



# Energy Economist

## US natural gas: near-term factors 3

The volume of US natural gas in storage is approaching the limits of physical capacity. Meanwhile, Platts forecasts a 3.6% fall in daily output from the Lower 48 states from 2006 through 2012, owing to the long-term decline in industrial demand and a mild weather outlook. Yet spot and prompt month prices remain firm. With fundamentals and the market apparently pointing in opposite directions, Platts chief economist **Larry Chorn** assesses the key determinants for the US natural gas business through to 2012.

## Elephant hunting in Brazil 6

Petrobras's giant Tupi field is the world's largest deepwater discovery to date and despite large capital and developmental challenges promises to push Brazil into the big league of oil exporters. While it has prompted a new debate on limiting foreign access to the oil sector, it is also just one of a number of subsalt prospects that could open up a whole new geology to oil exploration, and not just in Brazil. **Joshua Schneyer**

## WTI market could face new CFTC probe 9

Moves by the US Commodity Futures Trading Commission suggest that the West Texas Intermediate crude market may be the subject of a new investigation. Recent high profile cases concerning BP's activities in the US propane market and hedge fund Amaranth in natural gas have highlighted the CFTC's more active approach both to bilateral over-the-counter trading and Exempt Commercial Markets on electronic trading platforms.

## Climate prompts new mood for large hydro 12

Multilateral lending organizations turned against large-scale hydroelectric schemes following the publication of the World Commission on Dams report in 2000, which in turn prompted banks to withhold funding. But the desire to tackle climate change by promoting low carbon power generation has changed the balance between global and local considerations, signaling a return to favor for large hydro. **Nell Ford** reports

## Middle East investment turns to East Asia 17

Middle Eastern finance is playing an increasingly important role in the East Asian energy sector. Downstream refining and petrochemicals processing, as well as oil storage facilities, are prominent targets, expanding on Saudi Aramco's successful ventures in the region, but attention is also being paid to the upstream. Singapore, in particular, is trying to position itself as the gateway to Asia for Middle Eastern petrodollars, writes **Andrew Symon**.

## New markets drive US efficiency boom 19

US electricity networks together have demand response programs totaling more than 23 GW of power. In a few, energy efficiency is defined as a resource that can compete head to head on an equal footing with power generation. **Elisa Wood** looks at the innovations taking place that aim to harness and monetize what many see as the power sector's greatest and cheapest resource – energy efficiency.

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Creating the right conditions for investment abroad is central to energy and climate security. UK minister of state for energy **Malcolm Wicks** reports on his recent visit to the Caspian and the importance of sharing the UK experience of liberalized markets.

## New markets drive US efficiency boom

US electricity networks together have demand response programs totaling more than 23 GW of power. In a few, energy efficiency is defined as a resource that can compete head to head on an equal footing with power generation. **Elisa Wood** looks at the innovations taking place that aim to harness and monetize what many see as the power sector's greatest and cheapest resource – energy efficiency.

Say 'energy efficiency' and many Americans still think of former US President Jimmy Carter in a sweater, preaching sacrifice, in his famous 1977 conservation speech. The speech inspired US consumers to turn down their thermostats, but only temporarily. The notion of austerity did not sit well. The sweaters soon came off and conservation took a back seat in energy policy.

Now, energy efficiency has re-emerged as a cornerstone of energy planning in several states, but with a new twist: it is technology and markets – not moral imperative – that is the driver. A recent conference held by the Alliance to Save Energy underscored the new mood. Although the organization has existed for 30 years, it was not until this year that the ASE held its first global conference, attracting more than 800 participants to the three-day event.

ASE's goal was to bring cohesion and group identity to the diverse set of companies that have the common goal of promoting efficiency. The conference drew electric utilities, demand-response companies, commodity traders, energy service companies, appliance manufacturers and technology companies. The range of businesses makes for a big industry; valued at \$933 billion it is larger than the US renewable energy sector, according to the American Council for an Energy Efficient Economy.

### No pain, much gain

ASE makes a point of distinguishing between the 'conservation' of the 1970s and 'energy efficiency' of today. Conservation was about "doing with less or doing without, of being uncomfortable or less comfortable. In contrast, today's energy efficiency takes advantage of advances in technology to provide significantly better, smarter services. It saves consumers money, increases comfort, protects the environment, enhances the economy, and promotes national security."

Like the conservation movement of the 1970s, today's drive to reduce electricity consumption stems from record high energy prices. But this time, there is an additional impetus – impending carbon emissions restrictions. Carbon limits, coupled with a near 60% increase expected in worldwide energy demand over the next 25 years, create a "different and new" energy reality, one that is "unlike anything we have ever faced before," according to Clay Sell, deputy secretary and chief operating officer of the US Department of Energy.

Given that energy efficiency appears to be a relatively inexpensive and quick way to reduce greenhouse gas emissions, many states are putting in place policies that

make efficiency a first fuel. Connecticut, Massachusetts, Vermont, Rhode Island, and others are requiring that utilities improve efficiency in existing plants before they build new ones. Utah and other states have set goals to reduce statewide energy use by a specific percentage over time. In California, the Public Utilities Commission is pushing for all new homes to produce at least as much energy as they consume by 2020. The standard would apply to new commercial buildings by 2030. In addition, the PUC in October ordered utilities to create together a single roadmap to maximize efficiency by 2020.

State leaders are realizing that "there are new components of the cost-benefit relationship," according to Steve Cowell, president of Conservation Services Group, a company that has offered energy services and efficiency programs for more than two decades. "There are additional externalities in the equation today that were not there before – global warming, carbon reduction, nitrogen oxide reduction."

Thus, with an eye toward reducing carbon emissions, eight major utilities in September set up an energy efficiency institute, committing a total of \$1 billion over the next three years. The goal of the utilities, Consolidated Edison, Duke Energy, Edison International, Great Plains Energy, Pepco Holdings, PNM Resources, Sierra Pacific Resources, and Xcel Energy is to fix "chronic under-investment in energy efficiency," according to Jim Rogers, Duke's chairman, president and CEO

### Being paid to use less

Meanwhile, North America's ten organized wholesale markets – known as independent system operators or regional transmission organizations – are pioneering ways to encourage better demand responses to prices in competitive markets. Their work is significant because these grid operators serve 67% of US electricity customers and more than half of the Canadian population.

The ISOs/RTOs are working intently on developing programs that give energy users incentive payments to reduce consumption when the grid is overworked. Typically, manufacturers, office buildings, stores and other large energy users enroll in the programs. So far, enough participants have joined to reduce demand by 23 GW.

Combined, the demand response programs can cut electricity use 4.5%, according to an October 2007 report *Harnessing the Power of Demand*, published by the ISO/RTO Council. But potential exists for 500 GW of demand response programs, a large increase from the

2.3 GW now under contract, according to Michael Gordon, founder of ConsumerPowerline, a demand-response company. Energy users would pursue more demand responses savings but need educating. "It's largely lack of awareness and a sense that this is too good to be true – you get paid and you only do what you can comfortably commit to do," Gordon said.

Utilities in regulated markets have been slower to adopt demand-response than the deregulated markets, Gordon said, in keeping with their typically cautious corporate nature. In some cases, they were burned in early trials because they did not understand how to structure a demand-response contract. "Maybe they went with one company, and they wish they had contracted with two or three. Or maybe they went with a company that did not provide comprehensive value to the end user. So they didn't get variety, enough hours during the year, or quick enough response. But the utilities are learning."

### **Liberalized markets grow up**

In some markets, efficiency is being given the same financial opportunity as generation. These programs do away with the thinking that 'negawatts' are a resource solely supported by government subsidy. Instead, efficiency becomes a market player that competes head-to-head with generation to serve the grid.

Efficiency's status rose after grid operators began to see a flaw in the market pricing structure. The markets were not encouraging development of new capacity. As a result, rolling blackouts appeared possible in the not-too-distant future in some parts of the country. Banks with a financial interest in power plants began to worry. "They said we see that demand is increasing by 1 to 2%, and nobody is adding any generation. As a matter of fact, generation is being retired. You have demand going up and supply going down. Not a good thing," said Skip Trimble, an energy portfolio manager with South River Consulting in Maryland.

Some of the grid operators, among them ISO New England and the PJM Interconnection, began exploring ways to improve markets and encourage more capacity. In doing so, they expanded the definition of capacity, looking beyond just generation to encompass demand resources. "They are looking at it as a resource for the first time, not as a mandate for society. So all of sudden it is like buying steel or buying a car. This is a real fungible resource," Trimble said. Further, if capacity is needed quickly, demand resources are a better option. "A power plant takes 10 years to develop. Demand resources can happen overnight," he said.

To that end, ISO New England plans to accept bids from demand resources in its first forward capacity auction planned for February 2008. As an initial step in the auction process, the ISO in early November qualified nearly 190 new demand-side projects, totaling 2,500 MW, as eligible to bid in the auction. Those projects will compete against 45 new generation units totaling 3,758 MW and imported power totaling 658 MW. The qualified

demand resources include programs that create efficiency, load management, and distributed generation. In a sign the market is responding, 80% of the demand resource applications are from non-utility or merchant providers, "many of which have limited or no access to government funding," according to the ISO/RTO Council.

And the mammoth PJM Interconnection, a regional transmission organization the size of the world's fourth largest country in terms of power consumption, has initiated similar equality-of-resource in its new "reliability pricing model" for forward markets. Begun in April, the program offers financial incentives to build power plants or install demand resources in any of 23 parts of the system that lack capacity. Winning resources – whether supply or demand side – receive the same payments. The April auction cleared 127 MW of demand response; the second auction in July cleared more than 500 MW of demand response, and the third auction in October nearly 900 MW.

The movement toward demand resources emerges from a maturation and refinement of liberalization, which has led to the creation of several new electricity markets, said Trimble. "Ten years ago everybody thought if we deregulate the commodity market, it will take care of itself. Then we stated looking at it and realizing it is more complicated than we thought. And when people started thinking about it, they realized, 'I can have an impact on the grid in a positive way, and I can make money doing it.'"

### **Mimicking renewable energy**

The new efficiency market is also taking a page from the renewable energy industry book. Seeing strong growth in the renewable energy credit market, efficiency advocates are pushing for the development of a similar market for demand resources. Renewable energy credits, or RECs, are a currency used by utilities and retail suppliers to meet government requirements that they provide a percentage of their electricity from green energy. One REC equals one MWh. About half the states now have a renewable requirement, and Congress is considering imposing a national standard.

Three states – Connecticut, Pennsylvania and Nevada – have created a similar requirement for energy efficiency, and 12 states are thinking of following suit. And again, Congress is considering a national standard. Under these programs, utilities and in some cases retail suppliers must use energy efficiency to service load. However, the utility or supplier does not need to undertake an efficiency project to achieve the standard. Instead, it can buy credits from a manufacturer or building owner who has created them by installing efficient lighting, high efficiency motors, or some other approach that reduces energy usage.

Mel Jones, president and CEO of green energy commodity trader, Sterling Planet, has studied similar 'white tag' markets in the UK, France and Italy, and sees enormous potential for them in the United States. The REC business has increased dramatically in the last five years

for Sterling Planet, but Jones expects efficiency certificate trading to ramp up even more quickly. The white tag market can form more easily because buyers and sellers can plug into exchanges and procedures already put in place for trading RECs, he said.

Paul MacGregor, executive vice president of Neuwing Energy Ventures, which verifies efficiency projects and trades efficiency certificates and RECs, forecasts that the efficiency credit market will grow to ten times the size of the REC market in the next few years. Efficiency credits are better positioned than RECs because they are often easier and less costly to create, he said.

In addition, it appears the US could see a shortage of RECs. Energy efficiency credits might be able to fill some of the void. Demand for RECs is growing as states ramp up their requirements each year. Demand is also growing because companies buy them to achieve voluntary carbon emissions reductions. It is not clear that enough cost effective RECs will be available for these companies to fulfill their promises. Should a REC shortage occur, buyers may seek energy efficiency credits instead, as a means to green-up their energy profile.

Still, establishing an energy efficiency credit market is far from a done deal. Jan Hamrin, president of the Center for Resource Solutions, points out that while white tags appear promising, more work is needed to measure and verify the efficiency savings and any related carbon emissions reductions.

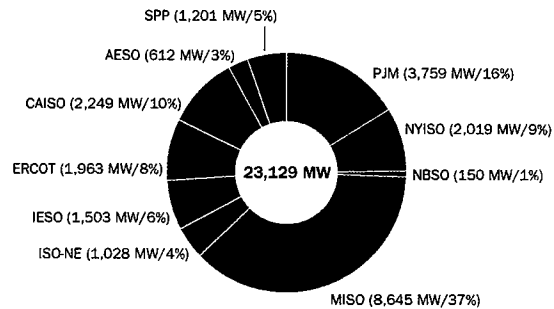
### Your meter's IQ

Smart meters are another step in the efficient use of energy, but not one without its critics. Advocates say true efficiency will only come when consumers can see prices in real-time and refrain from using electricity when it is expensive. To make way for smart meters, several states are looking into expanding various forms of time-of-use and real-time pricing. In some cases, customers would sign up voluntarily for the pricing programs; in other cases they are drafted. Certain plans apply only to large customers; others encompass residential users. Prices change once or twice a day in some cases and hourly in others.

The smart meter concept has met some skepticism, given that the meters can cost as much as \$500 per customer. Donald Downes, chairman of the public utilities commission in Connecticut, a state known for its innovation in energy efficiency, said "We will have to make a substantial capital investment to do some or all of these things. There are smart, smarter and really smart meters and obviously as you move up the smartness scale you also wind up increasing costs. When you multiple this by 1 million customers, this adds up to actual money quickly."

Moreover, Downes said, it will likely take years to actually get the new meters installed. In the meantime, when it comes to mandating any kind of real time pricing, regulators must consider issues of fairness.

### Size of the demand response programs in the 10 North American organized markets



Source: ISO/RTO Council source

Should the parent at home with several small children be penalized for using electricity during the afternoon? What about the senior citizen or a sick person? While real-time pricing may work well for large energy users, it may not make sense for households, he said. "This is probably one of those situations where some is good, more is not necessarily better," he said. "If you can muster 100,000 people who will do something at the same time that will send some kind of economic, cost or load signal, I'm game. But just doing it at the cost of \$200, \$300, \$400 and hoping someone uses it, impresses me as really, really foolish."

Still, for one company a form of simplified, residential time-of-use pricing has worked well. Salt River Project has significantly reduced demand and cut consumer costs through time-of-use and smart meter pre-pay programs. About 200,000 customers, 20% of the company's customer base, are now on voluntary time-of-use rates; most are residential customers. The time-of-use program has reduced peak demand by 11%, according to Michael Lowe, customer services executive.

In addition, about 55,000 customers joined a voluntary pre-pay program that allows them to buy power on a smart card. The customer inserts the card in a household smart meter, and can monitor kWh usage and money spent on electricity. Customers using the program reduced their usage by 12%.

Others point to smart appliances as a solution, since they will talk to the grid without any human interference. Work is underway on refrigerators that will check on the price of electricity before attempting to defrost; clothes dryers that turn off their heating mechanisms during periods of peak demand; and computer programs that will automatically buy, and possibly even sell, power on behalf of a household.

### Winning over utilities

A key obstruction to energy efficiency is the lack of incentives for utilities to pursue the resource. In fact, current rate structures create a disincentive, since utilities are rewarded based on the amount of electricity they sell. Several states are now looking

into decoupling utility revenue from sales as a means to encourage, or at least not discourage, utility pursuit of demand-side resources.

Others see utilities developing their role as information providers. Rather than selling electricity, they will manage information provided by the smart grid. "Information is ten times more valuable than the commodity. If you know consumption, the data, it is more valuable than going out and buying kilowatt hours. You can shape it and shave it. It gives you a lot of choice and a lot of control over risk mitigation," said Trimble.

However, in some cases, utilities are on board with efficiency, and have been for a long time. United Illuminating, a small Connecticut utility that serves only 320,000 customers already has smart meters. In fact, the utility has been creating model efficiency programs for decades. "We've always thought we should help customers use what we sell wisely. It is part of our corporate culture," said Tony Marone, vice president of client services. "We have a lot of interaction with individuals out in California. Some of the big, big utilities have come to us to purchase programs or get ideas."


For example, ice storage, "now all the buzz," has been an approach used by UI for almost two decades and shaves about 1% off the utility's peak demand. UI was also one of the earlier adopters of demand response, with a program that began in the early 1990s. In a more recent innovation, the company abandoned the often cumbersome coupon-rebate approach for high efficiency lighting, and instead has set up partnerships with major retail stores. The utility

buys down the cost of light bulbs at the store level, providing the store with the rebates, so that the consumer gets an immediate discount on the price without the hassle of filling out forms and waiting for checks.

UI also was one of the first to make white tag trades, and this year earned \$500,000 in revenue as a result. The utility approached state lawmakers with the idea three years ago. "They took heart and liked the idea. It is rewarding now that it has become law, and we are out there extracting additional value from conservation," said Pat McDonnell, the utility's director of conservation and load management.

But UI is one David facing a Goliath of energy consumption in the US. Consumer gadgets are becoming increasingly energy intensive, driving up demand. The US will require eight new 500 MW power plants in the next five years just to supply power for new plasma televisions, according to the Electric Power Research Institute. It will need four more 500 MW power plants to serve cable and satellite boxes for televisions. And that does not include the increased consumption from computers, air conditioners, cell phone chargers, game boxes, and a range of other new, smarter and more energy hungry gadgets.

The challenge for power reduction technologies is to advance at least as quickly as power consuming technologies. Equally important, efficiency advocates must convince consumers that it is a good thing to use less and that it will not cause pain. Otherwise their ideas risk getting tossed aside into the same bin as Jimmy Carter's sweater.



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