

Unlocking The Energy Potential Of The Industrial US Economy

Amidst soaring gas prices, growing geopolitical instability and increasing concern over carbon emission, the need for higher energy efficiency has never been stronger. However the energy debate continues to be focused on the supply side: how to ensure that future supplies and alternative sources are explored fully. What is not taken seriously is the other - and far more actionable alternative: how can energy be consumed more efficiently. Energy efficiency is the most clean and cost effective means of reducing carbon emission while meeting the nation's energy requirements and stimulating the economy. Although significant challenges stand in the way, solutions not only exist but can also be scaled up to a national level, which would cut the US energy bill by 23 percent and save a net \$680 billion by 2012. But that isn't very far in the future, and each wasted day makes this more difficult to reach.

Dynamics of the US energy sectors

Opportunities for energy efficiency gains are available in virtually every sector. A study by McKinsey in 2007 found that by 2050, energy efficiency could reduce United States carbon dioxide emissions by 40%, 16% from buildings, 13% from transportation and smart growth, and 11% from industrial sector. Through the carbon abatement or Vattenfaul curve, McKinsey illustrated a suite of energy efficient technologies available and their impact on the carbon foot-print. Many people focus on opportunities that require high-tech new systems believing that they reduce the energy spend. Yet there is a great potential to reduce the energy consumption and minimize the total cost by using existing technologies—and without changing everyday habits. If readily available technologies to boost productivity are adopted - for instance for the industrial sector, by using high-efficiency building systems, HVAC, pumps and motors and compact fluorescent lighting the sector's energy demand growth could be cut by one-third by 2020.

So why haven't these prospects been realized already, especially in the industrial sector, one of the largest in the U.S. economy? The processes, support systems, and buildings of the US industrial sector not only consume more energy than the others combined but also offer the greatest NPV-positive energy-efficiency opportunities (3.65 quadrillion BTUs). Spending \$113 billion today saves US \$447 billion in the long-run, Three fundamental barriers stand out. Energy efficiency typically requires large upfront capital investments to achieve savings with long pay-back periods. In addition, the industry is very fragmented, such that each sector requires sector-specific, bespoke solutions. Finally, the companies that would be primarily responsible for implementing energy efficiency do not have skilled workforce to focus on improvements, which makes them less motivated to act.

Opportunities

Industrial processes provide 67 percent of the sector's energy-efficiency potential; energy-consuming support systems (motors, buildings, and steam systems) and the recovery of their waste heat make up the remainder.

The largest opportunity lies in energy-intensive processes (such as polymerization in chemical, pulp and paper, and hydro-cracking, in refining), which require large upfront investments. Payback times of less than 2.5 years could be realized in about 42 percent of these projects, which involve

measures such as implementing more energy-efficient processes, upgrading current ones, and improving maintenance and monitoring. Systematically recovering waste heat would improve the energy efficiency not only of processes that are energy intensive but also of processes that aren't—within industries such as foods and plastics.

Energy-consuming industrial-support systems, including steam systems, motors, and buildings, provide an opportunity for cost savings. Although these represent a smaller opportunity, it could be easier to pursue because boilers and the like are more standardized than industry-specific process equipment. For boilers and other steam systems, the opportunities include waste-heat recovery, better-insulated distribution systems, and valve and fitting improvements. Pumps, process equipment, and other systems driven by electric motors can become more energy efficient if factories match the power of components with their load requirements. Routine maintenance of the compressed air leak and overhaul of HVAC, dryers, boilers, air compressors, refrigeration machines, spray dryers, micronizers, reactors, distillation columns, filters, media mills, heat exchangers, process chillers, pumps, compressors, etc. will enable the industrial operation reap the benefits of lower energy costs.

Barriers

Even in the industrial sector, energy often represents a relatively small fraction of costs, so top managers may resist serious investments. Industrial sites, for example, generally have tight budgets, and many companies now require a one-and-a-half- to two-and-a-half-year payback, although even a two-and-a-half-year timeline cuts the sector's potential by only 46 percent. Managers may ignore attractive energy-efficiency projects because companies fear hurting their credit ratings by raising incremental debt. Fear also causes risk-averse plant managers to replace failing equipment with the same models rather than more up-to-date and energy-efficient ones—but inventory-carrying costs prevent many distributors from offering them anyway. And many industrial-procurement operations focus on upfront rather than total lifetime costs, a more accurate measure of cash expenditures.

Solutions

An energy manager properly empowered through top-management and financial support can help companies realize 8 percent of the total industrial savings identified above. In some facilities, energy managers have delivered savings of 20 to 30 percent. Increasing the penetration of the kind of corporate programs that energy managers implement is the focus of the EPA's voluntary Energy Star Partnership. The US Department of Energy's voluntary Save Energy Now initiative, which aims to reduce industrial-energy intensity by 25 percent in ten years, has already helped 2,100 US manufacturing facilities cut their energy costs. Efforts to clarify the industrial sector's energy criteria for purchasing and using equipment could save significant amounts of money, without the staff reductions typical of other cost-cutting moves.

Financial incentives do help companies allocate capital for energy-efficiency plans, lengthen payback times, and make energy-efficient products more available. Direct incentives from Federal and State Energy Agencies, equipment manufacturers and distributors, governments, or utilities do promote upgrades of process and support systems.

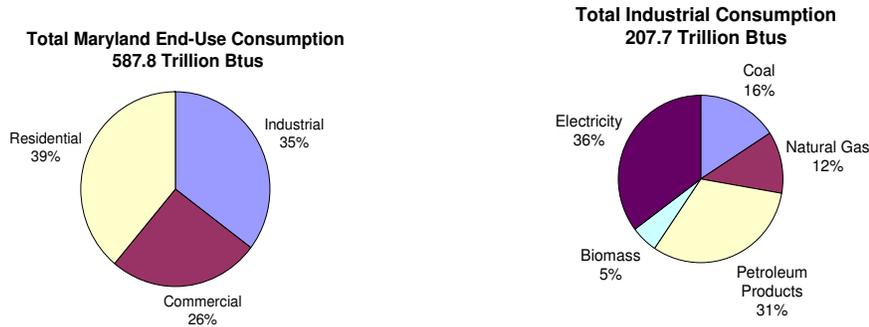
In essence, corporations having best practices such as embracing energy efficiency as a top strategy, setting a SMART goal, defining a robust tracking and measurement system and allocating substantial resources come out as clear winners.

What is the State of Maryland doing for its industries?

Governor Martin O'Malley and the Maryland General Assembly have set a goal for the state to reduce per-capita electricity usage and peak demand by 15% by 2015. This initiative has been motivated by several factors, including, but not limited to, steep increases in electricity rates by local utilities, a potential capacity shortage, and concerns about CO₂ emissions and climate change. The goals set forth by the Governor and the state legislature correlate closely to the U.S. Department of Energy's goal of reducing energy intensity in the industrial sector by 25% in 10 years.

For the past several years, Maryland has actively participated in efforts to reduce energy consumption in the state. Purchases of ENERGY STAR® consumer appliances are exempt from state tax, automobile air emissions standards match those in California, and state-wide appliance efficiency standards have been adopted. Same way Maryland industrial sector has been given a face-lift with programs such as Save Energy Now® Maryland as the proven means for delivering results to industry.

In 2006 Maryland industry produced over \$42 billion worth of manufactured products, employed over 130,000 people (6.1% of total non-farm employment), and consumed over 207 trillion Btus of energy.¹



By value of shipments and employees, the five most economically vital industries:

Industry Name	Employees	Payroll (Millions)	Value of Shipments (Millions)
Chemical Manufacturing	11,939	\$763	\$7,599
Food Manufacturing	14,414	\$508	\$6,341
Computer and Electronic Product Manufacturing	22,121	\$1,731	\$5,967
Machinery Manufacturing	8,650	\$478	\$3,418
Fabricated Metal Product Manufacturing	12,030	\$531	\$2,600

Source: [Annual Survey Of Manufacturers 2006, Maryland. http://factfinder.census.gov...](http://factfinder.census.gov...)

¹ Eldridge, et al. 2008. *Energy Efficiency: The First Fuel for a Clean Energy Future Resources for Meeting Maryland's Electricity Needs*. American Council for an Energy-Efficient Economy.

The *Save Energy Now* Maryland program has been designed to give Maryland industries exposure to technologies and operational practices that can be used to improve the energy efficiency of their facilities. By enabling energy efficiency improvements in the industrial companies, operational costs will be reduced resulting in them becoming more cost competitive during a difficult economic climate. Managing energy also provides competitive differentiation for manufacturers that want to demonstrate leadership in environmentally sustainable management practices. Active outreach to industrial managers and decision-makers, effective marketing and education, and targeted technical assistance are some of the other ways, the industrial sector is being supported by the Maryland State's program. Since its inception in 2011, the program has identified \$1 million cost, 8500 MWh and 49,000 million Btu's of energy savings through energy audits in six industrial facilities.

Conclusion

Driven by rising energy prices and growing concerns about greenhouse gas emissions, companies are implementing aggressive, corporate-wide energy efficiency strategies. Leading companies should not only be setting ambitious energy savings targets, but also be reaching out to suppliers and customers, and engaging employees at all levels of the organization to advance an ethic of energy efficiency. Increasing energy efficiency is a cost-effective, even profitable way of reducing greenhouse gas emissions. Lack of efficiency means a real waste of resources and money. Recognizing this, Government, private companies, NGO's, private citizens should work together in breaking the financial, regulatory, organizational and trade barriers for achieving the goal. By accepting the challenge, U.S, one of the world's largest economies, will set a global standard for efficiency. It will increase competitiveness and reduce dependency on external energy supplies. And it will make a vital contribution to controlling climate change as well.