Backgrounder: Diminished Need for New Electricity in Alberta's Industrial Heartland in 2010

1. Out-Dated Assumptions by AESO for Electricity "Needs" of the Industrial Heartland

In 2007 and 2008, the Alberta Electric System Operator (AESO) calculated the anticipated demand for the Heartland region based on the number of oil sands upgraders and related industrial development then being proposed. There were as many as 11 upgraders being proposed for the Heartland region. (AESO Report: Alberta's Industrial Heartland, May 30, 2008)

However, today, most of the upgraders have been cancelled. Only 2 might be proceeding. See http://www.theglobeandmail.com/report-on-business/syncrude-to-boost-oil-sands-production-upgrader-plan-ends/article1480613/ and March 25, 2010 *Globe and Mail* article:

> Syncrude's move [to cancel its upgrader] is the latest blow for those who have pushed for Alberta to process more of its crude on home soil, where it can be used to generate jobs, provincial income and tertiary industries.
>
> But those dreams have been largely extinguished in the last year, as extraordinary changes in the U.S. refinery industry have created strong new demand for unprocessed Canadian crude. Suncor Energy Inc., Imperial Oil Ltd., Total SA and Statoil ASA have all backed away from plans to process bitumen in Alberta in favour of exporting it raw, a strategy they believe will be more profitable.

The North American economics for upgrading have changed. It is more economic for the bitumen to be shipped to retrofitted US refineries via pipelines than building upgraders in the Alberta Industrial Heartland.

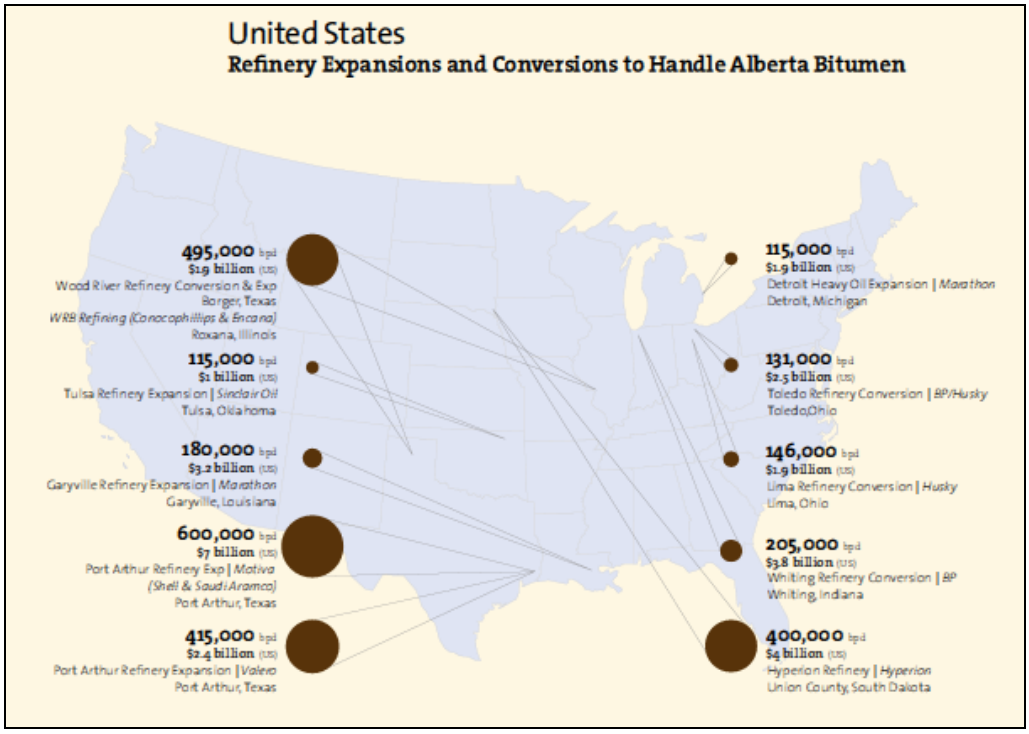
Oil companies have not simply put their plans for their Heartland upgraders on hold. Most companies have started construction on expanding and retrofitting existing US refineries to process the bitumen that they had previously planned to process in the Heartland. And extensive new pipelines are either being built or applied for to move the bitumen past the Heartland and into the US. These facts and this new reality are illustrated below. AESO's needs assessment was prepared before these fundamental changes occurred. AESO is proceeding as though the upgraders are still going to be built in the Heartland.

2. US Refineries being Retrofitted to Refine Alberta Oil Sands Bitumen

Here is the current data on US refinery expansions, conversions and new refinery construction to process bitumen from Alberta oil sands:

Refinery: Detroit Heavy Oil Expansion Company: Marathon Location: Detroit, Michigan Investment: $1.9 billion (US) Bitumen Capacity: 115,000 bpd	Refinery: Garyville Refinery Expansion Company: Marathon Location: Garyville, Louisiana Investment: $3.2 billion (US) Bitumen Capacity: 180,000 bpd	Refinery: Hyperion Refinery Company: Hyperion Location: Union County, South Dakota Investment: $4 billion (US) Bitumen Capacity: 400,000 bpd
Refinery: Port Arthur Refinery Expansion Company: Motiva (Shell and Saudi Aramco) Location: Port Arthur, Texas Investment: $7 billion (US) Bitumen Capacity: 600,000 bpd	Refinery: Port Arthur Refinery Expansion Company: Valero Location: Port Arthur, Texas Investment: $2.4 billion (US) Bitumen Capacity: 415,000 bpd	Refinery: Tulsa Refinery Expansion Company: Sinclair Oil Location: Tulsa, Oklahoma Investment: $1 billion (US) Bitumen Capacity: 115,000 bpd
Refinery: Whiting Refinery Conversion Company: BP Location: Whiting, Indiana Investment: $3.8 billion (US) Bitumen Capacity: 205,000 bpd	Refinery: Wood River Refinery Expansion Company: WRB Refining (ConocoPhillips & Encana) Location: Roxana, Illinois (with refinery in Borger, Texas) Investment: $4 billion (US) Bitumen Capacity: 495,000 bpd	Refinery: Toledo Refinery Conversion Company: BP/Husky Location: Toledo, Ohio Investment: $2.5 billion (US) Bitumen Capacity: 131,000 bpd
Refinery: Lima Refinery Conversion Company: Husky Location: Lima, Ohio Investment: $1.9 billion (US) Bitumen Capacity: 146,000 bpd	Number of U.S. oil sands related refinery projects 10 Total bitumen processing capacity: 2.8 million bpd Estimated investment: $31.7 billion (US)	

Sources: Environmental Integrity Project, corporate annual reports, corporate websites, media reports, AFL news release March 24, 2010



3. New Pipelines to Ship Oil Sands Bitumen to the US instead of the Heartland

Pipelines are currently being built while others are in the approval process to move the bitumen that was once proposed to be upgraded in the Heartland into the United States.

Bitumen Pipelines to the U.S. Mid-West

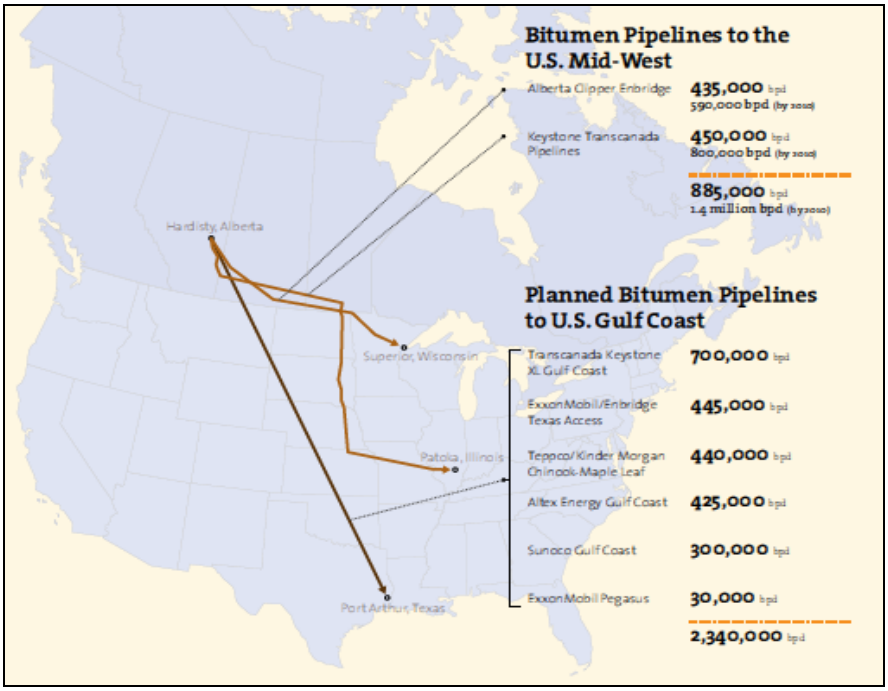
Pipeline: Alberta Clipper Company: Enbridge Capacity: 450,000 bpd (to be expanded to 800,000 bpd in 2010) Status: under construction	Pipeline: Keystone Company: TransCanada Pipelines Capacity: 435,000 bpd (to be expanded to 590,000 bpd in 2010) Status: under construction

Total Combined Capacity: 885,000 bpd in 2009; 1.4 million bpd by 2010
Source: National Energy Board (NEB)

Planned Bitumen Pipelines to U.S. Gulf Coast

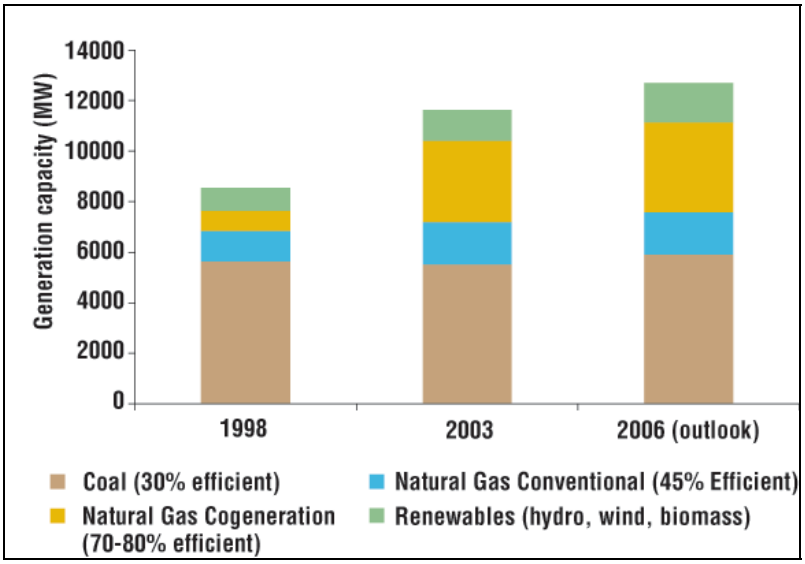
Pipeline: ExxonMobil/Enbridge Texas Access Capacity: 445,000 bpd Status: Proposed	Pipeline: Sunoco Gulf Coast Capacity: 300,000 bpd Status: Proposed
Pipeline: TEPPCO/Kinder Morgan Chinook-Maple Leaf Capacity: 440,000 bpd Status: Proposed	Pipeline: TransCanada Keystone XL Gulf Coast Capacity: 700,000 bpd Status: Proposed
Pipeline: Altex Energy Gulf Coast Capacity: 425,000 bpd Status: Proposed	Pipeline: ExxonMobil Pegasus Capacity: 30,000 bpd Status: Proposed

Total Combined Capacity: 2.34 million bpd Source: National Energy Board and CAPP



4. Upgraders, Co-Generation, Greenhouse Gas Reduction and New Technology

Many bitumen upgraders include electricity co-generation facilities within the plant design. This allows the upgrader to produce its own electricity. It does so from the off-gases and other gasses produced from the processing phase. The electricity produced is more efficient than electricity produced from off-site coal plants: see source and figure below. Furthermore, allowing upgraders to produce their own electricity from cleaner, more efficient gas as compared to coal, reduces Greenhouse Gas Emissions. While it may not be in the interests of the owners of coal-fired power plants, allowing bitumen upgraders to operate their own co-generation is more efficient, more cost-effective, requires little or no transmission infrastructure, and is better for the environment and the reputation of Alberta's oil sands industry.



Source: Co-generation and the Alberta Oil Sands
http://www.powergenworldwide.com/index/display/articledisplay/303182/articles/cogeneration-and-on-site-power-production/volume-8/issue-4/features/cogeneration-and-the-alberta-oil-sands-cogeneration-benefits-are-maximized-with-extraction-and-upgrading-integration.html

Over-building expensive transmission lines from the coal-fired power plants at Lake Wabamun and then shipping that electricity to the Heartland at the expense of all Albertans while forcing upgraders to use it instead of their own co-generation is a misuse of public and natural resources, and bad for the environment.

Furthermore, forcing future upgraders that might choose to locate in the Heartland to use expensive and dirty electricity from Wabamun instead of their own co-generation, could create yet another barrier to attracting upgraders to the Heartland.

The technology proposed for the transmission line to the Heartland is old technology. Significant technological advances are currently being made to the electricity grid in other countries. These advances are improving efficiencies at all levels, reducing consumption and reducing environmental impacts. The over-build proposed by AESO for the Heartland line will burden Albertans with old, expensive technology for decades to come. See *The Economist: "Smart Grids—Wiser Wires"* attached.

For more information on RETA and the Heartland Project go to http://www.reta.ca

Attachments

Syncrude to boost oil sands production; scraps upgrader plan

Alters growth strategy to boost output to 540,000 barrels a day by 2020

Globe and Mail February 24, 2010
Nathan VanderKlippe

Calgary — From Thursday's Globe and Mail Published on Wednesday, Feb. 24, 2010 4:02PM EST Last updated on Thursday, Feb. 25, 2010 7:32AM EST

Syncrude Canada Ltd. is scrapping plans for an expensive upgrader as it redraws its growth plans in a bid to profit from strong demand for unprocessed oil sands bitumen.

Rather than transform its heavy Fort McMurray-area crude into a light sweet oil, Syncrude is now making plans to export what critics have called "raw bitumen." The new strategy will allow the company, which is owned by a consortium of major energy players, to substantially trim its capital requirements while maintaining a strong rise in production.

Syncrude's move is the latest blow for those who have pushed for Alberta to process more of its crude on home soil, where it can be used to generate jobs, provincial income and tertiary industries.

But those dreams have been largely extinguished in the last year, as extraordinary changes in the U.S. refinery industry have created strong new demand for unprocessed Canadian crude. Suncor Energy Inc., Imperial Oil Ltd., Total SA and Statoil ASA have all backed away from plans to process bitumen in Alberta in favour of exporting it raw, a strategy they believe will be more profitable.

For Syncrude, the change is designed to cut the cost of building an upgrader – a hugely expensive undertaking – and reduce the risk that comes from operating one in the future.

"We've always talked about expanding. It's just how we will expand has evolved and changed," said Siren Fisekci, spokeswoman for Canadian Oil Sands Trust, (COS.UN-T29.11-0.24-0.82%) Syncrude's largest owner.

Syncrude has long planned to boost its current production capacity of 350,000 barrels per day to 500,000 barrels by 2020.

Under the previous timeline, output was to jump to 400,000 a day by mid-decade through improvements to its current facilities, in a process called "debottlenecking." The remainder was to come through construction of a new upgrader by 2020.

Under the new timeline, which was disclosed yesterday, Syncrude will lift production to 425,000 barrels through debottlenecking, and add a further 115,000 per day of bitumen production. Both expansions are expected by 2020.

(With additions to its mining operations, Syncrude actually plans to extract 600,000 barrels a day of bitumen by 2020, but barrels that go through its upgrading process actually shrink in size, resulting in a total output of 540,000.) Bitumen on its own is too thick to flow through a pipeline: at room temperature, it has the consistency of old molasses. But Syncrude plans to employ a new system that uses a solvent to remove what Ms. Fisekci called the "nasty" part of the bitumen. That system, which Syncrude operator Imperial Oil also intends to use at its Kearl oil sands mine, will allow the bitumen to flow without needing to be upgraded.

Syncrude has not disclosed estimated construction costs of its expansion plans, but Ms. Fisekci said striking out the upgrader should result in "substantial" savings. Observers, however, remained skeptical.

"Syncrude's long-term strategy is better defined and more credible following today's announcement," Andrew Potter, an analyst with UBS Securities, wrote in a note to clients.

"However, the key questions on costs and whether or not all owners will back the project (Syncrude requires unanimous approval) will remain unanswered for some time. We do not expect investors to place significant value into (Canadian Oil Sands Trust) for these expansions until these questions are answered."

Drops in heavy oil output from Mexico and Venezuela have left U.S. refiners scrambling for product, and bidding up the price of heavy oil. Heavy oil has historically traded at a 20- to 30-per-cent discount to light oil. Upgraders, which transform heavy into light oil, were built to profit from that difference.

But the strong heavy oil demand has narrowed that differential to as little as 10 per cent, largely erasing upgrading margins. As a result, it can be more profitable to ship unprocessed, heavy bitumen.

Some analysts believe the differential will remain slim for a decade to come – and enough in industry agree that Alberta currently houses two partially built upgraders, both of which have been put on hold.

Briefing

Smart grids

Wiser wires

Oct 8th 2009

From *The Economist* print edition

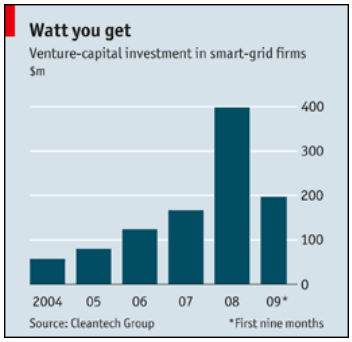
Information technology can make electricity grids less wasteful and much greener. Businesses have lots of ideas and governments are keen, but obstacles remain

Getty Images

WHAT was the greatest engineering achievement of the 20th century? The motor car, perhaps, or the computer? In 2000 America's National Academy of Engineering gave a different answer: "the vast networks of electrification". These, the academy concluded, made most of the century's other advances possible.

But whereas cars, computers and so forth have become ever more sophisticated, power grids have remained, in essence, sets of dumb wires. Thomas Edison, a pioneer of electrification in the 1880s, would be able to run them. Power is fed into the grid from power stations in the hope that it will arrive in factories, offices and homes. To this day most utilities rely on consumers to tell them that the power is out—and may then have to put in a lot of detective work to discover the cause.

This may be changing at last. A global movement is afoot to make grids "smart". This means adding all kinds of information technology, such as sensors, digital meters and a communications network akin to the internet, to the dumb wires. Among other things, a smart grid would be able to avoid outages, save energy and help other green undertakings, such as electric cars and distributed generation.



Governments have earmarked parts of their stimulus packages for smart grids. Utilities have started to spend serious money. In recent years American venture capitalists have put more than $1 billion into smart-grid start-ups, even if investment this year has not matched the heights of 2008 (see chart). Two of these start-ups, GridPoint and Silver Spring Networks, raised $220m and $170m respectively.

Big electrical-engineering firms and information-technology giants are joining in too. Siemens hopes to win orders worth €6 billion ($8.5 billion) in the next five years. Smart grids are a big part of IBM's "smarter planet" vision. Cisco, the world's biggest maker of networking gear, expects that the underlying communications network will be "100 or 1,000 times larger than the internet". Google and Microsoft also want to join the party.

Smart grids are neither a surprising nor a new idea. It is well known that systems transmitting and distributing electricity are exceedingly wasteful and vulnerable. Huge amounts of power are lost to technical problems or theft: up to 10% in America and Europe; more than 50% in some big cities in developing countries. Outages cost

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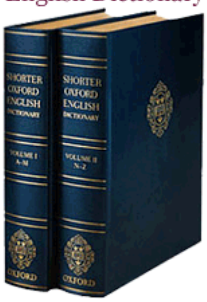

the American economy $150 billion a year.

With smart grids, there should be no need to send out lorries and ring doorbells when the power fails. A few mouse clicks may do the trick, or the equipment may even fix itself. Sensors on transmission lines and smart meters on customers' premises tell the utility where the fault is and smart switches then route power around it. That is similar to the internet, which redirects data packets if they get stuck.

A more resilient grid, however, is the less important half of the story. All told, estimates the Brattle Group, a consultancy, the benefits from a smart grid could amount to $227 billion over the next 40 years in America alone. Just as the original grid facilitated the industrial innovations of the 20th century, the smart grid should support the green advances of the 21st. "Without it, most of the other green technology won't work," says Ben Kortlang of KPCB, a Silicon Valley venture-capital firm that recently invested in Silver Spring.

Take what is called "demand response". Some big companies have long agreed to throttle back their consumption at times of peak demand. With a smart grid, all consumers would be able to do the same. In a basic version, they would get real-time information about their usage and could then turn off the tumble dryer or other energy-hungry appliances. Pilot projects show that this alone would reduce consumption by 6.5% on average, says Ahmad Faruqui of the Brattle Group. If prices also varied with a grid's load, rising when demand was heavy, customers would cut back by 10-15% during peak hours. That number would double again if smart meters could turn appliances off automatically should rates rise above a certain point.

With peak demand lower, utilities would no longer have to hold as much expensive backup capacity. Mainly because so many of its customers have air conditioners, Pacific Gas and Electric (PG&E), a Californian utility, needs to be able to deliver more than 20,000 megawatts (MW) in the summer months—almost twice the average demand. Eliminating only the top 10% of electricity usage through demand-response and efficiency programmes would save customers more than $100m annually, says Andrew Tang, who oversees the utility's smart-grid project, one of America's biggest. PG&E is installing 10,000 smart meters a day and wants to equip 5m homes by the end of 2011.

More intelligence in the grid would also help integrate renewable sources of electricity, such as solar panels or wind turbines. As things stand, the trouble is that their output, being hostage to the weather, is highly variable. A standard grid becomes hard to manage if too many of them are connected to it; supply and demand on electricity-transmission systems must always be in balance. A smart grid could turn on appliances should, for instance, the wind blow more strongly. Added intelligence would also make it much easier to cope with the demand from electric cars by making sure that not all of a neighbourhood's vehicles are being charged at the same time. Although this is still many years away, the cars' batteries could even be used to feed electricity back into the grid if needed, and so act as a vast electricity-storage system.

The Guardian

A smarter cup of tea

Some countries are further ahead than others in developing smart grids. Italy (surprisingly, perhaps) is a pioneer, at least in smart metering. In the early 2000s Enel, the country's biggest utility, started installing smart meters in most households

so that it could clamp down on theft and cut off non-payers remotely. Sweden has recently become the first country in which every customer has a smart meter, because the government made it mandatory. In America, Texas has led the way.

Behind the latest push, though, are several forces common across countries. Grids are ageing, giving utilities an incentive to invest in modern replacements. The technology has become cheap enough to be worthwhile. Rising energy prices mean consumers want more control over their bills. Governments, worried about both recession and the warming of the planet, have become more active. America's Department of Energy will soon start to dole out the $3.9 billion earmarked for smart grids in the country's stimulus package. In Germany, smart meters will be compulsory in new buildings from next year. Britain plans to complete a rollout of such devices by 2020. China has a five-year plan to make the core of its grid cleverer.

Switching on, stacking up

However, as a report by the World Economic Forum (WEF), a think-tank and conference organiser, and Accenture, a consulting firm, argues, smart grids' features will continue to vary with local circumstances. In some places, such as New York City, the focus will be on making the grid more reliable, to avoid blackouts such as that of 2003. Islands and self-contained cities, such as Malta and Singapore, will invest more in upgrading distribution, to cope better with renewables and electric cars. In areas with high-tech clusters, such as Silicon Valley, the quality of power is a priority, because of the damage voltage surges and brief interruptions can cause.

Whatever the characteristics of individual grids, it is easy to see why firms are lining up to build these systems. Morgan Stanley, an investment bank, predicts that the smart-grid market will grow from $20 billion to $100 billion in 2030, a compound average rate of more than 8% a year. Within this market, there are three different strata of technologies, known as "stacks".

The first stack is called "advanced metering infrastructure", or AMI. It is at the heart of every smart grid and is the most vibrant part of the market so far, which is good news for makers of smart meters, such as General Electric, Itron, based in Washington state, and Landis+Gyr, from Switzerland. Their products are rather like smart-phones: they have a powerful chip and a display, and are connected to a communications network. More than 76m will have been installed worldwide by the end of this year, forecasts ABI Research, a market-research firm. By 2013 the number will rise to 155m.

However, just as in the computing industry, the technologically more interesting and economically more promising bits of AMI may not be the hardware but the network: the software that makes the smart grid tick, and the applications that run on it. This field is dominated by start-ups, some of which were financed at first by Foundation Capital, a venture-capital firm that spotted the trend towards smart grids much earlier than better-known Silicon Valley competitors.

The main task of a metering system is to get information reliably into and out of meters—for example, how much power is being used, when and at what price. In Europe, this is mostly done by using power lines to communicate. But in America this would be too costly. The grid's architecture does not allow it to be turned into a data network easily. Using a public mobile network would also be hard. A meter cannot move to get better reception, for instance. The best approach is to use wireless mesh networks, in which data are handed from one meter to the next.

Such networks, which automatically reconfigure themselves when new meters are added, are at the core of the wares sold by Silver Spring Networks and Trilliant Networks, both based in Silicon Valley. Yet as well as providing the communications infrastructure of a smart grid, they also want to offer its software foundation. So far Silver Spring is the more successful of the two, having several American utilities on its customer list, PG&E among them. But Cisco is likely to enter this market, probably through acquisition.

For applications that run on smart grids, it is still early days. EnerNOC gives a hint of things to come. The speciality of this American firm, whose share price has more than quadrupled in the past 12 months despite the crisis, is demand response. It promises utilities to supply them if they need additional power and is paid as if it were keeping physical plants ready. In fact it has agreements with many firms, which it pays for the privilege of being allowed to shut down their non-essential gear if need be, thus freeing up capacity. As of June 2,400 customers, from steel plants to grocery stores, had signed up. They represent 3,150MW, the output of about 30 peak-power plants. But EnerNOC also wants to use the equipment it has installed and the data it collects to offer something called "continuous commissioning": making sure that big buildings, for instance, do not start to waste energy.

The other two technology stacks of a smart grid are more straightforward, but no less promising. One is all the technology a utility needs to manage the usage data, combine it with other information and set rates depending on demand. The leading start-up in this area is eMeter, from Silicon Valley, but Oracle, a database giant, offers similar software. IBM helps utilities connect their disparate systems, build applications for smart grids and analyse the huge amount of data they produce.

The third stack is the "home area network" (HAN)—industry-speak for all the smart-grid technology in the home, behind the meter. There is general agreement that it will include things such as wireless displays that show the household's power consumption at that instant, thermostats that are connected to the meter and smart appliances that can be switched on and off remotely. The big question is how all

these devices will be connected and controlled. Will the HAN be dedicated to regulating electricity consumptions, for instance, or will it also control home security or stream music through the rooms?

More than three dozen firms are peddling products. One is Control4, based in Salt Lake City. Just like Silver Spring, it aims to provide the dominant underlying software in its part of the smart grid. The start-up's devices allow consumers to control almost everything in a house that runs on electricity. A Silicon Valley rival, iControl, which recently raised $23m from venture-capital firms, comes at the HAN from a different direction. Its gear—cameras, sensors, wireless hubs—is mainly used to keep burglars out, but can also be put to work managing energy consumption.

Some technology heavyweights also want a piece of the pie. Cisco is likely to enter this market too. It already offers a line of wireless consumer-electronics and recently bought a start-up that has developed a device called Mediator, a central hub to optimise the energy consumption of big buildings. Entering the territory of start-ups like GridPoint and Tendril, Google and Microsoft have launched web-based services, called PowerMeter and Hohm respectively, that allow households to track their power usage—and, at some point, their operators to sell more advertising.

Given the infantry of start-ups and the artillery of corporate giants, you might think it cannot be long before smart grids are widely deployed, at least in the rich world. Alas, things are more complicated, for three main reasons. The first of these is that the technology is not ready yet. Granted, most of it exists in some form (with the notable exception of ways to store energy efficiently when demand is low). But many products are not widely available or still need honing. Smart grids are also said to be vulnerable to cyber criminals. At a recent conference, a security consultant showed how a large number of meters could be hacked and shut down.

Getty Images

To be switched on after bedtime

What is more, many standards have yet to emerge and the technology is still in flux. Understandably, utilities are hesitant to make big bets on products that could soon be obsolete. Before settling on Silver Spring, PG&E had picked a different metering infrastructure, which turned out to be too limited for many applications. It took some time to convince regulators to approve the additional investment, which has driven the cost of the project from $1.7 billion to nearly $2.2 billion.

This case points to the second obstacle: politics. Power grids have lots of interest groups, from utilities to consumers. Mark Spelman, Accenture's global head of strategy and an author of the joint report with the WEF, says sharing costs and benefits will be the subject of difficult negotiations.

Moreover, regulators are often still stuck in the era of the dumb grid. In America, states' public utility commissions do not allow much of the benefits of a smart grid, such as more efficient power distribution and lower carbon emissions, to go to a utility's bottom line. Nor does it help the business case for such an investment, that smart grids by definition reduce demand—and thereby revenues and ultimately profits. Only a few states, such as California, have decoupled both, making utilities no longer concerned about selling less power. The risk, says Adam Grosser of Foundation Capital, is that many utilities will go only halfway, and will not build a complete smart grid that reaches into the home.

Consumers in control

Third, no one can be sure how consumers will respond. Some studies are encouraging. One is a survey by IBM, of 1,900 people from six countries, which concluded that consumers would become more active in the next five years, as they have in media and entertainment. In some countries "passive ratepayers" are already outnumbered by "energy stalwarts" seeking more information and control, says Michael Valocchi, one of the study's authors.

Yet where variable rates have been introduced, they have not always been a success. When they were tried in Seattle a few years ago, most suburbanites liked the idea at first. They duly resisted turning on their dishwashers and so on until 9pm, the magic moment at which the local utility, Puget Sound Energy (PSE), started to charge less. But the mood quickly soured when it turned out that many households on the "time of use" rate plan actually paid more than ordinary ones. Consumers quit the programme in droves. In November 2002, only 18 months after it was introduced, PSE cancelled it with the backing of regulators.

To avoid a repeat, utilities and regulators in many states prefer not to touch dynamic pricing. The resistance to it is likely to stiffen as more such schemes are introduced. Consumer advocates will have understandable concerns—some consumers may find the change hard to cope with. Others will portray smart grids and dynamic pricing as evil government tools to spy on citizens and tax them. Still, unless rates are linked to the level of demand, much of the benefit of smart grids will fail to materialise, says Mr Faruqui of the Brattle Group. He estimates that dynamic pricing accounts for more than $45 billion of the $227 billion of savings on offer. To avoid a backlash, he says, utilities and their regulators have to move slowly.

That does not mean that smart grids will never be widespread. But just like other new technologies, they will first go through what Gartner, a market-research firm, calls the "hype cycle". After a peak of inflated expectations, there comes a "trough of disillusionment" before the technology reaches the "slope of enlightenment". And perhaps more than with other technologies, how steep this slope turns out to be will largely depend on what people, from politicians to business leaders to consumers, make of it.

To hear an audio interview on smart grids, go to economist.com/audiovideo/business

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