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## Through the Furnace – The Transformation of Energy Trading

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*Energy markets are experiencing a period of unprecedented upheaval. Deregulation is driving competition and trading into previous monopoly domains, leading to a fundamental redistribution of risk from end-consumers to market participants. Recent re-assessment of these risks has resulted in an industry-wide credit crunch, significantly impacting share values and market liquidity, and forcing a renewed focus on risk management in all its guises. At the same time, e-commerce is changing the way businesses interact, producing a dramatic shift to online venues, and re-defining the roles of trade intermediaries. Finally, growing awareness and concern regarding the environment is leading to the emergence of new markets, and an increasing interdependence between commodities. Collectively, this trinity of forces is transforming the trading of energy, and the marketplaces which provide the essential forums for this trade.*

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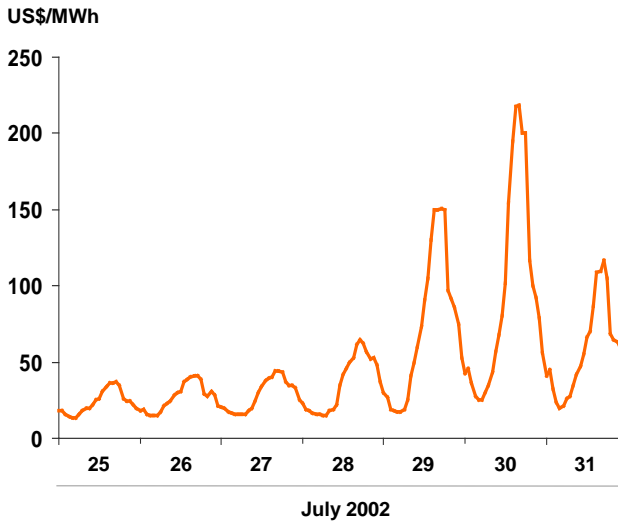
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## Commoditisation and the Growth of Derivatives

### *Derivatives as Risk Management Instruments*

The price of energy purchased ‘spot’ can be highly volatile, being heavily influenced by near-term factors such as weather. This volatility has the potential to expose energy traders to significant ‘market risk’.

**Day-Ahead Hourly Electricity Prices  
PJM Western Hub, USA, July 25-31 2002**



*“We were wrong. We should have hedged. I wish to hell we had hedged.”*

Stephen Baum,  
Chairman and  
CEO, Sempra

Commenting on Sempra’s  
Californian electricity trading.

Source: Dow Jones News Wire,  
Oct. 11, 2000

As markets mature they evolve mechanisms for managing this risk. Physical storage is one such mechanism, although limited by storage capacity (which in the case of electricity is not commercially significant). Derivatives provide the most effective mechanism for managing market risk, allowing traders to ‘hedge’ their spot exposures by locking in price and quantity for energy to be delivered at a future date.

Hedging should be an essential component of the trading strategy for any organisation engaged in the purchase or sale of physical commodities. The level of hedging employed is dictated by an organisation’s appetite for risk – representing the balance between certainty, versus potentially greater profits, or losses. Events in the Californian electricity market during 2000 demonstrate the consequences of getting this balance wrong.

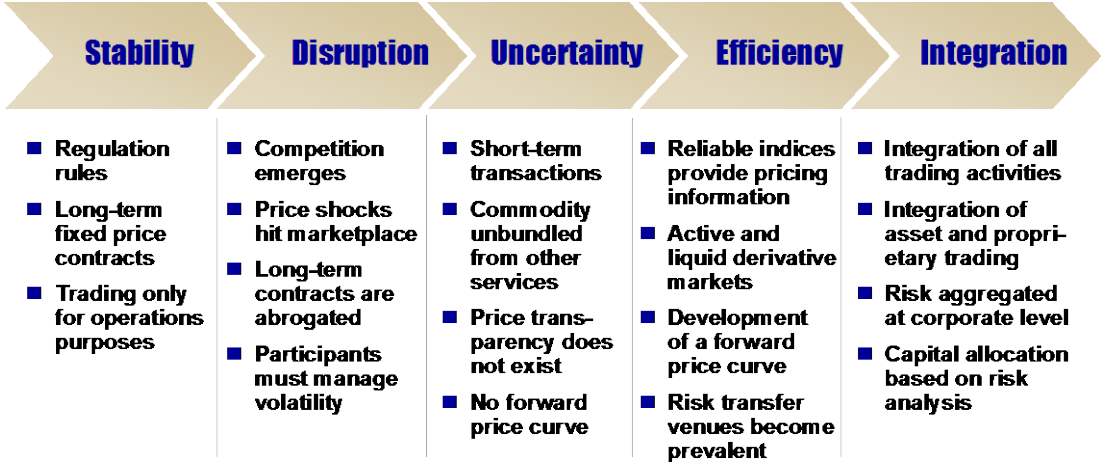
The use of derivatives, for both hedging and speculation, continues to increase dramatically. Between 1989 and 1999 the growth rate for energy derivatives in the United States was 4075%<sup>1</sup>. This strong growth trend can be expected to continue, driven by ongoing deregulation, and periodically reinforced by salutary lessons such as California.

### *Commoditisation*

For reasons of both efficiency and commercial convenience, trading becomes increasingly standardised as energy markets mature – with contracts evolving from customised long-term arrangements to discrete instruments with standard terms and conditions.

<sup>1</sup> United States General Accounting Office Report to Congressional Requesters: Issues Related to the Regulation of Electronic Trading Systems, 1999.

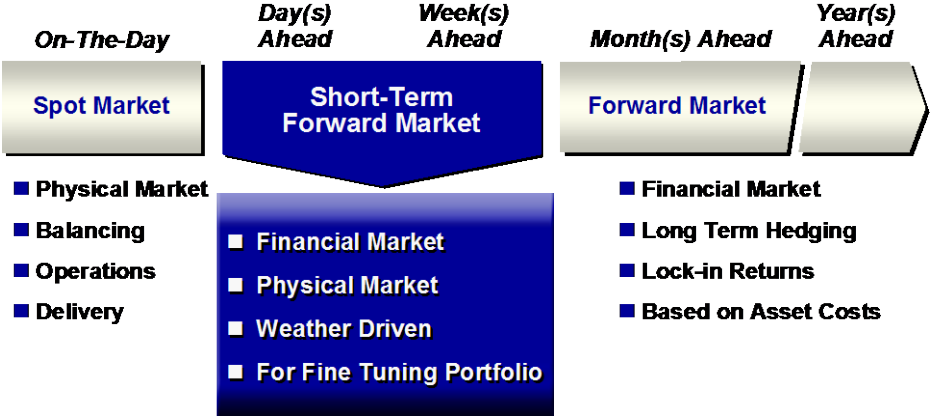
The advent of common product definitions is a key step in the commoditisation process, allowing trading to be simplified to two variables – price and quantity. The fungible nature of these products – where any one unit of the underlying commodity is interchangeable with any other – makes it far easier to enter and exit a trade, encouraging the transition to liquid markets, with trade velocities representing significant multiples of the underlying physical volume.



Currently, the state of energy market commoditisation varies significantly by commodity and geography, as a direct function of market maturity. Over the next few years this will become more uniform as the commoditisation process accelerates – driven by ongoing global deregulation and e-commerce, which together are making the markets for the trade of these commodities more accessible.

*Short-Term Forward Trading – A New Growth Area*

An important area where standard products are now emerging, and trading growth can be expected, is that of short-term forward trading. Traditionally, forward contracting has occurred in the medium to long-term – one month and out – generally adequate for commodities such as crude oil. In markets such as electricity and natural gas, however, spot market trading occurs far closer to real-time, with price and demand heavily dependant upon near-term factors, particularly weather. This creates a need for short-term forward instruments, such as daily, weekly and rest-of-month contracts, to allow participants who have already hedged their base risk to fine tune any residual exposure due to short-term variations.



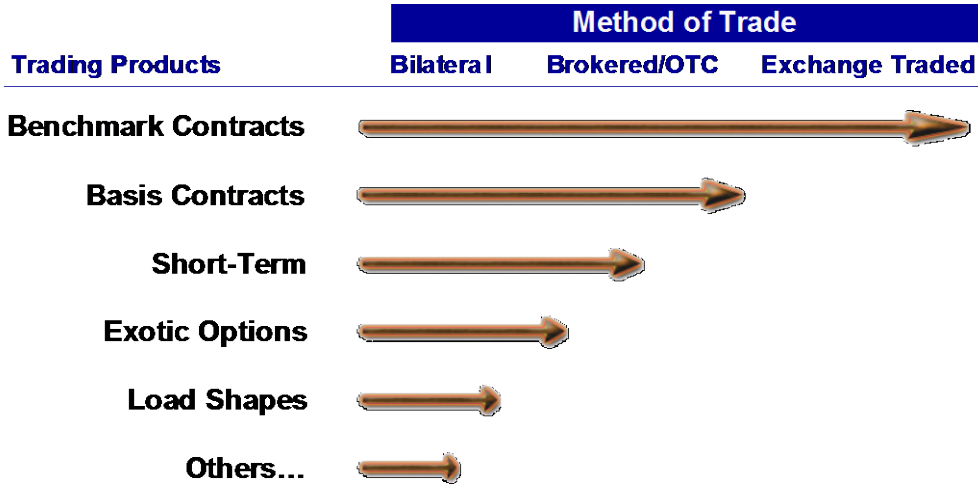
**Redefined Roles of Intermediaries**

Many pundits heralded e-commerce as the harbinger of disintermediation. This has proven to be a fallacy. Intermediaries will tend to emerge whenever a market has a significant number of buyers and sellers, alleviating the inefficiencies inherent in direct bilateral negotiations. This trend, originating from the days of the bazaar, precedes e-commerce by thousands of years and is a fundamental characteristic of markets. Instead, by changing the nature of how transactions are executed, e-commerce is helping to re-shape the roles played by different intermediaries, opening new areas of opportunity for some, and forcing others to evolve.

Participants in wholesale commodity markets have three broad methods of trading available to them:

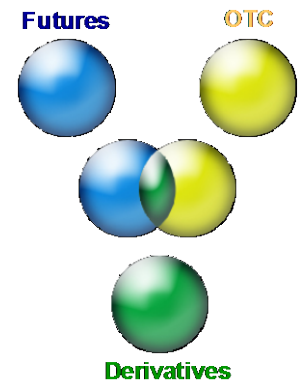
Bilateral	OTC	Exchange-Based
Contracts are negotiated directly between the two contract counter-parties.	Contracts are negotiated via a broker, who helps the two parties find each other and reach agreed terms.	Deals are made through a multilateral exchange, which provides a managed marketplace.
<ul style="list-style-type: none"> <li>• Contracts are often highly customised, and of longer duration.</li> <li>• Trading counter-parties are known to each other.</li> <li>• Pricing is opaque.</li> <li>• Execution is lengthy and expensive.</li> </ul>	<ul style="list-style-type: none"> <li>• Contracts parameters can vary significantly, though customisation is generally allowed.</li> <li>• Anonymity of trading varies widely.</li> <li>• Pricing is opaque.</li> <li>• Execution time and cost can vary significantly.</li> </ul>	<ul style="list-style-type: none"> <li>• Contracts are highly standardised.</li> <li>• Trading is anonymous.</li> <li>• Pricing is transparent.</li> <li>• Execution is quick and cheap.</li> <li>• Processes often exist to safeguard market integrity.</li> </ul>

All three of these methods of trading are present in a robust market. As energy trading matures and becomes increasingly standardised, however, the method-of-trade employed will evolve, with exchange-based trading becoming increasingly prevalent, and OTC and bilateral trading finding opportunities in less mature product areas.



When coupled with online trading, which is providing the technology catalyst to accelerate this evolution, a number of specific implications can be predicted, or are already becoming evident.

- Most trading of *standardised* instruments (representing a considerable portion of all current OTC trading) will transition to electronic exchanges<sup>2</sup> in the next 1-2 years.
- A substantial proportion of the OTC trade which does not move to exchanges will also move online – to broker-owned electronic platforms.
- Many OTC brokers will survive and some will thrive. The most successful brokers will focus upon product innovation and management of customer relationships – making their money from structuring deals to meet specific customer needs, and in developing new markets in less commoditised areas.
- The initial success of proprietary electronic platforms, such as Enron Online, will prove to be fleeting, principally a result of speed-to-market. Most electronic trading has already moved to multi-lateral platforms. i.e. exchanges.
- The artificial demarcation line between “swaps” and futures will disappear, resulting in a single derivatives market. The chief distinction between standardised contracts will be whether they are cleared.
- The efficiencies of open-access electronic trading will result in the demise of physical trading floors within 3-4 years. Any intermediaries existing solely to serve this environment, such as floor brokers, will also disappear.
- The virtual nature of the electronic trading floor will allow significantly more contracts to be listed, at very low marginal cost, side-stepping the constraints of the physical trading floor.
- The increased transparency resulting from exchange-based trading will lead to greater execution efficiency and reduced margins, for both traders and exchanges.



## Focus on Counter-Party Credit

### *The Importance of Counter-Party Credit Risk Management*

Market risk is only one element of the risk equation. An area gaining renewed importance is the management of counter-party credit risk.

A lucrative deal on paper is worthless, or worse, if the trader is unable to collect upon it because of counter-party default – as a number of energy companies have found out the hard way in the last couple of years. It would seem, however, that credit risk is one of those areas where many market players have been subject to rapid and severe memory loss – particularly in the US – despite significant defaults in the electricity markets in the Mid-West in 1998, and California in 2000/2001.

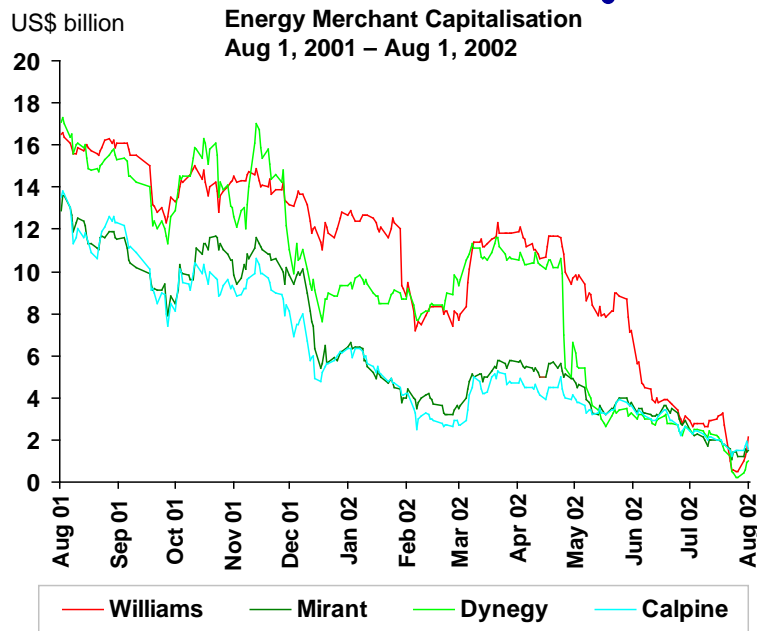
Not long after the collapse of the Californian market, some traders could still be heard to say – “I don’t need to worry about credit. I trade mainly with Enron, and they’re solid as a rock.” These companies were substituting their *belief* that something *wouldn’t* happen for the *risk* that something *might* – a poor risk management strategy.

*“A number of firms experienced serious power trading losses and defaulted contracts, which led to more losses and defaulted contracts in a complicated daisy chain. The cascading effect sucked other people into that vortex—a very expensive vortex.”*

Comments on the 1998 Midwest Electricity Credit Crisis, Derivatives Strategy, August 1998, Vol. 3, No. 8.

<sup>2</sup> Many of these platforms are erroneously referred to as “OTC Exchanges” – confusing the underlying products with the way they have historically been traded. The term “OTC Exchange” is an oxymoron.

The pendulum has now begun to swing in the other direction. Credit rating agencies, concerned about credit exposures, have moved to downgrade energy merchants' credit ratings, warning that "A negative credit event... resulting in even a modest rating downgrade – can trigger a significant call on cash."<sup>3</sup> This is forcing many to scale back their trading operations and/or search for partners with stronger balance sheets. The equities markets have also been extracting their toll, as seen in the chart below.



*“Moody’s believes that energy trading, as currently configured, may lack investment grade characteristics... We believe that a fundamental restructuring will need to occur in the near term for this sector to regain investor confidence.”*

Moody’s View on Energy Merchants, Moody’s Investors Service, May 2002.

Improving counter-party credit risk management is essential to bringing the energy industry onto a more secure credit footing, and restoring investor confidence.

### *Resurgence of the Clearing House*

Managing credit risk on a bilateral basis is complicated and inefficient:

- Assessment of risk is based on limited information. e.g. a trader generally has no knowledge of other positions their counter-party might have.
- Credit risk must be separately assessed and managed for each counter-party, requiring substantial resources, replicated across each trading house.
- Significant capital can be tied up to support trading – assuming adequate provision is made for counter-party default – particularly when contracts cannot be netted.

Credit derivatives have been suggested as one potential solution, however they only address the last of these points, and in doing so, introduce secondary credit risk issues. i.e. that the counter-party to the credit derivative defaults.

Clearing provides a far superior alternative, grouping together a number of processes for efficient centralised management of counter-party credit risk, including:

- novation of contracts to a Clearing House, which acts as central counter-party to all trades;
- levying of performance bond (initial margin) as a financial trade guarantee, based upon contract volatility and *net* position;

<sup>3</sup> “Moody’s View on Energy Merchants”, Moody’s Investors Service, May 2002.

- accrual of variation margin (up or down) due to price movement, based upon daily “mark-to-market” of positions.

Long used by futures markets, clearing allows market participants to trade against any other registered counter-party, with the clearing house guaranteeing every trade. When managed well this process is highly robust. For example, in its 130 year history the New York Mercantile Exchange (NYMEX) has not experienced a single default at the clearing house. This provides market participants with significant confidence in the integrity of the marketplace. Clearing also provides a number of other advantages:

- In a world of imperfect information, the clearing house – as an independent party sitting at the centre of the market – has a far better view of trading activity and other information than an individual trader. This places it in a much better position to assess and manage credit risk.
- The centralisation of counter-party credit management reduces the resource requirements on individual participants. Besides saving significant costs, this also facilitates the participation of smaller participants, such as market locals, which serves to aid liquidity.
- Capital is deployed more effectively. Performance bond requirements, as well as being less than the capital requirements to support uncleared contracts, are assessed only on net position, freeing up capital for use elsewhere. The use of cross-margining, allowing performance bond requirements for complementary products to be offset, further enhances these cash flow benefits.

*“Our clearing house, and its integrity, is one of the key foundations upon which the Exchange is built.”*

Neal Wolkoff,  
Executive VP & COO,  
NYMEX

The demand for clearing services is already on the rise, and will increase dramatically in the next one to two years – taking in a far wider range of trading activity than traditional futures markets. A number of businesses are already moving to meet this demand (the table below provides a non-exhaustive list).

Clearing Provider	Energy Commodities	Launch	
		On-Exchange	Off-Exchange
Clearing Bank Hanover	Electricity	-	2002*
Energy Clear	Natural Gas, Electricity	-	2002*
European Energy Exchange	Electricity	2002	2002
Intercontinental Exchange (ICE) – via LCH and Board of Trade Clearing Corp. (BOTCC)	Crude Oil, Refined Products, Natural Gas, Electricity	2002	2002
International Petroleum Exchange (owned by ICE) – via London Clearing House (LCH)	Crude Oil, Refined Products, Natural Gas, Electricity	1981	-
New York Mercantile Exchange (NYMEX)	Crude Oil, Refined Products, Natural Gas, Electricity, Coal	1978	2002
Nord Pool – via NOS	Electricity	1996	1997
Powernext – via Clearnet	Electricity	2003*	2002/2003*
UKPX	Electricity, Natural Gas	2000	2002

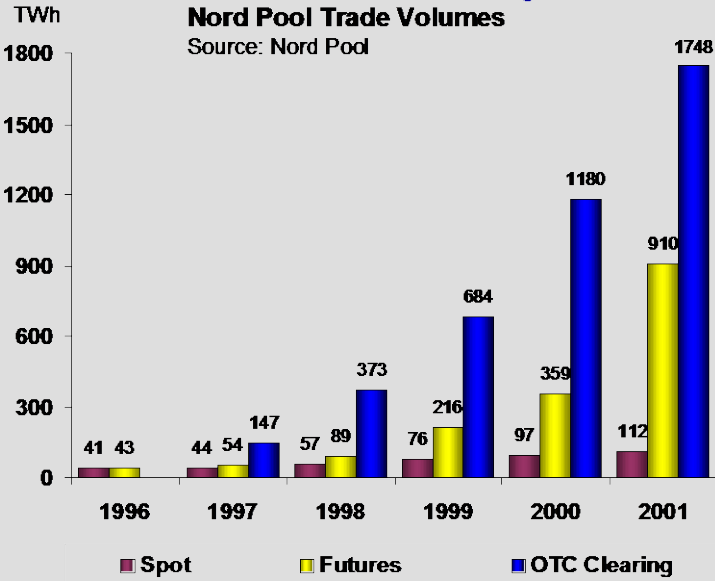
One of the most interesting trends is the move to clear trades executed off-exchange – also referred to as ‘OTC Clearing’. This defies the long standing practice of clearing only being provided for trades executed on a well-organised futures exchange. While the phenomenon of OTC clearing is relatively new, experience to date indicates that it serves to encourage liquidity growth in both the OTC and exchange-traded markets. In the few markets to which it has currently been applied, there can be no doubt of its success.

A key question, to which only time will provide the answer, is whether OTC clearing is an end in itself, or an intermediate step in the product development life-cycle. As an individual product matures, is OTC clearing a step along the way, speeding its evolution to mature, liquid exchange-based trading, or does it herald a greater emphasis on off-exchange trade execution?

### Nord Pool, Electricity and OTC Clearing

Nord Pool operates the spot (day-ahead hourly) market and futures market for electricity in the Nordic region – encompassing Norway, Sweden, Finland and Denmark. It is the world’s most successful electricity derivatives market. Amidst failures experienced elsewhere, Nord Pool provides positive proof that organised electricity derivatives markets can work (see graph below).

OTC Clearing has played a key role in Nord Pool’s success, encouraging off-exchange trading to develop and mature, which in turn has driven growth in both the spot and futures markets. Liquidity has grown year-over-year, with notional trade now reaching a multiple of five (5) times physical for OTC Clearing and 2.5 for futures (based on an underlying consumption of ~350 TWh/year). These are strong multiples for any commodity market – with continued growth expected.





## Continued Growth of Online Trading

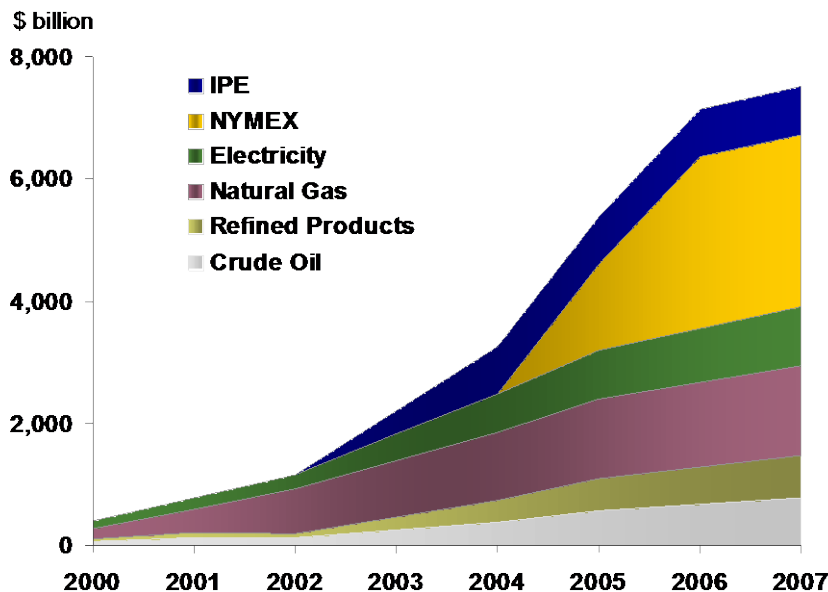
The low friction trading environment provided by the internet, coupled with ongoing global deregulation and a long-standing trend towards electronic marketplaces, is driving continued growth of online energy trading – despite the bursting of the dot-com bubble.

Few would have predicted the rate at which online energy markets have grown. The notional value of online energy trading in the year 2000 dwarfed all expectations, topping over \$350 billion. In 2001 it was almost \$800 billion. This is just the beginning.

Research by Accenture, updated in July 2002, indicates that by the end of 2007 global online energy trading will reach \$7.5 trillion in notional value. This growth prediction is based upon a number of estimating assumptions:

- The size of the energy trading market as whole will continue to grow in the medium-term, though with a dip in the short-term (2002-2003) due to credit issues.
- Although overall trade volumes may be down in some commodities, the percentage of these markets traded online will continue to increase.
- All exchange-based trading will transition online. This includes trade currently conducted on NYMEX and IPE, which alone represented \$3.1 trillion in 2001
- Of the trade currently conducted over-the-counter, some will transition to online exchange platforms, such as ICE, while yet more will move to online broker-based platforms such as GFINet and SpectronLive.

**Notional Value of Online Energy Trading**  
Accenture Estimates

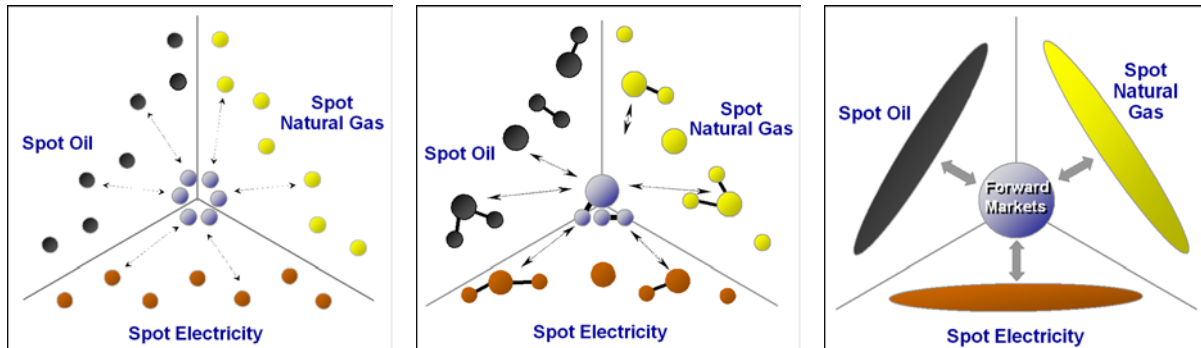


This rapid expansion of online trading was initially accompanied by a corresponding growth in the number and breadth of online energy marketplaces. In June 2000, a less-than-comprehensive search identified over sixty of them. However, the dynamics of marketplaces differ greatly from the dynamics of the underlying trade they support. As a result, while online trading flourishes, the prognosis for most online energy marketplaces is dire. As many start-ups have learnt to their chagrin, trade execution is not the key to a marketplace's success – it is simply the price of entry.

## Marketplace Consolidation

### Consolidation of Order Flow

Liquidity begets liquidity. Participants trade on marketplaces which offer good liquidity, leading to increased trading volumes, which in turn encourages even more participants to trade. A classic network effect, “consolidation of order flow” equates directly to a consolidation of marketplaces. This trend is further encouraged by the economies of scale resulting from electronic trading, where an arithmetic increase in costs can support geometric growth in volumes. Ironically e-commerce, the technological paradigm shift that encouraged the initial proliferation of online marketplaces, will be an agent in the demise of many.



The form consolidation takes will differ for cash (spot) and derivative (forward) marketplaces:

- Derivative Markets: will tend to consolidate by both commodity and geography. The key capabilities required to operate a derivative market do not differ greatly by commodity or geography. e.g. the trading and clearing of US Natural Gas and North Sea Crude work much the same way. As a result, consolidation of forward marketplaces both by commodity and geography can produce significant synergies.
- Cash (Spot) Markets: will tend to consolidate across contiguous geographic areas, within a given commodity. e.g. Nordic electricity. Spot markets are intrinsically linked to the mechanics of transportation, which differ significantly across energy commodities. As a result, consolidation of spot markets across commodity would produce few synergies. Expansion into new geographies, however, can leverage most of a marketplace’s existing skills and assets – particularly when across contiguous geographic regions, with interconnected transportation.

### The Emergence of Mega-Exchanges

Energy marketplace consolidation will lead to progressively fewer, and larger, exchanges. Amongst spot markets this evolution will take considerable time, eventually resulting in a number of supra-regional markets.

Derivative market consolidation will occur more rapidly, and be far more extensive. Most marketplaces for energy derivatives will either merge or be driven out of business by competitive pressures. Already, many high-profile dot-com energy platforms have folded, or retreated into other business areas, such as voice-brokerage and software sales. Eventually this trend will result in a small number of large, international “mega-exchanges” – possibly only 2 or 3 – providing a focus for market liquidity.

*“The International Petroleum Exchange said it has agreed to a one-for-one share merger offer from the Intercontinental Exchange...IPE Chairman Bob Reid said he anticipates that the exchange’s ‘open outcry’ floor trading will eventually close...”*

Dow Jones, April 30, 2001

### **NYMEX and ICE – A Battle to the Death?**

By far the most interesting battle looming amongst energy marketplaces is that between NYMEX and ICE. While there has been no explicit declaration of intent from either side, a number of salvos have already been fired, with the offerings of these businesses steadily converging:



Despite this convergence, there remains one fundamentally important difference between the two marketplaces – ICE/IPE will soon be fully electronic, whereas NYMEX steadfastly holds on to open-outcry. As all other differentiating factors become equal, this could turn the liquidity battle into a referendum on electronic trading. This is not a battle open-outcry is well poised to win, with no successful floor product in energy being launched in over ten years.

So will this be a battle to the death? In the current ‘flight to quality’ both exchanges have been doing very well. Additionally, traders have made it clear that they like competition amongst exchanges, and will support more than one. However, the move electronic is inevitable. Its timing could well determine who comes out on top.

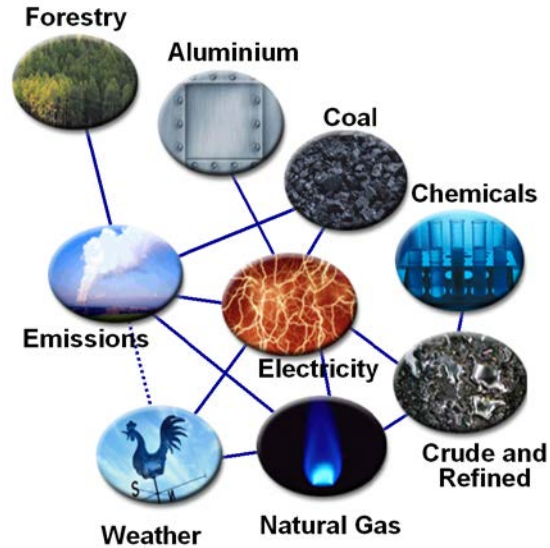
### **Convergence of Influences**

Commodity markets are becoming increasingly inter-dependant, with events in one market substantially influencing outcomes in another. For example, an event in the natural gas market is likely to have a significant impact upon electricity prices. Linkages already exist between markets as diverse as electricity, natural gas, metals, oil, chemicals, coal and weather.

Environmental concerns are leading to the emergence of renewable electricity certificates and greenhouse gas emission permits as new commodity markets – at both a national and international level. These markets will have significant linkages to the energy industry – the world’s largest producer of greenhouse gases (CO<sub>2</sub> and equivalent), and heavily dependant upon carbon-based energy sources. Through this connection a number of linkages will also be created to previously unrelated commodities, such as forest products.

*“A wide range of major European Union (EU) industries will be forced to take part in buying and selling the right to emit carbon dioxide (CO<sub>2</sub>), under a draft EU law seen by Reuters on Friday.  
...the ‘emissions trading’ scheme ... would start in 2005, the draft says.”*

Oil Daily, July 25, 2001.



*“Kaiser Aluminum Profit Soars – The profit included a pre-tax gain of \$228.2 million... from its sales of previously contracted power..., as it ramped down production of aluminum. As electricity costs have risen in the Pacific Northwest, it has become uneconomical for Kaiser to produce aluminum and highly profitable to resell the electricity.”*

Reuters, April 24, 2001.

These linkages will allow hedgers to better manage price risk across the value chain, i.e. across business inputs and outputs, while providing speculators with additional opportunities for arbitrage across a mixed portfolio. However, they also create added complexity, and pose additional risk, requiring comprehensive risk management across the entire trading portfolio.

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