

Active Carbon Management:

A More Systematic Approach to Energy Consumption and Cost Management

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It is common knowledge that energy prices are at or near all-time highs, and elevated prices are likely here to stay. What is slowly dawning on business executives is that the magnitude of energy price increases means that industry must fundamentally change the way it manages energy as a component of their product or service. Recently, many executives only thought of energy consumption and the energy content of their products in terms of global climate change implications, and strategies to counteract that impact. This is exemplified by the discussions of Carbon Trading and other approaches to reducing the corporate carbon footprint. Because these conversations were grounded in “good corporate citizenship,” it was hard to pin down their actual or projected impact. The idea of Carbon Trading (aka Cap and Trade), and the potential for a command and control approach that could produce onerous effects on industry, is viewed with healthy skepticism right now. We believe that a more robust approach is to establish the management capability necessary to fundamentally tackle the issue based on its most immediate market manifestation: the high price of petroleum. We suggest that the focus shift from Carbon Trading to *Active Carbon Management*.

The rapid rise in oil prices has changed the market dynamics. Now businesses need to consider a more systematic approach that reflects their need to manage what is becoming a problematic factor in their overall cost structure. In this article, we will introduce the concept of “Active Carbon Management,” and describe its application to the typical enterprise. We will also identify examples of business decisions that have been made over the past several years that will need to be reevaluated. Finally, we will present a framework for

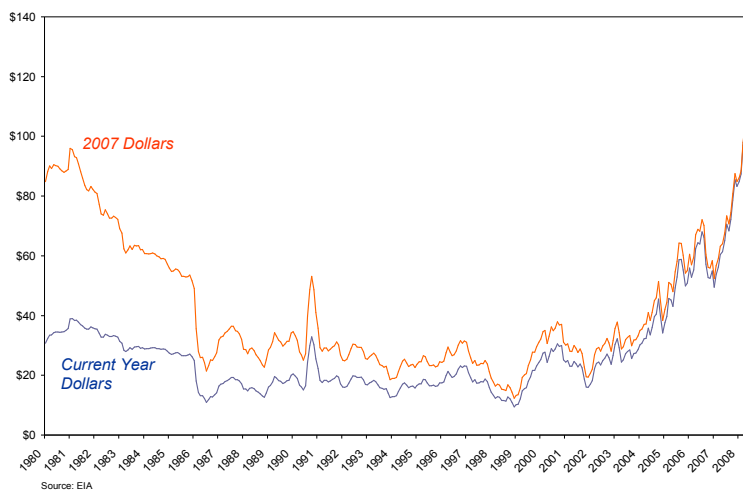
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addressing this issue and defining a plan to successfully mitigate the impact of rising energy costs.

The Emergence of Oil as a Dominant Cost Consideration

March 2007 was a major moment in oil price history. In that month, oil prices eclipsed record levels that had remained unchallenged for the three decades since 1981.¹ To give some perspective, in 1981, the price of a gallon of gasoline was \$1.35, or \$3.15 in today’s dollars. At the time of this writing, the average price of a gallon of gasoline is \$4.16.² Unlike 1981, however, energy price pressure is not expected to decrease in the coming months or years. The rapid rise of the Indian and Chinese economies, with large associated populations, means that the demand for conventional energy sources will stay at historically high levels. The Department of Energy predicts that by 2012, domestic energy prices will increase more than 400% relative to baseline 2004 prices.³ The days of inexpensive oil prices are gone, and the implications for business are significant.

Figure 1: Historical price of oil from 1980 to present in both nominal and real dollars



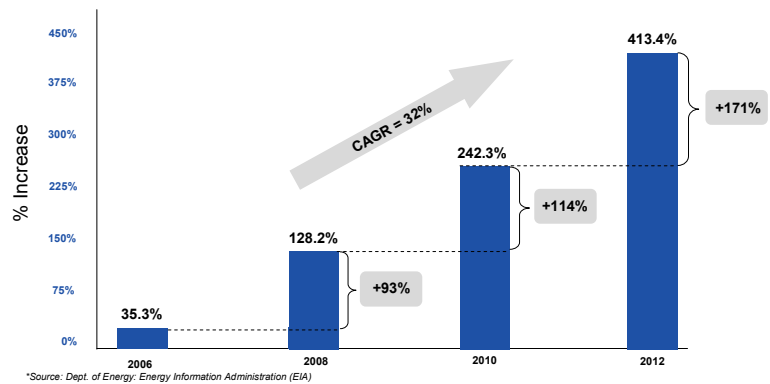
¹ CNN Money, “Gas prices: Worse than ‘81 oil shock,” May 2007.
² Energy Information Administration, Petroleum Navigator
³ Energy Information Administration, Weighted average increase in energy prices relative to 2004 baseline

One might argue that over the long run, the cost of energy cannot continue to stay high or even rise further, due to a variety of factors. These include innovative technologies that reduce our demand for conventional energy, more production of oil and gas (note the current debate in the US Congress over the potential expiration of offshore drilling bans) or relaxation of restrictions on oil alternatives, such as nuclear power. Many of these measures may occur and some will have a temporary impact, particularly offshore drilling, which has significant political momentum right now. In the near term, that will make a dent, but not overcome what appears to be a structural change in the market price for oil. While other measures that will impact our demand for oil at a fundamental level may occur over the next 10 or 20 years and ultimately drive the price of oil down, these will take time. Executives that are responsible for quarterly and annual results need to adapt to the issues that are of concern now, not the long run results to which economists refer.

Far-Reaching Business Implications

The ripple effects of significant energy price increases are also upon us. From 2004 to 2008, natural gas prices are up over 90%, coal is up 110%, and fuel oil is up 230%.⁴ With these price increases, production facilities and other fixed operations are more expensive to supply, run, light and heat. Any wasted effort is costly, and the direct cost of energy inefficiency can be calculated.

Figure 2: Weighted average increase in energy prices over 2004 baseline



Raw material prices, particularly those directly derived from petroleum, are up significantly as well.

Polypropylene and Low Density Polyethylene prices have increased an average of 46% from just one year ago, with the majority of this increase occurring in the past five months (29%).⁵ Steel prices have risen nearly 75% since January of 2008.⁶

Another obvious impact is in transportation costs, where freight surcharges have gone as high as 50% and ocean freight rates have increased 100% in the past year.⁷

Diesel fuel prices have likewise increased a whopping 205% in the last four years.⁸

⁴ Energy Information Administration

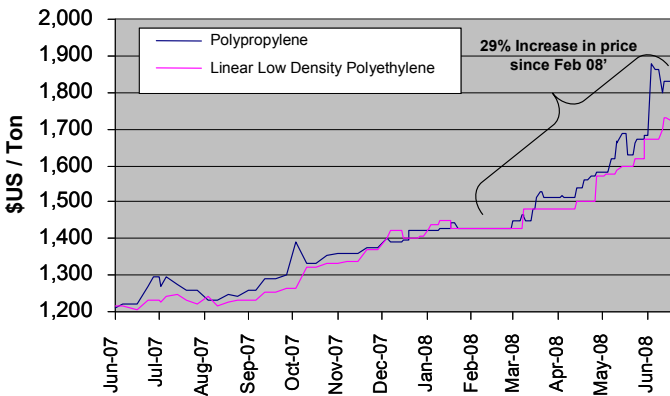
⁵ Energy Information Administration

⁶ London Metal Exchange

⁷ Financial Express, "Slump May Ease Global Ocean Freight," June 30, 2008.

⁸ Energy Information Administration

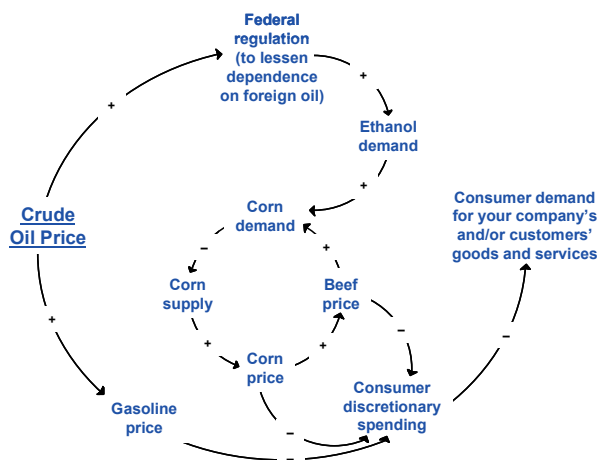
Figure 3: Price of Polypropylene and Low Density Polyethelene



Source: London Metal Exchange

There are less obvious and indirect impacts of oil price increases, as well. With an increased political emphasis on the reduction of the United States' dependence on foreign oil, we've seen a shift towards ethanol derived from cellulose as a petroleum alternative. This, in turn, has caused an increase in corn prices (among other basic crop prices), which has driven up beef prices. Everyday consumers in the market are affected as substitutes for petroleum are introduced, encountering unintended ripple effects that reach all the way to the meat counter at the grocery store, as depicted graphically in Figure 4:

Figure 4: How Crude Oil Has Impacted Beef Prices



Changing the Game

From time to time, business leaders have faced challenges driven by external realities over which they have limited control. These “game changing” events have caused significant challenges for entire industries. Organizations have been able, to one degree or another, change with the times and adapt. The speed at which an organization can adapt can mean the difference between a painful adjustment period (in which they may lag behind the competition) or the possibility of leading the transition to a new business model and competitive advantage. A few examples are given below in Table 1.

Table 1: Historical Examples of “Game Changing” Events

Event	Reaction and Results
US Rubber in the 40s: With the advent of WWII, many industrial products were rationed and protected for the war effort. Rubber was one such item, and by 1941, Japan controlled South East Asia, and 90% of the US rubber supply.	<ul style="list-style-type: none"> The US depended upon collection and reuse of post consumer rubber. Progress was made in the development and utilization of synthetic rubber. Use of substitute products.
The English Coal Scare: In 1865, it was predicted that there was not enough coal to provide for industry and current needs. It was further predicted that oil would be incapable of providing the necessary energy gap to make up for the shortage of coal.	<ul style="list-style-type: none"> Prospectors searched for, and found, additional deposits of coal. Inventors discovered innovative ways to improve extraction rates of coal. Ultimately, coal became a secondary source of energy.
1980's Casual Business Wear: In the 1980's, a large number of firms had adopted a trend of loosening strict work attire dress codes requiring formal suits and ties for men.	<ul style="list-style-type: none"> Levi's turned to the work apparel market to offset stiff competition from designer jeans. Launched Dockers, a comfortable form of work pants in 1986 in an attempt to expand its reach. By 1987, Dockers had become the fastest growing apparel brand in history.

“Globalization” versus “Localization”

While “Globalization” is a rough term at best to describe the connectedness of the world economy, it is clear that this connectedness is driven by the availability and rapid movement of both information and goods. The free movement of goods worldwide has given rise to the trend of moving manufacturing from high labor cost locations to lower cost alternatives, also known as “off-shoring.” The relatively low cost of oil has, until recently, been described as “... the lubricant of quick, inexpensive

transportation links across the world...”⁹ Companies are already beginning to reevaluate prior decisions to locate manufacturing sites or source suppliers. One recent example is the decision by Tesla Motors, the new electric vehicle designer, to shrink their supply lines from a Thailand to Britain to USA movement of a major battery pack subassembly to a single move from one location in California to another California site.¹⁰ Obviously, these decisions are driven by a number of factors, but many products, particularly those that require less investment in infrastructure, will show a much higher degree of mobility in their location of manufacture. Likewise, there are a number of other business decisions that will need to be rethought based on energy cost increases and their associated impact on the business enterprise.

When we look at various industry segments in the US economy, a variety of trends are causing the imbedded cost of oil to negatively impact results. Table 2 highlights a few, select examples of how energy costs must be taken into consideration as industry develops both near-term and long-term solutions. These examples are hardly an exhaustive list, but are meant to represent the types of decisions that must be examined.

A New Perspective: Active Carbon Management

In order to deal with this harsh reality, businesses must carefully and thoughtfully reexamine their relationship with energy. For all businesses, energy inputs are a necessity; that’s simply a fact. But, energy inputs must also be carefully accounted for and inefficiencies in manufacturing or operational practices must then be identified and removed from systems and processes. We call this evaluation and process of energy use and

efficiency “Active Carbon Management”. Through the implementation of both capital and operational changes, it is estimated that industry can achieve energy savings of approximately 20%, or about \$19B (in 2004 dollars). It is estimated that a full 30% of these savings can in turn be realized simply through behavioral and procedural modifications.¹¹

Table 2: Select Industry Examples of Energy Related Issues and Considerations

	Energy Issue	Considerations
<i>Hi-Tech Manufacturing</i>	Retailers need to protect high margin items from theft and have asked manufacturers to package small electronic items in bulky plastic packaging. Packaging is expensive (petroleum based) and takes up space in costly shipping containers.	<ul style="list-style-type: none"> • Are there alternative materials or design / feature techniques that can be used to protect items from shrinkage?
<i>Consumer Products</i>	As transportation and logistics become increasingly expensive due to fuel prices and surcharges, companies need to reevaluate the true cost of sending manufacturing overseas.	<ul style="list-style-type: none"> • What are the tangible and intangible benefits of manufacturing domestically? • Where is the break-even point and how is it calculated?
<i>Aerospace and Defense</i>	The Aerospace industry is laden with political ties and complexities. Historically, the location of manufacturing facilities has been heavily influenced by politicians and their interests in providing for their constituents. Location and logistical efficiency has not been a priority.	<ul style="list-style-type: none"> • If large sub-assemblies are manufactured according to political desires, how will logistics be balanced? • What is the strategy to balance manufacturing considerations with political ones?
<i>Biotech / Pharma</i>	The pharmaceutical industry has always been highly dependent on a mobile and autonomous sales force that travels, by automobile, through a regular rotation of visits to doctors, hospitals, clinics, etc. Personal contact and physician interaction are hallmarks of the industry’s strategy.	<ul style="list-style-type: none"> • How do rising fuel costs affect the channel and sales strategy for pharma? • What are the implications on vehicle fleet and sales force size?

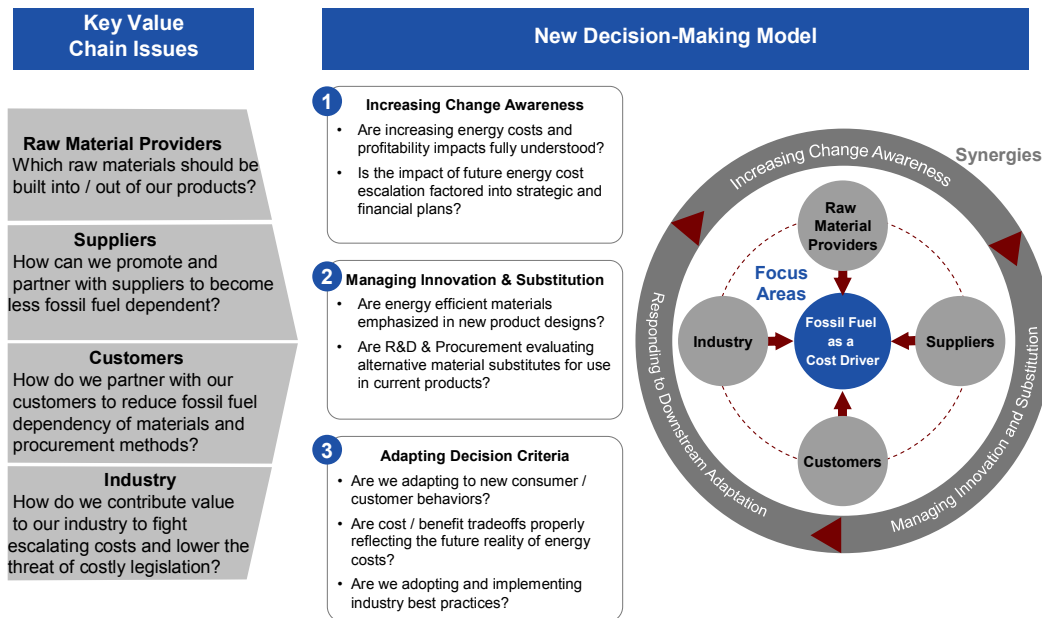
Businesses need to develop initiatives and goals to manage energy across the entire organization. Figure 5 provides a simple framework for thinking about changing organizational implications caused by energy considerations and how these changing implications drive “new requirements” for energy awareness and conservation.

⁹ New York Times, “Shipping Costs Start to Crimp Globalization,” August 3, 2008.

¹⁰ Ibid.

¹¹ National Association of Manufacturers, Efficiency and Innovation In U.S. Manufacturing Energy Use

Figure 5: Changing Organization Implications Affect Business Requirements



There are a series of pertinent questions that need to be asked of all participants in a company’s value chain (suppliers, customers, internal groups, etc.). For example, how will I source materials and how will I deal with price increases caused by energy pricing? How can I partner with suppliers to mitigate oil-driven cost impacts? How can I work with suppliers for mutual advantage and gain? How can I get employees to

As an industry, can organizations work together to leverage common interests, yet still remain competitive? These are just a few questions that must be considered, and may be difficult to answer definitively. Yet, these questions must be addressed thoughtfully and comprehensively if businesses are to adapt to the implications of rising energy prices.

What is "Active Carbon Management"?

Active Carbon Management is an evaluation method and change process used to describe and implement energy cost reduction activities across the entire value chain. Active Carbon Management combines internal changes that companies can make along with external coordination and cooperation among suppliers and customers in a prioritized way to maximize impact.

understand and embrace these new requirements for business operations? How will consumers respond to pass-through price increases? If a price must increase, how can I protect demand for my products and services?

Once the organizational implications are considered, businesses must plan and act to mitigate future impacts and to take advantage of disruptions. The impact of increasing energy prices can be thought of as a stone falling into calm water. As energy prices disrupt traditional business practices, a series of actions must be undertaken by company leadership to respond to the disruption and ripple effect and to calm the waters once again. Company leadership must first increase energy visibility across the entire organization. Where are the major energy inputs? Where is energy wasted and what is the magnitude of the loss? Innovation and substitution must be considered. Can other energy inputs be used?

Are there technological or capital investments that can be made to improve efficiency and decrease cost? What are the tradeoffs and benefits of a particular course of action or remedy? The customer must also be considered in the equation. Will improvements in the energy requirements of the company provide pricing power that will drive consumer behavior? Companies that proactively and decisively address the total impact of energy costs with an organized and comprehensive plan will develop a lasting competitive advantage at home and in global markets.

Companies need to look beyond internal opportunities and capabilities and consider external partners. Energy issues affect all companies, and cooperation along the value chain can result in novel, profitable solutions. The challenges that face business on the energy front have not been seen, or thought about with any degree of urgency, in 30 years.

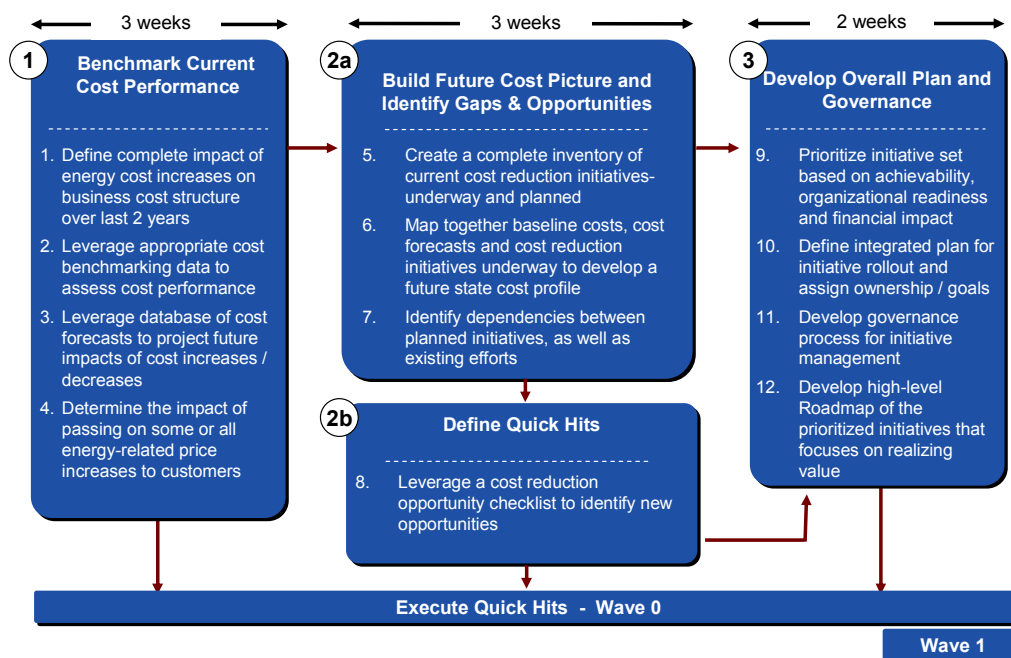
Next Steps

The critical question of where to begin is a difficult one. While energy prices are a business concern, it is part of a much longer list of activities and “fire drills” consuming the attention of senior leadership.

Key challenges to implementing an energy mitigation and cost reduction program include conflicting business improvement initiatives and the difficulty in orchestrating activities across a broad array of functions. The ambiguity surrounding the impact of energy use leaves many questions on the table that do not have easy answers:

- What types of resources are needed to reduce the impact of this rising cost factor on my business?
- What types of analysis should be used and how broad should that analysis be?
- What is the magnitude and scope of the opportunity?
- How long will a mitigation process take and what will the financial impact be?

Figure 6: Active Carbon Management Process



Archstone Consulting has developed a three-phase “Active Carbon Management” process to help businesses address pressing energy issues, quickly implement change, and develop a long-term vision and strategy to remain competitive in the future.

The end result of this work is a fact-based tool for communicating with the organization, completing budgetary requests, and executing performance monitoring—ultimately resulting in significant cost savings and increased market competitiveness. The phases are shown and described below.

Phase 1: Benchmark Current Cost Performance

The first step in any successful program will involve benchmarking current cost performance so that all future benefits can be clearly and unambiguously calculated. Through an inventory of all costs and cost increases over the past two years, business can establish a transparent baseline and clearly see how energy costs have impacted the business. Then, using appropriate cost benchmarking data, the company can determine cost performance and further project potential future cost increases or decreases.

It is important to understand that some of the cost pressure may need to be relieved by passing cost on to the consumer. Often, this can be the most critical and controversial decision a business must make, and a thorough understanding of consumer demand and financial impacts needs to be understood.

Phase 2: Build Future Cost Picture, Identify Gaps and Opportunities, and Define “Quick Hits”

Once the first phase has been completed, management must understand and catalog all cost reduction initiatives that are currently underway. It is important to know what activities are currently being undertaken across the entire organization and their impact on energy mitigation must be evaluated. Coupled with the baseline cost analysis and future cost forecasts, management can now develop a future-state profile of what the energy usage and impact should be. Furthermore, with a thorough understanding of energy impacts, it will be possible to quickly identify and address many issues that can be resolved immediately.

Phase 3: Develop Overall Plan and Governance

The insights gained from Phase 2 can be used to support near-term and long-term strategy development. The short-term roadmap should be more tactically based and detailed than the long-term assessment. The longer-term roadmap should roughly outline activities, key milestones and dependencies that should be considered in subsequent rounds of strategic planning and budgeting activities.

Long-term success is indeed possible, but requires a disciplined approach to making progress towards the goals outlined in the previous phase. A governance organization with executive sponsorship and clear, well-communicated guidelines is needed to enforce commitments. Tracking of internal metrics and their contribution to external company performance must

support this governance process with a means of driving action within the business. Most importantly, a review process must exist to revisit the relevancy of an Active Carbon Management strategy over time and resolve disputes or uncertainty as conflicts arise between these objectives and other strategic goals.

Conclusion

The time has come for business leaders to view expensive energy as an opportunity to change the game in their favor. Companies that understand that energy consumption is a pressing issue and a driver of profitability (and that are flexible enough to act on this knowledge) stand a better chance to become more competitive in their industry both at home and across the globe.

About the Authors

Eric Schlumpf leads Archstone Consulting's Manufacturing Practice. He has over 26 years of experience in a variety of industries, including high tech, aerospace & defense and consumer products. His career has included functional leadership in sales, finance, and operations, and he spent more than 10 years leading environmental services firms. He has written extensively on the environment and energy conservation.

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