

Lighting Restrictions and Energy

We live in a society that relies on multiple integrated systems, working together to create lower consumer costs and to rationally allocate time and resources. These systems have resulted in a civilization that enjoys unprecedented health and physical comfort, as well as freedom to pursue entertainment and social interests. Although amazingly resilient, these systems should never be manipulated haphazardly. The manipulation of a single aspect of our interconnected transportation, communication, and commerce system distresses our entire way of life.

Presently, a new movement – Dark Sky – has emerged, and its proponents are seeking to increase regulation of nighttime

lighting, including the light output of signs. Proponents of the effort claim it is primarily intended to make stars and planets more visible in the night sky, as well as to conserve energy. To those who do not understand the important role signs play in our economic and social system, the idea can appear to have few drawbacks. But due to the integration of signage into nearly every aspect of our society, particularly transportation and commerce, serious consideration should be given to the potential ramifications of implementing the policies advocated by the Dark Sky movement, especially where that implementation would restrict signage.

Supporters of the Dark Sky

movement argue that illuminated signs must be restricted because they are a part of a purported overall tendency to use more lighting than necessary which, the group claims, results in wasted energy. Effective commercial communication through signage is a far different matter than the issue of general outdoor nighttime lighting. It is protected speech, and it relies on the light as its sole method of communication at night. Effective sign design requires that the sign be easily seen and easily read throughout the life of the sign, and absent a provable benefit, this communication cannot legally be suppressed. Effective sign design, which frequently includes creation of a signature building, often will

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involve graphic elements that highlight the building, such as outline lighting, as part of the total signage presentation of the business to the public. When including signs, restrictive lighting regulations cross the line into censorship of speech and can have unintended consequences on that speech. It is a different issue than that of regulating area lighting in and around buildings and parking

lots, where reductions in lighting may be weighed against public safety and economic issues.

Another unintended consequence of this kind of lighting restriction is the impact on color. Reducing the intensity, tint or hue of colors by dimming a sign's lighting makes the colors harder to distinguish from each other. The effect is similar

to the way atmospheric conditions affect colors. For example, white can be nearly impossible to read under the foggy conditions common in San Francisco. When signs are difficult to read due to lack of contrast, the only solution is to increase the size of the sign, easily consuming more energy than the original smaller signs.

Energy consumption and energy savings do not occur in a vacuum; almost without exception, their impacts reverberate throughout other aspects of the transportation, communication, and commerce system. To assume those impacts will be either negative or positive, or that they are linear or simple, is imprudent. A close examination of the impacts of such regulation is necessary. Furthermore, our society seeks to conserve energy across all energy sectors, including not only electrical energy, but also gasoline, heating oil, natural gas, and any number of other types of energy.

Our capacity to reduce fossil fuel consumption in particular is linked in a symbiotic relationship with the electricity used by signs. A significant portion of our driving time, day or night, is spent interacting with signs. The signs provide effective direction to drivers, acting as a significant energy conservation tool, if fossil fuel energy is considered in conjunction with electrical energy.

Energy use represents a vast portion of our economy and social structure. Consumers

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Unintended Consequences of Size Limitations

Many cities worry that if they allow businesses to build large signs, then their city will be overrun by oversized signs that exceed the needs of its businesses. This perception is contradicted, however, by the facts. In the 1970s, San Diego discovered that 75% of sign users were not building their signs to the maximum size allowed under its code.¹ They discovered that the reason was that financially prudent business owners were choosing to invest in signs that were functional and met their needs rather than simply building the largest signs they could build.

Certainly, some signs could be made larger, and considering the stakes involved, some would. But even in a community with strict size limits, businesses will find other alternatives, many of which are even less energy-efficient than the original sign. These alternatives can include outdoor product displays and temporary signage, as well as an increase in construction of retail buildings with large display windows that can function as bright signs after dark. Temperature regulation in these buildings is much more difficult and energy-consumptive.

When businesses are driven to other methods of speaking, seldom, if ever, is energy saved, and often other unintended consequences occur. For example, one probable outcome is a loss of “mom and pop” businesses due to their relative inability to utilize advertising effectively to create name recognition.

purchase approximately \$215 billion of electrical energy alone each year in the United States² (the U.S. lighting market itself is valued at \$40 billion annually³). Meanwhile, gasoline service stations do in excess of \$244 billion in business each year.⁴ The potential ramifications of manipulation of these fuel resources ought to be sobering for anyone considering new regulations.

Americans' mobility, speech, and scale economy must work together as a system. People drive around looking at what various merchants have to say in order to choose where they will

stop and shop. Without effective commercial speech, which directs, informs, and even pleads with drivers to stop and shop, economy of scale is impeded, prices increase, and quality of life decreases. Regulatory assaults on commercial speech are, in many cases, an assault on the United States' economy and the chosen lifestyles of our citizens.

Restricted sign lighting would make conducting business after dark more risky for drivers, who would have difficulty finding their desired destination. This would likely have numerous

unwanted impacts:

- Fuel consumption and other driving-related costs increase for those drivers who miss their destination on the first pass, and have to turn around and come back to attempt to locate it.
- Poor sign visibility frustrates drivers and leads to unsafe last-minute maneuvers, increasing the likelihood of accidents and leading to increased automobile insurance premiums.
- Many travelers who miss their intended destination simply go on to the next town rather than

1. Due to its litigation with Metromedia, Inc. during that time, the City of San Diego hired Dr. Robert James Claus to assist it in analyzing and rewriting its on-premise sign code.

2. Energy Information Administration, U.S. Dep't of Energy, Electric Power Industry Summary Statistics for the United States, 1998 and 1999.

3. Bright Idea, FORBES, October 14, 2002, at 154.

4. U.S. Census Bureau, Estimated Annual Retail and Food Services Sales by Kinds of Business: 1992 Through 2000, (November 20, 2002), <<http://www.census.gov/svsd/retlann/view/table2.txt>>.

turn around, thus taking retail business away from the local community.

- Those who are able will simply rearrange their schedules to shop during daylight hours, resulting in congested roads and crowded stores.
- Any energy use by businesses open at night is far less efficient with fewer customers on the premises to take advantage of it.
- Businesses with little nighttime street presence are forced to close during those hours or resort to greater advertising expenditures to make up for lost business.
- Production of most alternative advertising that is affordable for the small business (including direct mail, coupons, newspapers, etc.) consumes natural resources and energy which likely have a greater environmental cost than the illuminated sign.
- Impulse oriented businesses, such as fast food restaurants and convenience stores, lose irreplaceable business, leading to an overall reduction in retail sales.

Almost all power generating systems in the United States by necessity generate more energy at night than is consumed. This



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is because power facilities must generate a consistent, minimum base load to meet the daily minimum demands on the system. Throughout the country, various fuels are used to power the base load generators. Power companies utilize the least expensive fuels available for generating base load power.

Additional generators supplying what is called “regulation energy,” usually powered by natural gas, coal or other fuels, kick in as needed throughout the day to meet demand. Most regulation energy production emits varying levels of contaminants into the environment, depending on the energy source. Regulation energy is not produced around the clock, and this energy source is generally much less efficient than the base load, in part because, like a well, a power generator often needs to be “primed” before it can begin producing energy. Additionally,

exists for all of it. The base load is the lowest amount of energy a system will produce, and a portion of it nearly always goes unused at night (typical night time use is 60% of capacity). One cannot, therefore, say that restricting lighting for commercial signs saves energy; it does not. The energy that has been generated simply goes unused. This unused nighttime base load electricity, and the environmental costs and production inefficiency of regulation energy that kicks in to serve increased demand during the day, are the primary reasons why shifting energy usage to night hours is a matter of public policy in many communities. In a complex society that is working 24 hours a day, the more activities can be shifted to evening, the less will occur during the day time. Increasing nighttime use from 60% of capacity to 70% can have enor-

the costs of various electricity generation technologies, in cents per kilowatt hour, vary: coal generation costs 3.11 to 3.41; gas turbine generation costs 2.53 to 3.41; nuclear power generation costs 3.31 to 5.74; and wind generation costs 3.89 to 5.84.⁵

Base load energy must be consistently produced, whether or not a market

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mous positive impacts in a number of areas. One of these impacts is to lower energy rates for the consumer. Many power companies charge lower “wholesale” rates during off-peak hours, and some have instituted a multi-tiered rate system to encourage consumers to shift the timing of their power use. This is partly because base load energy is less expensive to produce than regulation energy, partly because during times of peak demand production costs can actually exceed fixed regulated prices, and partly because energy companies want

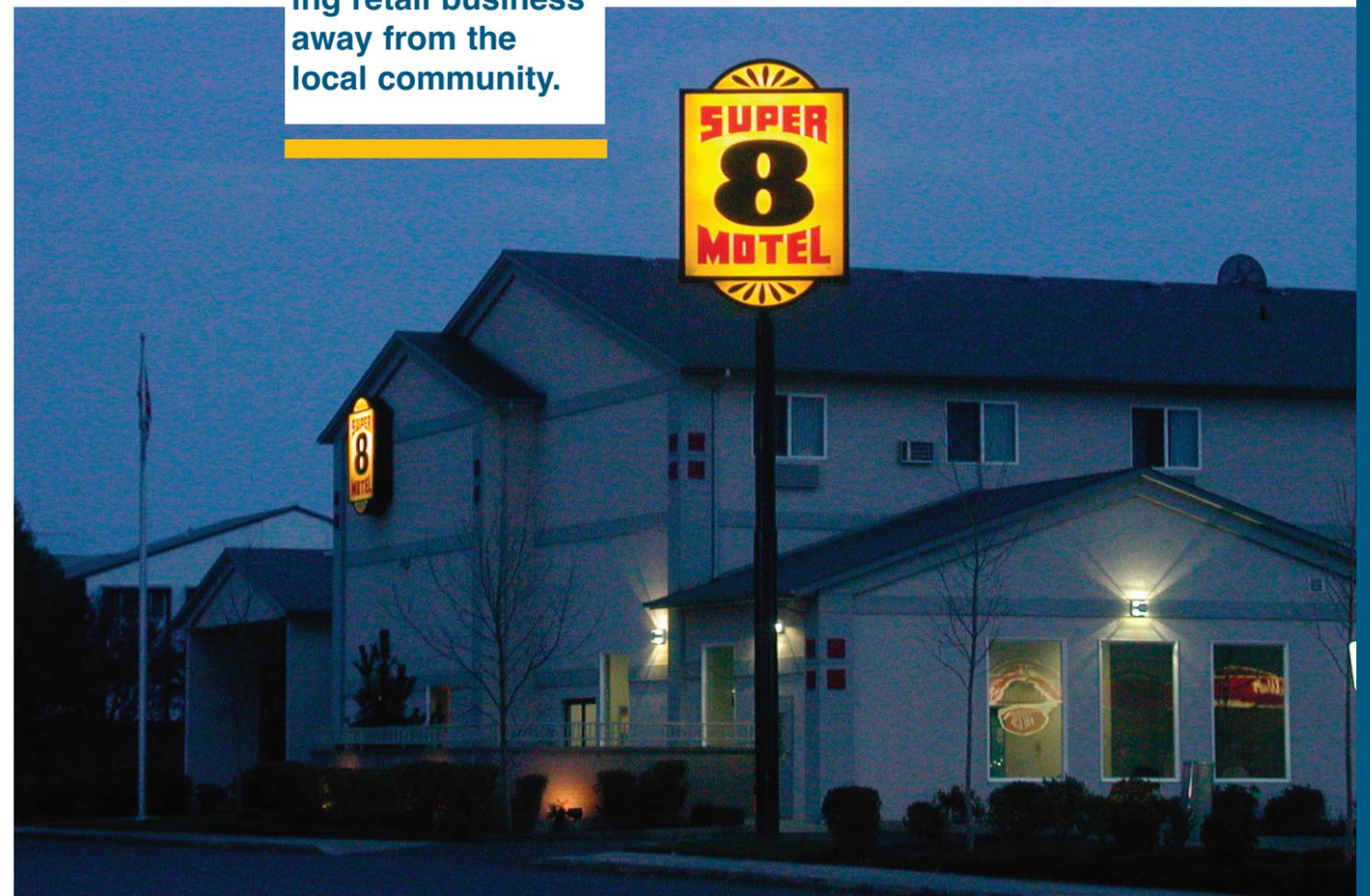
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to sell all of the base load energy being produced in order to offset those daytime losses. Thus, the negative implications of limiting use of energy during off-peak hours extend to daytime energy consumers. When energy sales are reduced at night, the result is revenue erosion and energy companies must compensate by increasing daytime rates in order to cover the costs of the base load energy production. So in a very real sense, business signs that are lit at night are consuming energy that would otherwise have been wasted, and by paying for that energy use are helping to keep daytime rates down.

Not only do restrictions on sign lighting result in

wasted energy and higher electricity rates for consumers, but the established retail communication system becomes less efficient. This has a number of negative consequences.

First, the incredible advertising and communication value of business signage is limited to daylight hours. The advertising ability of on-premise signage thus is reduced, because it can no longer communicate with those who are passing it at night. This harms the business because it prevents the sign from building memory in potential customers who might otherwise remember the store the next time they need what is for sale there. It also interferes with the business’s creativity and speech by restricting it to particular times



5. KEITH JOHNSON, Second Wind for Wind Power? Why Those Slender Turbines Might Make a Go of It This Time, WALL STREET JOURNAL, August 27, 2002, § International, at 1.

of day and to the use of particular materials. Perhaps worst of all, only businesses with recognizable buildings and corporate identification will be able to attract customers at night, applying an astonishing level of discrimination against the small, independent business owner.

Second, businesses with unlit signs often do not attract enough customers to remain open during evening and nighttime hours because people cannot look at the store and tell whether or not it is open – an especially harmful situation for restaurants, theaters and motels. This forces people to conduct their shopping at times of day that may not

always be convenient for them, which keeps them from making the most efficient use of their personal time. The compressed shopping day increases the number of people seeking to do their shopping during a limited number of hours, which in turn increases pressure for additional businesses to meet the retail needs that may begin to overwhelm existing businesses. This pressure leads to less efficient land use and greater land consumption.⁶

Furthermore, when a business must be closed at night, the jobs that are lost typically cannot be regained. A community can experience a number of other

negative consequences when the profitability of its businesses is reduced, including eroded tax revenues, business failures, and increased unemployment. Additionally, lending institutions may find that loan repayments and collateral are put at risk.

Third, lighting restrictions lead to less efficient use of the transportation system. People are forced either to drive up and

A business benefits from the advertising generated by an illuminated sign, even if it is closed for the night, because it helps reinforce memory of the business for recall when needed at a later time, and it brands the site.

down a street in the dark, or endure driving on congested streets during daylight hours in order to do their shopping. The slower driving speed during peak travel times and the stop-and-go nature of congested traffic results in more gasoline use and increased automobile emissions. Evening and night time retail activity, however, helps spread the use of the transportation system out over a longer period of time so that it is not overwhelmed and failing during the day, while sitting unused at night.

Fourth, restrictions on lit business signage undermine people's sense of safety at night. They simply will not go to a dark area at night, even if the stores are open. Turning off business signs at night darkens streets, which often results in an increase in criminal activity, and exposes businesses to a serious insurance liability. Illuminated business signs, on the other hand, augment the publicly funded street lighting system to enhance public safety and help prevent crime. This unfortunate fact was established during the energy crisis in 1976, and the national policy to turn off business signs and area lighting was quickly reversed.

All together, these factors would work to concentrate business activities into daylight hours,



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increasing the need for electrical use during the day. This in itself leads to more costly use of electricity. Due to friction, a minimum of 2% of the electricity transmitted along interstate power lines is lost before it ever reaches local lines, where an additional 3% of the power generated is lost on average. The warmer the temperature, the more electricity is lost. Thus, typically 4% of the total energy transmitted during off-peak hours (at night) is lost, while 6% of the total transmitted during peak hours (during the day) is lost (on very hot days, the losses can go higher).

Signs consume approximately 1.5% of the electricity transmitted at night. Generally speaking, 80% of the generated capacity is normally used during on-peak hours. The transmission of the 80% of generated electricity results in approximately 6% loss, or 4.8% of the total electricity generated. During off-peak hours, electricity consump-

tion is generally about 60% of generated capacity. The transmission of that approximately 60% of generated electricity loses approximately 4% in the lines, which is 2.4% of the total generated – a night time savings of nearly 1% more than the entire amount used by signs.

Let's look at it another way. Assume a nighttime use of 1,000,000 kilowatts at night at \$.03 cents per kilowatt for a total electrical sale of \$30,000. Daytime electrical rates typically increase by a third – in this example, to \$.04 cents per kilowatt. Shifting 250,000 kilowatts of use from nighttime use to daytime use would reduce nighttime costs by \$7,500 and add daytime costs of \$10,000, resulting in an overall cost increase to the consumer of \$2,500.

Remember, too, that energy is lost in the lines during transmission at a greater rate during the day than at night. The energy that would be lost in transmission of the 250,000 kilowatts at night (4%) would total 10,000 kilowatts, and during the day (6%) would total 15,000 kilowatts, for a difference in 5,000 kilowatts.

Sign manufacturers are constantly looking for ways to make sign lighting systems more energy efficient. Although

6. The conventional wisdom is that retail space in America equals approximately twenty square feet for every person. Figures from the U.S. Department of Energy, however, indicate that number may actually be closer to 60 square feet (U.S. DEPT. OF ENERGY, ENERGY INFORMATION ADMINISTRATION, ENERGY CONSUMPTION & EXPENDITURES, Table 15. Season of Peak Electricity Demand, Number of Buildings and Floorspace, 1995). According to F.W. Dodge, nearly 20 million square feet of new shopping center space is built each year (MICHAEL BAKER, Thirty years of retail construction trends, SHOPPING CENTERS TODAY, May 1, 1999), and every square foot requires greater energy use for lighting and climate control. If existing space is used more efficiently, this demand for land and electricity can be sharply curbed.



this effort can make their product more economically viable for the individual business, of primary importance is the sign's ability to communicate. Lighting restrictions that reduce the effectiveness of the communication system in order to save energy rarely offer a realistic trade-off. If the sign cannot communicate satisfactorily, it fails in its primary function, condemning the commercial use of the entire site to a reduced level of productivity.

A potent example of this can be found in Las Vegas. When the casinos desire activity in a particular area, full

Restaurants, theaters and motels especially need illuminated signs in order to attract sufficient customers to remain open after dark.

color spectrum lighting is used. This natural feeling light creates a comfortable atmosphere, and people tend to linger in these areas. On the other hand, in parking lots and garages, where the casinos want people to spend as little time as possible, monochromatic lighting is used. Not only does this form of lighting save energy, but it also creates an artificial atmosphere that people do not enjoy. Hence, they quickly leave the area and enter the casino, where the lighting is more comfortable. The lesson to be learned is that sometimes energy efficient lighting can have the negative effect of repelling people from a business site, so that even the reduced amount of energy used by the

business is then wasted because the building is empty.

Frequently, small retailers have virtually nonexistent advertising budgets and rely solely on their signs to draw in customers. Furthermore, newspaper and other advertisements do not allow instant communication with passersby on the street the way a sign does. A careful reading of *Lorillard Tobacco Co., et al. v. Reilly*⁷ will show the Supreme Court's view of regulations that seek to eliminate on-site advertising signage. Given the fact that no reasonable alternative means of communication is available to many small businesses, the insignificant amount of energy savings – if any – that would be gained by banning illu-



Nearly 40% of older drivers have trouble reading signs at night. Thus, proper lighting is essential for safe wayfinding.

minated signs, thus making them virtually non-existent at night, could become a very expensive alternative, especially if challenged in court.

Ultimately, restricting the use of illumination in commercial signage works completely contrary to the goal of saving energy. The high social and economic costs associated with these restrictions are thus entirely unjustified. Instead, the restrictions actually work to increase energy use, while simultaneously impairing commercial communication, limiting people's

freedom to manage their own time, increasing the peak load on the transportation system, and compromising public safety.

If regulators claim to be restricting sign lighting in order to save energy and cannot scientifically prove those claims, then they will quickly find that a successful legal challenge to the regulation is possible. It is a benefit that difficult, if not impossible, to prove. Such infringements on constitutionally protected speech are civil rights violations, and under the federal Civil Rights Act, Title 42 U.S.C. §§ 1983

and 1988, the government imposing the regulations can be forced to pay the legal fees of the citizen or citizens whose rights were violated. Plaintiffs in a number of sign cases in the past 25 years have recovered legal fees involving enormous amounts of money from cities that infringed upon their speech: *Metromedia, Inc. v. City of San Diego*,⁸ *City of Ladue v. Gileo*,⁹ *Cleveland Area Board of Realtors v. City of Euclid*,¹⁰ and *North Olmsted Chamber of Commerce v. North Olmsted*,¹¹ to name a few.

7. 533 U.S. 525 (2001).
 8. 453 U.S. 490 (1981).
 9. 512 U.S. 43 (1994).
 10. 88 F.3d 382 (6th Cir. 1996).
 11. 86 F. Supp 2d 755 (N.D. Ohio 2000).