, which was then passed through water to cool the air as it entered the structure. Closer to our own time, American homes, particularly those in the South, were once designed with screened-in porches for summertime sleeping. Damp sheets would be hung over the screens to cool the night breezes and bring relief on hot summer nights.

Commercial evaporative cooling arrived on the scene in the 1930s. Two professors at the University of Arizona published plans for a swamp cooler, as it was called, that could be made with an electric fan and a garden hose. An industry was born: By 1939, Phoenix could boast that it was the swamp cooler capital of the world, with five companies manufacturing the devices. And the technology caught on – by the 1950s, 90 percent of Arizona homes had swamp coolers to battle the western summer heat.

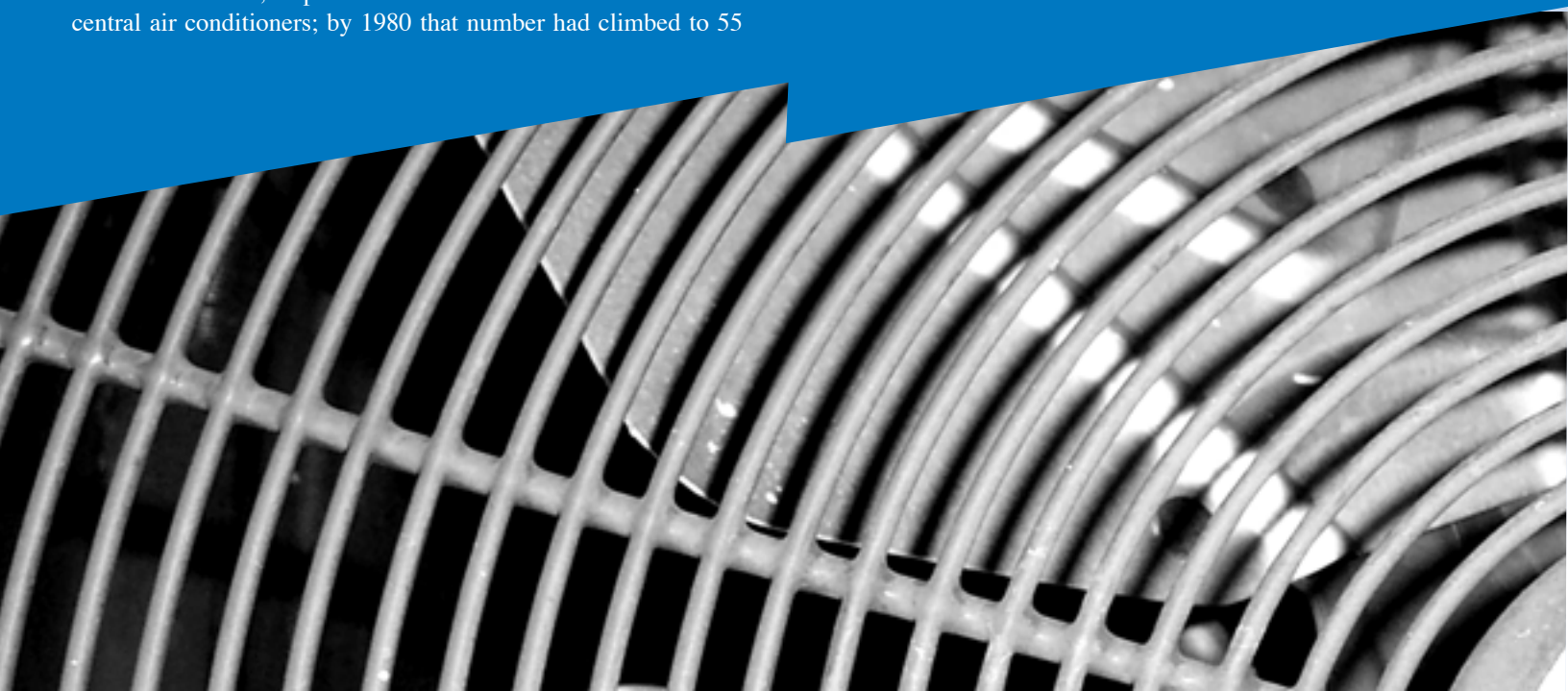
Mechanical air conditioning systems using a compressor and refrigerant, a more sophisticated but also more electricity-intensive cooling technology, were first developed by Willis Carrier in the early 1900s. These systems were more compact and required less maintenance than evaporative coolers. Also, they did not consume water directly; however, water is consumed in the thermal power plants generating the electricity that powers an air conditioner. Window-based air conditioning units, marketed as devices “for the millions, not just for millionaires,” became popular following World War II. Whole-house central air conditioning systems later took hold. In 1960, 12 percent of American homes had window or central air conditioners; by 1980 that number had climbed to 55

percent, and by 2001 it was 78 percent.

With its climate ideally-suited for evaporative cooling – low humidity and large day/night temperature swings – the West has not totally abandoned evaporative cooling in favor of mechanical air conditioning. In 2001, in Utah homes with some form of cooling, 29 percent used evaporative cooling and 34 percent central air conditioning systems. Also in 2001, 28 percent of the single family residences along Colorado’s Front Range used evaporative cooling, compared to 27 percent with central air conditioning. But the trend in new home construction and residential retrofit in the West is strongly towards compressor-based air conditioning and away from evaporative cooling.

Evaporative cooling is again of interest in the West because of its potential to reduce electricity consumption and peak power demand during hot summer days. Modern evaporative cooling systems can use 80 to 90 percent less electricity for cooling compared to standard air conditioning systems. Today’s evaporative coolers also overcome many of the stigmas attached to the old technology – newer units are more compact, they can be placed on the side of a house or on the ground, they require less maintenance, and they are less water-intensive. How much can be saved? SWEEP estimates that a typical resident of the West could save anywhere from \$100 to \$500 per year on cooling costs by using modern evaporative cooling over conventional air conditioning.¹³

Much work needs to be done to change the public’s perception of evaporative cooling – and thus transform the cooling market – but a combination of incentive programs from utilities, demonstration projects for builders and consumers, and education and promotion campaigns would all be steps in the right direction. In fact two major electric utilities – Xcel Energy in Colorado and Rocky Mountain Power in Utah – offer financial incentives to their customers who purchase evaporative coolers rather than standard mechanical air conditioners.





THE FUTURE OF THE WEST AND ENERGY

THE BIG PICTURE

This is not the first time that Westerners have faced big decisions about natural resources and their use. For much of the last two centuries, many occupants of the American West devoted great effort to finding natural resources, extracting those resources, making them mobile and transportable, and integrating them into a national and global economy. In a region so transformed by resource extraction, the twenty-first century presents an extraordinary challenge: there are powerful reasons to throw this vehicle into reverse or at least into neutral – to moderate growth, to save energy, and thereby to slow the rate of coal and natural gas extraction. This may well seem like a 180-degree shift in the trajectory of Western American history. But in fact this region has a rich historical tradition of people getting by, with some considerable degree of social and economic health, on limited resources. In the nineteenth century, American Indian people, as well as early non-Indian settlers, led lives of quality and meaning while relying primarily on human and animal muscle as their source of energy.

On the big scale of Western history, resource extraction and resource conservation share the stage. A hundred years ago, the West was the most important arena for the rise of a national enthusiasm for conservation, for reserving resources for future use and planning for the long haul. This attempt to think in the long term has, itself, a history more than a century in length, and the efforts of our ancestors and predecessors in this region – to leave something for future generations! – add up to a valuable inheritance for today's Westerners.

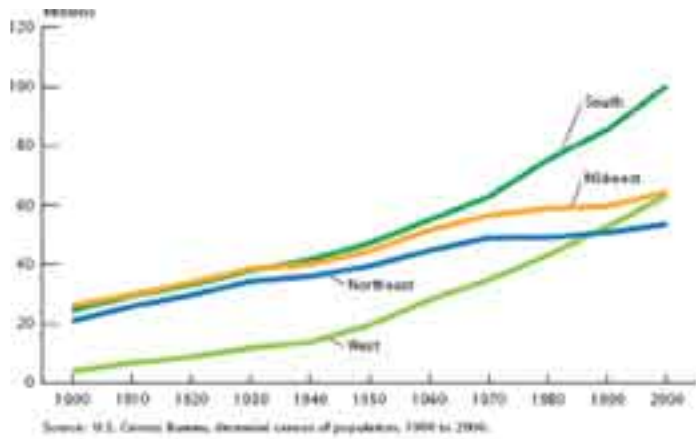
As we face the challenges of the twenty-first century and seek ways to reduce the waste of energy, we draw upon a rich regional history of using ingenuity and good will to fill in when natural resources are scarce.

But before we give ourselves a standing ovation to celebrate our collective regional wisdom when it comes to energy, we should look ahead. Can we maintain and even improve on our promising start? This will take some effort.

The West – particularly the area made up of New Mexico, Arizona, Nevada, Colorado, Utah, Wyoming, Montana, and Idaho – is the fastest growing region in the country, both in terms of population and in terms of demand for energy, particularly electricity. In every decade of the twentieth century, the population of the West grew faster than that of any other region in the country. Of course, for most of that time, the West was also the region with the smallest proportion of the nation's population; starting with a comparatively small base number makes it considerably easier to achieve the highest growth rate. As recently as 1950, Westerners accounted for only 13 percent of the total population of the United States, well behind the next largest region – the Northeast. But that trend has changed in recent years. By 1990, the West had moved out of the population basement and surpassed the Northeast, and as we move into the twenty-first century it is poised to overtake the Midwest as well. When it does, the West will be the nation's second most populous region, trailing only the South.²⁴

Between 1990 and 2000, the population of the West as a whole grew 20 percent, gaining an additional 10.4 million residents.²⁵ The five fastest growing states in the nation in the last decade of the twentieth century were Nevada, Arizona, Colorado, Utah, and Idaho in that order. Colorado, Utah, and Idaho all had population growth rates right around 30 percent. Arizona's population increased 40 percent, and Nevada's population grew by a jaw-dropping 66 percent in one decade alone (again, it helps to start with a small base population).²⁶

REGIONAL POPULATION GROWTH, 1900 - 2000¹⁴



The West's tremendous population growth since 1990 has meant more home construction, more water use, more cars on expanding highway systems, and more computers, televisions, and other electronic gadgets humming along twenty-four hours a day.*

As the population has increased, the West has experienced a surge in demand for electricity. Between 1990 and 2003, regional demand for electricity grew by 1.7 percent per year on average.²⁷ Of course, growth varied considerably from state to state, since states with exceptionally high population growth rates also topped the list as the states with the biggest increases in demand for electricity. Nevada's electricity use climbed nearly 70 percent between 1990 and 2000.²⁸ Electricity use in Arizona, Colorado, and Utah increased by 40 percent or more during the same period.²⁹

If the West lives up to the projections, it will continue to be the fastest growing region in the nation, with states like Nevada and Arizona leading the way.³⁰ The US Census Bureau projects that the West will be home to about one quarter of the nation's residents by 2030, and that the West will experience the most significant percent change in population of any region between 2000 and

2030.³¹ The Census Bureau's forecasters do not stand alone in this expectation. In another Center of the American West report, *Western Futures*, we project that the population of the West will increase by 65 percent by 2040, adding an additional 39.8 million residents to the region.³²

Considering a range of scenarios, experts estimate that regional growth in electricity demand will average somewhere between 0.5 and 1.9 percent per year between 2003 and 2020.³³ These may sound like small increments hardly worth fussing over, but anyone who has ever had a mortgage can easily appreciate how quickly small percentages grow into hefty totals as they compound year after year. The wide variation in these growth rates stems from different appraisals of the degree to which Westerners will take up and stick with the practice of energy efficiency and conservation. If we commit ourselves to energy efficiency wherever it is technically feasible and cost-effective, and our principles and resolutions turn into real action, we can hold growth in energy demand to a modest level, one that we can meet with clean renewable energy sources. But if we choose drift and inaction (this doesn't sound very true to the spirit of the West, does it?) and ignore opportunities to improve energy efficiency throughout our homes and workplaces, we will need dozens of new power plants and thousands of miles of new transmission lines – a very costly undertaking, and one that is not going to win us prizes from posterity for forethought and good sense. High growth in our regional and our national energy demand will put more pressure on Western energy resources, including resources located in areas treasured for their landscapes and wildlife. On the other hand, growth accompanied by a real commitment to energy efficiency and conservation will conserve precious resources and make it easier to defer or avoid the most disruptive and controversial undertakings in energy production.

* Electronic devices such as computers and TVs consume some electricity even when they are "shut off." This standby electricity consumption is growing and is now equivalent to the electricity use of a new refrigerator in each and every home in the West! Reducing standby electricity use by electronic devices is yet another strategy for energy efficiency and conservation, but one best tackled at the national or even international level by entities such as the federal Energy Star program.

HOW NORMAL ARE YOU, OR HOW DOES YOUR HOME COMPARE TO THE AVERAGE HOME IN WESTERN STATES?

The Energy Information Administration, part of the US Department of Energy, periodically surveys households concerning housing characteristics and energy-related practices. Here are the typical characteristics of all households (apartments and single family homes) in Western states as of 2001.¹⁵ This is the most recent data available.

- 62% of households use natural gas as their main heating fuel
- 30% of households use electricity as their main heating fuel
- 36% of households have heating equipment that is twenty or more years old
- 16% of households have two or more refrigerators
- 73% of households have a clothes washer
- 68% of households with a clothes washer claim they wash clothes using either hot or warm water
- 69% of households have a clothes dryer
- 6% of households have a hot tub or spa
- 34% of households claim their home is well insulated

- 48% of households claim their home has drafts all of the time during the winter
- 56% of households claim they lower the thermostat setting during the day when no one is home

These statistics point to both good and bad news. The good news is that, based on self-reporting, a nontrivial number of households are already well-insulated, already utilize their thermostat to conserve energy, and already wash clothes in cold water rather than warm or hot water. And, as noted in the sidebar on page 16, a nontrivial number of Western households use evaporative cooling rather than more electricity-intensive mechanical cooling. Again, we merit a pat on the back.

But the bad news is that we have a long way to go before we can call our region highly energy efficient. Many more households could upgrade insulation, seal the building envelope, replace older heating and cooling equipment, get rid of the second refrigerator, or set back the thermostat when no one is home. And as we noted earlier, most lights in our homes are still inefficient incandescent lamps rather than CFLs.

And let us not neglect the fact that the American home is being super-sized. The average single family home in the United States in 2001 contained 2530 square feet of living space, an increase of 11 percent since 1993. Over the same period, the average apartment grew 7 percent to 1040 square feet.¹⁶ Efficiency measures can offset some of this growth, but the bottom line is that today's larger homes, and the appliances that fill them up, require more energy than their more modest predecessors.



Laura Ingalls Wilder Initiative

TOWARD MORE LITTLE HOUSES ON THE PRAIRIE (AND DESERT AND MOUNTAIN) AND FEWER “LOG CABINS ON STEROIDS”

Increasing home size generally leads to more energy consumption for space heating and cooling, and provides more space for “hardware” that plugs into the power grid and adds to electricity usage. But there is nothing in the Western way of life that requires us to continue on our trajectory of bigger homes with more and more stuff. In truth, many of the virtues and attractions of Western life lie outside our houses. With the West’s vast open spaces as our home-away-from-home, we could be national pacesetters in reversing this trend toward ever-bigger homes. (Yes, that is a line of thought that could easily evoke cynicism and get itself accused of naivete and unrealistic cheer, but it also could turn out to be true.)

Author Laura Ingalls Wilder did us all a service by installing the phrase “Little House” lastingly in our heads, and giving it a positive, heart-warming set of associations. Thus, we seize on the many thousands of happy moments in which parents and children have curled up in snug circumstances and read, to themselves or to each other, Wilder’s *Little House* books.

The Center of the American West announces an incentive: the (Comparatively) Little House on the Prairie (or Desert or Mountain) letter of commendation, sent to the Western family who *could have* built a large, sprawling house, which would have required a lot of energy to heat in the winter and cool in the summer, but who chose instead to build a modest, comfortable, efficiently heated (Comparatively) Little House. Send your story and a photo of your comparatively little house to us at info@centerwest.org. While saving energy should be a primary motive

for this family, their larger goal would be happiness. When two or three or four people attempt to live in spaces that seem to be the equivalent of Grand Central Station, rattling around a giant house and endlessly returning to the room they just left to pick up items they misplaced and left behind, the cause of domestic happiness is not necessarily served. Humans are sociable creatures, and there is evidence that Pleasure thrives in conditions of snugness and withers in sprawl and isolation.

The Laura Ingalls Wilder Initiative is closely affiliated to another fine Western literary tradition, perhaps most associated with N. Scott Momaday and Ivan Doig. Consider the titles of their remarkable books: *House Made of Dawn* and *This House of Sky*. In both cases, these writers remind us that Westerners are privileged to live under skies that are often astonishing in their extent and their openness. In many Western locales, our home – in the broadest sense – has a “ceiling” that regularly and reliably invites our spirits to expand and to soar. Thus, in a manner very compatible to the Wilder Initiative, the Momaday and Doig Initiative asked us to spend more of our time looking up at the Western sky, while we say to ourselves, “The West is my home. The sky is my ceiling. And with a home and a ceiling like this to call my own, owning a very big house with a very big mortgage, very high taxes, and very high energy bills would be more of a burden than a pleasure.”





GROUNDS FOR OPTIMISM

WHAT THE WEST COULD SAVE

If we increased energy efficiency in our homes with some thoroughness, each household could save something on the order of \$300 to \$500 per year on our energy bills. With that kind of money you might take a weekend vacation to see some part of the wonderful West that you've never visited before (perhaps to one of the areas that, stayed wonderful thanks to the water left in the stream, pollution kept out of the sky, transmission lines not strung across the horizon, and drilling rigs not scattered across the landscape as a result of energy saved through efficiency measures). Or you could buy a new bicycle, which will in turn save you more money on gas. If pedaling around town isn't your idea of fun, you might buy season tickets for the theater or the local professional sports team. Whatever you do with the money, the promise of such dividends makes energy efficiency an attractive investment.

From making our homes more energy efficient, it is only a small step further to see how the same notion can be applied on a regional scale with widespread benefits for our communities and states. The Energy Efficiency Task Force established by the Western Governors' Association (WGA) found that it is feasible to reduce electricity use 20 percent from projected levels in 2020 if Westerners adopt energy efficiency best practices (see the "Electricity Consumption Scenarios" graph). Achieving this target would eliminate the need for 100 large new power plants, save consumers and businesses over \$50 billion net, and save approximately 1.8 billion gallons of water between 2006 and 2020.³⁴

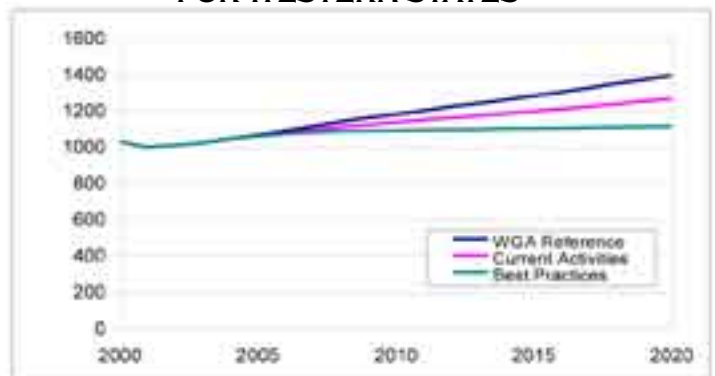
The Energy Efficiency Task Force report does say that it could cost about \$35 billion to finance the energy efficiency measures, throughout the western United States between now and 2020. A price tag of \$35 billion, or about \$550 per Westerner, may trigger an instinctual cry of pain from consumers. But the investment does not need to be made overnight, and the return would be sizable. In this scenario, if the majority of households and businesses made

significant efforts to improve energy efficiency, the economic benefits would exceed the costs by a factor of 2.5.³⁵

The Energy Efficiency Task Force report and other studies such as those cited in the accompanying sidebar on the next page reach an optimistic yet practical conclusion: It is cheaper for society to invest money in energy-saving technologies and practices than to expand the production of energy supplies. And with the financial savings come environmental and social benefits.

And then there's the matter of solid public support. Americans have registered their enthusiasm for energy efficiency and conservation in numerous polls (see the sidebar on page 26 if you don't believe us). Large majorities favor mandating higher fuel efficiency standards for automobiles and creating financial incentives for people who implement greater energy efficiency measures. And over half believe that energy conservation and use regulations should be the top priority as the nation crafts its twenty-first-century energy policy.

ELECTRICITY CONSUMPTION SCENARIOS FOR WESTERN STATES¹⁷



LENDING SUPPORT

ENERGY EFFICIENCY STUDIES FROM AROUND THE REGION

The findings of the Energy Efficiency Task Force convened by the WGA are consistent with those from numerous other inquiries. State and regional level studies show that there is a very big potential for cost-effective energy savings in Western states, and large benefits ready for the taking, from more widespread adoption of energy efficiency measures.

Southwest Study (2002). In a report entitled *The New Motherload*, the Southwest Energy Efficiency Project (SWEET) examined the potential for more efficient electricity use in Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming. The study develops two scenarios: (1) a business-as-usual (BAU) scenario that assumes that we maintain our current policies and follow our current trends, and (2) a high efficiency scenario that assumes widespread adoption of cost-effective energy efficiency measures between 2003 and 2020. Electricity demand grows 2.6 percent per year on average between 2003 and 2020 in the BAU scenario compared to just 0.4 percent per year in the high efficiency scenario. The study estimates that the high efficiency scenario would provide \$28 billion in net economic benefits, with an overall benefit-cost ratio of about four-to-one. The study also found that the high efficiency scenario would lead to an estimated net increase of 58,000 jobs by 2020, a 0.45 percent increase in the regional employment rate.¹⁸

California Study (2002). The *California Secret Energy Surplus Study* examined the technical, economic, and achievable potential for more efficient electricity use in that state over a ten-year period

of 2002-2011. The maximum efficiency scenario indicated 5900 MW of peak demand reduction, 30,000 GWh per year of electricity savings, and nearly \$12 billion in net benefits for consumers and businesses at the end of the ten-year period. Fortunately the opportunity for increasing energy efficiency in California did not remain a secret for long, and this study was instrumental in expanding the budget and goals for utility-sponsored Demand Side Management (DSM) programs in California. In 2004, the California Public Utilities Commission adopted new 10-year energy savings goals equal to about 75 to 80 percent of the achievable savings potential identified in the *Secret Energy Surplus* study.¹⁹

Northwest Electric Power and Conservation Plan (2005). The Northwest Power and Conservation Council (NPCC) published its Fifth Electric Power and Conservation Plan in early 2005. The plan analyzes ways to ensure the adequacy of future electricity supply in the Pacific Northwest, in the context of rising natural gas prices, uncertainty about future hydroelectric generation, and growing concerns about global warming. The Plan recommends that the region increase and sustain its efforts to promote the adoption of cost-effective energy efficiency measures. The plan lays out measures that would save a total of 21,900 GWh per year of electricity, or approximately 10 percent of the region's projected energy consumption, by the end of the twenty-year planning period. The NPCC estimates that achieving these energy efficiency and conservation goals will deliver to consumers and businesses in the region a cumulative savings of nearly \$2 billion.²⁰





GROUNDS FOR PESSIMISM

WHAT THE CRITICS SAY

Most of the time energy efficiency and conservation do not provide the occasion for fevered debate and heated dispute. While the relative peace and quiet surrounding this issue have many charms, debate and dispute generate a lot more headlines and draw a lot more press coverage.

We believe in the virtues of energy conservation and efficiency, but we also know that the best forms of belief come allied with tolerance for and responsiveness to dissent. Dissent in this territory is, however, a little tricky. The deliberate wasting of energy has few declared supporters. You can search the Internet, but you will not find a citizen group coaching you on the best ways to raise your monthly heating bill or setting forth the best methods for allocating as large a percentage of your income as possible to the purchase of gasoline (although you surely can find some well-marketed products that will move you in this direction). And yet this is America, where every plan of action causes an opposite (though not always equal) reaction – a very good thing on the whole, since it sharpens our minds and puts our assumptions through a strenuous, strength-building test. Some writers and speakers do perceive flaws and limitations in energy conservation and efficiency, and we include here a summary of their critiques.³⁶

Here is a primary argument delivered by the critics: we cannot conserve our way out of our energy predicament. Even if we declare the energy saved to be a harvestable resource, the energy made available by conservation and efficiency still must originate in the exploitation of oil, natural gas, coal, wind, sun, or water-power. Moreover, the critics say, the installation of energy-efficient devices in homes and workplaces presents expense and complication, factors that are not easy or feasible to overcome through persuasion or government initiative. Perhaps most discouraging, energy efficiency and conservation will require long-term and significant changes in our personal habits. And those

changes, the skeptics feel, require the near-impossible: consumers would have to drop their cynical and defeatist attitudes about the impact that the choices of individuals can have on a phenomenon as vast as our national energy use. To assert that individual choices matter is to provoke an understandable emphasis on scale: the nation uses so much energy that the decisions of individuals can look as if they are of no consequence.

These criticisms deserve attention. They make an inarguable point: there is no simple, instantaneous, or magic way to resolve our nation's energy predicament. Energy efficiency and conservation, for all their virtues, must be part of a much larger plan of action. And yet, asserting that energy conservation and efficiency cannot, in one stroke, solve all of our problems is far from a fatal blow to the cause. Such an argument does not – and cannot – call into question the fact that conservation and efficiency will be of tremendous help in dealing with those problems. Reducing our demand for energy – whether it originates in fossil fuels or renewables – will require a high level of commitment and dedication from consumers, voters, policymakers, industry leaders, engineers, and scientists. The good news is that we have examples in our region's and our nation's past – think of the scale of the transcontinental railroad, the national highway system, or the Apollo space mission – that demonstrate that we can make this commitment and we can devote our time and resources to overcoming what only seem to be insurmountable obstacles. Americans have the capability to take on this challenge with the enthusiasm and dedication that previous generations invested in comparable pursuits of national importance and consequence.

Now we will take a break from advocating our own position and do our best to transmit the most telling expressions of skepticism and doubt from the critics.

PUBLIC ATTITUDES TOWARD ENERGY EFFICIENCY AND CONSERVATION

Numerous public opinion polls demonstrate that a large majority of Americans favor stronger policies to advance energy efficiency and conservation. Here are some examples from recent public opinion polls:

- Would you favor or oppose the government requiring better fuel economy for cars, trucks, and SUVs?

- Favor: 86%
- Oppose: 12%

(Pew Research Center for the People and the Press, February 2006).

- Assuming it would cost more to buy or lease a car, would you approve or disapprove of the government requiring car manufacturers to meet higher fuel efficiency standards than they do now?

- Approve: 77%
- Disapprove: 20%

(Program on International Policy Attitudes, June 2005).

- Would you favor giving cash incentives like tax credits and rebates to individual households that upgrade to more energy efficient appliances like refrigerators and air conditioners?

- Favor: 81%
- Oppose: 16%

(Program on International Policy Attitudes, June 2005).

In addition, over half the public (52 percent) say that more energy conservation and regulations on energy use should be the most important priority for US energy policy, while 41 percent believe that more exploration, mining, and constructing new power plants should be the most important priority (Pew Research Center for the People and the Press, February 2006).

So even though people might not be enthusiastically practicing energy efficiency or conservation in their daily lives, they strongly favor public policies that would result in greater energy efficiency.

- *A rebound – or take-back – effect will erode most or all of our energy savings; at every scale, from individual households to the national economy, the impact of energy efficiency will whittle away at energy savings.* If the price of energy declines thanks to technological improvements in efficiency, consumers will respond by increasing their demand for energy. For instance, the owners of hybrid cars may actually drive more miles, and they may drive more often than they would otherwise, as a result of the improved fuel efficiency of the vehicle. The very success of energy conservation and efficiency will provide the occasion and opportunity for the next round of wasting energy! Overall, gains in energy efficiency will lead to increased energy use by making energy appear cheap; this will increase economic growth, which will in turn drive up energy use.

- *Conscious and intentional changes in policies and practices are unnecessary because technological advances and rising energy prices will automatically lead to energy saving anyway.* The power of the market is preeminent; technology and economics will produce the desired outcome, without the extra and unnecessary trouble of passing new laws and designing new regulations.

- *Energy savings are difficult, if not impossible, to calculate accurately.* We cannot measure energy savings as we can measure the output of a power plant, oil well, or wind farm. Since savings cannot be precisely measured, energy efficiency cannot qualify as a resource equivalent to materials that produce actual energy.

- *History demonstrates that energy efficiency policies, practices, and programs have failed to curb our overall energy demand.* Over the past thirty years, energy use has continued to rise, even as we have increased our energy efficiency efforts. Since energy efficiency has not resulted in an absolute reduction in energy use, its capacity to play much of a role in big solutions is correspondingly doubtful.

- *Some well-intentioned programs, like ratepayer- and taxpayer-funded energy efficiency programs, turn out to result in injustice, acting as an unfair subsidy that penalizes nonparticipants and low-income households.* The funding for financial incentives that promote the adoption of efficiency measures is drawn from all taxpayers. Therefore, people who do not themselves adopt energy-saving technologies (and they may have perfectly logical reasons for doing this) end up covering the bill for those who do.

How do the proponents of energy efficiency proponents respond to these criticisms? On a close inspection, the criticisms overstate their point or exaggerate the dimensions of the problems they single out. For instance, experience demonstrates that the rebound effect is small. It does not erode most or all energy savings from individual energy efficiency and conservation measures. After all, you'd have to drive two or three times as many miles in a hybrid to use as much gas as you would in a big SUV. And while the mention of government programs may cause backs to stiffen and knees to jerk all over the West, these programs do not, intrinsically, lead to injustice: well-designed standards, incentives, and other types of "market interventions" like the Energy Star and LEED programs have led to significant increases in the adoption of efficiency measures and thus in widespread energy savings. Furthermore,

even though we cannot measure energy savings precisely, we can estimate them with reasonable accuracy.

Total energy consumption in the United States increased 32 percent between 1973 and 2005 while population grew 40 percent and economic output (GDP) grew by 156 percent.³⁷ To say that energy efficiency was exposed as a failure because energy use did not fall is to ignore an element of unmistakable success: Total US energy consumption per unit of GDP declined 49 percent between 1973, the year of the first OPEC oil “crisis,” and 2005. Most of this reduction came from reduced energy intensity, or the use of less energy for a given activity or service. A smaller portion of the reduction came from structural changes such as the shift from manufacturing and basic materials processing, to a service-based economy. Removing energy efficiency from the picture would mean significantly increasing and multiplying the dilemmas and problems this nation faces in meeting its energy needs.³⁸

The critics of our cause offer us useful insights and lessons. Perhaps the most important lesson is this: Advocates on our side should steer clear of overselling the potential for energy savings and the benefits of energy efficiency and conservation. Excessively high expectations are an almost guaranteed precondition for disillusionment and disappointment. Energy-efficient technologies and conservation policies alone will not solve our energy predicament, but the same can be said of every other solution under consideration! Whatever the proportions that each good effort contributes to the cause, this is inarguable: we cannot solve our energy predicament without much higher levels of energy efficiency and conservation.

LIMITS TO REASON: A BUMMER OF A READING EXPERIENCE

We were midway through the writing of this report when our spirits took a dive. One of us (PL) sat down to read a book, *Energy Efficiency: Perspectives on Individual Behavior*, compiled in 1987 by Willett Kempton and Max Nieman.³⁹ We were receptive and eager – we knew that this book would offer us valuable guidance. But the very first article in the collection, by Shel Feldman, put our cheer to the test. Its title gave fair warning: “Why Is It So Hard to Sell ‘Savings’ as a Reason for Energy Conservation?”

It was hard not to take this as a personal blow, since so much of our report actually tries to “sell ‘savings’ as a reason for energy conservation.” Here, in a nutshell, was the bad news: “The research literature from social psychology suggests that the attitude-behavior link is rarely consistent, direct, or very strong.”⁴⁰ Dr. Feldman pulled no punches. Right at the outset, he delivered his depressing findings: “concern with monetary savings” did not turn out to be “a significant predictor” when it came to attitudes and intentions that led people to adopt the practices of energy conservation. Consumers simply had a hard time developing a realistic and solid belief in the value of future rewards generated over time by the practices of energy conservation. Thus, telling consumers how much money they will save if they invest in energy efficiency did not have much impact on their behavior. On the chance a little heartbeat of hope started up again in the reader, the last sentence of Feldman’s article brought that heartbeat to a halt: “We would do well,” he declared, “to avoid building our models and preparing our advertising campaigns based upon the assumption that the energy consumer operates – or can operate – as a rational investor.”

Other essays in this volume hammered in variations on the theme of the limited role of rationality. In “Why Don’t People Weatherize Their Homes? An Ethnographic Solution,” Richard Wilk and Harold Wilhite also questioned the assumption that consumers who are “given the proper incentives and adequate dissemination of the facts” will “react appropriately in a ‘rational’ economic fashion.” Wilk and Wilhite see many other considerations at work in, and carrying more impact on, the minds of consumers. For instance, while “other improvements are visible to neighbors, serving social ends,” weatherization “is not glamorous” and “offers few opportunities for bragging.”⁴²

And then, a slew of coauthors (Dane Archer, Thomas Pettigrew, Mark Constanzo, Bonita Iritani, Iain Walker, and Lawrence White) gang up to deliver the coup d’grace, in an article called “Energy Conservation and Public Policy: The Mediation of Individual Behavior.” “The factors that govern individual consumption levels” of energy, the authors begin, “remain largely unknown. Surveys commonly find that energy behavior is not readily explained by individual attitudes toward energy and conservation, and partly as a result, public policies and experimental programs designed to further energy conservation have reflected a confusing theoretical patchwork of approaches.” And furthermore, “two vague theories,” the authors declare, have guided our efforts at changing behavior: (1) the attitude model, or “the assumption that favorable attitudes lead to conservation behavior” and that “making people’s attitudes more favorable will make them more likely” to practice conservation, and (2) the rational model, “the assumption that people will perform conservation behaviors if these behaviors are economically advantageous and, further, that increasing fiscal incentives will make these behaviors more probable,” since “decision-making results from an informed assessment of costs and benefits.”⁴³

Regarding the attitude theory, many of the respondents to a survey conducted in Santa Cruz, California, we learned, had “a favorable attitude toward energy conservation” and believed “that the energy situation is a serious crisis.” But the social scientists conducting the survey found that the “individuals more concerned about the energy crisis . . . did not differ in general from other respondents in terms of their energy conservation behavior.” On the contrary, “people who cited conservation as the most important factor in the energy future were, in fact, no more likely to practice it.” The same pattern of inaction emerged even when survey respondents claimed to be well-informed on practices in energy conservation.⁴⁴

So this was a reading experience that met all the technical specifications for the phenomenon known as a “bummer” or a “downer.” But think about the timing. This discouraging set of findings arose from studies made in the mid-1980s. After the energy crises of the 1970s, the nation had settled happily back into complacency, taking cheap energy for granted and leaving behind the sense of urgency and anxiety that had hovered around the wasting of energy in the previous decade. The studies in this book were historic relics, attitudes reflecting the assumptions of a very different era. The early twenty-first century differs dramatically from the 1980s, in matters ranging from hairstyles to computer technology. One very big difference involves the degree to which energy issues have regained a position at the center public attention. In our times, the gap between knowledge and action, in energy efficiency and conservation, is growing ever more narrow, as the issue of energy use rises steadily higher among national priorities.



ABANDON HOPE (TEMPORARILY) ALL YE WHO ENTER HERE BARRIERS TO GREATER ENERGY EFFICIENCY AND CONSERVATION

So what's the deal? Are we wasting our time trying to sell energy efficiency and conservation measures through an appeal to reason? Before we address this question, it is helpful to dig a little deeper and understand some of the factors underlying the observations of the human behavior researchers. In particular, it is helpful to acknowledge the regulatory, economic and behavioral barriers that inhibit the adoption of seemingly wonderful energy efficiency measures and energy conservation practices. Economists call these factors market barriers and market failures. We call them a darned shame – that's our first reaction. But our second reaction is that these barriers and failures are well within the reach of intelligent and practical remedy and correction. But before we discuss how we get around these barriers, we describe the main market barriers or failures that now limit the adoption of energy efficiency and conservation.*

MARKET FAILURES: IT'S THE ECONOMY, YOU CLEVER THING**

Market failures occur if there is a flaw in the way markets operate. Take gas prices, for example. In the United States, the price of gasoline is artificially low; even a cost of \$2.50 or \$3.00 per gallon does not reflect the enormous costs associated with finding, extracting, refining, and delivering oil to the consumer – much less the cost of protecting and defending the US's ability to import the raw material.⁴⁵ Below are several examples of market failures that inhibit widespread adoption of energy efficiency and conservation measures.

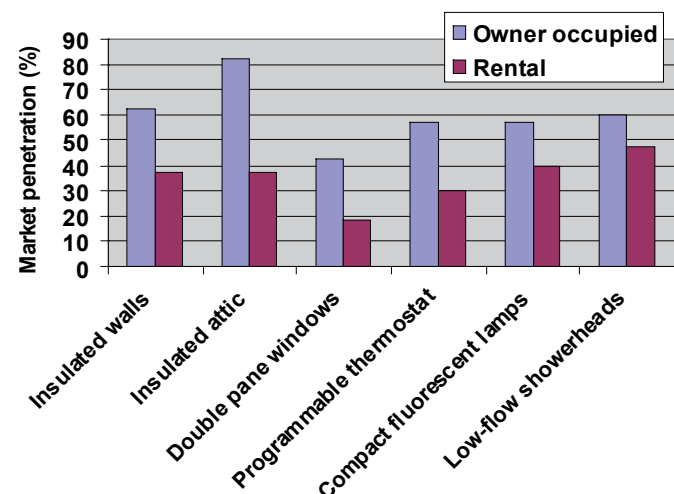
False Energy Prices. To repeat a key point: the prices that consumers pay for energy do not take into account – or pay the costs of – the adverse social and environmental impacts of energy production and consumption, such as emissions of mercury or carbon dioxide, land disruption, or water contamination that falls within the bounds of legality. Currently, the artificially low prices Americans pay for their energy needs convey the misleading “message” that there is no urgent need to invest in energy efficiency. These false prices ignore social and environmental

costs (externalities) that do not appear in the calculation of prices charged to consumers and thus mask the need to rethink our actions with respect to energy use.

Discouraging Policies. As a second example of market failure, various tax and regulatory policies work against investments in energy efficiency. Our current tax policy, for example, discourages investment in energy-saving measures in commercial buildings because energy purchases can be fully deducted from taxable income only in the year they occur, but investments in energy efficiency measures must be amortized over a long time period – up to thirty years in some cases. This is a deterrent to investments in energy efficiency because it makes consuming energy artificially less expensive than saving energy.⁴⁶ Likewise, regulatory policy that encourages public utilities to increase their profits by selling more electricity or natural gas acts as a disincentive to effective utility energy efficiency programs.

Split Incentives. And how about the misplaced, or split, incentive? These exist in rental markets in which building owners hold the responsibility for investment decisions, but tenants pay the energy bills. Under these terms, building owners have little incentive to invest in energy efficiency. Not surprisingly, as the graph below shows, studies have revealed lower levels of energy efficiency in dwellings occupied by renters compared to those occupied by homeowners.

MARKET PENETRATION OF ENERGY EFFICIENCY MEASURES IN CALIFORNIA HOUSING²¹



*No attempt was made to rank the various market failures or barriers by importance in this list or in the subsequent discussion.

**We cannot address our high caliber readers as “stupid,” despite the familiar phrase.

Limited Consumer Options. Meanwhile, some energy efficiency measures are relatively new and thus still not widely available in the marketplace. These include equipment such as highly efficient light fixtures, reflective roofing materials, heat pump water heaters, and modern evaporative coolers.

MARKET BARRIERS: SO, WHAT'S STOPPING YOU FROM BUYING THAT CFL?

If market failures are the big bogeymen of energy efficiency (“Sorry, ma’am, we don’t carry CFLs and the limited demand doesn’t justify a change”), market barriers are those pesky little “on the ground” issues that prevent consumers from taking that last step toward energy efficiency (“CFL, no thanks. I’d rather save money by buying the cheaper incandescent bulb.”) Market barriers are not flaws in the market per se, but they limit the adoption of energy efficiency measures nonetheless. For example, the well-meaning citizen who would like to support energy efficiency but cannot afford to buy insulation or new high-efficiency windows for her home has run up against a market barrier: her own lack of capital. Below are several common varieties of market barriers.

Limited Information. One of the most common market barriers is that consumers are often poorly informed about energy efficiency opportunities. Some consumers have the right intentions, but do not know where to find credible information on energy efficiency options. Consumers may know how much more an energy-efficient air conditioner or water heater costs, but they may not know how much they will save per year by purchasing the better product. And far too often, limited or uncertain information leads to paralysis or delay.

Faulty Decision-Making Processes. Even with sufficient information, one of the major market barriers at work here is the matter of time horizon. In a society focused on instant gratification, it can be difficult to appreciate the value of an energy alternative whose benefits are only realized years later. On the corporate level, for example, many businesses limit energy efficiency investments to projects with payback periods of two years or less, denying themselves substantial financial savings over the longer haul.⁴⁷ On the individual level, consumers generally expect improvements in energy efficiency to pay back the first cost in three years or less, even though appliances and vehicles remain in use for ten to twenty years.⁴⁸

Lack of Capital. Low-income folks would benefit the most from technologies that save energy and, in turn, money. But lower-income citizens (and smaller businesses) have limited access to capital and credit, necessities if they are to afford the higher up-front cost of adopting these energy- and money-saving technologies.

Perceived Risk. Yet even when they do have the money to spend, many people perceive that energy efficiency technologies do not perform as well as the standard, less efficient products that they see as familiar and “normal.” For example, some consumers believe that energy-efficient homes lack air ventilation and circulation, and thus have less healthy air quality than do leaky, inefficient homes. Not true! It’s hard, but by no means impossible, to change people’s minds. It’s certainly worth trying, and there is some evidence that consumers are hungry for credible information on better practices in energy use.



CHANGING LIGHT BULBS

HOW ARE WE DOING?

CFLs have been available for over twenty years, although their size, performance and price have improved considerably in the past decade, as noted previously. How are Western states doing in terms of substituting CFLs for incandescent lamps? In short, not as good as we could be doing. In California, 57 percent of all homes had one or more CFLs as of 2005. But out of forty-seven (yes, 47!) light sockets per home on average, only about 9 percent are CFLs.²² This is in a state that has had very strong promotion of and incentives for CFL adoption in recent years.

In other Western states, the numbers are even less impressive. In Colorado, the main utility serving the metro Denver area found that only 34 percent of its residential customers had CFLs and that CFLs represented just 4 percent of lights in use in homes as of 2005.²³ And in New Mexico, the main utility serving Albuquerque and Santa Fe found that about 40 percent of its residential customers had CFLs as of 2006. On a positive note, this survey found that 78 percent of households with CFLs were very satisfied or somewhat satisfied with their lamps, and only 7 percent were dissatisfied (15 percent had no answer).²⁴

In contrast, CFLs are much more common in other countries, especially some developing countries where energy prices and utility bills are relatively high compared to average household income. For example, CFLs already account for 64 percent of household lighting in the Philippines and about 33 percent of household lighting in Rio de Janeiro, Brazil.²⁵ Clearly, US households have a long way to go to take full advantage of this energy efficiency option.

THE GOOD NEWS

The good news is that we can address and correct (at least to some degree) all these market barriers and failures. We can engage, educate, and persuade consumers and business-owners. We can remedy the problem of split incentives. We can change unfavorable tax or regulatory policies, provide attractive loans, and convince home and business owners to invest more heavily in energy efficiency and conservation. And in theory we can factor “externalities” into energy prices via taxes, although this is a really tough task politically.

Unlike some critics of the nation’s energy policies and habits, we fully recognize that capitalism won the Cold War, that markets matter a great deal, and that better energy practices will not happen unless citizens and the owners and managers of American

businesses see good reason to adopt them. We are not, in other words, wasting anyone’s time in dreams of a utopian society where decisions descend to us from ethereal zones of high-ground principle and abstract ethics. We give our allegiance, instead, to this proposition: “Good capitalists get paid for solving big problems.”⁴⁹ Applied to energy efficiency and conservation, this is a proposition carrying a heavy load of hope. And yet, to do their best work, good capitalists deserve a thoughtful package of encouragements and incentives calculated to create the best possible playing field.

For more on remedies that will correct the market failures and barriers and create this better playing field, stay tuned. But first we want to suggest an entirely different way to sell energy efficiency and conservation than appealing to rationality.



THE APPEAL TO PRIDE

HOW SLOW CAN YOUR ELECTRIC METER GO, HOW FAR CAN YOU DRIVE ON A TANK OF GAS, AND OTHER FUN WAYS TO OUTSHINE YOUR NEIGHBORS

Having made our initial case with an appeal to Reason, we now continue our campaign, adding an appeal to Pride, that powerful human concern for reputation, and then bringing Reason and Pride together. We remind Reason, first, of benefits available in marketing and public relations. When businesses and companies engage in the saving of energy, customers and clients have every right to know about that good behavior, so that when they trade with such a business, they know they are supporting a cause that is, in measurable ways, making the world a better place.

And that gets us to the fundamental appeal to Pride - an invitation to take up “conspicuous conservation.”

A century ago, the great social scientist Thorstein Veblen coined the term “conspicuous consumption” to capture the popular sport, among the American elite of the late nineteenth century, of using the accumulation of material goods to feature, display, and make unmistakable their status, stature, and superiority. Over the twentieth century, thanks in large part to the opportunities made possible by fossil fuel use, conspicuous consumption became

democratized, practiced by many Americans whose income placed them far from the financial aristocracy. And now, in the twenty-first century, there is a wonderful opportunity for a change of fashion, and of terms. It’s time for the rise of “conspicuous conservation,” in which ordinary Americans – individuals, families, and enlightened businesses – lead the rest of us in affirming and displaying their status, stature, and superiority by the ostentatious display of good behavior in energy efficiency and conservation. By tapping into the force of one of humanity’s most powerful drives, conspicuous conservation can transform our habits, allowing us to preen and generally imitate peacocks, while also saving us money in the deal.

Here’s the theory: hard-wired into human nature is the desire to show off, to be admired and applauded, and to be recognized as superior to other human beings. This has not always been humanity’s most attractive character trait. Indeed, it has been the source of many sorrows, for instance, in efforts to cast white people as superior to other races or men as superior to women. And yet the desire to display oneself as superior – and to indulge

in the undeniable pleasures of pride, vanity, self-congratulation, and smugness – is an element of human character that presents possibilities as well as problems.

Now if asked to identify an arena that that is ripe for an appeal to this desire to appear as superior, a territory in which people could beneficially and fruitfully take the leash off their pride, vanity, self-congratulation, and smugness, hardly anyone would suggest energy conservation and efficiency. Yet if everyone competed fiercely to be the best and most impressive performer, or (to put it another way) if everyone struggled mightily to make the neighbors, competitors, and rivals look backward and faltering in their energy practices, then the very powerful human desire to feel superior to others would drive and fuel one of the world's best causes.

The goal – let's be explicit with this – would be to own the most fuel-efficient car on the block, and to make sure your neighbors know about it and even feel a little guilty too. And why stop with the family car? Why not try to impress those pesky neighbors with how low your monthly utility bills are? Getting their attention in this matter might take a little assistance from your city hall or your local utility company, but it is conceivable (see page 32). In short, the idea is to look so good that your neighbors look bad, while the neighbors, in turn, push themselves to catch up to you and pass you in energy conservation accomplishment.

The appeal to pride we have enunciated so far is essentially an appeal to vanity, to look better than one's peers. But the appeal to pride is also an appeal to the better instincts in human beings, instincts such as setting a good example for one's children or a concern for the well-being of future generations. This appeal addresses the adverse environmental and security consequences of energy waste including the impacts it has on global climate change, our dependence on energy imports, and natural resource depletion. More about these issues later.

Purchasing a fuel-efficient hybrid vehicle is one example of this appeal at work. Given that a hybrid often has a first cost premium of \$3,000 or more (prior to any tax incentives), it is hard to justify the extra first cost on fuel savings alone. As the market research firm R.L. Polk has noted, "our research indicates people buy a hybrid not for short-term economic gains, but to make a clear statement about what they want to do for the larger community."⁵⁰ And if you don't trust market research firms, just listen to five-year-old Grant Freeman of Boulder, Colorado, who has a solid handle on the satisfaction that conspicuous conservation can bring: "I like our Prius because it doesn't shoot out global warming pollution and kill Planet Earth."⁵¹ Buying a hybrid is an environmental and social statement, as well as a way to save some money at the gas pump.

Whether pride comes from impressing the neighbors or from feeling better about how one's lifestyle affects future generations, there is plenty of "pride potential" for individuals who maximize energy efficiency and diligently cut their energy waste. Below we tell the story of two families who are already practicing "conspicuous conservation" and are proud of it. No doubt there are other proud conspicuous conservers out there, and we want to hear about them. So if you and your family are already stellar energy savers (or if your parents or siblings are, but are too

humble to admit it), please let us know what you (or they) have done and how it has affected your (or their) energy bills. Once again, send us an email message at info@centerwest.org and info@swenergy.org. Seriously conspicuous conservers will be featured on our websites.

Leading by Example Saves Money... and Brings Recognition to the Toor Household. Taking steps to save energy in your home doesn't normally get a lot of attention. About the only people who may hear about it are family members or your favorite salesperson at the local hardware store. That's not the case for Will Toor and his family. Toor, a Boulder County commissioner and former mayor of Boulder, and his family were recently featured in *USA Today* in a national news story that highlighted their efforts to save energy and reduce their contribution to global warming.

Most trips taken by Toor family members are done on bike, foot, or bus; the family car is driven just 5,000 miles per year. Through a recent renovation, the Toors' home uses such techniques as passive solar design, high-efficiency windows, and extra insulation to complement the CFLs and energy-efficient appliances that reduce electricity and natural gas use. And the laundry is dried on a clothesline, not in an energy-guzzling clothes dryer.

The Toors also took advantage of federal and utility incentives to install a solar photovoltaic (PV) system on the roof of their garage, further reducing their electricity use. And through a solar hot water system, the sun also helps the family meet its hot water needs.

An average month sees the Toors spending only about \$26.00 on electricity and natural gas, nearly 75 percent less than the typical family in the Boulder-Denver area. While the steps the Toors' took to limit their energy footprint were extensive, they were not heroic. "Our efforts were not particularly challenging to achieve, and haven't been a hardship of any sort," Will Toor says. "We now have a house that is more comfortable while saving us money. And the best part about it? Anyone can do what we've done."⁵²

Keeping It Simple Saves Energy and Money for the Ryba Household. In Santa Fe, New Mexico, the Ryba household is steadily reducing its energy load, mostly by adopting the "no-brainers" in energy conservation. Of course all the lights are CFLs, and for a combined twenty-five years neither Gail nor Tom Ryba have owned a clothes dryer. Even with cloth diapers for two years after their daughter was born, they haven't felt any need for a dryer in arid New Mexico. Gail says, "It's great having the extra space in the utility room for storing garden seeds and supplies."

When she first moved to New Mexico in 1992, Gail lived five miles from her workplace at Sandia National Laboratories, which had good bicycle parking and shower facilities. Bicycling to work almost every day was the logical choice. Now that she lives in Santa Fe, she occasionally needs to visit Albuquerque, but the vast majority of those trips are on the commuter bus service, which saves both time and money. However, even her 1991 Ford Escort is a high-mileage vehicle that fulfills most of her family's need for a car.

When they bought a house in Santa Fe in 2000, the first project was to remove an old rooftop evaporative cooler and use the roof opening to vent an 81 percent efficient catalytic wood-burning stove that they use occasionally in the winter. Now the family is planning a small remodeling project to convert the south-facing living room windows to a solarium and add solar hot water and radiant heating to replace some electric baseboard heat in the 1970 addition.

Even with Tom and Gail working at home from two offices, the Ryba household uses only 465 kWh of electricity per month on

average, 30 percent less than the typical New Mexico home. When high natural gas prices hit in 2005 and 2006, they added insulation to the hot water pipes under the house, installed storm windows, and did some other minor weatherizing. As a result, they reduced winter gas use by about 15 percent over the previous year after adjusting for the warmer weather.

“We have no desire to build an amazingly efficient new solar home,” say Gail and Tom. “It’s more rewarding to upgrade an existing, leaky old home, knowing that we are reducing at least one family’s impact on the planet.”⁵³



A LITTLE HELP FROM OUR FRIENDS

WHAT WE CAN ASK OF OUR PUBLIC OFFICIALS AND UTILITY COMPANIES

While the Toor and Ryba households are taking advantage of readily available energy efficiency and conservation measures, they are the exception rather than the rule. So are the exemplary businesses featured earlier in our report. The barriers to widespread energy efficiency and conservation are formidable, and the appeal to self-interest – whether to save money, impress the neighbors, or increase a business’s bottom line – only gets us so far. We need and should expect our public officials and utility companies to pitch in.

State and local governments have the power to create policies and programs that will encourage – or, sometimes, require – greater adoption of energy efficiency and conservation measures by consumers and businesses. But, fellow citizens, we cannot expect our political leaders to act without support and affirmation from their constituents. The onus is on us. As citizens, voters, and writers of letters to the editor, we must engage and encourage our public officials to implement policies and programs that will lead our communities, our states, and our shared region to a future of increased energy efficiency and conservation. This section of our report lays out a number of positive and productive policies that, we believe, deserve your (and their) attention and support.

Of course, this means that we must talk, civilly and productively, about the issues in public, a project that in the early twenty-first century seems to present a stumbling block for otherwise reasonable, thoughtful, and honest people. In our times, public discussions are often derailed by a regrettable habit of the mind: the entirely unnecessary arrangement of options into an either/or framework. Either we will be liberals or we will be conservatives; either we will squander our natural resources or we will lock them up; either we will be public-spirited or we will be selfish; either we will be idealistic or we will be practical; either we will think in the short-term or we will think in the long-term; and, to highlight the false polarity most in need of disappearing on behalf of the concerns of this report, either we will use governmental powers and regulate everything into the ground or we will disable government and let the market cure all of our ailments. Fortunately, the cause of energy efficiency and conservation presents us with no imaginable reason to split up into bitter, polarized teams of conservatives and liberals, Democrats and Republicans, or supporters of market forces versus advocates of government edicts. In fact, as the examples below show, energy efficiency and conservation garners support from all manner of people throughout the West.

THE ART OF ENERGY EFFICIENCY



After a distinguished nineteen-year career in particle physics, Arthur “Art” Rosenfeld devoted himself to the challenge of improving energy efficiency following the 1973 OPEC oil embargo. He cofounded and directed the Center for Building Science at Lawrence Berkeley National Laboratory which, among its many achievements, developed important energy-efficient lighting and window technologies as well as computer software now widely used to design and analyze the energy performance of buildings. These innovations have delivered over \$20 billion in net economic benefits to American families and businesses according to a 2001 study by the National Research Council.

Art Rosenfeld has inspired a generation of energy efficiency researchers, analysts and advocates through his work at Lawrence Berkeley Labs, in his role as a Senior Advisor to the US Department of Energy, and as a member of the California Energy Commission, where he serves today. He has been a major force behind California’s leading energy efficiency initiatives for the past 30 years (see sidebar below). In July 2006, Art Rosenfeld was given the Enrico Fermi Award, our nation’s highest scientific honor, by Secretary of Energy Samuel Bodman. At that event, Secretary Bodman talked about the “Rosenfeld Effect” – the magnetic pull that one man’s energy and passion for a cause can exert on all those who come in contact with him. The American West and our nation have benefited enormously from the Art of Energy Efficiency.²⁶

Legislators in many Western states have already passed new laws and created new policies and programs to advance energy efficiency. These initiatives affirm both the power of government and the power of the market, and provide models for others to follow. The discussion and case studies below demonstrate that cooperation across the political and ideological spectrum is both feasible and desirable when it comes to advancing the cause.

How to Succeed in Politics: Goals for Energy Savings. In the early twenty-first century, citizens around the West hunger for a kind of political leadership that extends beyond the rapid rotation of the election cycle. Of all the ways to offer that kind of leadership, thinking long-term about energy use is a prime opportunity. In actions both reflected in and championed by the

Western Governors’ Association’s unanimously adopted Clean and Diversified Energy Resolution, states are beginning to take up the challenge of achieving a 20 percent improvement in the efficiency of electricity use by 2020 – when we’ll have a whole new set of governors who will be thankful for the foresight of their predecessors! Setting energy efficiency and energy savings goals at the state or local level are Big Issues, and thus Big Political Opportunities; they give a state legislature, a mayor, or a city council a chance to exercise true leadership, motivating citizens, businesses, and public agencies to take action, while also earning politicians admiration and votes. Of course, specific policies and programs must accompany goal-setting if the goals will be more than political posturing.

A PROFILE OF ENERGY EFFICIENCY POLICIES AND PROGRAMS IN WESTERN STATES²⁷

	Utility Energy Efficiency Programs and Incentives				Up-to-Date Building Codes		Appliance standards	Public buildings program	Tax credits/ deductions
	Electricity	Natural gas	Public benefits fund	Energy savings goal	Residential	Commercial			
AZ	X		X				X	X	X
CA	X	X	X	X	X	X	X	X	
CO	X			X				X	
ID	X	X			X	X		X	X
MT	X	X	X		X	X		X	X
NV	X			X*	X	X		X	X
NM					X	X		X	
OR	X	X	X		X	X	X	X	X
UT	X				X	X		X	
WA	X	X			X	X	X	X	
WY								X	

*Nevada allows for a portion of the requirements under its Renewable Portfolio Standard to be met by energy efficiency measures.

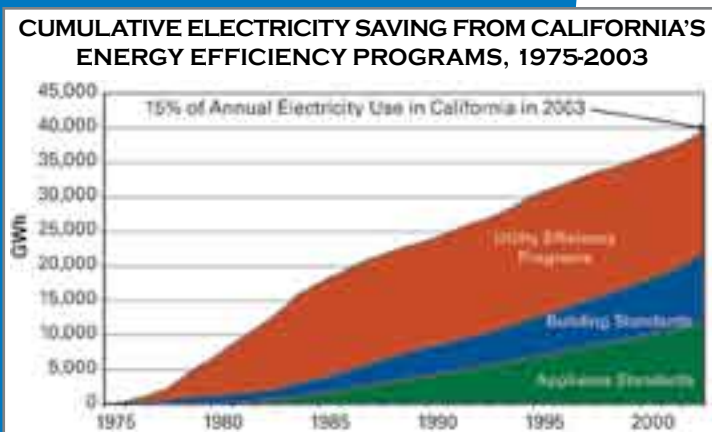
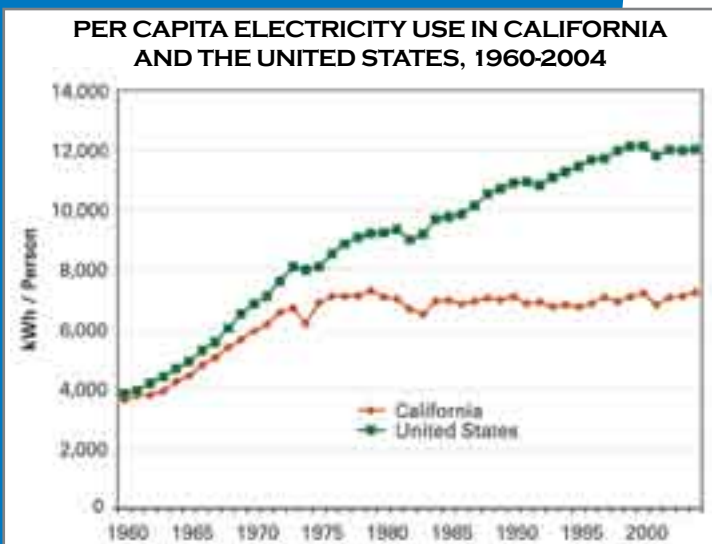
CALIFORNIA DREAMIN'

MAKING ENERGY EFFICIENCY PRIORITY NUMBER ONE

A recently published brochure about California's impressive energy efficiency efforts says it all:

"Energy Efficiency is California's highest-priority resource for meeting its energy needs in a clean, reliable, and low-cost manner. For more than three decades, California has adopted energy conservation and efficiency policies and made investments that are among the most aggressive in the nation. These efforts have saved more than 40,000 gigawatt-hours (GWh) of electricity and 12,000 megawatts (MW) of peak demand – avoiding the need to build 24 large (ie, 500 MW) power plants, and equal to the energy required to power 3.8 million homes."²⁸

The results of California's long term commitment to energy efficiency are impressive. The first chart below shows that electricity use per capita has remained relatively stable in California over the past thirty years, while electricity use per capita nationwide increased nearly 50 percent. The second chart shows the relative contribution of utility efficiency programs, building energy standards, and appliance efficiency standards to electricity conservation efforts in the state. As of 2003, electricity use in the state would have been 15 percent greater without these three policies and programs.²⁹



There are a number of inspirational examples of Western states, public utility commissions, and cities adopting ambitious energy savings goals. Here is a small sample of the good work being done across the region:⁵⁴

- In 2006, Utah Governor Jon Huntsman announced a new state policy which includes a goal of 20 percent energy efficiency improvement statewide by 2015. The policy calls for action to save energy in state-owned buildings, in transportation, in residences, and in commerce and industry. Utility energy efficiency programs, improved building codes, and education and outreach are all part of the mix as Utah works toward this goal. Utah, ostensibly one of the most politically conservative states in the country, is taking energy conservation seriously.
- In 2004, the California Public Utilities Commission adopted ten-year savings goals for electric and natural gas utility energy efficiency programs. The goals call for saving 23 billion kWh of electricity and 44 billion cubic feet of natural gas per year by 2013, from programs implemented between 2004 and 2013. These designated savings are equivalent to the average electricity use of 3.3 million California households and the average natural gas use of one million California households.
- In 2003, Fort Collins, Colorado, adopted goals of reducing per capita electricity consumption 10 percent and per capita peak demand 15 percent by 2012. The city's municipal utility is implementing a variety of energy efficiency programs in order to achieve these goals. Their efforts will certainly be reinforced by Colorado Governor Bill Ritter's commitment to creating a "New Energy Economy," announced in 2007, which includes an executive order to improve the efficiency of electricity use by 20 percent statewide by 2020.

The Unexpected Power of the Electric and Gas Companies: Utility Energy Efficiency Programs. Electric and gas utilities can play a crucial role in fostering greater energy efficiency; no other organizations or groups of people are better positioned to encourage change in this terrain.

But doesn't this seem contrary to a utility's best interests? Why would a product provider campaign for diminished consumption of its primary commodity? Wouldn't a utility want to sell more electricity or gas to customers who were wasting as much energy as possible, and thereby make more money? The answer is yes, unless we can modify the way the utility makes money and views its mission. And since most electric and gas utilities are monopolies subject to federal and state regulation, it is possible to modify how utilities do business and make money.

The first trick is to ensure that utilities view energy efficiency as a resource on par with other potential energy sources, such as coal-fired power plants or wind farms. If encouraging customers to take up energy efficiency actually costs less than supplying more energy by constructing new power plants and transmission lines or acquiring new natural gas supplies, then utilities can

be told (or can be given financial incentives) to pursue energy efficiency first.

In a number of Western states, including California, Nevada, Oregon, and Utah, you can see this perspective, commonly known as Integrated Resource Planning (IRP), in action. Utilities may not embrace this broad perspective initially, and it usually takes state legislation or state utility commission action to put the policy in place.⁵⁵ Utilities then implement IRP under the oversight of a state regulatory agency.

The second trick is to make sure utilities do not have a financial incentive to sell more electricity, and are not penalized financially in ways that discourage them from operating effective energy efficiency programs. There are different ways this can work.⁵⁶ Some investor-owned utilities operate under terms that allows to make a greater profit on their expenditures for energy efficiency programs than they would make on expenditures for electricity generation and supply. Sometimes regulations adjust rates so that selling more electricity does not add to a utility's allowed fixed cost recovery; nor does selling less electricity subtract from it. Even with these incentives or rate adjustments, consumers and businesses still receive hundreds of millions or billions of dollars in benefits from utility energy efficiency programs.

Leading utilities – Austin Energy in Texas (see sidebar on next page), Rocky Mountain Power in Utah, Puget Sound Energy, Nevada Power Company (see sidebar on page 37), and investor-owned utilities in California including Pacific Gas and Electric (PG&E), Southern California Gas Company, Southern California Edison, and San Diego Gas and Electric view energy efficiency as a serious resource and are spending tens of millions or in some cases hundreds of millions of dollars on energy efficiency programs each year. “We really view energy efficiency as the fifth fuel,” Jim Rogers, CEO of Duke Energy recently proclaimed.⁵⁷ These likeminded utilities are putting their dollars into programs that educate consumers and business owners about energy efficiency options, offer technical assistance, and provide rebates and other financial incentives to encourage greater adoption of cost-effective efficiency measures. The best programs have been able to reduce electricity use by 0.8 to 1.0 percent per year, or 8 to 10 percent from cumulative efforts over a ten-year period.⁵⁸ Consumers save money, fewer controversial new power plants or transmission lines are needed, and customers view their utility in a more favorable light. “The public loves it, the risk to shareholders is less, and the company's image is better,” says PG&E chief executive Peter Darbee.⁵⁹ It turns out that when utilities make a commitment to energy efficiency, everybody wins.

All consumers and businesses pay for utility energy efficiency programs, whether they participate in the programs or not, through a small surcharge on utility bills. This cost recovery policy can sometimes be controversial. Yet, as it stands now, a similar burden falls with equal or greater weight on all consumers if the utility turns away from energy efficiency and chooses, instead, the construction of new power plants or transmission lines: all consumers pay for these costly new energy supply facilities, whether or not they contributed to the need for their construction.

Utility energy efficiency programs must pass a test for cost effectiveness. Usually, the full cost of energy savings (including

TAKING IT TO THE MAX

THE STORY OF HOOD RIVER

What if you set ambitious goals and try to implement home energy conservation measures across an entire community? Would the community be receptive? And if so, what kind of results would you achieve?

Such an unprecedented experiment was conducted in Hood River, Oregon, in the early 1980s. The brainchild of the Natural Resources Defense Council, funded by the Bonneville Power Administration, and administered by Pacific Power & Light, the Hood River Conservation Project (HRCP) sought to quantify the energy savings and other benefits that could result from implementing a suite of energy efficiency measures in as many homes as possible in a community. In pursuing its goals, the project broke new ground and influenced DSM program implementation nationwide.

Hood River was chosen for the project because it represented a prototypical Pacific Northwest community, with a variety of housing types and ages, and residents with a range of occupations and household characteristics. A total of 3500 homes were deemed eligible for the project, which had a budget of \$22.5 million.

The HRCP sought to achieve 100 percent customer participation at a time when utility-sponsored conservation programs were typically seeing participation rates on the order of 3 to 6 percent. Through a concentrated marketing effort and high community interest, 91 percent of the eligible homes signed up for and received an initial energy audit. In addition to the audit, these homes received a number of low-cost/no-cost energy efficiency measures, including outlet gaskets, water-heater blankets, hot-water pipe wraps, and low-flow showerheads.

Over 85 percent of the eligible homes installed one or more of the energy efficiency measures recommended by the audit, including ceiling, wall, and duct insulation; storm windows; caulking and weather stripping; and a programmable thermostat. All audits and retrofits were completed between 1983 and 1985.

Was the Hood River Conservation Project a success? By almost all measures, the answer is yes. The project achieved unprecedented participation rates. Analysis of pre- and post-retrofit electricity bills of nearly 70 percent of participants revealed an average annual energy savings of 2600 kWh per house, or 15 percent of pre-HRCP use. Over 14,000 measures were installed in nearly 3000 homes, saving an estimated 342 GWh of electricity over the lifetime of those measures. In addition, the HRCP proved that an energy efficiency program could be a viable energy resource, one that should be considered on equal ground with energy supply options.³⁰

ENERGY EFFICIENCY IN THE HEART OF TEXAS

AUSTIN'S CONSERVATION POWER PLANT

Austin Energy is a publicly-owned utility serving around 350,000 customers in Austin, Texas. Austin Energy has implemented a wide range of energy efficiency programs for all of its customers over the past two decades. Austin Energy currently spends about \$22 million per year on its energy efficiency and load management programs, about 3 percent of its revenues. These programs on a cumulative basis have reduced peak power demand by 600 MW – in effect, a virtual power plant with power output equivalent to one large baseload power plant.

The programs are comprehensive and include rebates on a wide range of efficiency measures, low-interest loans, technical assistance, training and promotion of green building practices, and free retrofits for low-income households. Since 1982, there have been 374,000 residential participants, and all of Austin Energy's top 200 commercial customers have participated in energy efficiency programs. Austin Energy has won national awards for its sustained energy efficiency efforts including being named by the Environmental Protection Agency and Department of Energy as an Energy Star 2006 Partner of the Year.

In 2003, Austin Energy adopted a new strategic plan with ambitious energy efficiency and renewable energy goals. The plan calls for an additional 15 percent energy savings from energy efficiency programs by 2020. Austin's commitment to and achievements in pursuing greater energy efficiency and resource conservation are an integral part of the city's pursuit of its vision – to become the most livable community in the country.³¹

both utility and participant costs) must be less than the cost for the supply of energy that the utility did not have to develop, thanks to the efficiency measures. In general, electric utility energy efficiency programs save electricity at a total cost of 2 to 3 cents per kWh saved, a third to half as much as the cost of electricity from new power plants.⁶⁰

Proud to Own the Cheapest House (to Heat) on the Block: Building Codes and “Beyond Code” Programs. Building energy codes are mandatory energy efficiency requirements for new homes and commercial buildings. If the code is well enforced, it ensures that new homes and commercial buildings are at least moderately energy efficient. Many states adopt mandatory building energy codes at the state level. But in Arizona and Colorado, it is the responsibility of local rather than state government to enact and enforce building codes.

Many jurisdictions have adopted a model energy code known as the International Energy Conservation Code (IECC), a relatively stringent code developed and revised periodically by representatives of the building industry and national building efficiency experts. This ensures that the model building code takes into account newer energy efficiency measures and strategies. Whether they adhere to the IECC or their own similarly rigorous code, leading states and cities usually update their building energy codes at least once every three years to ensure they do not become outdated.

Building energy codes set a floor on the energy efficiency of new homes and commercial buildings. But why sit on the floor? A number of Western states and utilities operate programs to encourage voluntary construction of new homes and commercial buildings that exceed the minimum energy code requirements. These programs provide training and technical assistance to architects, builders, and contractors, and education to the broader public. Some programs offer financial incentives to builders whose structures exceed the minimum code requirements by a significant degree, for example for new homes that qualify as Energy Star homes.

Energy Star homes in the West use about 15 percent less energy than new homes meeting typical building energy codes. It's possible to do even better, and the federal government is on the case, believe it or not. Build a new home that consumes 50 percent less energy than a home meeting typical building energy codes and you (the builder) receive a \$2,000 tax credit from the feds (see Appendix A for more on tax credits). Likewise build a commercial building that uses 50 percent less energy than one must just meeting codes and you get a juicy tax incentive too.

You Can Have Your Crushed Ice and Eat It, Too: Appliance Efficiency Standards. Beginning in 1987, the federal government has adopted minimum energy efficiency standards for a wide range of appliances and equipment found in homes and businesses. These standards have had a big impact on the energy efficiency of appliances sold in the United States. For example, typical refrigerators manufactured and sold in the US today use about one third as much electricity as refrigerators made twenty-five years ago, even though today's refrigerators are bigger and have more features like through-the-door chilled water and ice dispensers. Although they may not realize it, consumers are

VIRTUE IN SIN CITY

ENERGY EFFICIENCY WHERE YOU MIGHT NOT EXPECT IT

Nevada Power Company and Sierra Pacific Power Company, the two investor-owned utilities in Nevada, phased out their energy efficiency programs in the mid-1990s as they prepared for utility deregulation and growing competition. But in 2001, in the midst of the Western electricity crisis and skyrocketing electricity costs, the deregulation was repealed. Nevada Power and Sierra Pacific Power were back to being vertically integrated, regulated utilities. As such, the companies are required to operate cost-effective energy efficiency programs for their customers.

In late 2001, the utilities established a collaborative process with interested parties for developing and analyzing potential energy efficiency programs. Based on this collaborative effort, the utilities launched in 2003 a set of energy efficiency programs that included:

- Promotion of Energy Star appliances and lighting products.
- Incentives for high efficiency air conditioning systems, air conditioner tune-ups, and duct sealing.
- A pick-up and recycling program for older refrigerators and freezers.
- Incentives for all types of efficiency measures implemented by businesses, a program appropriately named the “Sure Bet” program.
- Technical and financial contributions to the state’s weatherization program for low-income households.

The first year of the program was relatively successful. The utilities estimate they reduced electricity use by 35 million kWh per year and peak demand by 16 MW, exceeding initial projections. In 2005, the utilities added commercial new construction and an energy-efficient schools programs, and expanded funding for high efficiency air conditioning incentives in southern Nevada. The Nevada Public Utilities Commission also approved a new policy allowing the utilities to earn their approved rate of return plus 5 percent on the equity-portion of their energy efficiency program funding. This regulatory change has a clear implication: it means it is more profitable for utilities to help their customers conserve electricity than it is to build new power plants!

In June 2005, Nevada enacted legislation that added energy savings from energy efficiency programs to the state’s Renewable Portfolio Standard.³² This innovative policy allows energy savings from utility programs to supply up to 25 percent of the requirements under the renamed clean energy portfolio standard. The clean energy standard is equal to 6 percent of electricity supply in 2005-06 and increases to 9 percent in 2007-08, 12 percent in 2009-2010, 15 percent in 2011-2012, 18 percent in 2013-14, and 20 percent in 2015 and thereafter.

Within months of passage of this legislation, the utilities proposed nearly doubling the budget for their energy efficiency programs. The utilities estimate they will save 153 million kWh per year and reduce peak demand by 63 MW from programs implemented in 2006 alone. Moreover, the utilities are planning further program expansion in 2007 and beyond.

Nevada is quickly becoming a leading state in promoting energy efficiency through enlightened state policies.³³ Nevada is also the fastest growing state in the country, in spite of the fact that most of this growth is occurring in the desert! As policy makers in Nevada are keenly aware, energy and water conservation are essential if Nevada wants to continue to grow.





DOING IT IN THE DESERT

CIVANO, ARIZONA

Located in the Sonoran desert near Tucson, Arizona, the new community of Civano has been designed from the beginning with a commitment to sustainable living. Civano has adopted an ambitious but attainable set of goals, including reducing potable water consumption by 65 percent, and reducing home energy consumption by 50 percent over the 1995 Tucson model energy code. The designers and builders have incorporated numerous energy- and water-saving techniques and measures into Civano's structures, including passive solar siting, water harvesting, the use of recycled construction materials, photovoltaic and solar hot water systems, and super-efficient windows.

As of 2004, homes in Civano used 20 kBtus of energy per square foot per year, thus meeting the home energy consumption goal. The average home in Civano used 21 percent fewer kWh of electricity and 75 percent fewer therms of natural gas than the average Tucson home. In 2004, Civano came close to meeting its water consumption goal of reducing potable water consumption by 65 percent. Overall potable water use for Civano homes averaged 3837 gallons per home per month, as compared to 9208 gallons per home per month for the average Tucson home, a reduction of 58 percent (close enough to 65 percent, in our judgment, to justify considerable self-congratulations).³⁴

saving billions of dollars on their energy bills thanks to these standards. But is the US Postal Service overburdened with thank-you notes from American citizens, thanking legislators or the US Department of Energy for this improvement in their lives and finances? Sadly, no.

Appliance efficiency standards remind us of the benefits that can come from the interesting dance between the authority of the federal government and the authority of the states. The federal government has, currently, set efficiency standards on about forty different products. States are prohibited from adopting tougher efficiency standards on products covered by federal standards, but states can regulate the efficiency of products not covered by federal standards. California has led the nation in developing and enacting minimum efficiency standards at the state level, in advance of federal standards. Other Western states including Arizona, Oregon, and Washington have adopted appliance efficiency standards on some of the products initially regulated by California. At a certain point, if enough states have their own regulations, federal adoption of those standards can make life more consistent, and generally easier, for manufacturers. Indeed, efficiency standards first adopted by California on a wide range of products later became national standards.

Both federal and state appliance standards have proven to be very cost-effective. In most cases, savings on energy bills pay back any additional first cost for consumers in three years or less. And while satisfying rigorous efficiency requirements, appliance manufacturers also make products that meet consumers' other needs and desires.

Getting the Word Out: Consumer Education, Feedback, and Recognition. Consumer education is an important element of energy efficiency programs. While it can be difficult to evaluate

the impacts of advertising campaigns, there is evidence that well-designed information and education campaigns can be effective. For example, a number of low-income home weatherization programs have found that energy savings increase when education is provided along with energy efficiency “hardware.”⁶¹

In the Pacific Northwest, the Northwest Energy Efficiency Alliance (see sidebar on page 42) has been educating consumers about CFLs and Energy Star fixtures through in-store promotional materials, cooperative advertising, and other strategies. About 7.5 million CFLs were bought in the region in 2005, about 50 percent more than in 2004.⁶² Not surprising, a larger fraction of households own CFLs and Energy Star appliances in the Northwest than in the country as a whole

The national Energy Star labeling program is a very important platform for educating consumers about energy efficiency measures. Energy Star products, homes and commercial buildings are promoted by the federal government, utilities, and regional and state energy efficiency programs. Energy Star labeling now covers over fifty different product categories. Consumer recognition of the Energy Star label has reached 63 percent of households nationwide, and recognition is greater in high-publicity areas compared to low-publicity areas.⁶³

Information programs that provide consumers with specific recommendations on how to save energy and achieve the best results from these actions, and target decision makers at the time when a product is being purchased or when a building is being constructed, tend to be most effective. Also, information dissemination tends to be more effective if combined with other policies such as financial incentives or regulations.

Another approach is to provide consumers with feedback on how much energy they are consuming as well as how their energy use compares to consumption in the previous month or year. Improved metering and broadcast technologies make it feasible for utilities to provide this information to consumers at moderate cost. In-house digital displays can show electricity use per day or per month, energy price and bill information on a real time basis, and comparisons to other consumers in the same city or even neighborhood. Experience with in-house displays in low-income households in Arizona suggests that they can help stimulate greater energy conservation.⁶⁴

The opportunity to provide in-house energy use displays presents another opportunity, one linked to our Appeal to Pride. In-house energy displays could also show how a home’s electricity (or natural gas) use compares to others on a street, in a neighborhood, or in a town or city. Households could compete to be best on the block or best in neighborhood, and could see instantaneously how they are doing relative to their neighbors. A utility or city could then recognize and maybe even give prizes to top energy savers on a monthly or yearly basis. Even just a prominent newspaper ad listing families with the lowest electricity or natural gas use by neighborhood might make a real difference, enabling families to strut their “energy-saving feathers.”

“LEED” by Example: Public Sector Initiatives. Many state governments in the West have acted to cut energy waste in public buildings. This saves the government money and provides a positive example for the private sector. Leading public sector initiatives in energy efficiency initiatives in Western states include:⁶⁵



LEEDING THE WAY TO BETTER ENERGY BEHAVIOR

When children step out of line, their behavior is often excused on the grounds that they “don’t know any better.” So, during a person’s formative years, adults educate children about the value of good behavior. We learn to keep our hands to ourselves, speak politely, clean up after ourselves, and all of the other standards of conduct we expect in society. When children are old enough to go to school these expectations of good manners are often reinforced through the ever-popular star system, where children are awarded with colored stars that denote levels of proper classroom behavior. Generations of elementary school teachers have been keenly aware that encouraging competition can be an effective way to produce desired results.

Children evolve into adults and, accordingly, so do our expectations of good behavior. The LEED program, short for Leadership in Energy and Environmental Design, is part of the process of adaptation in becoming a responsible, well-behaved adult. Especially if you are an adult who has any say in how buildings are designed, built, remodeled, or operated.

Based upon a comprehensive approach to sustainable building design, construction, and operation, LEED offers a broad range of programs that assess and encourage the development of sustainable communities. In essence, LEED’s certification system is a grown-up, energy-minded version of stars for good behavior. Using a consensus-based definition of green buildings, the program scores buildings in a variety of categories and awards those responsible for outstanding structures with one of four certification levels: certified (26-32 credits), silver (33-38), gold (39-51), and platinum (52-69). Achieving the various levels of LEED certification is a little like an adult form of earning stars – they let everybody know that the people responsible for this building have displayed good environmental behavior, and thus encourage the competitive part of our personalities, not to mention our pride, to want only the best in energy-smart buildings.

- In the spring of 2003, the Arizona Legislature directed state agencies and universities to achieve a 10 percent reduction in energy use per unit of floor area by 2008 and a 15 percent reduction by 2011.
- In December 2004, California Governor Arnold Schwarzenegger issued an Executive Order requiring that all new and renovated state buildings achieve a LEED silver certification or higher, and setting a goal for all state buildings to be 20 percent more efficient by 2015 (see sidebar).⁶⁶
- Colorado has made considerable progress in using energy service companies (ESCOs) and performance contracting to carry out energy efficiency projects in public schools and state and local government buildings. And in 2005 the governor issued an executive order requiring new and renovated state buildings to meet LEED standards.
- The Texas LoanSTAR program provides low-interest loans for energy-conserving retrofits made in state, county, and local government buildings and independent school districts. The program has funded 187 loans totaling \$235 million since 1989.⁶⁷

Improving the energy efficiency of governmental buildings is a quiet and modest way of leading by example. In line with our earlier recommendation, we would support more in the way of display and self-congratulation in this territory, giving the government officials who have taken up this work the chance to receive more in the way of appreciation and applause.

Pay to Play: Pricing and Tax Policies. Higher energy prices are one way to stimulate greater energy efficiency and conservation. For example, sales of energy-efficient hybrid vehicles tend to rise when gasoline prices increase and fall when gas prices decline.⁶⁸ While the price of commodities such as petroleum and natural gas is determined in the national or global marketplace, state tax and rate design policy can influence the energy prices that consumers pay.





At least four Western states (California, Oregon, Utah, and Washington) have adopted inverted block electricity rates, also known as tiered rates, for residential customers. This means that the cost per kWh increases as monthly electricity consumption rises. If you use more power, you pay more for those “extra” units of power. In California, for example, basic residential tariffs are split into five tiers, with the highest consumption tier nearly twice as expensive per kWh as the lowest tier. This encourages energy efficiency and conservation by giving consumers reason to curtail their consumption to stay within the lower tiers.

Some states and utilities have offered price discounts to encourage greater energy efficiency and conservation. During the 2000-01 electricity crisis in California, customers of investor-owned utilities received this incentive: if they reduced their monthly electricity use by at least 20 percent relative to their consumption in the same month of the previous year, they received a 20 percent discount on the price they paid for their electricity. This program was extremely successful (see sidebar). A similar program in Utah provided a 10 percent discount for 10 percent savings.

A number of Western states have enacted tax credits or other financial incentives for energy efficiency measures and projects, apart from incentives provided by utilities. At the federal level, new income tax credits enacted in 2005 offer incentives for construction of highly efficient new homes and commercial buildings, as well as for home retrofits and purchase of hybrid gas-electric vehicles. The tax credits are available for energy efficiency measures adopted in 2006 and 2007, but they could be extended by Congress. Several states – including Idaho, Montana, Nevada, and Oregon – supplement the federal tax credits with state tax credits for some energy efficiency measures. (See Appendix B for a rundown of federal and state tax incentives.)

What Would Your Mascot Be? Regional Cooperation. States within a region often face similar issues when developing or deploying energy efficiency and conservation programs. There is thus good reason to create and to participate in regional alliances to support energy efficiency implementation and innovation. The Northwest Energy Efficiency Alliance (see sidebar) has had considerable success in accelerating the adoption of cost-

THE 2000-01 CALIFORNIA ENERGY CRISIS

ENERGY CONSERVATION TO THE RESCUE

California adopted legislation in the mid-1990s that partially deregulated electricity supply. The goal was to introduce more competition in order to lower electricity prices. But due to flaws in this policy, market manipulation by Enron and other companies, and poor oversight and regulation, California experienced temporary power shortages and severe electricity price spikes in 2000 and early 2001. Further electricity shortages and rolling blackouts were forecast for the summer of 2001.

In response, the state of California and its electric utilities rapidly ramped up their energy conservation programs. In fact, it was the only thing California could do to avoid further disastrous power outages. About 33 percent of households and 25 percent of businesses participated in a program whereby the utilities offered a 20 percent reduction in the price of electricity if the consumer cut electricity use by 20 percent or more relative to the same month the previous year.³⁵ Energy conservation rebate and promotion programs also were expanded. In total, households and businesses in California reduced their electricity use by about 7 percent and peak demand by 10 percent in the summer of 2001 compared to levels the previous year.³⁶ The predicted blackouts that summer did not occur, due in large part to successful energy efficiency and conservation efforts.

DOING IT IN THE RAIN

THE NORTHWEST ENERGY EFFICIENCY ALLIANCE

The Northwest Energy Efficiency Alliance (NEEA) is a non-profit organization supported by electric utilities, state governments, public interest groups, and energy efficiency industry representatives. These entities have worked together to make affordable, energy-efficient products and services widely available in the marketplace in Idaho, Montana, Oregon, and Washington. NEEA was founded to complement – not replace – the strong state and local utility energy efficiency efforts in the region.

Many of NEEA's projects aim at increasing the demand for and supply of energy efficiency measures, removing barriers to the adoption of these measures in the marketplace. Projects target residential, commercial, agricultural, and industrial sectors. A number of the projects provide information and training on such topics as supporting building energy code compliance and adoption of best practices in industrial energy management. NEEA has had great success in expanding the market for CFLs, Energy Star appliances, and Energy Star windows in the Northwest.

NEEA estimates its activities during from 1997 to 2005 reduced electricity use in the region by about 1.3 billion kWh per year.³⁷ This is equivalent to about 0.8 percent of annual electricity use in the four-state region. By 2015, NEEA and related utility efforts are expected to save the region 5.0 billion kWh per year, enough to offset the need to build two medium-size power plants. NEEA's efforts have saved electricity at a cost of about one cent per kWh on average. This is much less than the wholesale cost of power in the region which is on the order of four cents per kWh.³⁸

effective efficiency measures in the four Northwestern states. Other Western states could try to replicate what the Northwest Alliance has done. For example, Arizona, Nevada, New Mexico could form a Desert Southwest Energy Efficiency Alliance, while Colorado, Utah, and Wyoming could form a Rocky Mountain Energy Efficiency Alliance. Given the power of the competitive aspect of human nature, these consortiums could then compete fiercely for the annually awarded title of Most Effective Regional Alliance!

GOODBYE, EITHER/OR. . . HELLO BEST PRACTICES

Our policy review provides a number of lessons for citizens (also known as consumers), businesses, and policy makers in the West. First, Westerners are pioneering new ways of dealing with our energy challenges, refusing a false and unnecessary choice between an entirely unregulated market and totally unrestricted governmental powers. Building energy codes, appliance standards, and utility regulations are playing an important role in advancing energy efficiency. But so too are educational, incentive, and pricing initiatives. Such efforts encourage consumers and businesses to act in their own self-interest, producing and purchasing attractive, energy-efficient products, homes, and commercial buildings – products and buildings that go well beyond minimum efficiency requirements.

Second, many solutions to the market failures and barriers discussed earlier in our report are already in place somewhere in the region. We could save a great deal of energy simply by adopting these “best practices” throughout the West. Message to policy makers: have you established energy savings goals, reformed utility regulations, or updated your city or state's building energy codes lately? If you haven't, we suggest you follow the lead of Utah Governor Huntsman, the California Public Utilities Commission, the Fort Collins City Council, and other energy efficiency leaders.

Last but not least, what are you waiting for? Have you outfitted your home or business with CFLs, Energy Star appliances, and other efficiency measures yet, and claimed your utility rebate or tax break too? If you haven't, maybe your neighbor or competitor has. There is no longer a good excuse for delay.



NOW FOR THE TOUGH PART: TRANSPORTATION AND ENERGY EFFICIENCY CAN A REAL COWBOY OR COWGIRL DRIVE A HYBRID WITHOUT COMPROMISING DIGNITY?

The fuel we put into cars and other vehicles constitutes much of the energy we use and also much of the energy we waste. In fact, households on average purchase more energy in the form of gasoline and diesel fuel than all other forms of energy combined.⁶⁹ As of 2001, Westerners owned 42 million vehicles, and they drove those cars 478 billion miles per year. That is an astronomically large distance. Literally. It's so large that one has to think on a planetary scale to put it into perspective. Westerners drove the equivalent of over a million roundtrips to the moon and back to Earth, more than 2500 roundtrips to the sun, or a full 130 roundtrips to the outer edge of our solar system, where poor demoted Pluto trolls the perimeter doing its best impersonation of a planet.⁷⁰

To make such a long collective journey in 2001, Western vehicles consumed 24 billion gallons of fuel, which cost the drivers about \$34 billion collectively. With the recent rise in gasoline prices (just think back to what a gallon cost several years ago!), consumers are spending even more for gasoline and other motor vehicle fuels today.

We do seem pretty smitten, certifiably head-over-heels, in love with our cars, pick-ups, and SUVs. Automobiles have become closely associated with the Western landscape in the last decades. In advertisements, automotive companies commonly place cars in the stunning scenery of canyons, mesas, and mountains. Even the vehicle names invoke the ambience of the West, particularly in the marketing of sport utility vehicles and pickup trucks. Today's car companies market their SUVs and trucks as vehicles for rugged, adventurous, and independent living. Many of the most popular trucks and SUVs sold today have names that correspond to Western places, features, occupations, identities, and cultures. Some take advantage of the appeal of specific Western places, such as the Dodge Durango, Chevrolet Tahoe, GMC Sonoma, and the Hyundai Santa Fe. Other models try to harness the

romance and nobility of Western occupations and identities, claiming names like the Chevrolet Trailblazer, Jeep Cherokee, Nissan Pathfinder, Mercury Mountaineer, Ford Ranger, Dodge Dakota, and Jeep Wrangler, for example. The Isuzu Rodeo, the Nissan Frontier, and the Buick Rendezvous appeal to Western cultural imagery.

These images have contributed to the idea that Westerners are more enamored with and more dependent on gas-guzzling vehicles than are residents in other regions. But how accurate is that image?

It is our privilege, once again, to defend the reputation of Westerners and to put to rest a few myths about the driving habits and vehicle choices of Westerners. The good news, again, is this: we may be further down the road (so to speak) of recovery from this love affair with fossil fuels than you may suspect.

First, we can debunk the myth that families in the West drive their vehicles more than families in other parts of the country. In fact, as of 2001, members of the average household in the West drove 22,300 miles per year, slightly below the national average of 23,100 miles per year. Likewise the average household in the West consumed 1,119 gallons of gasoline and other motor fuels per year, slightly less than the national average of 1,143 gallons per year.⁷¹ This is not a dramatic difference, but given the scale of Western states, it is still striking.

Second, we can moderate the charge that sport utility vehicles and pickup trucks predominate in the Western part of the country. As of 2001, SUVs and pickups represented about 33 percent of vehicles in the West, compared to 31 percent in the country as a whole. These less efficient vehicles are slightly more common in the West than elsewhere, but not greatly so.

THE LIMERICK PEDESTRIAN PLAN

AN INVITATION AND AN APPEAL TO
PLEASURE FROM PATTY LIMERICK

***Pedestrian:** (1) going or done on foot; walking; (2) lacking interest or imagination; prosaic; dull, as a literary style, etc.*

In the early twenty-first century, one set of frequent newspaper stories describes the American people's struggle with obesity and susceptibility to cardiovascular illness. Meanwhile, another set of frequent newspaper stories portrays the American people's vexation with foreign oil dependence and cyclically rising gasoline prices.

In some significant ways, these are the actually same story.

Headlines proclaiming the chubby and plump condition of Americans are omnipresent: "Americans Grow Fatter by the Year," the *Los Angeles Times* summarized a report from the Trust for America's Health, noting that the "economic costs" of obesity are "devastating."³⁹ The *New York Times* summarizes the state of Americans as "fatter, taller, and thirstier." The American people, for all their other virtues and achievements, "remained the fattest inhabitants on the planet."⁴⁰ Besides risks to long-term health, obese Americans pay a very literal cost: as the *New York Times* succinctly put it, "More Pounds, Fewer Dollars," and "Being Overweight Can Limit Wealth as Well as Health." People only thirty or forty pounds overweight can face higher life insurance premiums and higher medical expenses, all the while manifesting a tendency to make less money and to accumulate less wealth.⁴¹ Extra expense comes into play in surprising places: "To Save Cash on Gas, Lose Some Weight," declared the Associated Press, reporting on a study finding that, "simply put, more weight in the car means lower gas mileage."⁴² The choice of transportation methods knits together both the diagnosis and the solutions to the nation's parallel troubles: a population tending to the portly, and an expanding demand for energy.

Walking has an astonishing capacity to trim off pounds while also clearing the mind, transporting the self to desired destinations, and conserving fossil-fuel-derived energy. In an article describing

the conduct of once-overweight people who not only lost weight but kept it off, a giant part of their success was attributable to the activity of walking. "Walking is huge," the obesity researcher James O. Hill said. Of the participants in the survey, 28 percent got their exercise "mostly walking" and 49 percent "combin[ed] walking with cycling, aerobics, or lifestyle changes such as parking further away."⁴³

I was no particular enthusiast for or practitioner of walking until a confrontation with tragedy delivered an unexpected consequence: the onset of a completely new level of physical vigor and the loss of forty pounds. Over the last two years, I have spent considerably less time sitting in automobiles and considerably more time wearing out new pairs of walking shoes. My new habits reduced my weight and my cholesterol; they improved my mental health and my clarity of mind; and they reduced the frequency of my visits to the gas pump.

But no one should start this program the way I did.

My husband, at age fifty-six, died of a sudden stroke. We had been together for thirty-two years. I lost the first five or six pounds simply because food was not appealing or interesting or even relevant. But then the process of losing weight became chosen and intentional, and altogether a remarkable experience in proving that I had a capacity to conduct myself with purpose and discipline. Grief was the beginning of my changed practices, but at least partial recovery from grief was one of the outcomes.

So what I recommend here is the Patty Limerick Pedestrian Plan, or what I did after the initial weeks of intense grief after my husband's death. The plan meets the definition of "pedestrian," quoted above, though I must say that the second definition ("lacking interest or imagination; prosaic; dull") is a little wounding, even if it is also pretty accurate. But too many plans for weight loss are not pedestrian enough: they are high-falutin' and complicated; they require special equipment or special food; they require you to measure this, that, and the other in your intake, and to flee in horror from the temptation posed by forbidden food or drink. In other words, these nonpedestrian plans force you away from normal life in a manner rather reminiscent of jailers and wardens incarcerating a criminal, leaving you to look yearningly at normal life through the bars of your prison cell of a diet.



No wonder it's hard to stay in compliance with such punitive regimes.

So what's the alternative?

Walk as much as you can.

On one day three months into my widowhood, I set off to walk across campus to give a lecture in a friend's class. I had left my office a little too late, and as I trudged along, I said to myself, "Well, for heaven's sake, you're late. So why don't you try walking faster?"

Well, what a concept! I gave it a try. The sensation was interesting and novel. I thought I might try to keep it up.

When I was invited to breakfast, lunch, or dinner somewhere in town, I walked. Since I had never been much of a pedestrian before, on nearly all of these walks, I was on my "maiden run" ("maiden walk" doesn't sound exactly right, though at age 55, it is wonderful to be associated with the word "maiden" in any phrasing), so I had no idea how long it would take to get from Point A to Point B. This uncertainty reinforced the intent to walk faster, since the desire to get to the destination and not leave a friend sitting alone looking at her or his watch effectively picked up my pace.

"Destination walking" is definitely the way to start (the authorities call this "integrative exercise"). It spares you the sorrow and burden of exercising for the sake of exercise. But at a certain point, a gear located somewhere in the self kicks over, and walking becomes something you want to do, something you must do, and at that point, heading off to arrive at a particular destination at a particular time becomes unnecessary as a motivation. After the transition, if you don't walk, you feel restless, uneasy, and more than a little batty. It did not surprise me when I learned that the excellent walking shoes I had acquired carried the "honesty in advertising" name, Addiction Walkers. One indication of the fact that you have crossed over occurs in parking lots: on occasions when you must drive, when you find a parking place close to the store or restaurant you are going to, you feel disappointed that you will have so little distance to walk.

Walking is simply a miraculous force for weight loss. It is, of course, important to add that I shifted my eating habits, becoming a

consumer of vast amounts of fruits and vegetables (brought to me, alas, by a giant network of fossil-fuel-subsidized crop production and transport!) and ate comparatively little in the way of foods centered on carbohydrates or sugars. But there was nothing abstemious about my intake of food: when some friends expressed concern about whether I was eating enough, other friends who had seen me at work often used the phrase, "I wouldn't worry; she eats more than anyone!" In matters of hearty appetite, and in other matters as well that, in the interests of discretion and Parental Guidance ratings, I won't spell out, walking, weight loss, a sense of fitness, and general well-being add pleasure to life in many dimensions.

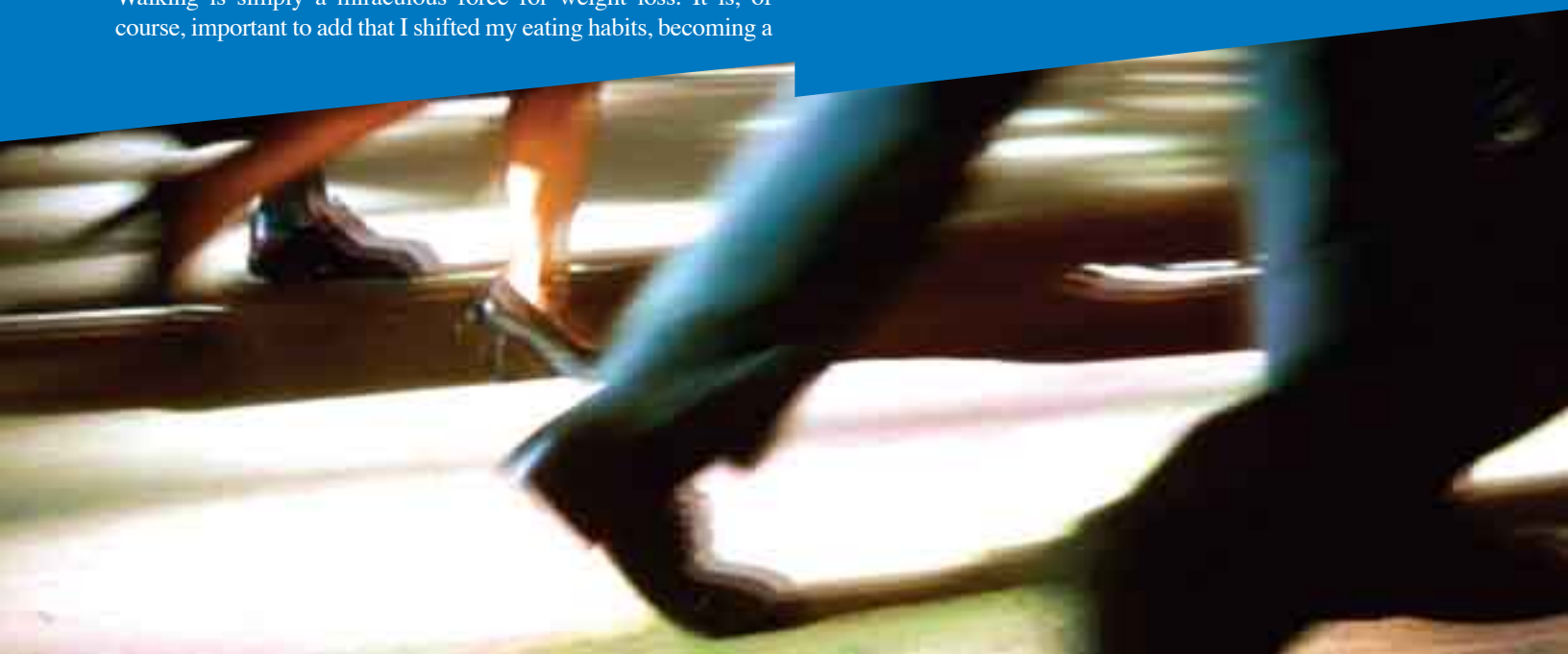
And now a word to my fellow workaholics. Yes, you are absolutely right; walking takes time that you think you don't have. You have to be writing and planning the next projects and holding meetings. You have no time to walk.

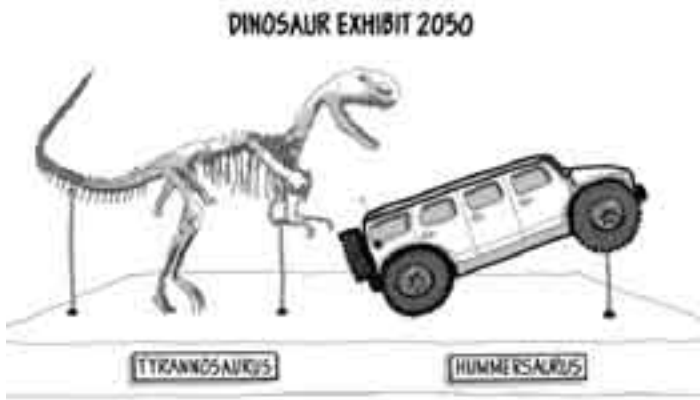
So how to counter that?

As you set out for a walk, choose a problem that has you stymied in your work. Devote the walk to thinking about that problem. Move it around in your mind. Approach it, and then retreat from it, and then come around from behind at it. Here is a very likely outcome: in the course of the walk, the problem that simply sat in your path, blocking your motion and your progress, will submit to solution, or sometimes even to a reconceptualization that transforms it into more of an opportunity than a problem. By taking the walk, you will actually save time and increase your efficiency at work. The act of walking will, in very down-to-earth ways, set you, and your imagination and your problem-solving capacity, free.

This pedestrian plan delivers energy efficiency and conservation in a wonderful package with pleasure and productivity. So tell gravity to back off. Walk as much as you can. Eat a great deal. Solve your problems as you move energetically over the planet. Welcome to the Limerick Pedestrian Plan.

I am proud to have your company.





And this may surprise you: hybrid gasoline-electric cars are more common in the West. In 2004, California led the nation in hybrid car sales, registering just over 25,000 new hybrid vehicles (out of about 88,000 registered nationwide). Washington recorded the third highest rate of new hybrid registrations in 2004, just behind Virginia. Three of five top markets for hybrid cars are in the West – Los Angeles, San Francisco, and Seattle-Tacoma. Westerners are also more open to the idea of buying a hybrid car in the future. A recent poll showed that, compared to other regions, a higher portion of Westerners said that high gas prices will influence their next vehicle choice. Westerners were much more likely than residents in other regions to consider the hybrid option.⁷²

The automobile has exerted a great deal of power over the design and configuration of human settlement in the West. In the very recent past, the interior West was a remote area. Many parts of the interior West seemed destined to have small populations because they were too hard to reach and too far from the centers of economic activity. But the advent and rapid spread of automotive travel changed all of that. Once remote and inaccessible areas are now within easy range for commuters (not to mention telecommuters), and a web of paved roads has brought many of these places – now classified as exurban – into the sphere of our sprawling metro areas. Cars have given rise to easily accessible subdivisions and developments in spaces that once only the hardiest (and least socially inclined) of souls might have considered calling home. It is this spatial arrangement, much of it a result of post-World War Two change, that makes advocacy of public transportation a constant challenge. The image of Westerners paired with their trusted companion, the SUV, is a convenient marketing tool that plays on the dreams of consumers who watched a few too many Western movies at a formative age, with the SUV replacing the horse as the negotiator of rugged terrain. The happy reality is that Westerners are just as taken with vehicles whose names – Insight, Civic, and Prius (which means, remember, “ahead” – a term of joy and hope for anyone dealing with crowded roads and highways) – play to a more hopeful vision of the future of the American West.

WHY DON'T WE DO IT ON THE ROAD?

Through much of this report, we have been congratulating, celebrating, and generally behaving like exuberant high school cheerleaders whose team is on a winning streak. But every once

in a while, our team loses some yardage, and we must shift from a cheer to a sigh. Here is one of those occasions: In the West and throughout the nation, the average fuel economy (miles per gallon) of new vehicles has declined over the past two decades, a result in large part due to the growing popularity of inefficient SUVs, pickup trucks, and minivans (collectively considered light trucks). The federal government has contributed to this trend by declining to significantly raise the fuel economy requirements imposed on vehicle manufacturers, and today's new vehicles are far more powerful than those produced fifteen or twenty years ago.

The desire to move small units of people around in large, heavy, metal containers is not humanity's most reasonable preference. But one advantage of our current high level of inefficiency and waste in transportation is that individuals and families can do a great deal to conserve energy. (The logic here – the more waste, the more opportunities to conserve – may not dazzle you instantly, but it gets better with more contemplation!) One obvious route to conservation is to cut down on driving: through greater use of public transportation where practical; increased use of ridesharing and thus fewer single passenger trips; and more travel by bicycle or foot. In addition to saving gasoline, driving less (and walking and biking more) will save money, reduce pollutant emissions, and improve your health.

Wise choice in vehicles represents another important opportunity to conserve energy. The most fuel-efficient passenger vehicles have composite city-highway fuel economy ratings of 45 to 60 miles per gallon (MPG), compared to 10 to 15 MPG for the least efficient passenger vehicles. A smaller vehicle usually means a more fuel-efficient vehicle. But within many popular vehicle categories, the most efficient vehicles are at least twice as efficient (that is, they double the fuel economy) as the least efficient vehicles.⁷³ The most efficient vehicles also tend to produce lower pollutant emissions than less efficient vehicles.

As many people know, the most fuel-efficient vehicles now available are gas-electric hybrid vehicles such as the Toyota Prius, the Insight and Civic hybrid from Honda, and the Ford Escape hybrid. These vehicles contain a smaller gasoline engine that operates closer to optimum efficiency by charging/discharging batteries depending on the power demand of the vehicle. Hybrid vehicles also recover energy when the car is braking. Today's hybrids contain electric motors to boost power output, but they are not yet plugged into the grid for electricity.

While there are relatively few gas-electric hybrid vehicle models on the market today, many more will be launched in the next five years. But not all hybrid vehicles are actually fuel-efficient. General Motors, for example, produces hybrid versions of their Chevy Silverado and GMC Sierra pickups that get about 18 to 19 MPG, only about 10 to 15 percent better mileage than the regular versions of these out-of-scale gas guzzlers.⁷⁴ Obviously, a buyer can get much higher fuel economy from a car smaller than these indulgently large vehicles, whether it is a hybrid or not. And to sweeten the deal, the federal government and some states offer tax incentives and other inducements to consumers who go hybrid (see Appendix A).



VIRTUAL OIL FIELDS

IMPROVING VEHICLE FUEL EFFICIENCY

Increasing the efficiency of lights, refrigerators, and other appliances is frequently viewed as a conservation power plant (see the case study on Austin Energy on page 36), virtual power plant, or “negawatts.” The same principle can be applied to other forms of energy – saving energy through efficiency improvement or conservation can be viewed as an alternative source of energy supply. For example, improving vehicle fuel efficiency can be seen as an alternative source of oil.

What if we improved fuel efficiency of the entire fleet of passenger vehicles (cars, suvs, pick-ups, and minivans) by just one mile per gallon? Doing so in all Pacific and Intermountain states would save about 4.2 million gallons of gasoline per day. This is more than all of the oil produced by the 6862 operating oil wells in Colorado as of 2005, which was 2.65 million gallons per day.⁴⁴ Thus, buying more fuel efficient vehicles, as well as maintaining them and driving them efficiently, can be an important “virtual oil field.”

Along with cutting back the miles you log and choosing a more fuel-efficient vehicle, there are a variety of driving and vehicle maintenance practices that can conserve fuel:

- Obey the speed limit. Fuel economy tends to fall at speeds above 60 MPH. When you’re driving on the highway, use cruise control to counteract your lead foot tendencies.
- Avoid rapid acceleration. There is no better way to show that you are taking your time reaching maturity than by peeling away from a stop sign or stoplight.
- Plan trips to avoid rush hour and stop-and-go driving.
- Keep your tires properly inflated – fuel economy goes down about 1 percent for every three pounds below recommended pressure.
- Replace your worn out tires with low-rolling-resistance tires that have treads designed to minimize energy losses from tire deformation and therefore increase gas mileage.
- Keep your vehicle tuned up and change the oil regularly and on schedule.

And last but not least, consider telecommuting if your employer allows it. This will save you time, reduce aggravation in rush hour traffic jams, and generally clear your head, as well as conserve energy.

TRANSPORTATION AND PUBLIC POLICY: CHANGE BEYOND INDIVIDUAL ACTION

As was the case for electricity and natural gas, there are very good reasons for governments to adopt policies and programs that will lead to oil savings by helping to overcome the barriers to more efficient vehicles as well as encourage less vehicle use. Among these reasons are the benefits it will bring to the nation and world by reducing our petroleum imports and dependence on hostile and unstable nations for petroleum, improving urban air quality, and cutting down on emissions contributing to global warming. We discuss these “externality benefits” in greater detail in the next section. Below we discuss some of the main actions that governments can take to foster more efficient gasoline use in particular.

Helping Us Get Out of Our Cars. A variety of policies can cut down on car and light truck use, and facilitate use of alternative modes of transportation. These policies include increased investment in mass transit (bus and rail) systems, reduced fees for mass transit use and/or increased fees for driving and parking particularly in crowded downtown areas, locating new housing and commercial development near public transportation systems (also called transit-oriented development), and limiting urban sprawl. These policies can reduce road congestion, air pollution, and transportation costs, while also reducing gasoline use.⁷⁵

Many Western cities have taken actions to reduce urban sprawl and increase use of mass transit, biking, and walking. These efforts range from passing bonds to fund bus and light rail system expansion,

TAKING ON DETROIT

THE LEFT COAST LEADS AGAIN

States are prohibited by federal law from adopting fuel economy standards on new vehicles sold within their boundaries. But federal law allows California to establish vehicle emissions standards that are more stringent than the federal emissions standards, and other states can then adopt California's emissions standards. In 2002, California passed the Pavley bill, named for its sponsor, State Representative Fran Pavley. This law calls for the regulation of greenhouse gas emissions from vehicles sold in California. Accordingly the state Air Resources Board enacted standards on greenhouse gas emissions from cars and light trucks in 2004. These standards take effect in 2009 and should lead to a 22 percent reduction in CO₂ emissions by 2012 and a 30 percent reduction by 2016, compared to emissions of vehicles sold as of 2002.⁴³ Since it is not feasible to capture and dispose of CO₂ emissions from a vehicle, this measure effectively requires manufacturers to improve vehicle fuel economy in order to meet the standards.

Other states, including Oregon and Washington (as well as eight East Coast states), have adopted the California greenhouse gas emissions standards since the specific regulations were issued in 2004. However, auto manufacturers and California auto dealers have sued the state, alleging that these standards violate the federal law that bars states from regulating vehicle fuel economy. The courts will decide the legality of the Pavley law.

changing zoning laws to increase urban density, providing free or low-cost bus/transit passes to downtown workers, and charging higher parking fees and using the proceeds to support mass transit use, construction of bike lanes, or car/van pools. Among Western cities, Portland, Oregon, has made good progress and received considerable attention for its pioneering urban growth boundary, investments in light rail lines rather than highway expansion, and integration of transit and building development.⁷⁶

Gasoline Taxes. Taxing gasoline and other forms of energy is another way – though, heaven knows, a politically complicated way – to encourage energy efficiency and conservation. Gasoline taxes in the United States are relatively low compared to tax levels in most other industrialized countries: at this writing, they are only 18 cents per gallon at the federal level and average 27 cents per gallon at the state and local level.⁷⁷ Even though the idea of increasing taxes in general is unpopular (to indulge in spectacular understatement), there is nonetheless growing discussion of and support for raising gasoline taxes as a way of reducing US dependence on foreign oil. A public opinion poll conducted in February 2006 found that 55 percent of those polled said they would support an increase in the gasoline tax if it did, in fact, reduce oil imports, and 59 percent would support it if reduced gasoline consumption and global warming.⁷⁸ People's support for increasing taxes on fuels appears to grow if the tax revenue is dedicated to popular activities like developing alternative energy sources and new energy technologies.

Vehicle Fuel Economy and Carbon Dioxide Emissions Standards. The federal government adopted energy efficiency standards for cars and light trucks, known as corporate average fuel economy (CAFE) standards, in 1975. These standards were a major reason why vehicle manufacturers nearly doubled the average fuel economy of new cars between 1975 and 1988. But the CAFE standards reached their maximum level in 1985; only small increases in the standards for light trucks have been adopted since then. And because of the consumer shift from cars towards less efficient SUVs, pickup trucks, and minivans (all categorized as light trucks), the average fuel economy of new passenger vehicles (cars and light trucks combined) declined over the past twenty years.

Strengthening the CAFE standards is technically and economically feasible according to a wide range of studies, including one performed by the National Research Council, part of the National Academy of Sciences.⁷⁹ But US vehicle manufacturers strongly oppose raising the standards, and these companies have a great deal of influence in Washington, DC, a combination that has so far deterred elected officials from significantly raising the standards. Polls make it clear that consumers have a favorable attitude toward greater vehicle energy efficiency. But in this area, policy makers have not responded to consumer (also known as voter) sentiment.

The automobile companies have a moment of greatness ahead of them, when they come to an awareness of the enormous value in public relations and marketing that they would harvest if they shifted their position on CAFE standards. This is a prime opportunity to apply the maxim, "Good capitalists get paid for solving big problems." Meanwhile, as the automobile companies miss this opportunity for cultivating a more favorable image in the public mind, US gasoline consumption and oil imports have been steadily rising; the nation's gasoline consumption in 2005 was 34 percent greater than in 1985, the year the CAFE standards for cars maxed out.



LOOKING BEYOND THE LOCAL

THE GLOBAL CONTEXT

While we are big supporters of regional thinking, when we talk about energy, we must place the West and Westerners in the context of global population growth, changes underway in developing nations, constraints in natural resources, and climate change.

As the dramatic growth of the world's population makes clear, human sexuality is one of the great forces of the universe, and it is (so far!) a force entirely beyond the control of the Center of the American West and the Southwest Energy Efficiency Project. Doing our best to defend energy efficiency and conservation from the charge of being “not sexy,” we have tried to write as seductively as we can about conservation and efficiency. However, the births of many more human beings around the planet seem to be making our efforts irrelevant. Alas, nothing in either the Center's or SWEEP's mission statement or bylaws gives us the authority to say who should and should not reproduce. This is a personal and private choice, even as the aggregate result of all those choices builds up as an enormous pressure on the world's energy resources.

We applaud the education of women worldwide. We urge all human beings to think hard about their responsibilities to the babies who they might bring into being. And at that point, we reach the limits of our right to tell anyone what to do. We realize that an extremely effective form of energy conservation would be a dramatic decline in the world population. We cannot think of a humane way to achieve this.

And thus we shift back to a necessary realism, and an even more necessary humility. There is little consistency or moral inspiration on display when citizens of prosperous, developed countries tell citizens of developing countries that they must not aspire to the comfort and convenience that comes with abundant energy. Thus, one of our greatest priorities in the twenty-first century must be securing an adequate, and environmentally-sound, energy supply for emerging nations such as China, India, and those in Africa. These nations need more energy, specifically

modern sources of energy such as electricity and fossil fuels, to power economic growth and improve their standards of living. World energy consumption could increase by as much as 57 percent by 2025, with much of that growth occurring in nations that have yet to fully industrialize.⁸⁰

Finding resources to meet a growing world demand for energy will be even more difficult, in economic, environmental, social, and political terms, if we consume energy inefficiently. The more we can do to reduce energy waste and slow the growth of demand through efficiency and conservation, the greater the well-being of the planet and its natural and human communities. The US, with 5 percent of the world's population, consumes nearly 25 percent of commercial energy worldwide (ignoring fuelwood and the like collected in Third World countries). Put simply, we cannot expect China, India, African nations, or other developing nations to seriously take up energy efficiency and conservation if we rich Americans do not.

To a very significant degree, our fortunes still rise and fall with petroleum. Accordingly, warnings about the approaching peak of world oil production and the inevitable end of the age of oil cast their shadow over our lives. Many of these warnings come loaded with grim forecasts for the global economy and dire descriptions of the political and social dilemmas bearing down upon us. We are not on the verge of running out of oil. Still, as we approach the peak of world oil production, we are reaching the limits of our ability to find and extract high-quality and, above all, *cheap* oil. This is a very big deal.

Oil is the lifeblood of transportation. As our demand for oil increases, and our access to high-quality, easily extractable oil diminishes, the price of oil will continue to climb, making it more expensive for us to transport ourselves and our goods. High oil prices add to the cost of just about every product or service. That cannot be good news for our regional, national, and global economies.

A consideration of the phenomenon known as global warming leads to a similar conclusion. We are aware of the fact that some people with solid educations and good intentions remain unconvinced of the role of human activity in causing climate change. We do not want to lose this constituency as allies. So stay tuned for a future Center of the American West report on “What Every Westerner Should Know about Global Warming,” and in the meantime, permit us to assert the following: the reality of global warming – whatever its causes – offers another strong rationale for conservation and efficiency.

The United Nations Intergovernmental Panel on Climate Change (IPCC) is the gold standard for interpretation and synthesis of climate science. Created in 1988, the IPCC has since served as an authoritative voice for the “objective, balanced, and internationally coordinated” assessment of scientific knowledge about Earth’s climate. The panel is a cooperative effort that includes the majority of the world’s most distinguished climate scientists. Their periodic reports summarize the best information available on the topic, ensuring accuracy and concord through a three-step process in which reports are prepared by teams of experts and then vetted by a second team of experts and governments before being approved line-by-line at a group congress. For assessing complex questions of climate science, the IPCC is one of the best instruments for mobilizing scientific intelligence that humanity has conjured into being.

The global climate is getting warmer, and most of the increase in temperature since the mid-twentieth century is “very likely” the result of human activities, especially the production of greenhouse gasses from the consumption of fossil fuels. Such is the primary conclusion of the IPCC’s fourth report on climate change, released in 2007 with the approval of 113 governments, including the United States. The term “very likely” denotes a probability greater than 90 percent, which represents an increase in certainty from the previous assessment report in which scientists only felt comfortable declaring the human influence “likely” (greater than 66 percent chance). They are still short of “virtually certain,” but according to the IPCC, the growing preponderance of evidence no longer leaves much room for doubt. Among the detrimental effects resulting from global warming, the report emphasizes the potential rise of sea level that could displace millions of people living in low-lying coastal regions, the probability of hotter and lengthier summers, longer and more intense droughts, and a less reliable water supply in regions like the West that depend on mountain snowpack to meet their needs. Even if we were to stabilize greenhouse gas emissions today, the climate would continue to

warm and seas would continue to rise for centuries. But continued emissions at or above current rates would very likely provoke more severe changes than any that have been observed so far.⁸¹

So the most credentialed and certified of scientists have said that global warming is happening, that it originates at least in part from human-induced greenhouse gas emissions, and that it is likely or very likely to cause some large, negative global effects. But they also admit that some uncertainty remains when it comes to declaring the magnitude of these effects or the human role in producing them.

What does this mean for energy efficiency and conservation? Given the IPCC’s findings and recent disturbing evidence of rapid warming in the polar regions, what should you do? Do you put money into insulating your attic? Do you invest in compact florescent lamps? Do you consider buying a car with greater fuel efficiency? Do you reduce your greenhouse gas emissions by shifting to renewable energy sources?

The answer to all of those questions is yes, but for various reasons. One reason is that the answer would still be yes with respect to energy efficiency if the IPCC had declared global warming to be a hoax and a fraud. These measures would still save you money and cut down on pollutant emissions that are harming public health across the region. But the weight of judgment from the world’s finest scientists surely settles the case. If Earth is our home, and if we follow the principles that guide our treatment of the houses in which we live, then our course of action is clear: we should act as we would if we were trying to balance cost with safety in the maintenance of those houses.

Say you have bought an old house with old wiring. There is no guarantee that the wiring will cause a fire, but there is also no guarantee that you will be exempt from this danger. Do you replace the old wiring in the house that shelters your spouse, your kids, your pets, your treasured photos, the model train you have spent hours perfecting, and the love letters exchanged by your parents?

You act responsibly, of course, because you are a responsible person, because you care about your family, and because this planet is your home. And acting responsibly means accelerating energy efficiency and conservation efforts in our homes, workplaces, and vehicles. This will reduce carbon dioxide emissions from the burning of fossil fuels, and thereby slow global warming.



HISTORICAL CHEER

OUR CURRENT ENERGY HABITS HAVE SHALLOW ROOTS AND COULD CHANGE FAST

For hundreds of years, human beings did not write reports preaching the gospel of energy efficiency and conservation and exhorting one another to convert and take up these practices. On the contrary: They simply lived the gospel.

When wood was the principal source of warmth in cold seasons, and human and animal muscle raised crops, constructed buildings and roads, and transported goods and people, unnecessarily wasting energy was about the dumbest thing a person, a household, or a community could do. This is not to say that our predecessors on the planet lived at a high level of principle or used resources with wisdom and grace. Quite the reverse – principle took a second place to the fact that if you wasted energy, you were on a direct route to discomfort, and maybe injury or death. Wasting energy carried unmistakable penalties of hunger, exposure, chill, and exhaustion.

But *homo sapiens* is a complicated species, and, in many societies, a skill in and a commitment to the wasting of energy served as the job description for a small sector of the population. This was definitely a niche occupation: royalty, aristocrats, elites shouldered the burden of engaging in indulgent, profligate, luxurious, and generally over-the-top energy use. By and large, these members of the privileged class did their job well, and enthusiastically, while the vast majority of human beings practiced energy efficiency and conservation, without ever having the occasion to invent such a term.

And then, over the last two centuries, the Fossil Fuel Age knocked apart these arrangements. Coal, oil, and natural gas took the burden off human and animal muscle. In the United States and Europe, the Era of Fossil Fuel, by enormously reducing the necessity for the labor of men, women, and children, also turned out to be the Era of the End of Slavery and the Era of the Spread of Democratic Government. This was not a coincidence.

When we contemplate the gradual decline of the Fossil Fuel Age, it would be smart to remember that the tremendous power unleashed by coal, oil, and natural gas set the conditions, in the most literal sense, for the emancipation of human beings.

That power also took what had been aristocratic privilege – the right to use energy freely, thoughtlessly, even witlessly – and extended that privilege to the common folk (to use a term not often heard these days). Abundant and inexpensive fossil fuel, in other words, provided millions of human beings with the opportunity to become wasters of energy. They were, heaven knows, quick studies and picked this up fast. But the fact remains that the wasting of energy was a talent that had to be learned – and learned in defiance of centuries of human custom and practice.

A skill for wasting energy is not a feature of basic human nature. Quite the opposite: as a species, we are novices and newcomers when it comes to very curious practices like keeping an empty house at a toasty winter temperature, heating our driveways to melt accumulating snow, or using gasoline-powered leaf-blowers in lieu of muscle-powered rakes or brooms (or even more peacefully, allowing the solar-energy-provoked winds to carry our leaves to the neighbors' yards).

This report is a not proposal that we retreat to Paleolithic or even pioneer modes of living. On the contrary, this is a much more modest request that we recognize that our current habits of energy use are very recent acquisitions, and they are thus flexible, pliable, and infinitely subject to change.



THE APPEAL TO PLEASURE

SAVING ENERGY CAN BE FUN

Fellow Westerners, when we invite you to practice energy efficiency and conservation, we are setting you up for dramatic *sacrifice* or *deprivation*. On the contrary, energy efficiency and conservation can and should be pleasurable! This is not an easy or obvious sell. Clearly certain energy efficiency measures and practices, such as stuffing more insulation under the attic floor, weatherstripping those leaky windows and doors, getting the air conditioner tuned up, or buying an energy-efficient water heater, will not meet everyone's definition of a good time. But let's take a closer look at some newer energy efficiency measures, as well as some routine practices. With thoughtful application of state-of-the-art technologies along with some simple behavioral changes, there is significant "pleasure potential" in efficiency and conservation.

Here's our list of enjoyable ways to save energy. Some of these measures are not quite ready for prime time, but all should be possible if not already here and now.

- Driving a hybrid gas-electric vehicle can be a lot of fun (see the sidebar on the next page). The gasoline engine shuts down as the vehicle coasts to a stop, providing soothing silence and comfort in knowing you aren't wasting gas as you wait for that dang light to turn green. And some hybrid models display instantaneous and cumulative miles-per-gallon values, challenging the driver to "play the fuel economy game" and see how high you can "drive" your MPG number during a trip or on a tank of gas. In fact, an entire website is devoted to the real world fuel economy achieved by light-footed hybrid vehicle owners.⁸²
- If a digital MPG display is a fun and effective way to get hybrid car owners to lighten up on the accelerator, why not put this device in every vehicle? Why not give every driver instantaneous feedback on how good a job she or he is doing behind the wheel, from

a gas guzzling/sipping point-of-view? In fact, the guy (we assume it's a guy) behind the wheel of that monstrous SUV needs the feedback a lot more than the driver of a Prius or Civic hybrid! And while we are putting technology to work, how about tracking the average fuel economy of all vehicles? Then collect and compile this information somehow, and let every driver know occasionally how she or he is doing compared to other owners of the same vehicle? Let everyone have fun trying to be above average!

- New "smart windows" look (no pun intended) to be both fun and energy saving. Smart windows change their light transmittance properties either automatically or manually. Windows can go from transparent to opaque, and back again, with a push of a button to block out or let in the sun's heat as appropriate.⁸³ This could be a crowd pleaser at your next holiday party, or a fun way to tease the neighbors. That is, if you follow our advice and get out of the car from time to time, and get back into shape!
- Newer so-called "mini-split" air conditioners are energy-efficient by allowing separate control of the amount of cooling in each room served. Using a remote control (yes, another remote control), you can turn up or turn down the AC from the comfort of your couch, easy chair, or bed. But why stop with cool air? How about adding a little fragrance to the air with a push of a button on that remote? Care for a touch of pine? Or maybe you prefer floral bouquet, or how about a hint of musk?
- While avoiding the waste of energy, you can manipulate . . . well, let's rephrase that . . . you can bring out the best in your family members and friends. In winter, you can keep the living room toasty and turn

“IT’S JUST DARN NICE TO DRIVE”

THE HYBRID FUN FACTOR

You could just take our word for it: Hybrid owners constitute one of the happiest and most satisfied species of car drivers in America. But why take our word for it when so many of these savvy gas-sippers are eager to share their automotive joy? Next time you find yourself stopped at a light alongside a hybrid, look at the driver. If they are anything like Arnold Foster or Gloria Main, there’s a good chance that they are having more fun than you.

Arnold Foster is a seventy-nine-year-old jack of all trades whose resumé includes stints as a farmer, city street commissioner, tow truck driver, plumber, furnace and air conditioner installer, and custodian in Plainview, Nebraska, and San Diego. Today he lives in Colfax, a small farming town situated amid the rolling wheat fields of the Palouse region in eastern Washington, where he travels the picturesque highways in a white Toyota Prius.

Generally more inclined to buy a tractor or a truck (he has a couple of each) or a sedan with some oomph (he did have his eye on a Chevy Impala), Arnold did not plan to buy a hybrid. But in January 2005, when he heard that his sister was on a waiting list to get one in California, he headed to a dealership in nearby Moscow, Idaho, to investigate. “I just wanted to look at it,” he insists. “It turned out they had one on the lot that just arrived. I asked the salesman if it had any pep to it. He said ‘Take it for a test drive.’ It drove so nice, and I was surprised at how much power it had. I ended up buying it.” As an added bonus, the Prius was less expensive than the Impala he was contemplating.

Two years later, he has not even the slightest hint of buyer’s remorse. If there is a downside to owning a hybrid, he says, “I haven’t found any yet.” On the contrary, he has nothing but praise. “It’s just darn nice to drive. Gas mileage, of course, is great. Probably averages between forty-seven and fifty miles per gallon. It handles good, and has great power to pass when I need to. But it’s totally quiet when backing out of a garage or driving through a parking lot – they always say they can’t hear me coming. Also,

for a small car, it has a lot of head room. And a lot of storage. It’s surprising, when you fold the Prius’s seats down, how much room there is. So even if I need to haul something, I can put a lot of stuff in the Prius.”

Terrific gas mileage, excellent handling, remarkable roominess, and other right-brained amenities are all perfectly reasonable motives for buying a hybrid, but they are not what won Arnold over during his test drive. The biggest selling point was the sheer pleasure of driving it. “It’s just fun to drive!” he says, patting it on the hood.

University of Colorado history professor Gloria Main wholeheartedly agrees. “My speed-loving Prius seems convinced it’s a Porsche. On long trips through empty country, it easily tops ninety if you’re not watchful, and it will still average forty-four miles to the gallon. It’s a roomy, comfortable, quiet-riding car that holds the road, likes curves, and has a narrow turning radius.”

OK, she admits that her Prius is not a Porsche, but that doesn’t dampen her enthusiasm. “It does not accelerate like a Porsche, but highway merges are no problem and there’s plenty of power to get out of trouble when you need to.” And inside the cabin, it sports some decided advantages over the famously compact German sports cars: “The hatchback provides easy access to a spacious cargo space made even larger by folding down the back seats, and the dashboard sits directly in front of the driver with all parts of it brightly visible even in broad daylight.”

Smart design and superior performance – not to mention the satisfaction of making an environmentally positive choice that your friends and neighbors will notice – are powerful incentives for purchasing a hybrid. It is an easy decision to justify and feel good about. But there is a far more gratifying reason to drive your new hybrid off the lot: actually driving it. Gloria joins Arnold in her conclusion that the fun factor is the best part of hybrid ownership. “The Prius is beautiful to look at and fun to drive,” she declares. “I wouldn’t give it up except, maybe, for a Prius convertible.”



the heat down in bedrooms (by closing the vents in those rooms, for example), thus pulling children out of their rooms and into domestic warmth. You can also turn the heat down at night, and thus provoke in your spouse or partner a strong desire for your physical company. You can, in other words, spoon as if there were no tomorrow, while cutting the utility bill!

- And speaking of spooning, what about the energy efficiency of devices often associated with that ultimate fun and pleasurable activity? If refrigerators and furnaces can be made more energy efficient, why not water beds, hot tubs, or, yes, even certain types of specialized toys? Come on, engineers, get to work!
- For another variety of gratification, immerse yourself in the exotic pleasure that comes from ceasing to be a hypocrite. In the twenty-first century, most of us are sadly resigned to living with an uncomfortable gap between our principles and our actions. Closing that gap delivers a remarkable dose of both relief and pleasure.
- Find a reliable source of motivation for achieving a whole new level of physical well-being. This requires one simple act: give up the practice of “vapid transit,”⁸⁴ a mystifying activity which consists of moving around a two-ton hunk of metal (otherwise known as a car), with yourself in it, on trips of a mile or less. Vapid transit is also the practice of driving a car on a longer trip, even though a bus follows the same route and could get you within a mile or so of your destination. Regularly choose walking over driving when you have only a short distance to cover, and you are not only avoiding the waste of fossil fuel, you are well on your way to the condition known as “glowing with good health.”
- Pay for a proliferation of fun activities (vacations, sports, games, movies, who knows what) with the money you save when practicing energy efficiency and conspicuous conservation.
- Unleash your ingenuity, which registers among the most pleasurable of human activities, and share in the celebration of that ingenuity of others. Have fun figuring out new ways to slow down your electric or gas meter, and take pride in your positive example (as well as in the money you don’t have to fork over to the utility company).

The desire for pleasure has a tremendous power to direct and to energize human conduct. Equally important, that desire also has a great power to obstruct good efforts and good undertaking. For the long-range well-being of humanity, the drive for pleasure simply must be enlisted into the cause of energy conservation and efficiency. And that reality brings us to make an unexpected proposition: for the greatest amount of pleasure, you might want to consider cutting back a bit on comfort.

⁸⁴This phrase is a clever play on the term “rapid transit,” so clever that many bright people miss it.

FOR AN ESPECIALLY GOOD TIME, CALL AN ECONOMIST

In 1976, a Hungarian immigrant and Stanford professor named Tibor Scitovsky published a remarkable book, full of implications for energy efficiency and conservation, called *The Joyless Economy: The Psychology of Human Satisfaction*. “Man’s [and surely woman’s as well!] need for pleasure and its profound influence on his behavior are an essential part of his nature and must be taken into account by any theory of rational behavior,” Scitovsky wrote, providing a fine ratification of our choice to conclude with an appeal to Pleasure. Exploring the puzzling discontent of consumers in a society of great material abundance, he had educated himself in psychological theories of pleasure. “I argue in the book,” Scitovsky wrote in a preface for a new edition fifteen years later, “that people’s love of comfort deprives them of some of life’s pleasures.” Psychological studies persuaded Scitovsky that comfort is, essentially, a steady state, while the onset of pleasure requires a change, a new stimulus, a different level of arousal. “Many people are aware, more or less vaguely, of this,” he wrote. “Most of us know that one must be tired to enjoy resting, cold to appreciate a warm fire, and hungry in order really to enjoy a good meal.” Thus, “too much seeking for comfort will reduce or eliminate pleasure in any and every activity.”⁸⁴

No doubt some economists will vigorously dispute the validity of Scitovsky’s theory, and no doubt psychological theories of human pleasure have multiplied and “complex-ified” in the years since 1976. But there is a basic good sense at work in this book, *The Joyless Economy*, and we are eager to hear what happens when you test his thesis. So here is our final invitation: try Scitovsky’s model out. Cut back, in an aimed and thoughtful way, on some aspect of the comfort you currently receive from the consumption of electricity, natural gas, or gasoline. Remember his premise: “In familiar terms, discomfort must precede pleasure,” in order to provide that change in level of sensation that provides an escape from the humdrumness and tedium of comfort and permits the onset of novelty and pleasure.⁸⁵ Take energy efficiency and conservation to a (entirely voluntary) level of mild discomfort; turn the heat lower in the winter, or turn off the air conditioning for an hour or two in the summer. See how fresh and intense your pleasure is, when you turn the heat back up or turn the air conditioning back on.

Let us know how you feel. Please send us particularly telling and poignant examples of putting Scitovsky’s ideas to the test. You can email us at info@centerwest.org or info@swenergy.org.

CONCLUSION

AN ENERGY DECLARATION FOR THE TWENTY-FIRST CENTURY

Here is our report's conclusion, achieved by negotiating an alliance between and among the distinctive but equally necessary powers and desires of the human personality: Reason, Pride, and Pleasure. We take pride and pleasure in serving as the authors and first signers of this Declaration of Energy Independence, writ-

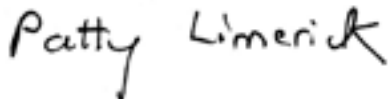
ten with the unanimous support of Reason, Pride, and Pleasure.* But we invite other citizens, business folk, legislators, and governors of the American West to join us and, in doing so, commit to greater energy efficiency and conservation individually and professionally.

Declaration of Energy Independence

When in the course of human events it becomes necessary for one people to dissolve the bands which have tied them to outmoded habits of waste and inefficiency and to assume among the powers of the earth the station of leadership, to which the Laws of Nature entitle them, in the domain of energy efficiency and conservation, then a decent respect to the opinions of mankind requires that they should declare the causes which impel them to this transformation.

We hold these truths to be self-evident, under-recognized, and deserving of much wider acceptance and adoption:

- That the American people have – as their most immense resource in the field of energy – an unlimited and endlessly renewable ingenuity and capacity for innovation and originality.
- That energy efficiency and conservation will decrease our dependence on foreign oil and on domestic fossil fuels, thus improving our nation's security and providing a healthier and cleaner environment for our descendants and the future residents of this region and this planet.
- That accelerated efforts in energy efficiency and conservation are essential if human beings want to do their part to limit global climate change.
- That the solid majority of alert and thoughtful citizens know that energy conservation and efficiency are good ideas and good practices.
- That further research and development of technology must be pursued, but in the meantime, we already have in hand designs and devices that can play an enormous role in improving the wisdom of our energy use.
- That vigorously pursuing energy efficiency and conservation can be a source of pride and pleasure, as well as a way to save a bunch of money.
- That enterprises that combine Appeals to Reason, Pride, and Pleasure are enterprises most likely to prevail, giving energy conservation and efficiency a considerable advantage over causes that are inherently more dreary and less compelling.
- That with good will and perseverance we can overcome the obstacles that now slow our progress toward a sustainable and efficient energy future.



Signed this first day of March in the year 2007

* We recognize that the goal of US energy independence, proclaimed by every President since President Nixon in 1974, is unachievable, at least anytime soon, and will never be achieved through greater energy efficiency and conservation alone. But we couldn't resist the temptation for a good-natured homage to the Declaration of Independence.



APPENDIX A

WHERE TO BEGIN

RESOURCES FOR CONSUMERS AND BUSINESSES

There are many actions that consumers and businesses in the West can take to increase energy efficiency and lower their energy bills. The following websites provide information on what can be done to cut energy waste in homes, vehicles, and workplaces, as well as access to other resources.

- The US Department of Energy has updated its **Energy Savers: Tips on Saving Energy & Money at Home** brochure and website (www.eere.energy.gov/consumer/tips/), providing the latest and greatest tips on ways to save energy at home. The site includes quick, easy tips to save energy, as well as tips for long-term energy savings.
- The American Council for an Energy-Efficient Economy's **Consumer Guide to Home Energy Savings** site (www.aceee.org/consumerguide/index.htm) includes lists of top-rated products, a home energy checklist, and ordering information for this highly-regarded handbook.
- SWEEP has developed a resource page dedicated to hybrid electric vehicles, for those looking to save money and gasoline in their choice of an automobile. SWEEP's **Hybrid Electric Vehicles Resource Page** (www.swenergy.org/resources/hybrid_electric.htm) includes information on top-rated hybrid models, news about hybrid and other fuel-efficient vehicles, information on government tax incentives for the purchase of a hybrid, and answers to frequently-asked questions.
- The Alliance to Save Energy's **Power Smart** home energy booklet site (www.ase.org/powersmart/index.html) includes tips on saving energy in the home, checklists, and links to other resources.
- Colorado's **ColoradoEnergy.org** (www.coloradoenergy.org) is a comprehensive energy information site for the state, and includes a **Home Energy Checklist** (www.coloradoenergy.org/tips/homeowner/hec/) and an **Energy Action Guide** (www.coloradoenergy.org/tips/homeowner/actionguide.htm).
- The US Environmental Protection Agency and Department of Energy's **Energy Star Products** website (www.energystar.gov) lists Energy Star appliances, heating and cooling equipment, lighting products, office equipment, windows, and more.
- Lawrence Berkeley National Laboratory's **Home Energy Saver** website (<http://hes.lbl.gov/>) is a web-based do-it-yourself home energy audit tool.
- SWEEP has developed two resources that will assist businesses in implementing energy efficiency projects that will save you energy and money – and help protect our natural environment. The **Energy Efficiency Guide for Colorado Businesses** (www.coloradoefficiencyguide.com) and the **Energy Efficiency Guide for Utah Businesses** (www.utahefficiencyguide.com) point out opportunities that businesses can take advantage of to improve the energy efficiency of their buildings and operations.
- The California Energy Commission's **Consumer Energy Center** (www.consumerenergycenter.org/tips/index.html) provides energy conservation and efficiency tips for your home, office, school, car or truck, and other areas.
- The **Rocky Mountain Institute** (www.rmi.org) provides extensive recommendations on making your home or business more energy efficient.



APPENDIX B

ENERGY EFFICIENCY TAX ADVANTAGES AND OTHER INCENTIVES

FAVORABLE FEDERAL AND STATE POLICIES

There are numerous federal and state government tax incentives available for the purchase and implementation of energy efficiency measures and technologies for homeowners, commercial, and industrial business owners and operators, and for those looking to purchase highly-efficient vehicles. The information below describes the federal incentives, and then lists the incentives available in Western states. Following this list you will find links to websites that will help you learn more.

This is not an exhaustive list, as it does not include weatherization programs, incentives offered by local government jurisdictions, or incentives offered by utilities. More and more local governments are offering incentives to residents and businesses for pursuing energy efficiency. In addition, the utilities in the Western states offer a wide variety and growing number of incentive programs for their customers, programs which support and complement those that you will find listed here. In Oregon, the Energy Trust of Oregon administers these programs on behalf of the state's utilities.

FEDERAL

The federal Energy Policy Act of 2005 provides a number of tax incentives designed to promote energy conservation and efficiency. Most of these incentives expire with the Act itself, on December 31, 2007, unless otherwise noted.

COMMERCIAL / INDUSTRIAL

The **Energy Efficient Commercial Buildings Tax Deduction** provides a tax deduction of \$1.80 per square foot to owners of new or existing buildings who install interior lighting; building envelope; or heating, cooling, ventilation, or hot water systems that reduce the building's total energy and power cost by 50 percent or more in comparison to a building meeting minimum requirements set by ashrae Standard 90.1-2001. Deductions of up to \$0.60 per square foot are available to owners of buildings

in which individual lighting, building envelope, or heating and cooling systems meet target levels that would reasonably contribute to an overall building savings of 50 percent if additional systems were installed. This provision has been extended to December 31, 2008.

The **New Energy-Efficient Home Tax Credit for Builders** provides tax credits of up to \$2000 for builders of new energy-efficient homes, including manufactured homes constructed in accordance with the Federal Manufactured Homes Construction and Safety Standards. Site-built homes qualify for the credit if they are certified to reduce energy consumption by 50 percent relative to the International Energy Conservation Code standard and meet minimum efficiency standards established by the Department of Energy. Building envelope component improvements must account for at least one-fifth of the reduction in energy consumption. This provision has been extended to December 31, 2008.

The **Renewable Energy Systems and Energy Efficiency Improvements Program** makes direct loans, loan guarantees, and grants to agricultural producers and rural small businesses to purchase renewable-energy systems and make energy-efficiency operational improvements. Qualifying technologies include solar water heat, solar space heat, photovoltaics, wind, biomass, geothermal electric, geothermal heat pumps, hydrogen, direct-use geothermal, anaerobic digestion, renewable fuels, and fuel cells. The maximum grant award is 25 percent of eligible project costs up to \$500,000 for renewable energy projects and up to \$250,000 for energy efficiency improvements. Under the guaranteed loan option, funds up to 50 percent of eligible project costs up to \$10 million are available.

RESIDENTIAL

The **Residential Energy Efficiency Tax Credit** provides tax credits for energy efficiency improvements in the building envelope of existing homes and for the purchase of high-efficiency heating, cooling, and water heating equipment. These

improvements and/or equipment must be placed in service from January 1, 2006, through December 31, 2007, and must serve a dwelling in the United States owned and used by the tax payer as a primary residence. The maximum amount of homeowner credit for all improvements combined is \$500 during the two-year period of the tax credit.

Building envelope improvements qualify for tax credits of up to 10 percent of the cost of the following eligible upgrades: insulation materials, exterior doors and windows, and pigmented metal roofs.

Purchasers of high-efficiency heating, cooling, and water heating equipment are eligible for the following tax credits: electric heat pump water heaters (\$300); electric heat pumps (\$300); geothermal heat pumps (\$300); central air conditioners (\$300); natural gas, propane, or oil water heaters (\$300); natural gas, propane, or oil furnace or hot water boilers (\$150); and advanced main air circulating fans (\$50).

VEHICLES

A prominent provision of the Energy Policy Act of 2005 created new tax credits for consumers who purchase various advanced technology vehicles, including hybrid-electric and diesel-powered cars and light trucks. The provision differs from previous federal incentives for these vehicles by relying on tax credits rather than deductions, typically resulting in greater savings for consumers.

The provision is structured so vehicles can earn credits both for achieving greater fuel economy and for saving fuel. Fuel economy improvement is measured against a weight-dependent, model-year 2002 baseline, with tiered credits starting at 25 percent over the baseline fuel economy. With each 25 percent improvement over the baseline fuel economy up to a maximum of 250 percent, the tax credit increases by \$400.

A “conservation credit,” designed to boost the amount of credit available for vehicles in the heavier weight classes, is available as well. A vehicle qualifies for the credit if it is expected to save at least 1200 gallons over its lifetime relative to a vehicle achieving the baseline fuel economy for that weight class. For each additional 600 gallons of gasoline savings up to a maximum of 3000 gallons, the vehicle earns \$250 in tax credits.

Credits are available only for a limited number of vehicles per automaker. Once a manufacturer sells 60,000 qualifying vehicles, the tax credit is phased out over a period of fifteen months for vehicles produced by that manufacturer.

STATES

The following Western states offer tax and other incentives designed to promote energy conservation and efficiency.

ARIZONA

Residential: Arizona provides an individual **Income Tax Subtraction for Energy Efficient Residences** to the original owner of a new energy-efficient home. The credit may be claimed in the year that the house is sold. It is equal to 5 percent of the sales price excluding commissions, taxes, interest, points, and other brokerage, finance, and escrow charges, and cannot exceed \$5000. Energy-efficient residences include new single family-

residences, condominiums, or town houses that exceed the 1995 Model Energy Code Threshold by at least 50 percent (90 points) as determined by an approved rating program.

CALIFORNIA

Residential: The **Tax Deduction for Interest on Loans for Energy Efficiency** allows taxpayers to deduct the interest paid on loans used to purchase energy-efficient products or equipment for a residence in California. Qualifying products include energy-efficient heating, ventilation, air-conditioning, lighting, solar, windows, insulation, zone heating products, and weatherization systems. Customers of publicly-owned utility companies that do not offer customer financing may be able to deduct the interest from a home equity or home improvement loan used to purchase energy-efficient products and equipment.

Other: Through its **Energy Efficiency Financing Program**, the California Energy Commission provides loans to schools, hospitals, and local governments looking to install energy-saving measures in their facilities or conduct energy audits. Interest rates are fixed at 4.5 percent for the term of the loan, unless the project is completed within 12 months, in which case the interest rate is reduced to 4.1 percent. The maximum loan amount is \$3 million and loans must be paid back within 15 years from energy costs savings, or in 2 years for energy audits. Common projects include lighting and equipment upgrades and heating systems, but can also include renewable energy systems.

COLORADO

Vehicles: An **Alternative Fuel Vehicle (AFV) and Hybrid Electric Vehicle (HEV) Tax Credit** is available for the incremental cost of purchasing and afv or hev, or for the conversion of a conventional vehicle to an afv. The credit is only available in the year during which the vehicle was purchased or converted, and a vehicle can qualify for the credit only one time. Lessees or lessors of qualifying vehicles are also eligible for the credit. The value of the credit is based on the EPA emissions classification of the vehicle. This tax credit is available through 2012.

IDAHO

Commercial/Industrial: The state’s **Low-Interest Energy Loan Program** makes funds available at a 4 percent interest rate for energy efficiency retrofit projects. Commercial customers may undertake projects to improve insulation, windows and doors, heating systems, building commissioning, or custom-designed projects. Specific energy-efficient agricultural equipment may also be eligible. Loans are available from \$1000 to \$100,000, and must be repaid in five years or less.

Residential: The **Insulation Income Tax Deduction** allows Idaho residents whose home was built or under construction before 1976, or who had a building permit issued before 1976, to deduct 100 percent of the costs of installing new insulation. Any insulation added must be in addition to, not a replacement of, existing insulation. The amount charged for labor may also be deductible.

The state’s **Low-Interest Energy Loan Program** makes funds available at a 4 percent interest rate for energy efficiency retrofit projects. Eligible energy efficiency technologies for residential customers include insulation, electric and gas heating and air

conditioning upgrades, water heating system improvements, and windows. Residential loans are available from \$1000 to \$15,000, and must be repaid in five years or less.

MONTANA

Commercial/Industrial: The **Deduction for Energy-Conserving Investments** allows corporate taxpayers to deduct a portion of the cost of a capital investment in a building that demonstrably promotes energy conservation. “Energy conservation” is defined in this case as reducing the waste or dissipation of energy or reducing the amount of energy necessary to accomplish a given quantity of work. New construction must surpass established energy standards for new construction to be eligible for this deduction. Taxpayers may deduct 100 percent of the first \$2000 expended, and smaller amounts for subsequent spending. The maximum deduction is \$3600.

Residential: The **Deduction for Energy-Conserving Investments** allows homeowners to deduct a portion of the cost of a capital investment in a building that demonstrably promotes energy conservation. “Energy conservation” is defined in this case as reducing the waste or dissipation of energy. New construction must surpass established energy standards for new construction to be eligible for this deduction. Homeowners may deduct 100 percent of the first \$1000 expended, and smaller amounts for subsequent spending. The maximum deduction is \$1800.

Individual taxpayers may claim an Energy Conservation Installation Credit for up to 25 percent of the energy conservation investments they make in the physical attributes of a building or in a water, heating, or cooling system. The maximum credit is \$500, and must be claimed in the year the expenditure was made. Qualifying products include water heaters, chillers, furnaces, boilers, heat pumps, air conditioners, programmable thermostats, caulking and weather stripping, building insulation, and windows and doors.

Vehicles: The **Alternative Fuel Vehicle (AFV) Conversion Income Tax Credit** is available to businesses or individuals for up to 50 percent of the equipment and labor costs for converting vehicles to operate on alternative fuels. The maximum credit is \$500 for the conversion of vehicles of 10,000 lbs. or less and \$1000 for vehicles over 10,000 lbs.

NEVADA

Commercial/Industrial: Assembly Bill 3, passed in June of 2005, included a **Property Tax Abatement for Green Buildings** provision for the partial abatement of property taxes for buildings that meet or exceed the US Green Building Council’s LEED Silver standard or an equivalent green building rating system standard. The partial abatement may be for a duration of not more than 10 years and can not exceed 50 percent of the total property taxes due.

NEW MEXICO

Vehicles: A **Hybrid Electric Vehicle (HEV) Tax Exemption** is available to purchasers of hevs with an EPA fuel economy rating of 27.5 miles per gallon or more. This is a one-time exemption from the motor vehicle excise tax that is charged at the time of the issuance of the original certificate of title for the vehicle. This exemption is available until June 30, 2009.

Other: The **Clean Energy Grants Program** supports the development of renewable energy, energy efficiency, and alternative transportation fuels technologies. Grants are available to municipalities and county governments, state agencies, public schools (K-12), post-secondary educational institutions (colleges and universities), and tribal entities. Capital projects are required to meet performance measures, including a 5 percent reduction in energy consumption in building projects or 15 percent increase in alternative fuel usage. Educational and non-capital projects must either increase the development of clean energy market demand, or advance the commercialization and widespread application of clean energy technologies.

OREGON

Commercial/Industrial: Oregon’s **Business Energy Tax Credit (BETC)** is available for qualifying investments in energy conservation, recycling, renewable energy resources, or less-polluting transportation fuels. The 35 percent tax credit is taken over five years: 10 percent the first and second years and 5 percent for each year thereafter. Any unused credit can be carried forward for up to eight years, and eligible projects with costs of \$20,000 or less may take the tax credit in one year. An option is available that enables non-profit organizations, schools, governmental agencies, tribes, and other public entities and businesses with and without tax liability to use the betc by transferring their tax credit for an eligible project to a partner with a tax liability.

Qualifying projects include those that use solar, wind, hydro, geothermal, biomass, or fuel cells to produce energy, displace energy, or reclaim energy from waste; general retrofit projects, including lighting; weatherization projects for rental property; new construction projects that perform better than the state energy code; cogeneration projects; projects that develop new markets for recycled materials or recycle materials not required by law; and projects that reduce employee commuting or work-related travel.

In 2001, the Oregon Legislature added sustainable buildings to the list of measures and systems eligible for the betc. Sustainable buildings must meet the US Green Building Council’s Leadership in Energy and Environmental Design (LEED) Silver Certification standard.

Residential: Homeowners and renters who pay Oregon income taxes are eligible for the **Residential Energy Tax Credit** if they purchase premium-efficiency appliances, heating and cooling systems, duct systems, closed-loop geothermal space or water heating systems, solar water and space heating systems, photovoltaics, wind, fuel cells, and alternative fuel vehicles and charging or fueling systems. This tax credit sunsets on December 31, 2015.

Vehicles: An **Alternative Fuel Vehicle (AFV) and Hybrid Electric Vehicle (HEV) Business Energy Tax Credit** is available to business owners who invest in afvs or hevs for business use. The tax credit is for the incremental cost of purchasing hevs and afvs, the cost of converting vehicles to operate on an alternative fuel, and the cost of constructing alternative fuel refueling stations. The tax credit is 35 percent of the incremental cost of the system or equipment and is taken over five years.

The Alternative Fuel Vehicle (AFV) and Hybrid Electric Vehicle (HEV) Residential Tax Credit provides tax credit incentives of up to \$1500 to encourage the purchase of qualifying afvs and hev's. The tax credits are a dollar-for-dollar credit against income taxes owed to the State of Oregon. A credit is also available for the cost of converting vehicles to operate on an alternative fuel.

The Oregon **Small Scale Energy Loan Program (SELP)** offers low-interest loans for projects that save energy; produce energy from renewable resources such as water, wind, geothermal, solar, biomass, waste materials or waste heat; use recycled materials to create products; use alternative fuels; and reduce energy consumption during construction or operation of another facility.

Loans are available to individuals, businesses, schools, cities, counties, special districts, state and federal agencies, public corporations, cooperatives, tribes, and non-profits. Loans sizes generally range from \$20,000 to \$20 million.

UTAH

Vehicles: The state's **Alternative Fuel Vehicle (AFV) Tax Credit** provides an income tax credit for 50 percent of the incremental cost (\$3000 maximum) of a clean-fuel vehicle built by an Original Equipment Manufacturer (oem) and/or an income tax credit for

50 percent of the cost (\$2500 maximum) of the after-market conversion of vehicles purchased and registered in Utah. If not previously used, the tax credit may be claimed on the purchase of used afvs. Tax credits are available for businesses and individuals and may be carried forward up to five years. Tax credits are not available for hybrid electric vehicles. This incentive expires December 31, 2010.

WYOMING

Other: The Small Business Energy Audit Program provides 75 percent, or up to \$4000, of the cost of an energy audit for commercial enterprises that meet the Small Business Administration's definition of a small business. Manufacturers may use the audit to qualify for sales tax abatement on energy used in the manufacturing process.

ADDITIONAL RESOURCES

For additional information on energy efficiency tax and other incentives, visit the Database of State Incentives for Renewable Energy and Energy Efficiency website at www.dsireusa.org.

For additional information on vehicle-oriented tax and other incentives, visit the Alternative Fuels Data Center website at www.eere.energy.gov/afdc/laws/incen_laws.html.

ENDNOTES

Many of the sources cited in this report, such as government documents and institutional reports, are available online as well as in print. However, in light of the transient nature of many web addresses, we have provided only the traditional citation information for these sources. If a corresponding online version does exist, the citation information provided will make it easy to find with your preferred search engine. For sources available only online, or in cases when the printed version of a document is not conveniently accessible, we have provided a web address. These addresses were checked for accuracy shortly before this report was published, but we cannot assure that they will not be changed or removed by their hosts in the future.

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ABOUT SWEEP

Founded in 2001 and based in Boulder, the Southwest Energy Efficiency Project (SWEEP) is a public interest organization promoting greater energy efficiency in Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming. SWEEP focuses on electricity and natural gas conservation along with promotion of combined heat and power systems while working in the following areas:

- state energy legislation
- utility energy efficiency policy and programs
- building energy efficiency
- education and training, and
- information development and exchange.

For more information, visit SWEEP’s website at www.swenergy.org.

ABOUT THE CENTER OF THE AMERICAN WEST

The Center of the American West, at the University of Colorado at Boulder, is one of the region’s most creative and innovative organizations in identifying and addressing such crucial issues as multiculturalism, community building, fire policy, and land, water, and energy use. The Center brings together, for meaningful conversation and interaction, people as diverse as the American West itself. To understand the region, we believe that the exploration of the minds of its residents is as important as the inquiry into the workings of its cultures and ecosystems. Enterprising and inclusive in its embrace of a wide range of disciplines and strategies of communication, the Center strives to illuminate the challenges and opportunities facing this complicated geographic and cultural area. Ultimately, we want to help citizens of the West become agents of sustainability – citizens who recognize that their actions determine the region’s future and who find satisfaction and purpose in that recognition.

For more information about the Center of the American West, visit the Center’s website at www.centerwest.org.



IMAGE CREDITS

Toaster- courtesy of stock.xchng, by Lorena Molinari; Luxury home - courtesy of stock.xchng, by bainsworth; Seattle at night - courtesy of stock.xchng, by mliss; Lovely little cottage 3 - courtesy of stock.xchng, by Lonnie Bradley; Downtown Los Angeles - courtesy of stock.xchng, by Rich DuBose; Christmas Tree Lights - courtesy of stock.xchng, by GeoPappas; Bikini Drying - courtesy of stock.xchng, by sandralise; Derrick - courtesy of stock.xchng, by Nadya Yasnogorodskaya; Landscape Panorama - courtesy of stock.xchng, by snem; Sky and fence - courtesy of stock.xchng, by lorado; Colorado State Capitol - courtesy of stock.xchng, by nantela; Flowing Water - courtesy of stock.xchng, by Rushang Shah; The Highway - courtesy of stock.xchng, by Christina Chirtes; AC Fan - courtesy of stock.xchng, by P Fraedrich; San Luis Valley - by Simon Wilson; Office Workstation - courtesy of stock.xchng, by Zoltan Sasvari; Las Windows - courtesy of stock.xchng, by Thad Zajdowicz, Flatirons - courtesy of Honey Lindburg and Amber Blais; Snowy Trees - courtesy of stock.xchng, by Vlad Romascanu; Compact fluorescent bulb - courtesy of stock.xchng, Jason Antony; Electric meter - courtesy of stock.xchng, Kenn Kiser; Las Vegas - courtesy of stock.xchng, chad Mathews; Wolf Law Building - courtesy of CU Law School; Los Angeles skyline by night - courtesy of stock.xchng, grzswe; Fuel gauge - courtesy of stock.xchng, Rajmund Barnas; Orbit - courtesy of stock.xchng, Peter Werner; Pump it up (oil pump) - courtesy of stock.xchng, Brad Harrison; Coalmine panorama - courtesy of stock.xchng, Piotr Ciuchta; Arnold Foster - courtesy of Dennis and Nancy Lintvedt; Lower Wapama Falls - courtesy of Jason Hanson; CFL Wins Bulb Battle and Hummersaurus cartoons - courtesy of Craig Hibbard; Try Me Again cartoon - courtesy of Matt Occasio. Butterfly - courtesy of stock.xchng, Jacquet Karine. Lightbulbs - courtesy of Michael Robson Photography.