

California's Energy Policy

A Cautionary Tale for the Nation

By Thomas Tanton

*Advancing Liberty
From the Economy to Ecology*



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Executive Summary

Global warming policies championed by former Vice President Al Gore, California Governor Arnold Schwarzenegger, and several Members of Congress clash with America's long-term economic and energy interests. These policy makers advocate 70-, 80-, and even 90-percent reductions in carbon dioxide (CO₂) emissions by mid-century. Yet the federal Energy Information Administration projects a 34-percent increase in U.S. emissions by 2030. Emissions tend to increase along with increases in population and economic output. Is it possible to reduce emissions by 70 percent or more without severe cutbacks in either economic or population growth?

Among other policies, global warming activists call for an effective moratorium on new electrical plants lacking carbon capture and sequestration (CCS), and increased energy efficiency and use of renewable sources. Since it may take two decades to find out whether CCS is economical and decades more to build the infrastructure, and renewables just cannot provide enough, this constitutes a ban on new plants. How then do we meet U.S. electricity needs as the economy and population grows?

Many policy makers and environmental activists assert that the rest of the country can simply replicate California's demand-side management (DSM) programs, which consist of an assortment of subsidy programs to retrofit buildings and subsidize energy-using equipment. California supposedly shows that we can have it all—a growing population and economy *and* lower overall energy consumption and emissions. Adopt the “California model” nationwide, they claim, and America will become so much more energy efficient that we will not need new electrical capacity for decades. This will give us time to develop a non-carbon energy system. Many states are set to follow the California model, and several key lawmakers are pushing Congress to enact similar interventions at the federal level.

In reality, rather than a model, California energy policy is a cautionary tale. Yes, since 1980, per capita electricity consumption in California has remained flat while it has increased in most other states. However, holding *per capita* consumption flat is not the same as reducing *overall* consumption or emissions. As California's economy and population have grown, so have the state's aggregate electricity consumption and emissions. Today, California consumes 65 percent more electricity than it did in 1980. Coal-based electricity imports from other states grew by 60 percent from 1983 to 2005, and is now 10 percent of California's total generation, growing from 9 percent in 1983. Even if DSM policies contribute marginally to California's comparatively low per-capita electricity consumption, this in no way proves that America can afford to ban new coal plants.

DSM proponents exaggerate the energy savings from such policies. Contrary to popular belief, energy efficiency improvements do not reduce society's overall energy consumption. In fact, greater efficiency leads to more energy use, because efficiency lowers the cost of consumption and frees up dollars for other energy-consuming activities.

Moreover, California's comparatively low per-capita energy use is not chiefly due to its DSM policies but to other factors that most other states cannot replicate.

First, California's mild climate aids dramatically in reducing consumption for heating and cooling of homes and businesses.

Second, California's economy has undergone a structural change, away from energy-intensive manufacturing to less energy-intensive services, which are also more reliant on having a consistent electricity supply. This shift is due in part to manufacturing firms leaving the state because of high energy prices.

Third, while the California economy has grown during the past 25 years, it has also become more volatile.

Fourth, California's high residential property prices tilt the housing market towards smaller homes and apartments and encourage more people to live in the same household.

The key question for policy makers should be whether California's energy policies benefit consumers. The answer is no. With a few exceptions, electricity prices in California are higher than in the rest of the nation. The oft-repeated claim that California electricity rates are high but overall bills are low is a myth. Residential power bills increased by 36 percent since 1990.

Moreover, DSM policies have created razor-thin supply margins, resulting in price volatility and rolling blackouts during periods of peak demand. During the summer of 2007, California utilities actually told people to turn off their air conditioners on hot days. That is not efficient. It is a good way to get heat stroke.

California's ability to slow growth in electricity demand is not due to interventions such as its demand-side management programs. California is not an appropriate model for other states or for the nation.

Introduction

High energy prices, environmental concerns, and geopolitical instability in many regions of the world have heightened interest in reducing energy demand growth and in finding suitable alternative energy supplies. Many politicians and academics¹ point to California's energy policy as a good model for the rest of the nation. California has limited growth in electricity consumption and is moving regulatorily towards lower carbon content of transportation fuels.

Those politicians, interest groups, and academics are calling for a moratorium on new electrical plants that lack carbon capture and sequestration (CCS)² and increased energy efficiency and use of renewable sources. Since it may take two decades to find out whether CCS is economical, decades more to build the infrastructure, and renewables just cannot provide enough generating capacity, this essentially constitutes a ban on new plants. How then do we meet U.S. electricity needs as the economy and population grows?

Many assert that the rest of the country simply replicate California energy policy, specifically with respect to energy efficiency. The nation would thus become so much more efficient that we would not need new electrical capacity for decades, giving us time to build a yet-to-be defined non-carbon energy system.³ Proponents of California's "demand side management" (DSM) policies—an assortment of cross subsidy programs to retrofit buildings and subsidize energy-using equipment⁴—fail to note that the state's economy, population, and energy consumption have grown significantly while only per capita energy consumption remained flat.

California's gross domestic product was \$1.6 trillion in 2006 (in 2000 dollars), reflecting approximately 4 percent annual growth from 2003. California's economy represents 14.6 percent of the U.S. as a whole.⁵ While overall electricity consumption has grown along with population and economic growth, the sales per customer has increased only by around 1 percent during 1990-2005 (see Table 1).⁶

Population Trends

California is home to more than 37 million people and has the world's eighth largest economy. The population has grown from just under 24 million since 1980, an increase of almost 60 percent. Much of the growth in absolute numbers has occurred in large cities like Los Angeles, as would be expected, but less densely populated areas have grown much more rapidly in percentage terms. During this 26-year period, Los Angeles County increased by 50 percent, while Placer County, just east of Sacramento, more than doubled with a 173-percent increase. Other less populated counties are also growing rapidly.

In the 2000 U.S. Census, 15.7 million California residents aged five years and over reported changing their place of residence between 1995 and 2000. About an equal number of residents reported staying in the same house. Depending on their previous place of residence, the movers can be divided into four major groups: those who moved within the same county (62 percent), to a different county within California (20 percent), from a different state (9 percent), and from a different country (9 percent). Approximately 2.2 million Californians moved to other states, compared to 1.4 million who moved to California from other states and 1.4 million who moved to California from other countries.

Derived from California Department of Finance, Demographic Research Unit, http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_Misc.htm, and U.S. Bureau of Economic Analysis, <http://www.bea.gov/regional/index.htm#gsp>.

Table 1. Increases in Electricity Consumption, 1990–2005

| Total Annual Sales per Customer (kWh) | | | | | | |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|----------------------|
| State | 1990 | 1995 | 2000 | 2004 | 2005 | % Change (1990–2005) |
| CA | 17,646.61 | 16,941.20 | 19,465.66 | 17,936.28 | 17,803.55 | 1% |
| CT | 18,921.72 | 19,037.36 | 19,889.89 | 20,417.53 | 20,874.77 | 10% |
| TX | 31,600.93 | 32,152.24 | 34,222.41 | 31,622.36 | 32,144.01 | 2% |
| VT | 15,889.08 | 16,351.28 | 17,273.15 | 16,504.76 | 16,912.47 | 6% |
| GA | 27,033.55 | 28,935.44 | 31,048.74 | 30,358.73 | 30,316.75 | 12% |

However, some DSM proponents, like the American Council for an Energy-Efficient Economy, an advocacy group, suggest that changes in consumption can be determined by state regulatory agencies' level of commitment to DSM policies.⁷ Yet there are significant factors that influence energy consumption beyond regulatory policy.

Economic vs. Political Conservation

Economic energy conservation consists of making sensible actions and investments. Political conservation policies, including demand-side management, consist of subsidies that encourage free-riding on the backs of taxpayers.

DSM rose to regulatory prominence during the 1980s, after many plants were proposed but thwarted due to activist resistance during licensing proceedings, based largely on claims that the plants were not needed. The utility industry thus sought other approaches besides building new plants to meet future energy demand.

DSM and energy efficiency advocates, such as the Natural Resources Defense Council and Union of Concerned Scientists, argued that if everybody were to use super-energy efficient light bulbs, then dozens of power plants could be shut down, and that a coercive tax-and-spend program was needed to get everyone on board.

By the late 1990s, America's utilities had spent \$20 billion on DSM programs, with little to show for it. In 1992 alone, utilities are estimated to have received about \$1 billion in incentive payments.⁸ With the collapse of managed retail competition, DSM is making a comeback.

What Is DSM?

Demand-side management (DSM) programs provide subsidies to consumers to install or use more efficient appliances, even though some consumers would use these appliances on their own. Free-riding is endemic to most DSM programs. For example, one DSM program in Georgia plans to give away 200,000 compact fluorescent light bulbs for an estimated cost to ratepayers of \$700,000, or \$3.50 apiece. These same bulbs can be found at Lowe's or Home Depot for \$9.96 a six pack, or \$1.67 apiece. If a consumer has \$20 to spend on energy efficiency, he can get 12 light bulbs on his own. If that \$20 is taken from the customer in inflated power bills, it will only put about six light bulbs in place. The program's high overhead eats up half the conservation money. Taking that money away from consumers and spending it in such a wasteful manner reduces the ability of individuals to spend more on conservation or make more attractive investments.

The mandatory DSM subsidy can only be achieved in a strictly regulated sector of the economy where the political machinery exists to shift money without consumer consent. DSM program exuberance waxes and wanes in inverse relation to the viability of competition in the electric utility industry.

The presumption of a correlation between government-mandated efficiency programs and society's overall energy use is wrong. Increased efficiency has consistently resulted in more, not less, energy use. For example, in a typical household, money saved from the use of high-efficiency appliances yields the family more money to spend on other things—say, a trip to Hawaii or a new SUV—and virtually any new spending will involve additional energy use.

Similar things happen in the business world. If a retailer cuts costs through the use of high-efficiency air conditioning, he is better able to compete for new business. Lower prices passed on to the consumer mean that a shopper in his store may now buy two sweaters instead of one. More sweaters means more energy used in their production and delivery. A manufacturer who reduces the energy use per unit of product will make more units of that product. Federal and state subsidies and mandates for conservation have not, and cannot, reduce energy demand in the aggregate.

Taxing all customers for conservation programs to subsidize a few creates perverse incentives by punishing the frugal and rewarding the spendthrift. Those who have sought to increase energy efficiency on their own dime must pay those who have not been as frugal to do the same. As a result, those who would have implemented energy conservation measures on their own will now wait for the subsidy.

Cross-subsidy cannot be tolerated in a competitive market; its abolition should be among the first reforms stemming from real deregulation. Despite its claims to serve lofty goals, regulation usually ends up in the brokering of political favors to various interest groups.⁹ A competitive market threatens to end such rent-seeking, while political conservation would help to entrench it.

California's DSM Programs

In December 2006, the California Public Utilities Commission (CPUC) approved more than \$1 billion, for the next two years, for low-income utility bill discounts and energy efficiency programs run by the state's four major private-sector energy utilities—Pacific Gas and Electric, Southern California Edison, Southern California Gas, and San Diego Gas and Electric. Qualifying customers can receive utility bill discounts and free energy efficiency services and products. More than 3.5 million customers are expected to receive these services.¹⁰

The CPUC action adopted budgets, policies, and program parameters for two established programs—Low Income Energy Efficiency (LIEE) and California Alternate Rate for Energy (CARE)—which are managed by the four major utilities, as well as six smaller investor-owned utilities. They are budgeted to collectively spend another \$11-\$12 million on the LIEE and CARE programs.¹¹

The CARE program allows low-income customers to receive a 20-percent discount on their electric and natural gas bills. The program is funded through a rate surcharge paid by all other utility customers.¹² Some utilities also offer shareholder-funded emergency payment assistance programs, which provide cash assistance to help customers offset the costs of heating and cooling their homes.

Flex Your Power

Flex Your Power is California's statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California utilities, businesses, government agencies, and nonprofit organizations. The campaign includes retail promotions, a website, an electronic newsletter, educational materials, and advertising. According to a recent Flex Your Power ad campaign, "In a state with as many people—and air conditioners and light bulbs—as California, taking even small steps to save energy can quickly add up. If all California households permanently replaced 5 incandescent light bulbs with CFLs, it would save 6.18 billion kilowatt-hours (kWh) and 2.26 million tons of CO₂ per year *equivalent to taking 414,000 cars off the road.*" [Emphasis added] Not mentioned is the fact that there are over 25 million personal vehicles in California, so if *everybody* replaced five light bulbs a reduction equivalent to only 2 percent of vehicles might occur. Another recent campaign encourages people to shut off their air conditioning whenever the grid's power supplies are stressed, which in California happens to be when it is hot and people actually need air conditioning.

The LIEE program provides low-income households with no-cost weatherization services, including attic insulation, energy-efficient refrigerators, energy-efficient furnaces, weather-stripping, caulking, low-flow showerheads, water heater blankets, and door and building envelope repairs that reduce air infiltration.¹³

These programs have an inherent internal conflict: By lowering the apparent cost to low-income rate payers, it undermines the incentive to reduce energy use. The two programs together multiply the "snap back" effect—the tendency to increase usage due to more efficient use and lower per-unit cost. (It usually does not completely offset efficiency gains, but does significantly reduce them.)

Factors Affecting California Energy Use

Weather affects California energy use patterns. California is blessed with a dry, pleasant, mild climate that reduces heating and cooling demands for residential and commercial buildings.

Change in economic structure. California's economy has undergone a structural change over the past quarter century from energy-intensive manufacturing to services, which are less-energy intensive, but require reliable supply. In 1980, the state's dominant sector was manufacturing, representing more than 10 percent of gross state product (GSP). During the 1980s, California experienced a widespread

Population Density Is Only a Small Factor

New Yorkers have often been told that they use less energy than most Americans, partly because they live in the most densely populated city in the country. And that is true, up to a point. Sure, New Yorkers have the benefit of an extensive mass transit system, which means lower auto emissions, but the city's residential buildings are less energy efficient than those in many other places in the country, especially eco-friendly states like California and Vermont. "The main reason that New Yorkers use much less electricity is that our apartments are so much smaller" than homes in other cities, says Rohit Aggarwala, the director of the Long-Term Planning and Sustainability Office, part of the New York Mayor's Office.

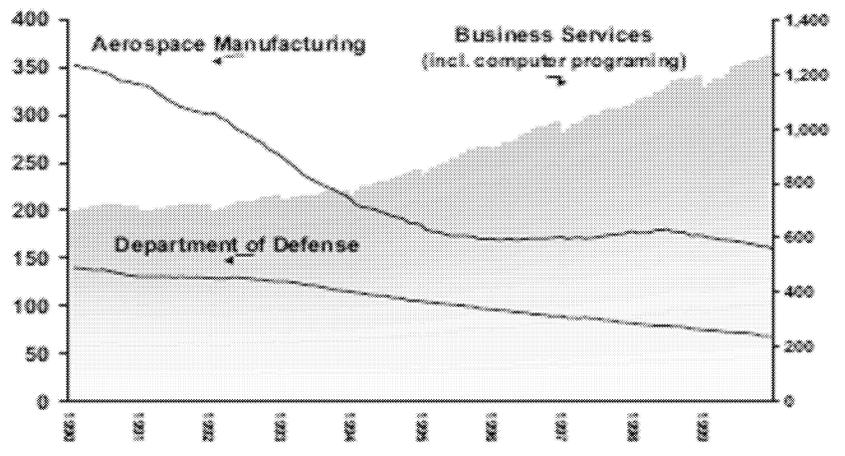
Source: J. Alex Tarquinio, "The Cost of Saving Energy," New York Times, July 15, 2007

recession, brought about in part by high energy prices, out-migration of businesses, and downsizing of its defense industries as part of the post-Cold War “peace dividend.”¹⁴ By 2006, manufacturing accounted for only 8.5 percent of GSP. During the same period, information services—software, movies, and data processing—grew from less than 2 percent to more than 5 percent of total GSP, while finance and insurance grew from about 2 percent to almost 8 percent.¹⁵

Both information services and finance are inherently less energy-intensive than manufacturing, with less than 10 percent the energy intensity of manufacturing processes. They are, however, more sensitive to energy reliability and prone to larger annual swings. Other states would be hard pressed to replicate California’s new economic structure.¹⁶ Politicians, like Senate Environment and Public Works Committee Chair Barbara Boxer (D-Calif.), who claim that jobs are created when shifting to lower energy or carbon intensity conveniently forget about the jobs lost in other sectors (see Figure 1).¹⁷

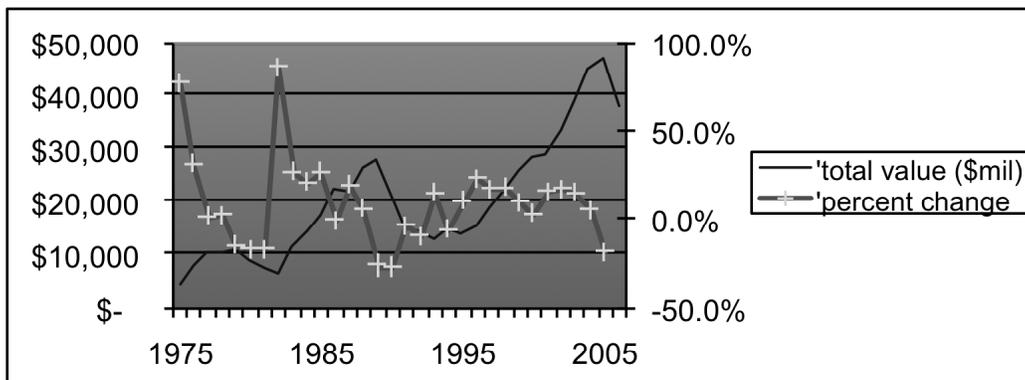
Construction activity is a significant measure of economic vitality. California’s hot real estate market exaggerated yearly increases, and overall the performance is not good (see Figure 2).

Figure 1. Employment Transition in the 1990s (1,000s of Jobs)



Source: *Economic Report Of The Governor 2000*; Gray Davis, Governor, State of California

Figure 2. Construction of Residential Units in California



Source data: Construction Industry Research Board, (Security Pacific through 1986), seasonally adjusted by the California Department of Finance.

Table 2. Fuel Choice for Major Home Energy Use in Various States and for the U.S. as a Whole (the majority of non-electric use is natural gas)

| | CA | GA | NY | TX | FL | US |
|---------------------|-----|-----|-----|-----|-----|-----|
| Electric Space Heat | 18% | 50% | 14% | 58% | 83% | 31% |
| Electric Water Heat | 14% | 52% | 28% | 43% | 83% | 40% |

Source: U.S. Department of Energy, Residential Energy Consumption Survey, 2001.

Building and appliance standards. Some of the earliest energy efficiency policies adopted in California, in the mid-1970s, were standards for buildings and appliances. Known as Title 24, California’s building standards have since then become increasingly stringent, while at the same time taking into greater consideration the diversity of climate zones in California.¹⁸ Similarly, appliance standards have changed significantly since 1977, and energy efficiency has increased due to improved technology.

In addition, partly because of relative prices and because of building and appliance standards, Californians use more natural gas than electricity for water and space heating than do residents of other parts of the country, or around the country as a whole (see Table 2). Finally, more agricultural water pumping is done using natural gas and liquefied petroleum gas—rather than electric—pumps.

Housing trends. California’s high real estate prices have helped to reduce the physical size of houses and apartments, which has led to less space to heat and cool, even as the number of persons per household has increased. Overall, California’s major metropolitan areas, like Los Angeles, have more people per household (PPH) compared to the nation and to other parts of the state. Los Angeles has an average PPH of 3.12 compared to 2.5 for Placer County, just east of Sacramento, and a national average of 2.6.¹⁹

Further, more of the housing stock in California consists of multi-family homes—apartment complexes and condominiums—than elsewhere. Structural differences in apartment buildings compared to single-family homes, such as greater geographical concentration of energy use, further reduce requirements for heating and cooling.²⁰

Shifting Housing Patterns

California homeowners have told reporters that home prices have brought important changes to their neighborhoods. Prices have driven the working poor to team up to buy houses. Realtors say four, five, or even six people are listed on mortgage titles to qualify for financing. Seven, eight, nine cars are parked in the driveways and on the streets in front of the houses. What’s going on here? For a century, people in Southern California moved to the suburbs as they got richer, leaving the more urban parts of town to poor people. Now that pattern has reversed itself. Affluent people are leaving the suburbs to live in the city, while the working poor—people who have jobs but do not earn enough to exceed the poverty line—are doubling and tripling up in the suburbs to buy houses.

Source: William Fulton, “Trading places As the affluent go downtown, the working poor are tripling up to buy homes in the ‘burbs,” Los Angeles Times, July 29, 2007

Costs of California Energy Policy

High energy prices. One of the common fallacious arguments for DSM programs is that total bills are more important than the rate per unit (of dollars per kilowatt-hour). That is only true for residential and some commercial buildings. Worse, areas with high DSM activity like California have seen their total bills go up, in some cases substantially. Average bills for all customer types in California have increased by 34 percent since 1990. Californians’ bills have increased more during this period than have those of residents of 32 other states.²¹ High bills and rates cannot be blamed entirely on DSM programs, but DSM policies have contributed significantly to increases in both rates and bills. This increase affects residential consumers directly, and also indirectly—by raising bills for commercial and industrial customers, economic competitiveness suffers, with a natural increase in business out-migration and outsourcing (see Table 3).

Structural Impacts. High energy prices have driven some types of businesses out of California, especially those that are energy intensive by nature, such as manufacturing. This has led to increased volatility of economic growth—the shift to services, software, and entertainment has made California’s economy more subject to boom/bust cycles depending on consumers’ access to discretionary income.²² As noted above, it has also caused a shift in fuel type, from electric to natural gas, where fuel switching is feasible.

Thin and absent supply reserves. In large measure due to reliance on DSM and other efficiency measures, along with other government interventions,²³ and extremely long lead times for new transmission lines, the supply of electricity for California is not keeping pace with demand growth. For many years, overly optimistic expectations of increased energy efficiency due to DSM influenced regulators’ determinations of “need,” a central feature of power plant siting proceedings.

Today, California’s reserve margin—necessary to protect against grid imbalances caused by a temporary spike in demand, such as a heat wave or a power plant breakdown—has decreased to only about 10 percent from an average level of about 18 percent in the early 1980s. On some days, especially during the summer, operational reserves drop to less than 5 percent or lower, leading to curtailments and potentially rolling blackouts.²⁴

Greater price volatility. Thin supply can help increase price volatility. Because generation costs during peak hours can be five to 10 times greater than the cost during normal hours,²⁵ the marginal generation capacity added to the supply determines the cost for those hours. A larger reserve margin allows the marginal need to be made up by increasing loads on more efficient units, reducing the costs and volatility.

Table 3. Increases in Electric Bills from 1990–2005

| Total Annual Sales/Customer (\$) | | | | | | |
|----------------------------------|------------|------------|------------|------------|------------|-------------------------|
| State | 1990 | 1995 | 2000 | 2004 | 2005 | % Change (1990–2005) |
| CA | \$1,559.96 | \$1,678.87 | \$1,880.38 | \$2,035.77 | \$2,084.80 | 34% |
| CT | \$1,733.23 | \$1,998.92 | \$1,893.52 | \$2,094.84 | \$2,517.50 | 45% |
| TX | \$1,826.53 | \$1,961.29 | \$2,221.03 | \$2,513.98 | \$2,937.96 | 61% |
| VT | \$1,315.62 | \$1,546.83 | \$1,773.95 | \$1,818.82 | \$1,851.92 | 41% |
| GA | \$1,773.40 | \$1,915.53 | \$1,928.13 | \$1,997.60 | \$2,252.53 | 27% |

Recent Changes in California Energy Policy

Low Carbon Fuel Standard. Governor Schwarzenegger has proposed a Low Carbon Fuel Standard (LCFS) to reduce the carbon content of transportation fuels by 10 percent.²⁶ Though purportedly a market-based mechanism, the LCFS is anything but, because buyers of the products it promotes are not *willing* buyers.

Under the plan, transportation fuel sold in California would be subject to a ceiling on the amount of carbon it can emit per unit of energy. The limit would take into account the carbon produced throughout the fuel's entire life cycle, from production to consumption.

One potential beneficiary of the new standard is ethanol, which has several major downsides:

- **Fuel will be less efficient.** Ethanol contains about 34 percent less energy per gallon than gasoline,²⁷ which greatly reduces the number of miles traveled per gallon.
- **Fuel will be more expensive.** The reduced efficiency mentioned above increases the effective price per gallon. In addition, ethanol must be transported by truck or rail because it is too corrosive for pipelines.²⁸ These increased transportation costs contribute to higher prices at the pump.
- **Food will be more expensive.** Skyrocketing corn prices, driven by the clamor for ethanol, are squeezing California milk producers because of the increased cost of cattle feed, reports the California Farm Bureau Federation.²⁹ In addition to increasing the costs of animal feed, the high price of corn has encouraged farmers to switch from other grains, such as wheat, to corn, thus raising the costs of other grains because of reduced supply.
- **Energy savings will be illusory.** When transportation, refining, and farming costs are factored into the production of ethanol for fuel, the energy savings are negligible. In fact, ethanol often requires more energy to produce than it yields.³⁰

Population and Tax Structure

The structural changes in California's economy, coupled with demographic shifts, have made state tax revenues more prone to instability. Twenty-five years ago, the state's two major revenue sources, personal income taxes and sales taxes, collected almost exactly the same amount, around \$10 billion each per year. While state sales taxes have climbed to about \$30 billion a year since then, income taxes have exploded to \$56 billion. Two factors are widening the gap between the two tax types:

- A steeply progressive income tax system with narrow brackets that puts the biggest burden on high-income residents, boosting revenues faster than overall income rises.
- A flattening of consumer spending on taxable retail goods such as cars, clothing, and appliances.

As a portion of personal income, taxable sales have been declining steadily, from 50 percent-plus 25 years ago to about 40 percent today. Because the relative handful of high-income Californians who pay the vast majority of personal income taxes are increasingly dependent on capital gains and other non-salary income, even the slightest uptick or downturn in the stock market, real estate, or other speculative activities can generate a rapid increase or decrease in tax revenues, as the past decade has shown on several occasions. In California's 2007-2008 budget year, tax revenues are down sharply, by about \$12 billion, due to declines in both real and stock estate markets.

Source: California Franchise Tax Board, http://www.ftb.ca.gov/aboutftb/annrpt/archive_index.shtml

Researchers are investigating numerous creative ways to increase ethanol yield from per-acre corn production, as well as conversion processes for other cellulose sources, but it will be years until those approaches have been adequately tested and validated. In the meantime, we can expect disruptions in our food and fuel supplies. Creating artificial “markets” for inefficient sources will only stifle innovation and raise prices.

The good news, perhaps, is that corn ethanol’s luster as a low-carbon fuel is fading. Recent life cycle analysis finds that ethanol production from corn actually produces more greenhouse gas emissions than the gasoline it replaces.³¹

Tradable Credits For Renewables and Conflicts With Carbon Trading. California has a renewable portfolio standard (RPS) that requires utilities to include a specific—and growing—percentage of renewables in their electricity mix. California is having problems in meeting the standard. Utilities have been unable to sign contracts, get permits for, and finance the building of transmission capacity with renewable resources.³² More recently, nationwide demand for some equipment, especially wind turbines, in response to 20 states having similar RPS requirements, has driven prices through the roof and availability through the floor.³³ Partially in response to their difficulty in complying with their self-imposed mandate, California now is working with other Western States to trade renewable energy credits through the Western Renewable Electricity Generation Information System.³⁴

Much of the push for renewable energy technology development focuses on a new, *artificial* commodity called renewable energy credits (RECs), which are often traded separately from the actual electricity.³⁵ RECs are often touted as a market mechanism for complying with renewable portfolio standards in 18 of the 26 states with such requirements, and are promoted by some state and local governments as the solution to the high costs of renewables. They are anything but.

RECs homogenize all renewables by stipulating that they all provide *exactly* the same attributes. For example, biomass projects are assumed to have the same environmental attributes as wind energy projects with equivalent energy production, even though biomass has additional benefits not provided by wind. Biomass can help reduce forest fire risk (when fueled by timber wastes) or reduce odor (when fired with feedlot waste), two benefits not provided by wind generation. Thus, a biomass generator selling RECs for the same price as a wind farm broadcasts a perverse market signal. The result is a subsidy for politically favored renewables projects that may not be the most economically or environmentally efficient. This harms those renewable developers that are actually providing real and quantifiable environmental enhancements.³⁶

The Myth of Jobs from Renewables

Most renewable energy advocates claim that renewable portfolio standards and similar mandates will create jobs in the jurisdictions where they are enacted. But this would only shift resources—we could also create jobs by mandating increased manual labor in the manufacture of, say, refrigerators. Moreover, approximately 55 percent of the wind turbines installed in the U.S. during 2006 in response to renewable portfolio standards and heavy federal tax subsidies were imported, primarily from Denmark, Germany, and India. The remaining jobs were temporary.

Source: Wiser, Ryan, et al., Annual Report on U.S. Wind Power Installation, Cost, and Performance Trends: 2006; LBNL, May 2007.

Substituting for electricity generation, renewables offset emissions from fossil fuel-fired generation. The amount and type of emissions that are offset vary depending on the electric grid into which the power is sold—emission offsets in a grid dominated by older coal power plants would be significantly different than emission offsets in a system dominated by either natural gas or hydroelectric generation. In addition, the time of electrical production has a significant effect on emissions offset, since very few grids rely on the same fuel for balancing supply and demand at all hours. For instance, a renewable source that delivers at night may be offsetting emissions from coal—used typically for baseload generation—while a source delivering power during the day into the same system may be offsetting natural gas or hydroelectric—used for peak-hour generation. The amount offset also varies over time as new generation systems are added to a grid, and existing facilities are upgraded.

Homogenizing trading permits for renewable energy credits presumes perfect knowledge on the part of regulators as to what is offset and when. Reliance on an artificial commodity assumes that a small cadre of bureaucrats has perfect knowledge about the hourly operation of generation sources in real time, the location and timing of offsets, and the actual damages those offsets avoid. It further assumes that regulators have incorrectly set emission level standards.³⁷

National markets for RECs will transfer wealth from some states to others, as some regions are better endowed than others with cost-effective resources. Based on modeling of proposed federal renewable portfolio standard legislation, analysts at the U.S. Energy Information Administration predict that a national RPS would lead to significant wind development in the Northwest and Midwest, where strong wind resources make wind power most cost competitive, and significant biomass development in the Southeast and Central states.³⁸ Less well-endowed regions would end up paying for renewable energy development elsewhere in order to achieve compliance.

The creation and trading of RECs will likely lead to worse conditions, forced transfers of wealth, diminution of energy security, and even worse distortion of the already complicated and economically dubious emissions trading markets, all for the questionable goal of subsidizing an already-too-expensive class of technology.

Conclusion

California has been able to moderate electricity consumption, but not as a result of market intervention via demand-side management. Electricity consumption per capita has not risen as much as in most states, but overall consumption and emissions have increased along with population and economic growth. California in no way shows that it is possible to avoid increases in energy consumption and emissions and sustain robust economic and population growth at the same time. DSM has also caused a number of negative, albeit unintended, consequences, including higher electric bills, reduced energy reliability, and critical power shortages. For all these reasons, California does not provide a useful energy policy model for the rest of the nation. Rather, the California experience is a cautionary tale about the need to carefully evaluate all factors, not just regulatory commitment, and the likely, albeit unintended, negative consequences.

Notes

¹ David R. Baker, "Sen. Boxer In Silicon Valley To Emphasize Conservation," *San Francisco Chronicle*, Wednesday, August 15, 2007, and Marvin Horowitz, "Changes in Electricity demand in The United States from the 1970s to 2003," *The Energy Journal*, Volume 28, Number 3 (2007), pp. 93-107.

² There is a virtual panoply of technology approaches for carbon capture and sequestration. Many of them are briefly described in the April 2007 *Power Magazine*, http://www.powermag.com/powerweb/archive_article.asp?a=40-SR_IGCC&y=2007&m=april. They include pre-and post-combustion absorption, gasification and separation, and chemical solutions. Sequestration approaches include deep ocean deposit, geologic deposit and biological techniques.

³ Joseph Romm; "OnPoint" broadcast 01/16/2007; discussing his book *Hell or High Water*, http://www.eenews.net/tv/video_guide/531.

⁴ See e.g. Docket No. 17687-U: Georgia Power Company's Application for Approval of Its 2004 IRP, before the Georgia Public Service Commission, and Direct Filed Testimony of Resource Supply Management.

⁵ U.S. Bureau of Economic Analysis, Regional Economic Accounts, <http://www.bea.gov/regional/index.htm#gsp>.

⁶ U.S. Department of Energy, Residential Energy Consumption Survey, 2005.

⁷ Maggie Eldridge, et.al., The State Energy Efficiency Scorecard for 2006, American Council for an Energy-Efficient Economy, June 2007.

⁸ Before The Georgia Public Service Commission, State Of Georgia, In RE: Docket No. 24505-U, Georgia Power Company's 2007 Integrated Resource Plan, Brief of Resource Supply Management.

⁹ See Timothy P. Carney, *The Big Ripoff: How Big Business and Big Government Steal Your Money*, New York, Wiley, 2006.

¹⁰ California Public Utility Commission, "D0612038: Adopting Utility Budgets for Low Income Energy Efficiency Programs and California Alternate Rate for Energy, Appendix," http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/62945.pdf.

¹¹ For the four largest utilities, the collective CARE budgets for the next two years are \$977 million in 2007 and \$1.04 billion in 2008; for LIEE, the budget calls for \$157 million next year, and \$156 million in 2008.

¹² California Public Utilities Commission, *California Alternate Rates for Energy (CARE)*, <http://www.cpuc.ca.gov/PUC/energy/consumers/care.htm>.

¹³ California Public Utilities Commission, *Low Income Energy Efficiency (LIEE)*, <http://www.cpuc.ca.gov/PUC/energy/consumers/liee.htm>

¹⁴ Economic Report Of The Governor 2000, Gray Davis, Governor, State of California, p.42.

¹⁵ U.S. Bureau of Economic Analysis, Regional Economic Accounts.

¹⁶ If they did, California's economy would likely shift back to manufacturing of durable goods, with an associated jump in energy use.

¹⁷ R. Baker.

¹⁸ In some specific climate zones within California, early versions of the building standards led to issues with moisture control, due to high levels of envelope insulation and air infiltration control, which caused premature wood rotting in walls and ceilings. Other areas of the country have different climates and different energy prices and many requirements contained in California's standards would not pass a cost effectiveness test in those areas.

¹⁹ State data from California Department of Finance, Demographic Research Unit, *Summary File 3*, <http://www.dof.ca.gov/HTML/DEMOGRAP/SDC/SDC-Products.php>. National data from U.S. Census Bureau, Current Population Survey, 2006 Annual Social and Economic Supplement, March 27, 2007.

²⁰ U.S. Department of Energy, Residential Energy Consumption Survey, 2005.

²¹ Derived from Energy Information Administration Electric Power Annual 2005 State Data Tables, http://www.eia.doe.gov/cneaf/electricity/esr/esr_tabs.html.

²² California source: Construction Industry Research Board, (Security Pacific through 1986), seasonally adjusted by the California Department of Finance, updated: May 31, 2007.

²³ Government interventions include renewable portfolio standards, prohibitions on new nuclear or coal-fired power plants, and bureaucratic obstacles to building new gas-fired facilities.

²⁴ California Energy Commission, Energy Action Plan: Preliminary Monthly Outlook for Summer 2006, http://www.energy.ca.gov/energy_action_plan/meetings/2005-09-12_meeting/2005-09-12_2006_SUMMER_OUTLOOK.PDF.

²⁵ See for example *Comparative Cost Of California Central Station Electricity Generation Technologies*, http://www.energy.ca.gov/reports/2003-06-06_100-03-001F.PDF.

²⁶ Executive Order S-01-07 by the Governor of the State of California, January 18, 2007.

²⁷ “Alternative and Renewable Fuels: Ethanol,” Facts on Energy, Institute for Energy Research, http://factsonenergy.com/?page_id=60.

²⁸ “Shipping Ethanol through Pipelines,” American Petroleum Institute backgrounder, <http://www.api.org/aboutoilgas/sectors/pipeline/upload/pipelineethanolshipmentfinal.doc>.

²⁹ *Ethanol Production Fuels High Corn Prices*, AgAlert, p.1, November 29, 2006.

³⁰ See e.g. David Pimentel and Tad W. Patzek, “Ethanol Production Using Corn, Switchgrass, and Wood; Biodiesel Production Using Soybean and Sunflower,” *Natural Resources Research*, March 2005, and http://factsonenergy.com/?page_id=61.

³¹ T.R. Searchinger et al, “Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change,” *Science*, 319, 2008, pp. 1238-1240, and P.J. Crutzen et. al., “N₂O release from agro-biofuel production negates global warming reduction by replacing fossil fuels,” *Atmospheric Chemistry and Physics Discussions*, 7, 2007, pp. 11191-11205.

³² California Energy Commission consultant report by KEMA, Inc., *Building a “Margin of Safety” Into Renewable Energy Procurements: A Review of Experience with Contract Failure*, January 2006, <http://www.energy.ca.gov/2006publications/CEC-300-2006-004/CEC-300-2006-004.PDF>.

³³ The price of wind turbines has increased by approximately 125 percent over a year ago—if you can find them for sale.

³⁴ The Western Renewable Energy Generation Information System (WREGIS), a renewable energy registry and tracking system for the Western Interconnection, went online on June 25, 2007. It is housed at the Western Electricity Coordinating Council in Salt Lake City, UT. WREGIS was developed in response to policies set by the California Legislature, Western Governors Association, and California Energy Commission to develop and implement a system tracking renewable energy generation. See <http://www.energy.ca.gov/portfolio/wregis/index.html>.

³⁵ RECs are typically normalized to 1 megawatt-hour of electrical production. See, for example http://new.evomarkets.com/index.php?page=Renewable_Energy-REC_Trading_101.

³⁶ RECs only transfer to purchasers the purported benefits of renewable generation, not any environmental hazards, such as bird kills from wind turbines or toxic releases from geothermal facilities. For biomass technologies, the situation is even more contorted. Some types of biomass are considered renewable while others are not, a situation complicated by different states having different definitions. The distinction between qualifying and non-qualifying biomass is often a function of local resources and definitely a function of local pressure groups. Ironically, in many locales biomass residues that would otherwise be considered waste material or burned openly (tree trimmings, cereal husks, rice straw), do not qualify as a renewable source simply because they are considered “open loop” and not grown specifically for energy.

³⁷ Offset emissions claimed by renewable generation only affect what may be termed “residual” emissions, which are those remaining after a power plant complies with regulatory standards. Those standards are ostensibly set to protect public health and safety; hence any residual should have little to zero negative effect on public health and safety and consequently little additional value. By requiring RECs, the effective value of those residual emissions is greatly inflated.

³⁸ U.S. Department of Energy, Energy Information Administration, *Impacts of a 15 Percent Renewable Portfolio Standard*, [http://www.eia.doe.gov/oiaf/servicerpt/prps/pdf/sroiaf\(2007\)03.pdf](http://www.eia.doe.gov/oiaf/servicerpt/prps/pdf/sroiaf(2007)03.pdf).

About the Author

Thomas Tanton is a Vice President and Senior Fellow with the Houston-based Institute for Energy Research (IER), which he joined in 1997. IER is a non-profit research organization that evaluates public policy, energy, and economics. He is also an Environmental Fellow with the Pacific Research Institute and President of the consulting firm T² & Associates. Tanton is a strong proponent of free market environmentalism and consumer choice, and frequently publishes and speaks against alarmist policies and government failures.

Tanton has 37 years of direct experience in energy technology and economic evaluations. During 2000-2003, he was general manager at the Electric Power Research Institute, where he was responsible for the overall management and direction of collaborative research and development programs in energy technologies and markets. Until 2000, Tanton was principal policy advisor with the California Energy Commission, where he began his career in 1976. There, he evaluated and developed advanced technologies, and designed policies and legislation on energy issues of importance to California, the U.S., and the world. Tanton served as lead advisor on energy and infrastructure to California's Task Force on 21st-Century Development. He has provided expert witness testimony in power plant siting cases and testified before Congress and several state legislatures.

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