

Demand Reduction in Buildings

Conclusions:

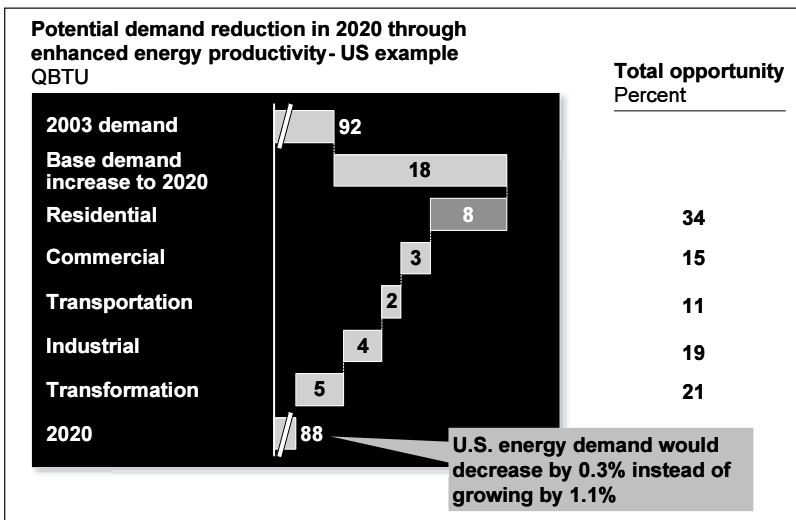
- The potential of energy efficiency — an essential resource for economic productivity, environmental improvement and energy security — remains significantly untapped.
- To promote greater energy productivity by building owners and tenants, governments at all levels should establish performance-based building standards for further consideration by code-setting bodies and provide assistance and incentives for their adoption and implementation.
- Building R&D and improved design tools for architects and builders remains a pressing need. These efforts should include all major classes of buildings including residential, office, laboratory, light and heavy industrial, and retail.
- Governments should encourage new methods to incentivize energy service providers to save energy and find appropriate tools that are aligned with the details of energy industry structures in different parts of the country.
- To reduce demand in buildings, mandatory federal appliance standards and voluntary consumer education efforts (e.g., Energy Star) should be accelerated and enhanced. Next-generation (solid state) lighting holds promise and should be encouraged by government technical and policy support.

Price Signals

According to a recent McKinsey Global Institute study, global energy demand will grow 2.2 percent annually to 2020 with business as usual. Through adequate investment in energy efficiency, this growth could be reduced to half that amount, and U.S. energy demand could be capped at current levels.

Industry leaders recognize the role energy efficiency can play in resolving global energy issues; yet consumers determine their own energy consumption. Today, consumers have to make a conscious decision to opt into energy efficient technologies. Generally, people know if they turned off their computers, turned down their air conditioners, or bought more efficient appliances, their electric bills would decrease. Motivating those behavior changes, unfortunately, is more difficult than simply placing an advertisement.

Delivering on the Energy Productivity Challenge Could Cap US Energy Demand Growth



Source: McKinsey Global Institute

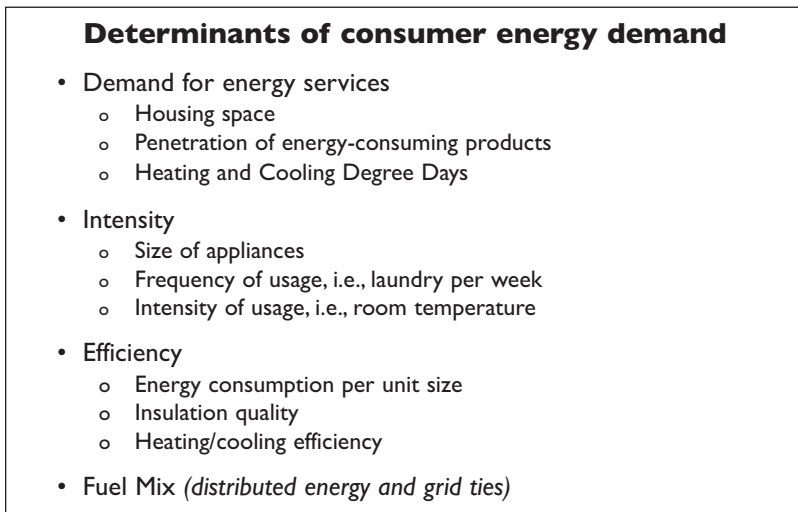
With technologies currently available, appropriate policy initiatives and adequate investment, Americans could cap energy demand growth in the United States through 2020, with residential demand responsible for about one third of the savings.

Efforts to encourage in-home metering and real-time prices will help to make people more aware of the cost of electricity, as will other advanced metering technologies. But to have the impact required to address escalating demand and combat climate change, the electricity market will need a different service model. There must be universal access to efficient choices. Options such as more energy efficient appliances and electronics and revised building regulations can address these issues by promoting green materials and energy efficient systems in housing.

Figure 1 on the next page breaks out several specific micro-level determinants of energy demand. These incremental adaptations to demand, intensity and efficiency of energy use can begin to identify options for the retail residential consumer to hedge against high energy prices. To tap energy efficiency as a reliable substitute for new energy supply, targeted interventions will be required to correct policy distortions, overcome market failures, and provide better information to consumers.

Price signals can change people's behavior, but the acceptable range for price is often defined by the necessity of a good or service. This means that decisions on organizing utility markets will affect demand. Market stalwarts support reducing demand for electricity in the residential and commercial environment by eliminating features of the current regulatory system that hide prices. They suggest that politicians and regulators, seeking to protect consumers, freeze retail rates and use other methods that send inaccurate price signals. They believe consumers will respond appropriately when they see the real price of their electricity.

Figure 1



Source: McKinsey Global Institute

Regulation and Codes

Energy efficiency investments can have a long horizon for pay-back, but there is great value in this low-cost, emission-free option. Duke Energy has defined efficiency as a resource and a “fifth fuel” in its generation portfolio. Its proposed “Save-A-Watt” program would make investments in demand reduction and seek compensation for 90 percent of the avoided cost of every watt offset from peaking or base load generation. The proposal suggests that energy efficiency should be valued at the avoided cost of new generation.

Although Duke’s proposal has not been reviewed by the public utility commissions in the states it serves, Oregon and California have moved to reward investments in demand reduction as traditionally occurs for supply increases. Some participants suggested that if regulators evolve from their traditional roles as price setters to become market rule makers, utilities are more likely to develop strategies to promote energy efficiency.

In the built environment, market signals currently are disguised for both producers and consumers. Homebuilding cries out for mar-

ket signals to be adjusted to support energy efficiency and demand reduction. Today, contractors bear the costs of homes that must be competitively priced. Investments such as more efficient air conditioning and appliances, extra insulation, low emissivity glass, and passive solar design, although they mean savings for the future owner or renter, generally cannot be recouped in the price of the house. Builders thus have little incentive to invest in energy efficient materials and design.

The Forum discussed how government can help develop better methods to encourage the construction of smarter, greener buildings that enable consumers to reap the benefits of energy efficient technology. Industry leaders are already developing technologies to achieve these goals. R&D priorities need to concentrate on creating design tools that help architects better understand implications of their designs on energy consumption. Research will also contribute to advanced materials and technologies for builders to use in construction.

Codes to encourage “green design,” such as the Leadership in Energy and Environmental Design (LEED) rating system, are helpful; however, the emphasis on certain political and technical points could be better balanced to reflect market design. For example, one Forum participant suggested that because lighting represents 21 percent of electricity used, rating systems should proportionately address this key area of interest in reducing demand. Another participant noted that the promising Light Emitting Diode (LED) did not need government support since this form of solid-state lighting technology already has strong market viability without intervention. Recommendations to accelerate its market penetration by applying Energy Star criteria to LED raised questions about the appropriate criteria for solid-state lighting and illustrated the role that government-set standards play in determining market outcomes.

Incentives to Save Energy: Suppliers, Producers and Consumers

Demand reduction poses two key challenges: consumer education alone will not sufficiently motivate behavior change, and energy providers' business models are based on selling energy, not saving it. If energy and demand reduction provide the "fifth fuel," they should be compared to other energy supply technologies. This approach opens up various options for discussion to solve the challenge of decreasing demand.

Some participants noted that investment in energy and demand reduction will be enhanced by setting a price for carbon and letting prices more accurately reflect all costs. Suppliers and producers may respond as a carbon market develops and matures. Hedging will drive down volatility and risk. But carbon controls still present an uncertain future. Mitigation technologies are at different stages of development, and there is considerable debate on what signals – cost, regulation, competition - will most effectively drive solutions.

Smart grid technology offers another option to assist suppliers, producers and consumers to save energy. A properly developed grid needs to overcome two of the biggest bottlenecks for energy efficiency – lack of standardization beyond the meter and lack of a common architecture. Smart grid technology must address integration to enable utilities and customers to communicate and manage use effectively.

Consumers expect power to be convenient. They generally do not know the incremental cost of using power and often have little incentive to take advantage of lower cost off-peak power. As a result, their decisions create pressure to add generation and transmission capacity to serve peak periods. While some federal efficiency standards emphasize reducing the use of energy by prohibiting the manufacture of inefficient appliances, the Energy Star program provides voluntary level targets that encourage the manufacture of efficient appliances. Demand reduction and response still rely in part on consumers' recognition of their use patterns and knowledge of how they can best control their energy consumption. Education will be essen-

tial to shifting consumption patterns as consumers learn how they can change their use of energy, why they should, and why they cannot afford to do otherwise.

Smart grid technology will allow consumers to recognize the benefits of more efficient appliances as they can monitor their use and shift or shed demand during peak times. Combined with higher rates for on-peak use, consumers will have the tools to control what they pay every month by adjusting their demand. Incentives to save energy can be also be augmented by standards that prohibit the construction of inefficient buildings – using efficient designs and installed appliances along with green materials. These efficiency standards, already in place for many appliances, can help overcome two factors that increase energy demand.

First, builders tend to install less energy efficient components including doors, windows, appliances and insulation in order to keep initial prices down. Consumers, in turn, pay more attention to the initial prices rather than to life-cycle operating costs. For example, while rent or purchase price may be lower, often the annual heating and cooling bills are not considered by purchasers and may prove to be expensive relative to the value of the home. By requiring that the most energy efficient materials and appliances be used, builders and consumers will be encouraged to accommodate higher up-front costs for long term environmental and economic benefits. Mandatory standards are not without detractors – some believe such mechanisms can remove the cheapest appliances and homes from the market, limiting affordable ownership options and excluding some consumers.