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## Cut Energy Use, Greenhouse Gases

Buildings and cars consume almost 70% of all energy used in the United States. The glass industry has innovative products that can substantially improve their efficiency.

Buildings are by far the least efficient energy consumers. There is ample evidence that buildings could see energy use reductions exceeding 25% through wise implementation of relatively easy and cost-effective retrofit measures. Similarly, applying known design and construction approaches to the 1.5 million homes and the billion square feet of nonresidential buildings constructed annually could reduce average energy use 50% or more.

Energy inefficiency makes buildings the single largest cause of greenhouse gas emissions. The achievable target of lowering energy use in buildings and cities by 25% would reduce greenhouse gas emissions by about half of the original U.S. target proposed during the negotiation of the Kyoto Treaty.

### Home Improvements

Fiberglass insulation for walls and roofs has long made highly energy effi-

cient buildings possible. Judicious use of fiberglass insulation is one of the most cost-effective ways to reduce energy use and increase the comfort of buildings.

Specialist glass-based insulation makes refrigerators, dishwashers and other appliances substantially more energy efficient. Similarly, glass-based insulation reduces energy loss in heating and cooling pipes.

There is also a wide range of windows and window glass that radically reduce the need for heating in the winter and air-conditioning in the summer. If, as in Europe and some parts of the United States, commercial levels of efficiency in windows were required for residential renovation and construction, the energy benefits would be swift and substantial.

Glass of varying strengths, manufacturing properties and colors is a crucial component of highly efficient lighting systems, including the growing range of compact fluorescent lighting and the even more efficient LED lighting that is now entering the market.

An often overlooked contribution of the glass industry to building and automobile efficiency comes from advanced fiber-optic technologies. These are indispensable for the advanced systems that direct and optimize energy flow in modern buildings and hybrid automobiles.

The use of high standards of insulation in walls, pipes, ducts and appliances combined with efficient windows can easily contribute to 20–30% overall energy use reduction. Even higher reductions can be expected during peak electricity demand due to air conditioning use. Efficient controls, lighting and energy-sensitive architectural design potentially can double these reductions.

### Vehicle Applications

In the automotive arena, according to DOE's National Renewable Energy Lab, the fuel used to air condition light duty vehicles is ~7 billion gallons annually (or ~1 million barrels of crude oil per day). IR reflective windows can reduce

this by 9%, or 0.63 billion gallons. There is also a reduction of CO<sub>2</sub> of ~5.6 billion Kg. Infrared and ultraviolet absorbing glass also can help.

Weight is a major factor in vehicle fuel economy. Increasingly, carmakers are turning to advanced glass-fiber composite materials to reduce weight, improve manufacturability and reduce costs. The glass-fiber industry is developing new materials and composites to make this possible.

Worldwide, electricity generated by wind turbines is a rapidly growing cost-effective option. The United States alone is adding ~3000 MW of capacity a year. Worldwide, ~20,000 MW a year is coming on stream. Every windmill blade is a complex structure made possible by tons of carefully engineered glass fiber-reinforced material.

This is by no means an exhaustive list of the ways that the glass industry can be a major contributor to the nation's energy challenges.

The glass industry not only has the tools to radically change energy use in buildings and cars, but also has a crucial interest in seeing that this happens to help ensure its own long-term competitiveness and that of the U.S. economy.

The U.S. glass industry, operating cooperatively through the Glass Manufacturing Industry Council, is organizing to develop a roadmap with various federal agencies as well as other industry groups to promote a program of information, incentives, recommended guidelines, codes and standards, as well as the monitoring and enforcement of all guiding conditions, that will lead to significant gains in energy efficiency in the next 10 years.

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