



*A Tsunami of change bearing
down on the refining industry*

For U.S. refiners, staying in the game will take flexibility and adaptation. The survivors will have leaders who see early on that the economic recovery will not solve the problems faced by the U.S. refining industry.

A Tsunami of change



The golden age of refining ended last year when oil prices surged and the economy sunk into recession. As ages go it was short – about four years – and it won't be back anytime soon.

While the deepest recession since World War II is expected to end late this year or early next, U.S. refiners need to brace for what's ahead. What had been a profitable industry running at respectable operating rates, will see higher costs, steadily declining demand and excess capacity.

The spike in gasoline prices to \$4 per gallon in mid-2008 offered an early warning of the changing times. And the subsequent drop in fuel demand showed that U.S. drivers were willing and able to reduce their fuel use far more dramatically than most people had ever expected. The financial meltdown and recession that followed further reduced the demand for transportation fuels and helped usher a Democrat into the White House with a mandate for change.

For refiners, the mandate has resulted in a flurry of proposed legislation, which will likely have a significant impact on the U.S. refining industry by:

- Putting more fuel-efficient cars on the road sooner.
- Mandating the use of renewable fuels that directly displace a portion of the gasoline and other fuels produced by refineries.
- Reducing carbon dioxide emissions with a complex system that will increase the cost of refining and result in higher pump prices (further crimping demand).

Taken together, these three factors have turned the future demand curve for gasoline – the most significant product from most U.S. refineries – upside down. A conservative estimate from the U.S.

Department of Energy's Energy Information Administration (EIA) shows the amount of fuel sold in the U.S. to power cars and trucks will drop nearly 13 percent between now and the year 2030.

Things could turn out even worse for U.S. refiners, depending on how legislation regulating carbon emissions plays out in Washington. Lawmakers are still feverishly negotiating the terms to create a cap-and-trade system, with a goal of passing the bill this year.

Cap-and-trade would require that refiners make large investments to reduce emissions of carbon dioxide by imposing what amounts to a tax on carbon emissions. It sets a cap on the amount of carbon dioxide emitted by industrial facilities. Operators unable to reduce their emissions to below the limit – which will decline over time – will need to obtain permits allowing the facility to emit the gas linked by scientists with global warming. Critics say this market-based system will interfere with long-term planning because it will be difficult to predict the cost to emit a ton of carbon dioxide. Interestingly, proposed carbon legislation also appears to run counter to federal regulations that have prompted many refiners to undertake large energy-intensive capital investments that reduce the sulfur content in diesel fuels, but create a larger carbon footprint in the process.

One certainty, however, is that new cars will be able to travel considerably farther on the same volume of fuel. Automakers will need to produce cars with significantly better mileage to comply with the revised federal fuel economy standard fully phased in by 2016 – four years earlier than originally planned.

Aggressive initiatives to produce more fuels from renewable sources will further reduce demand for fossil fuels. Congress first adopted the Renewable Fuel Standard

(RFS) in 2005 and substantially expanded this legislation under the Energy Independence and Security Act of 2007. The RFS legislation mandated the use of 9 billion gallons of renewable transportation fuels in 2008, which was achieved mostly through the use of corn-based ethanol blended into unleaded gasoline. However, the RFS mandate expands to 15 billion gallons per year by 2015 and tops out at 36 billion gallons by 2022. Currently, what comes out of the unleaded gasoline pump typically contains about 10 percent ethanol. And there's talk of pushing it to 15 percent, in effect further reducing the amount of gasoline in a gallon of "gas". Meeting future RFS requirements, which constitute a four-fold increase over current levels, will require new types of renewable fuels, as well as changes to the vehicles using the fuels.

Clearly, America is on a journey of change when it comes to transportation fuels. Oil companies have already taken the first steps in this long-term journey. There have been a number of cancellations and postponements of projects to expand and upgrade refineries. Oil companies have also been stepping up their investments in biofuel facilities and research. However, the industry still needs to rationalize future capacity and cut payrolls to match the shrinking demand for fuel in the U.S.

Projections by the EIA show the utilization rate of the U.S. refining industry – the output as a percentage of the production capacity – will slide to 78.5 percent next year as a result of reduced demand, and an increase in capacity from refinery projects already begun and nearing completion. The last time utilization rates were that low was 1985.

Looking ahead to the years 2020 and 2030, the agency is not showing any real rise in this key measure over the next two decades. This conservative long-term estimate is understandable – no one knows how much capacity will actually be cut and how long it will take to do so. But the projections for average refinery utilization rates at the levels projected by the EIA clearly indicate a glut of capacity that will force the elimination of marginal operations. Also, the large capital investments required as a result of the regulations will put the operating models of some smaller independent refineries in jeopardy.

In the short run, refiners can reduce throughput or shut down less efficient units. Over the long haul, though, it's hard to justify keeping a refinery operating while selling less output at a time when profit margins are declining and costly upgrades are required.

In the end, refining profits in the U.S. are likely to shrink as long as there is too much capacity. The numbers tell the tale: the EIA projects the price of imported light crude will rise 283 percent between 2009 and 2030 as a result of growing demand worldwide, while the average price of the gasoline sold in the U.S. will go up by a much smaller 172 percent.

History repeats itself – the last industry shakeout

The best analogy for how this tsunami of change will transform refining is the shakeout that followed the oil price shock in the late 1970s. During that time there was a spike in crude prices followed by a recession and a rapid shift to more fuel-efficient cars.

Added to the pressure was the phase-in of new rules requiring big investments to reduce emissions at the refinery and from the fuels sold. The average refinery utilization rate dropped in the U.S. to 84 percent in 1979, a little above where it is now. It then fell to less than 80 percent, where it stayed until 1986. Over the next two decades, the number of U.S. refineries was halved, from 319 in 1980 to 149 in 2006.

For baby boomers, this situation might bring back memories of 1979, with President Jimmy Carter in a sweater asking Americans to conserve. The solution for many drivers was an underpowered hatchback made by a Japanese automaker. Detroit was feeling the pain back then as well.

The shift to small cars showed that consumers, who had been stung by high gas prices and a deep recession in the early 1980s, were willing to downsize. It also demonstrated the power of a new regulation. For the first time, U.S. automakers were required to make more fuel efficient vehicles to comply with what is commonly called the CAFE standard, for Corporate Average Fuel Economy. CAFE is back in a big way. As previously stated, the Obama administration announced automakers will be required to increase the average mileage per gallon of the cars they sell in the U.S. from 27.3 miles per gallon in 2011, to 35.5 miles per gallon in 2016, which is sooner than expected. It will again mean lower U.S. motor fuel demand.

Back then, refiners were also ordered to get the lead out of gasoline. The octane enhancer, tetra-ethyl lead, was phased out because lead causes health problems and the additive interfered with the catalytic converters that were appearing on cars to reduce smog and other forms of air pollution. The cost of complying with environmental regulations, from producing cleaner burning unleaded gasoline to complying with the emissions limits in the Clean Air Act, added to the woes of marginal refiners.

Now another wave of environmental regulations is about to hit the industry at a time when the business is down. The cost of complying with cap-and-trade is difficult to gauge because the law to control carbon emissions is likely to go through major changes before it gets to the president's desk. Much of the early attention has been on changes to the initial proposal that are supposed to limit the early impact of cap-and-trade on certain industries. The proposal will offer a lot of free allowances to electric power producers, permitting them to emit carbon while they work on emission reductions.

So far, though, refining is low on the list of beneficiaries, which means it could get hit hard by cap-and-trade soon after the law takes effect. This could force a number of refineries to shut down (perversely, that might ultimately improve profit margins by eliminating excess capacity sooner).

Of course, the 1980s analogy isn't perfect. After the sharp decline in refinery output – 18 percent from 1978 to 1983 – it slowly started rising. It took 20 years, and America's love affair with massive SUVs, as well as an increase in the U.S. population and corresponding increase in the number of miles driven by Americans, for refiners to get back to

History repeating?

	Late 1970s	Now
Environmental legislation	<ul style="list-style-type: none"> Clean Air Act Tetra-ethyl lead eliminated 	<ul style="list-style-type: none"> Renewable fuels standards Carbon cap-and-trade debated
Passenger car mileage	<ul style="list-style-type: none"> CAFE standards set at 20 miles per gallon by 1980 	<ul style="list-style-type: none"> CAFE standards raised to 35.5 miles per gallon by 2016
Vehicle technology	<ul style="list-style-type: none"> Four-cylinder cars commonplace Honda Accord introduced 	<ul style="list-style-type: none"> Toyota Prius sales in U.S. exceed 700,000 since the year 2000 U.S. lends \$8B to Ford, Nissan, Tesla for energy-efficient cars
Refinery utilization rate	<ul style="list-style-type: none"> Operating at 90% in 1977 Dropped to 69% in 1981 	<ul style="list-style-type: none"> Operating at 93% in 2004 (currently at 82%) Projected to drop to 77% in 2020

their 1978 peak. This time around, projections from the EIA don't indicate any pickup in U.S. demand for fuel for cars and trucks over the 20-year horizon.

Stagnant U.S. demand is a sharp contrast with rising fuel consumption in Asia and other parts of the world. The recent rally in oil prices is a reminder of how focused oil traders are on the demand from new economic powers, like China and India. In those countries, rapid industrial growth is forecast to continue and the number of cars on the road is expected to balloon, driving global energy demand for gasoline, diesel and other fuel products ever higher. While gasoline demand in the U.S. is expected to decline as result of new energy regulations, the International Energy Agency is predicting worldwide demand for gasoline and other fuel products will rise by more than 25 percent by the year 2030.

Various estimates predict that up to six million barrels a day of added refinery capacity will be coming online worldwide between 2009 and 2013. In the near term, this could add to the negatives for domestic refiners. With demand depressed by the global slowdown, the U.S. is still an attractive market that accounts for a significant portion of demand for refined products. And without the costly regulations affecting refiners in the U.S. and Europe, several "export" refineries may have an economic advantage in supplying the U.S. with refined products.

In the short run, refiners can reduce throughput or shut down less efficient units. Over the long haul, though, it's hard to justify keeping a refinery operating while selling less output at a time when profit margins are declining and costly upgrades are required.

Surviving the tsunami

For U.S. refiners, staying in the game will take flexibility and adaptation. The survivors will have leaders who see early on that the economic recovery will not solve the problems faced by the U.S. refining industry. As the impact of the new regulations is realized over the next several years, up to two million barrels a day of crude processing capacity in this country may be eliminated. Modern mega-refineries capable of adjusting to a wide range of crudes are likely to remain strong players. But size isn't the only determinant of success. Smaller operators can still thrive in locations offering unusual advantages, like low-cost crude supplies nearby or access to refined product markets that cannot be economically served by others. One of the most perilous places will be the Gulf Coast, which has the nation's biggest concentration of refineries. In this intensely competitive market, a small disadvantage like being 50-cents per barrel out of the market from a feedstock or product transportation perspective could be deadly.

Owning a refinery capable of processing lower cost heavy crude may also no longer be as big of a plus. Oil

companies invested billions of dollars to deal with this hard-to-refine stuff because it costs less to buy. Limits on carbon emissions may alter this calculation. The added processing needed to turn this more challenging feedstock into clean fuels consumes more energy than refining light, sweet crude. With the advent of caps on carbon emissions what once looked like a cheap feedstock may now mean a costly carbon footprint.

Survival this time around will require the flexibility to seize opportunities in a world where many of the rules of thumb no longer apply. Even some of the most sophisticated operations will find their location and technology no longer give them a competitive edge given the expanded value chain that incorporates renewable fuels and carbon constraints. Also, many questions remain as to the impact of proposed legislation on imports of crude oil and refined products. Here especially, the laws of unintended consequences are sure to result in surprises from new regulations, as well as opportunities for those with the insight and global agility to act quickly and capture the benefits from market disruptions.

How to Survive the Tsunami

- Internalize the new rules – Quickly develop the organizational capabilities and infrastructure to capture, track, analyze and report carbon emissions, renewable fuels and their financial derivatives on an enterprise basis. Having timely and accurate information will ensure compliance and facilitate strategic decision making.
- Reassess competitive position – The competitive position amongst many of the traditional players is likely to shift as new regulations take effect. A portfolio strategy backed up by a market-by-market analysis of the potential changes in competitor positions is key. This will provide the insights required to gain a competitive advantage and rationalize assets as necessary.
- Capture more of the emerging value chain – Although somewhat ironic, refiners can leverage their operations expertise and capital to embrace the regulations designed to significantly reduce the consumption of traditional transportation fuels in the U.S. This would entail expanding operations to capture more of the economic return along the new value chain for transportation fuels.
- Disruption creates opportunity – Prepare for opportunistic pricing as portfolios of refining and marketing assets are rationalized. New carbon markets and the evolving market for renewable energies will provide large opportunities to the bold players. Additionally, expect a plethora of unintended consequences to result in opportunities for those with the knowledge and capital to act.

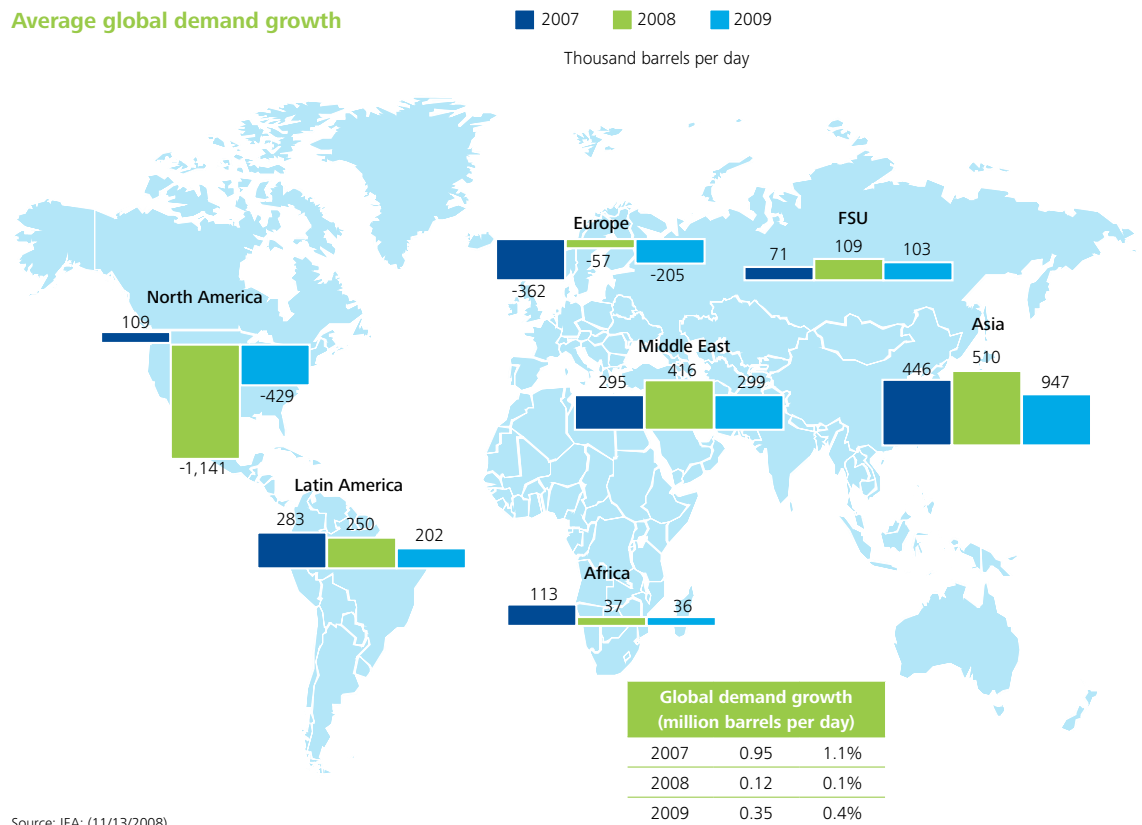
The biggest integrated oil companies and the independents will need to adjust their refining capacity to the markets they serve. The future of a refinery will depend on whether it is a low-cost operator, the sort of competition it faces, and whether its profits justify the cost to comply with regulatory changes.

Refiners are already starting to expand their view of the industry's new value chain. Valero Corp. and Sunoco have recently announced significant acquisitions of ethanol manufacturing plants from distressed sellers. These large independent refiners are buying facilities at deep discounts to their original cost and, as history suggests, will work to operate them much more efficiently. Also, most of the majors have announced investments in the next generation

of biofuels. They appear to be looking to combine their technical skills and capital with entrepreneurial ideas and new research to create cost-efficient alternatives, such as fuels made from algae or cellulose.

No matter how the regulatory landscape unfolds in the U.S., it is safe to speculate that the innovations and learning developed here will have global applicability as the current recession ends and growth in the world economy returns. While the U.S. refining industry will be among the first to experience the economic and market disruptions associated with regulatory policy designed to reduce energy consumption and carbon emissions, it is doubtful it will be the last.

Average global demand growth



Source: IEA: (11/13/2008)

About the author



Roger Ihne

Principal,
Deloitte Consulting LLP
+ 1 713 982 2339
rihne@deloitte.com

Roger Ihne is a Principal and the Energy Client Portfolio Leader for Mid-America at Deloitte Consulting LLP. He is responsible for leading the client programs for all energy-related companies based in the region across all the Deloitte businesses and has more than 28 years of experience. He joined Deloitte in 1987 and previously held progressively more responsible management positions with a Fortune 500 Oil & Gas company, and with the energy strategy practice of an international consulting firm. Before assuming his current responsibilities for the Deloitte firms,

Ihne led the Strategy & Operations practice for Deloitte Consulting in the Mid-America and Southeast regions of the U.S. He has extensive experience advising clients on important aspects of major change programs and has distinguished himself as a leading practitioner in a variety of consulting areas. Ihne presently advises clients on a variety of issues including: strategy formulation, financial management, corporate performance management, operational excellence, corporate restructuring, cost reduction, and post-merger integration.

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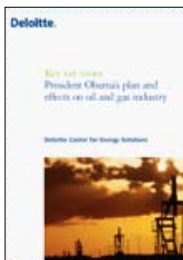
Oil & Gas reality check: Top 10 issues facing companies in the coming year

Deloitte identified 10 of the top issues that oil and gas executives will face in the near term. Deloitte oil and gas practitioners from around the world created this piece to discuss these issues and trust oil and gas companies will find it useful in charting the uncertain course over the coming months.



Full speed ahead: Chinese NOC continues M&A trends

China has invested heavily in the outbound oil & gas business since early 1990 with state-owned companies participating in over 70 exploration and production (E&P) projects in over 30 countries. For those Chinese NOCs that have cash, today's economic environment and the slump in oil prices have provided good buying opportunities to expand their overseas resource acquisitions and acquire assets at favorable valuations.



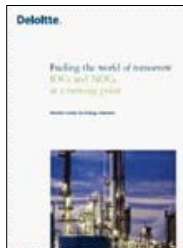
Key tax issues: President Obama's plans and effects on the oil and gas industry

This publication discusses President Obama's outline of a fiscal 2010 budget that puts in motion his campaign promises to provide tax cuts to working families while imposing significant tax increases on businesses and upper-income individuals, closing perceived corporate loopholes, and limiting tax benefits for companies that move jobs overseas.



America's renaissance: Energy environment, security and global leadership

In the first 100 days of his administration, President Obama has put energy and environment policy at the heart of America's future. In the next 100 days, he will need to work with various political interests and make keen decisions to realize his vision.



Fueling the world of tomorrow: IOCs and NOCs at a turning point

This publication illustrates the transitions the NOCs and IOCs are going through. Over the past several years, record oil prices, coupled with a re-emergence of resource nationalism, have fueled the growth and expansion of several NOCs.



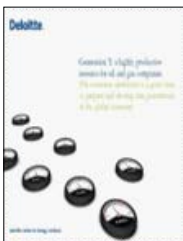
IFRS considerations for the oil and gas industry

This publication provides practical industry insights on IFRS and includes useful sections on accounting, finance systems, and tax for the oil and gas industry. The publication also discusses key differences between IFRS and GAAP, evaluating approaches to IFRS conversion, and developing an IFRS road map.



Sounding off: Oil and gas executives look at petroleum's future

This publication, based on a Deloitte survey, addresses issues such as how energy security and the ailing economy are challenging, even to the most well established petroleum companies.



Generation Y: A highly productive resource for oil and gas companies

This article discusses what oil and gas organizations can do to strategically develop their workforce – especially the Gen-Y segment – to survive the downturn and remain ahead of their competitors.



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