



Enron Corporation

Managing energy and information

23 May 2000

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Contents

1. Executive summary	1
2. Valuation Results	2
3. Introduction to Enron	4
4. Enron Wholesale Energy	7
5. Enron Energy Services	23
6. Gas Pipelines	28
7. Enron Broadband Services	33
8. Other businesses	43
9. Group level results	46
10. Valuation	49
Appendix 1: Enron wholesale assets	52
Appendix 2: Merchant plant valuation	59
Appendix 3: Global regions	63

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1. Executive summary

Price: May 22, 2000
US \$73.25

Fair Value
US \$76 (+4%)

Market Capitalization
US \$54 Billion

Recommendation
HOLD

NYSE
ENE
 Reuters Code
ENE.N

Index:
 S&P 500
US 1,400.72

Enron is one of the largest and most innovative companies competing in the deregulating energy markets worldwide. It is a market leader in the US and is growing rapidly in Europe, Latin America, and Asia. We believe that its wholesale energy business will continue to grow quickly and remain the primary driver of earnings. We believe 2000 will be a breakout year for Enron's retail energy services business. Enron's broadband communications business is promising and is in the early stages of development. Enron's share price has risen 68% since the beginning of the year, which we attribute largely to its launch of an Internet-based commodity trading platform and enthusiasm over the broadband business. We believe that this stock price movement has brought Enron's shares near their fair value. We are initiating coverage with a HOLD recommendation and a target price of \$76 per share.

Wholesale Energy: large and growing

This business is the firm's largest and is dominated by Enron's energy trading and marketing activities. We forecast continued growth in this business, driven largely by energy marketing operations in North America and Europe. We believe that EnronOnline, its new Internet-based commodity trading platform, will help Enron to increase its wholesale volumes and stay ahead of its competitors. We forecast that EBITDA from this business will grow at a 20% CAGR over the next 5 years. Our DCF value for this business is \$37 per share. We estimate that approximately 80% of this value will come from trading and marketing operations. The balance will come from the operation of physical assets.

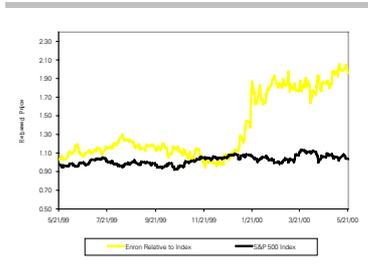
Enron Energy Services: emerging in 2000

Enron Energy Services (EES) helps manage the energy needs of large commercial and industrial customers. EES is a new business that turned profitable in Q4 1999. EES is operating in a large market with little competition. We expect EES to have a breakout year in 2000, with profits above targets announced by Enron at the beginning of the year. After 2000, we forecast that EBITDA will grow at a 5-year CAGR of 50%. Our DCF value for EES is \$11 per share.

Broadband Services: riding the broadband wagon

Enron Broadband Services (EBS) is Enron's communications business that trades bandwidth and delivers broadband content. We project that EBS will contribute strongly to future growth at Enron. After 2000, we forecast that EBITDA will grow at a 5-year CAGR of 300%. Our DCF value for the business is \$16 per share, with approximately 60% coming from bandwidth trading and 40% from content services. Some published estimates value this business at \$30 per share or more. We believe these estimates incorrectly rely upon illustrative guidance provided by Enron, which did not explicitly consider capital expenditure requirements or corporate taxes.

Enron Price Relative



Source: Datastream

TABLE 1: Summary valuation results

Static valuation data	1999	2000E	2001E	2002E	DCF valuation data	\$Millions	Per Share
EPS (Recurring) (\$)	1.10	1.39	1.55	1.90	Unlevered Enterprise Value	55,463	75.76
P/E (x)	66.59	52.87	47.16	38.48	Value of Tax Shields	9,063	12.38
P/E Relative (%)	247	229	235	n/a	Total Enterprise Value	64,526	88.15
CEPS (\$)	2.84	2.27	2.47	3.16	Investments in Affiliates	3,263	4.46
P/CEPS (x)	25.8	32.3	29.6	23.2	Less: Debt & Preferred	(9,994)	(13.65)
EBITDA/Share (\$)	2.98	3.29	3.55	4.47	Less: Value of Minorities	(2,003)	(2.74)
EV/EBITDA (x)	28.6	23.4	21.7	17.2	Fair Value	55,793	76.22
DPS (\$)	0.46	0.62	0.70	0.86	Current Value	53,622	73.25
Dividend Yield (%)	0.6	0.9	1.0	1.2	Upside		4%
Dividend Yield Relative (%)	57	71	68	n/a			

Source: Commerzbank Securities

2. Valuation Results

2.1 Methodology

We forecast cash flows separately for each of Enron's businesses

We value Enron on the basis of its free cash flows. We forecast cash flows separately for each of Enron's businesses. For Enron's wholesale business we forecast cash flows on a project-by-project basis, taking into account the unique characteristics of each project.

For valuation, we use a sum of the parts discounted cash flow approach

We use the Adjusted Present Value (APV) discounted cash flow method to derive the equity value of Enron, using a sum of the parts approach. We include only the cash flows from current businesses and projects currently in place or in construction. We do not include projects that have been announced but are still in the planning stages. We are uncertain whether these projects will actually come on-line and assume, a priori, that these projects neither add nor destroy value.

2.2 Results

Based on our APV valuation, we believe that Enron's common equity is trading near its fair value. Our calculated equity value of \$55.8 billion indicates that Enron is a HOLD with a target price of \$76 per share. This is 4% above the current market price.

TABLE 2: Sum of the parts valuation (\$Millions)

Business Segment	Enterprise Value		Net Debt & Preferred Allocation \$Millions	Minority Interests Valuation \$Millions	Equity in Earnings Valuation \$Millions	Equity Value		
	\$Millions	\$/Share				\$Millions	\$/Share	% of Total
Wholesale Energy	32,664	44.62	(4,910)	(1,343)	921	27,332	37.34	49%
Retail Energy	10,240	13.99	(1,539)	(659)	0	8,041	10.98	14%
Gas Pipelines	5,926	8.10	(500)	0	1,635	7,061	9.65	13%
Corporate & Other	(925)	(1.26)	0	0	708	(217)	(0.30)	0%
Energy Net of Corporate	47,905	65.44	(6,949)	(2,003)	3,263	42,217	57.67	76%
Broadband	13,601	18.58	(2,045)	0	0	11,556	15.79	21%
PGE Sale	3,020	4.13	(1,000)	0	0	2,020	2.76	4%
Total	64,526	88.15	(9,994)	(2,003)	3,263	55,793	76.22	100%

Source: Commerzbank Securities

We believe that Enron's energy business is worth \$42 billion, or \$58 per share, after subtracting the negative value of corporate costs and investing. Based on our discounted cash flow analysis, we believe that Enron's broadband business is worth \$11.6 billion, or \$16 per share. We note that some published estimates of the value of this business exceed \$30 per share. We believe that these estimates incorrectly rely upon illustrative guidance provided by Enron, which did not explicitly take into account capital expenditure requirements or corporate taxes. Large capital expenditures are planned at this business over the next five years, and excluding this planned investment from the analysis significantly overstates value.

2.3 Recent performance

Enron's share price has risen about 100% in the past year and 68% since January 1, 2000

Enron's share price has risen about 100% in the past year and about 68% since January 1, 2000. Much of this movement was in response to the unveiling of two new communications and technology initiatives: EnronOnline, its Internet-based commodity trading portal, and Enron Broadband Services, its communications business. The market reaction to these initiatives has been positive and has reflected the general positive sentiment for technology issues. Since April, the technology laden Nasdaq Composite Index has seen its value decrease by about 35%. Enron's share price has largely retained its gains despite a general decline in the technology valuations.

2.4 Valuation sensitivities

Based on our valuation, Enron's shares are trading at nearly fair value

Based on our valuation, Enron's shares are trading at nearly fair value. The two largest components of our valuation are Enron's wholesale energy business and the new broadband business. Our wholesale energy valuation depends upon growth in energy marketing volumes of around 25% per year over the next five years, part of which will be driven by EnronOnline. Our broadband valuation depends on bandwidth intermediation and content services revenues increasing more than 100-fold over the next five years. There is a risk that some of this growth will not materialise, particularly if competing on-line trading portals emerge or the broadband market develops more slowly than we forecast.

We examine several sensitivities on our base case valuation

We examine several sensitivities on our base case valuation to test the impact of higher or lower growth in Enron's businesses on our target for fundamental value. Under our sensitivity scenarios, we examine the effect of higher and lower growth rates at Enron's wholesale energy business and broadband. Our valuation scenarios provide a range of target prices, from \$70 per share to \$84 per share, for an 8% downside to a 10% upside.

- **Wholesale Energy:** We examine scenarios under which Enron's traded volumes of gas and power grow 10% faster or slower than under our base case. We believe that it is possible for EnronOnline to contribute to volume growth higher than presented under our base case. It is also possible that increased future competition, particularly through competition from other on-line trading portals, could lead to slower volume growth. The low growth scenario subtracts \$4 per share from our target price and the high growth scenario adds \$4 per share.
- **Broadband:** We examine the effect of 25% higher and lower revenue growth throughout our forecast period. The high revenue growth scenario can be taken to represent Enron capturing greater market share, or larger than expected overall market growth. As the broadband market is still in its infancy, the low revenue growth scenario can be taken to represent slower growth in demand or greater than expected competition. The low revenue scenario subtracts \$6 per share from our target price and the high revenue scenario adds \$8 per share.

TABLE 3: Valuation sensitivities (\$/Share)

Sensitivity Scenario	Valuation	Current Price	Absolute Upside/ (Downside)	% Upside/ Downside	Absolute Change from Base	% Change from Base
Low Broadband	70.15	73.25	(3.10)	-4.23%	(6.06)	-7.96%
Low Wholesale	72.21	73.25	(1.04)	-1.42%	(4.01)	-5.26%
Base Case	76.22	73.25	2.97	4.05%	0.00	0.00%
High Wholesale	80.69	73.25	7.44	10.15%	4.47	5.87%
High Broadband	84.15	73.25	10.90	14.89%	7.94	10.42%

Source: Commerzbank Securities

3. Introduction to Enron

Enron is a global energy company with a diverse set of business

Enron is a global energy company with a diverse set of network-based gas, electric, and communications businesses. Enron is developing a portfolio of complementary energy businesses to take advantage of the unprecedented opportunities arising from the deregulation of the electricity industry and the increasing convergence of the gas and electricity markets.

3.1 Strategy

Enron's primary emphasis is on the trading and marketing of energy-related products

Enron's broad strategy is to build a set of complementary energy businesses designed to take advantage of near-term structural and regulatory changes in the gas and electricity markets. Enron's primary emphasis is on the physical and financial trading and marketing of energy-related products such as natural gas and electricity. In markets with a highly developed energy infrastructure, Enron is pursuing a strategy that focuses on energy marketing and market making. Enron supports its energy marketing with limited ownership of physical assets, such as power plants and significant amounts of contractual access to assets. In developing markets, Enron is helping to create the physical infrastructure necessary to facilitate energy trading and marketing and is initially adopting a more asset-intensive strategy.

Enron got its start in the US natural gas industry

Enron got its start in the US natural gas industry, where it was active in nearly every aspect of the gas business. Today Enron continues to own and operate gas pipelines, but has sold off its gas exploration and production (E&P) business. When US gas markets were deregulated in the 1980s Enron quickly focused on the competitive side of the energy industry and became a major wholesale marketer of natural gas. Enron brought its experience with deregulation and its focus on market making to the electricity industry when that industry began to deregulate in the 1990s. Enron is looking to add additional businesses in the energy industry and other network-based industries where the development of liquid traded commodity markets can help eliminate inefficiencies and create profit opportunities.

3.2 Business units

Enron runs four principal businesses. All of Enron's businesses operate in unregulated markets except for its regulated interstate pipeline business. Each of Enron's energy businesses is a market leader on a stand-alone basis.

Principal Businesses

- **Wholesale Energy Business:** is a business that focuses on wholesale energy marketing and includes a diverse portfolio of energy-related assets on five continents. Enron trades and markets large volumes of energy-related products and services. Enron's assets include power plants, gas pipelines, and gas and electric distribution networks.
- **Enron Energy Services:** is a leading retail energy services business in the United States. In this business, Enron helps commercial and light industrial customers lower their commodity expenses, improve the operations of facilities, and identify necessary capital improvements. Enron recently signed its first major energy services contracts in Europe.
- **Enron Broadband Services (EBS):** is Enron's nascent communications business that is working to interconnect fiber-optic networks and improve network efficiency through the introduction of standard bandwidth commodity contracts. EBS also provides content delivery services.
- **Enron Gas Pipelines:** operates one of the largest natural gas pipeline and storage systems in the US.

Enron's wholesale business is the company's largest business segment

3.3 Relative size of businesses

Enron's wholesale business is the company's largest business segment and earned 66% of Enron's 1999 EBIT. Enron's gas pipelines earned 19% of 1999 EBIT. Enron Energy Services had net losses in 1999, but turned positive in Q4 1999. Enron's gas E&P business was spun-off in July 1999. Sierra Pacific Resources agreed in November 1999 to purchase Portland General Electric (PGE) from Enron for \$2 billion in cash plus the assumption of \$1 billion in debt. This transaction is expected to close in Q3 or Q4 2000. Enron Broadband Services was developing in 1999. The business did not make a profit in 1999 and the results were included in the wholesale business. Enron did not report its earnings separately.

TABLE 4: **1999 Reported EBIT by business segment**

1999 EBIT	\$Millions	Percentage
Wholesale Energy	1,317	66%
Gas Pipelines	380	19%
Enron Energy Services	-68	-3%
Exploration & Production	65	3%
Portland General	305	15%
Corporate & Other	-4	0%
Total	1,995	100%

Source: Commerzbank Securities, Enron

3.4 Competitors

Enron is the largest US company in what we term the competitive energy industry

Enron is the largest US company in what we term the **competitive energy industry**. We include in the competitive energy industry electric utilities and natural gas firms that are participating in deregulating energy markets as well as independent power companies. As the gas and power industries continue to deregulate these types of companies are becoming harder to distinguish from one another and are competing directly. Most of these companies retain businesses that still operate in some regulated form (for example, regulated electric wire businesses, gas pipelines, or qualifying facility power projects under long-term contracts). However, increasing percentages of these companies' profits are coming from competitive power and gas businesses.

TABLE 5: **US competitive energy companies**

Company	Original Business	Market Capitalization (\$Billions)
Enron Corporation	Natural gas	54
Duke Energy <DUK, \$62.5, BUY>	Electric utility	23
AES Corporation	Independent power	18
Southern Company <SO, \$26, BUY>	Electric utility	17
Williams Companies	Natural gas	17
Dominion	Electric utility	11
El Paso Energy	Natural gas	11
Dynegy	Natural gas	11
Pacific Gas & Electric	Electric utility	10
TXU Energy	Electric utility	9
Calpine	Independent power	7

Source: Commerzbank Securities

3.5 Market position

Enron has a leading market position in the US and is growing globally

Enron has a leading market position in the US and is growing globally. Enron focused on the competitive portions of the energy industry much earlier than most of its competitors in the US. Today, Enron trades and markets more gas, power, and coal in the US than any other company and continues to create new structured products and energy services offerings. Enron has been quick to identify opportunities, aggressive in pursuing them, and successful at profiting from new initiatives. We believe that Enron's leading position in wholesale energy trading and marketing in the US allows them to learn markets more rapidly and gather more market information than any other energy market participant. The constant learning and market intelligence that Enron acquires as the leading energy trader should enable Enron to maintain its market position. Enron is exporting its business model to Europe, Latin America, and selected markets in the Asia-Pacific region. Enron already has a strong energy marketing presence in Europe, is one of four principal western energy firms operating in South and Central America, and is moving quickly in selected Asian markets.

4. Enron Wholesale Energy

4.1 Overview

Enron's energy business is active worldwide and is led by its operations in North America

Enron's wholesale energy business is active worldwide and is led by its large energy marketing operations in North America. Enron is the largest energy marketer in North America and continues to grow rapidly despite its large size. In Europe, Enron is trying to replicate its North American market position. Enron's wholesale energy business in Europe has developed quickly, yet faces entrenched competitors and unique political and regulatory hurdles. Enron has significant operations in Latin America centred on Brazil and Argentina. The region has been hurt by macroeconomic problems and liquid wholesale energy markets are developing slowly. Enron is also developing businesses in several promising countries in the Asia-Pacific region including India, Australia, South Korea, and Japan.

Enron's wholesale strategy focuses on energy marketing

Enron's wholesale strategy focuses on energy marketing. Enron's wholesale energy business also operates a diverse set of energy-related physical assets located primarily outside the US, including electric power plants, gas pipelines, and electricity and gas distribution companies. These assets generally support Enron's energy marketing activity. In markets with less developed energy infrastructure, Enron often develops and operates energy assets with the intention of creating a liquid market for the marketing of energy products. In developed markets, Enron's wholesale energy business focuses more on energy marketing, with fewer physical assets.

4.2 Business strategy

Enron's strategy is to be the leading market maker for energy-related products

Enron's primary wholesale energy strategy is to become the leading market maker for energy-related products. In regions that are being liberalised or will soon be liberalised, Enron's strategy involves developing a complementary set of energy businesses that will eventually support energy marketing. Enron initially puts in place a network of physical assets and then helps develop liquid trading markets for energy products. This business strategy has several principal steps:

- **Establish initial asset position:** Assets are often necessary initially to underpin trading and marketing operations. An initial asset position helps Enron learn about the market and provides legitimacy with counter-parties. Enron is often also an early participant in the build-out of incomplete energy networks in less developed countries. In these less developed markets Enron pursues a more asset-intensive strategy than in developed markets. In Australia and Japan, which have well-developed energy markets, Enron is entering these markets and pursuing its business without physical assets.
- **Commoditize the market for energy products:** Once Enron has established an asset position and has become an active participant in the local energy market, Enron seeks to develop a competitive market for standardised energy products. Enron helps to develop forward contracts for gas, electricity, coal, and other energy products with standard terms and specifications.
- **Add commodity trading and marketing:** In both developed and developing markets Enron looks to add energy trading and marketing operations and uses its physical assets to underpin these operations.
- **Continue to add products and services:** As liquid markets for tradable energy products develop, Enron continues to add additional commodities and more complex financial packages to its trading and marketing business offerings. Enron also offers asset outsourcing services through its trading and marketing group.

- **Sell-Down assets:** Enron will often sell-down its asset portfolio and concentrate on energy marketing as markets mature and physical assets become less essential to the trading and marketing function. As markets become liquid, Enron's trading and marketing business can often buy contracts for physical capacity, requiring a much smaller commitment of capital to support its physical trading requirements.

4.3 Energy trading and marketing

Restructuring of energy markets has contributed to rapid growth in energy marketing

Ongoing restructuring of energy markets has been contributing to rapid growth in energy trading and marketing. Electricity and natural gas production and supply businesses are transforming into commodity businesses, leading to increases in price volatility, price risk, and credit risk. These changes have created a role for intermediaries to provide exchange-traded, over-the-counter, and structured products to both the supply and demand segments of the energy market. Enron is the largest trader and marketer of natural gas, wholesale power, and related energy products in the US. Energy trading involves acting as an intermediary, or broker, between buyers and sellers of energy commodities. Energy marketing involves the buying and selling of energy commodities and services as a principal, thereby owning a contractual or physical long or short position in an energy commodity or energy assets.

Enron matches buyers and sellers of commodities such as natural gas, electricity, and crude oil. Enron also markets more complex energy services to customers, such as outsourcing the operations of gas storage systems or electric power plants. In addition, Enron's energy marketing group sells risk management and hedging services to customers.

Energy marketing is an extremely complex and risky business

As a consequence of energy marketing activities, Enron's traders can often build commodity positions that require hedging at the corporate level. Such commodity price exposures make energy marketing an extremely complex and risky business. Trading and marketing in general also expose Enron to the risk of default by counter-parties. In order to profit and appropriately manage risk, trading and marketing businesses need to have several critical attributes:

- **Scale and scope:** energy trading and marketing is a competitive and narrow-margin business. Successful firms need the scale and scope to offer a range of products to customers over a variety of regions. Scale and scope also help a trading and marketing firm to balance risk.
- **Superior risk management controls:** energy trading and marketing is a risky business and many firms have incurred large losses on speculative trades and market positions. To be successful, adequate risk management controls are necessary to limit potential losses while providing the opportunity to profit.
- **Execution excellence:** successful trading firms must develop the capability to execute trades accurately and quickly for customers and counter-parties. They must have the systems in place to handle growing volumes and they must know the limits of their trading capacity.
- **Origination of innovative products and services:** trading and marketing energy products is a rapidly evolving and innovative field. Development of new and better techniques and products is critical for maintaining customers and market share. New products and services also help to offset some of the reductions in margins that come with increasing competition.
- **Human capital:** trading and marketing is an information-based business that depends upon attracting and retaining skilled personnel.

Trading and marketing platforms

Enron's wholesale energy trading and marketing is conducted both through employees on traditional trading floors at various Enron trading centres, as well as through an Internet-based trading portal called EnronOnline.

Enron has one of the largest and most complex energy trading floors in the US

Traditional trading floor

Enron has one of the largest and most complex energy trading floors in the US, which is located in Houston, Texas. Enron also has marketing offices in Europe, Australia, and Latin America. These trading floors are staffed with energy traders who trade and market energy-related products and services with numerous counterparties every day. The net positions of all of the traders are centralised for risk management purposes.

Enron launched an on-line trading portal called EnronOnline (EOL) in November 1999

EnronOnline

Enron enhanced its traditional energy marketing business by launching an Internet-based, on-line trading portal called EnronOnline (EOL) in November 1999. Enron is currently the only major energy company operating an on-line trading platform for wholesale energy products and services.

Customers can currently buy and sell over 750 energy products from EOL, with products traded in 13 currencies. Enron is the counter-party for all trades on EOL, which differentiates EOL from bulletin board-type matching systems that are being developed by competitors. Enron estimates that 45% of its energy trading transactions and 33% of its trading volumes have taken place on EOL since its inception. Enron believes that EOL will lead to volume expansion, as its ease of use helps to attract new customers. EOL should also allow Enron to lower its cost profile as on-line volumes grow and the need for physical staff to process simple trades is reduced.

EOL has completed over 107,000 transactions with a gross value of \$43 billion

EOL has already completed over 107,000 transactions with a gross contract value of \$43 billion. EOL currently executes approximately 1,400 transactions per day. This is helping Enron maintain its lead in energy marketing. Moreover, Enron should have at least a one-year head start over competitors who are currently developing alternative on-line trading platforms, which are planned to begin operating at the end of the year.

4.4 Business activities

Enron markets energy products and operates physical assets

Enron performs many business activities in its wholesale energy business. Enron's wholesale energy group engages in the business of selling energy commodities and related services and also manages a collection of energy-related assets and investments.

Commodity sales and services

Enron performs a myriad of functions related to its commodity sales and services operations:

- **Commodity sales:** Enron markets and trades large volumes of natural gas, electricity, coal, NGL, crude oil products, pulp and paper, and emission credits to customers. In developed markets, Enron is generally the market-leader in the sale of wholesale energy commodities.
- **Asset management/outsourcing:** Enron manages the gas and electric assets of customers including small utilities, municipal utilities, and industrial customers.

- **Tolling:** Enron signs tolling arrangements with electric generating facilities. Under tolling arrangements, Enron supplies the fuel for an electric generating facility that is owned by a third party. Enron assumes responsibility for dispatching the unit when hourly electricity prices make it profitable.
- **Risk management:** Enron manages the fuel and electricity market price risks of gas and electricity customers through risk pooling and derivative products.
- **Financial derivatives:** Enron creates tradable financial products such as weather derivatives for its customers.
- **Provides investment capital and finance expertise:** Enron will make investments in energy businesses and provide financial advice to energy market participants. These services are an extension of the other products provided to Enron's energy customers.

Assets and investments

Enron develops and operates a diverse set of energy assets in its wholesale business

Enron develops and operates a diverse set of energy assets in its wholesale business. In both developed and developing markets these activities include:

- **Merchant generation:** Enron develops and operates merchant power plants that sell power directly into competitive spot markets in regions with unregulated wholesale markets for electricity. These plants sell power for prices determined by the market.
- **Contract generation:** Enron develops and operates power plants that sell power under long-term contracts, typically 10 to 20 years in length when signed, in both regulated and unregulated electricity markets. These plants sell power for pre-determined contract prices. In developing countries, Enron occasionally signs build-operate-transfer (BOT) contracts, which call for the plant to be transferred to the local customer after the contract term expires.
- **Gas pipeline operation:** Enron operates gas pipelines that transport natural gas over long distances to wholesale customers. This includes Enron's unregulated intrastate pipelines in the US.

In developing countries Enron manages additional asset-based businesses

In developing areas Enron manages additional businesses, including:

- **Gas LDCs:** Enron operates local distribution companies (LDCs) that deliver natural gas to end-use retail customers.
- **Electric distribution:** Enron operates electric distribution systems that distribute electricity to end-use customers.
- **LNG production and shipping:** Enron operates liquified natural gas (LNG) processing plants and LNG shipping businesses.

CHART 1: Enron International asset locations



Source: Commerzbank Global Equities, Enron

4.5 Competitors

Enron's wholesale energy business is the largest in the US

Enron's wholesale energy business is the largest in the US based on energy marketing volumes. Enron's primary energy marketing competitors in the US are Duke Energy, Utilicorp United (Aquila), Pacific Gas & Electric (PG&E), Southern Company, Reliant, and Dynegy. Enron is also growing its wholesale energy business rapidly in Europe, where it competes primarily with the major incumbent electric utilities.

TABLE 6: Top North American gas and power marketers in 1999

Gas marketers	Bcf/d	Power marketers	TWh
Enron	13.4	Enron	380.5
Duke	10.5	AEP	306.6
Aquila (Utilicorp United)	10.4	Aquila (Utilicorp United)	236.6
Coral	9.8	Southern	217.7
PG&E	9.2	PG&E	204.1
Dynegy	8.8	Avista	135.1
Reliant	7.9	Duke	109.6
Sempra	6.9	Reliant	109.6
El Paso	6.7	PacifiCorp	98.0
TransCanada	6.6	Citizens Power	93.3

Source: The Oil Daily

EnronOnline is the leading on-line trading portal, but will soon face two new competitors

EnronOnline is the leading on-line trading portal, but will soon face two new US-based on-line trading competitors. The first is a consortium of six companies including Duke Energy, Southern Company, American Electric Power, Utilicorp United, El Paso Energy, and Reliant Energy. The second is an on-line trading venture between Dynegy, Inc. and the Williams Companies through an investment in eSpeed. We expect these two new trading platforms to provide strong competition for Enron in the US once they are launched in late 2000. Enron's main competitors are bulletin-board type trading platforms as opposed to Enron's principal-based EOL.

Enron operates one of the largest portfolios of energy assets in Latin America. Its principal competitors include AES Corporation, Duke Energy, and Endesa <ELE, 21, BUY>. Enron is also one of the most active western energy companies in the Asia-Pacific region, where the competitive environment is still developing.

4.6 North America

Enron's largest wholesale energy business is in North America

Enron is a US-based energy company and its largest and most developed wholesale energy business is in North America. Energy markets in North America are well developed and Enron is pursuing its business with minimal asset ownership, focusing primarily on energy marketing.

Market overview

North American markets have several notable attributes:

- **Well-developed infrastructure:** North American gas and electricity markets are well developed and have strong interconnections. Gas and power volumes flow over long distances to end-use customers.
- **History of private ownership:** Utility companies in the US have traditionally been privately owned with a few notable exceptions. This means that liberalisation of the energy sector involves deregulation without the need for privatisation.
- **Wholesale deregulation:** Wholesale markets for both gas and electricity are openly competitive. Liquid and efficient wholesale trading markets exist. The size of the energy wholesale markets will increase through continued deregulation efforts.
- **Retail deregulation:** Deregulation of retail gas and electricity markets is proceeding on a state-by-state basis. States in the Northeast, California, and the upper Midwest are generally the furthest along on implementing retail competition.
- **High near-term commodity prices:** Wholesale prices of electricity have been high and volatile in recent summer peak periods. The threat of deregulation reduced new power plant construction over the last decade. This has effectively lowered reserve margins and current electricity prices are significantly above the costs of new entry. Natural gas prices are also on the rise because the number of gas-producing rigs in US gas producing regions is low by historical standards and demand for natural gas as fuel for new power plants is growing at a rapid pace.
- **Market consolidation:** In response to deregulation of the gas and electricity sectors in the US, a wave of consolidation is taking place in these industries. There have been several mergers between electric companies, as well as between electric and gas companies. In addition, recent asset sales are highlighting a functional consolidation, with electricity market participants beginning to specialise in transmission and distribution, generation, or retail supply.

Strategy

Enron's strategy in North America is to dominate the energy trading market

Enron's strategy in North America is to continue to dominate the wholesale energy trading market, while maintaining a small portfolio of physical assets and occasionally monetizing the value of these assets. Enron is maintaining its leading position in North America by offering innovative products and services to its customers, as well as expanding its on-line energy trading business at EnronOnline. Enron is also opportunistically developing or buying physical assets when it identifies near-term market dislocations that Enron can profit from. Enron is well-positioned to continue to benefit from the structural changes in the gas and power business, particularly the

increase in wholesale gas and electricity volumes that will accompany additional deregulation of energy markets in the US on a state-by-state basis.

Trading and marketing activity

Enron markets more volumes of electricity and gas than any of its competitors

Enron's North American energy trading and marketing unit is the largest single component of its wholesale business. Enron is the largest company in this market and trades and markets more volumes of electricity and gas than any of its competitors.

- **Gas, power, and coal:** Enron is the largest trader and marketer of gas, power, and coal in the US and is a market maker for emission credits.
- **Crude oil:** Enron trades crude oil and has increased its volumes nearly eight-fold between 1997 and 1999 to 5,400 billion Btu equivalent per day (Bbtue/d). Oil is a global product and Enron's reported US volumes include some volumes that are physically traded outside the US.
- **Pulp & paper:** Enron participates in the financial trading of pulp and paper products for the extremely volatile pulp and paper industry. Enron also has a small asset position to underpin its trading activity. 90% of Enron's pulp and paper trading is financial.

TABLE 7: **Physical trading and marketing volumes by Enron in North America (Bbtue/d)**

Product	1996	1997	1998	1999
Gas	8,404	9,917	10,904	13,380
Electricity	1,628	5,220	10,974	10,382
Oil	320	690	2,960	5,407
Liquids	1,187	987	610	753
Total	11,539	16,814	25,448	29,922

Source: Commerzbank Securities, Enron

Asset position

Enron operates a small asset portfolio in North America

Enron does not believe that it needs to maintain a large asset position in North America, because there are currently large, liquid, and active markets for trading wholesale gas and power. Enron's existing assets consist primarily of electric power assets that have been developed in regions where Enron has identified good near-term market opportunities. Enron has ownership positions in 5,230 MW of electric generating plants in North America that are currently operating or in construction. Enron also has some small equity investments in the pulp and paper and steel industries. Enron has made these investments in order to establish an initial asset position in industries where Enron believes that it can participate in or develop tradable markets for commodities.

TABLE 8: **North American power plants operating or in construction**

Region	Gross MW	Owned MW
Northeast	1,037	529
Midwest	1,164	1,164
Southeast	2,226	2,226
West	803	803
Total	5,230	4,722

Source: Commerzbank Securities, Enron

4.7 Europe

Market overview

Enron's European business emphasizes energy marketing

The energy infrastructure in Europe is well developed and the gas and power markets are beginning to be liberalised. Liberalisation of the UK energy sector has proceeded faster than in the US, while liberalisation in Continental Europe has proceeded more slowly. Enron's European business strategy mirrors its US strategy with the primary emphasis on energy marketing. Currently, Enron operates several power plants in Europe and is rapidly developing its energy marketing operations. Principal features of European energy markets include:

- **Well-developed infrastructure:** European gas and electricity markets are well developed and have strong interconnections between regions.
- **History of public ownership:** Utility companies in Europe have traditionally been run by the public sector and liberalisation of the energy sector generally involves privatisations prior to deregulation. Even after privatisations, governments in Europe often own large minority stakes or golden shares in the privatised companies that provide veto power over the board.
- **Local dominance and cross holdings:** Large and entrenched utilities dominate many of the local markets in Europe and create large barriers to entry. Additionally, many utilities have systems of cross-ownership with other electric and gas utilities. These ownership links can stifle competition and slow the development of liquid markets.
- **Varying speed of deregulation:** There are varying degrees of state ownership and divergent liberalisation timetables in Europe. Liberalisation of electricity in Europe was set in motion by the European Union electricity directive. The directive dictated that certain large customers be allowed to select their energy providers beginning in February 1999. Increasing numbers of smaller customers are planned to be given the ability to select their providers, with competition expanding through 2006 when approximately 35% of the market is expected to be open to competition. Individual countries can opt for a more rapid timetable than the directive. Germany and the Nordic countries are examples of countries where markets are opening more quickly than required.
- **Power more competitive:** On the Continent, electricity markets are being liberalised much faster than gas markets. This can create difficulties for power plant developers in securing competitively priced fuel supply, as there is still limited access to competitively priced gas supply and transmission.
- **Wholesale deregulation:** Wholesale markets for both gas and electricity are openly competitive and wholesale trading markets are developing quickly. As liberalisation progresses in Continental Europe the volumes of traded gas and electricity should increase quickly.
- **Falling power prices:** Wholesale prices of electricity have been falling rapidly over the past two years in many European countries, notably in Germany where they had been relatively high.
- **Market consolidation:** As in the US, a major wave of consolidation is occurring in Europe as deregulation moves forward. Germany, in particular, is seeing major consolidation as a result of mergers.

The European Union electricity directive is leading to electricity market liberalisation

- **Transmission access unclear:** The rules for transmission access are not clear and make it difficult to get access to the transmission grid at competitive prices. The EU is expected to clarify these rules shortly.

Trading and marketing activity

Enron is actively marketing energy in three principal regions of Europe

Enron is actively marketing energy in three principal regions of Europe.

1. **United Kingdom:** Enron is one of the largest traders and marketers of gas, electricity, and coal in the UK. Enron also offers weather derivative products.
2. **Nordic:** Enron is the leading power marketing company in the Nordic region and is expanding its position in gas trading.
3. **Continent:** Enron is transacting in every major market and is leading the push to bring liquidity to Continental European wholesale energy markets. Enron is initially focusing on electricity trading and marketing because electricity markets are liberalising at a faster pace than gas markets.

TABLE 9: **Physical trading and marketing volumes by Enron in Europe (Bbtue/d)**

Product	1996	1997	1998	1999
Gas				
UK Gas	289	660	1,243	1,520
Continental Gas	0	0	0	29
Total Gas	289	660	1,243	1,549
Growth		128%	88%	25%
Power				
UK Electricity	17	28	30	99
Nordic Electricity	3	7	20	29
Continental Electricity	0	0	0	202
Total Power	309	697	1,293	1,879
Growth		126%	86%	45%
Total Gas & Power	598	1,357	2,536	3,428
Growth		127%	87%	35%

Source: Commerzbank Securities, Enron

Asset position

Enron operates or is constructing 3,174 MW of electric generating plants in Europe

Enron operates or is constructing 3,174 MW of electric generating plants in Europe. European energy markets are developing quickly and liquid markets for wholesale electricity, in particular, are expanding at a rapid pace. Over the next several years, Enron's European wholesale energy business should start to resemble its North American business, with large energy trading and marketing operations supported by a relatively small amount of physical assets.

Enron may sell-down its physical assets as liquidity develops in European markets

Enron is operating or developing new power plants primarily in the UK, Spain, Italy, Poland, and Turkey. In the UK, Enron is constructing gas-fired power plants to displace existing inefficient generating capacity. These plants were recently on hold as a result of a moratorium on new gas-fired power plant construction. The moratorium is in the process of being lifted. Enron is likely to sell-down its stakes in physical assets in Europe as liquidity develops in European wholesale markets.

TABLE 10: **European power plants operating or in construction**

Country	Gross MW	Owned MW
UK	2,029	1,015
Italy	551	248
Turkey	478	239
Poland	116	113
Total	3,174	1,615

Source: Commerzbank Securities, Enron

4.8 Other international regions

Enron is active in several regions of the world outside of North America and Europe. These regions are relatively small contributors to Enron’s current earnings and are developing more slowly than North America and Europe.

Market overviews

Enron is also active in: Latin America, India, Australia, South Korea, and Japan

Enron has substantial operations in Latin America and India and is building businesses in Australia, South Korea, and Japan. Enron also owns small assets in the Philippines, China, and Guam.

- **Latin America:** Enron has a large presence in Latin America’s electricity markets, with the primary emphasis on Brazil and Argentina. Most countries in South America have or are in the process of fully privatising their energy sectors. South America has ample gas reserves. However, the reserves are largely to the North and West, while the major gas demand regions are to the South and East. One of the most pressing needs in South America is the construction of pipeline capacity to bring gas supply to the demand regions. Future gas demand throughout South America is projected to be high, driven largely by the need for gas to fuel new electric generating capacity. The bulk of existing generating capacity in South America is hydroelectric. The bulk of new capacity in the region is expected to be gas-fired. Latin America does not have liquid energy trading markets.
- **India:** The Indian electricity market is largely a contract generation market as opposed to a market with competitive wholesale power sales. In a contract market, a developer wins the right to build a plant under a long-term power sales agreement. India has a significant shortage of electrical capacity and reliability is poor. Political and regulatory difficulties are limiting the willingness of foreign firms to build generating capacity to meet the demand for new power. Demand for generating capacity is expected to grow by roughly 10,000 MW per year for the foreseeable future. Natural gas demand is outstripping gas supply, forcing the use of more expensive LNG.
- **Australia:** The Australian electricity and gas markets are in the process of deregulating and several states have privatised assets. Prior to 1995, each Australian state operated its own electricity and gas network with little interaction between states. As in the US, the speed of deregulation and privatisation varies from state to state. The Australian state electricity and gas markets are still poorly interconnected and largely isolated. 80% of Australia’s generating capacity is coal-fired and there is currently a surplus of generating capacity. Australia has ample gas reserves and it is expected that the bulk of future electric generating capacity will be gas-fired.

- **South Korea:** South Korea's energy markets are still largely closed although the legislature is considering deregulation legislation. Korea Electric Power Corporation (KEPCO) dominates the electricity market. The company is an integrated utility, is the only company in the transmission and distribution business in South Korea, and generates over 90% of the country's electricity. KEPCO is in the process of divesting some of its 41 GW of generating capacity. South Korea's gas market is more fragmented and foreign firms including Enron have taken equity stakes in several local gas distributors.
- **Japan:** is one of the largest energy markets in the world and is beginning to liberalise. 25% of Japan's power market opened up in March 2000 including 50% of the industrial load. Japan currently has the world's highest power prices (currently about 50% higher than in Germany). Demand for new electric generating capacity has been estimated to be around 5,000 MW annually, without taking into account existing plant retirements.

International strategy

Enron is targeting international regions that are large and are beginning to liberalise.

Enron is targeting international regions that are large and are beginning to liberalise

Latin America

Enron is developing an integrated gas and electricity business in both South America and Central America. Enron has acquired or is in the process of constructing a portfolio of electric and gas assets. With these assets, Enron is helping to create the infrastructure necessary for the development of liquid wholesale energy markets. Enron is developing an energy marketing business in South America and will emphasise energy marketing increasingly as the markets develop, although liquid energy trading markets are currently developing slowly.

Asia-Pacific

Enron's strategy in the Asia-Pacific region is focused on India, Japan, South Korea, and Australia. Enron believes that these markets are attractive long-term and is positioning itself to benefit once they open up. Enron believes India is a promising market because of its enormous need for new electric generating capacity and natural gas infrastructure. Enron is currently building power plants under long-term contracts in India and developing natural gas assets to fuel its power plants. Enron has purchased gas distribution assets in Korea. In Australia and Japan, Enron's wholesale business is focusing entirely on energy marketing and is pursuing a business solely with energy marketing personnel and systems.

Trading and marketing activity

Enron has a growing power marketing operation in Australia, which is the Asia-Pacific energy market furthest along in liberalisation. Enron also offers other energy products in Australia and plans to participate in the wholesale gas market in Australia as it develops. Enron is developing a trading and marketing business to leverage its physical assets in South America. The volumes of gas and power currently traded and marketed by Enron in South America are relatively small, because these markets are still developing. The energy markets in South Korea, India, and Japan are in the early stages of liberalisation and Enron is not actively trading energy products.

Enron has a growing power marketing operation in Australia

TABLE 11: Physical trading and marketing volumes by Enron in Asia-Pacific (Bbtue/d)

Product	1996	1997	1998	1999
Australia Power	0	0	1	30
South America Energy	0	0	0	0
Total	0	0	1	30
Growth				3100%

Source: Commerzbank Securities, Enron

Asset position

Enron operates a substantial set of assets in Latin America and India

Enron operates a substantial set of assets in Latin America and India and a small number of additional assets. Enron has ownership interests in 5,077 MW of electric power plants that are in operation or under construction outside North America. Enron also has ownership stakes in nine gas LDCs in Brazil, an LDC holding company in South Korea, and two electric distribution companies in Brazil. Enron owns stakes in five gas pipeline projects and is constructing several additional pipeline projects. Enron operates LNG processing and transport businesses in Venezuela.

TABLE 12: Other international power plants operating or in construction

Country	Gross MW	Owned MW
Brazil	480	268
Guatemala	234	179
Nicaragua	71	36
Panama	355	181
Dominican Republic	514	422
India	2,450	1,795
Philippines	226	168
China	160	160
Guam	80	40
Puerto Rico	507	254
Total	5,077	3,501

Source: Commerzbank Securities, Enron

TABLE 13: Enron's international pipelines in operation (capacity end of 1999)

Name	Country	Capacity (MMcf/d)	Stake	Cost (\$Millions)
Transredes	Argentina	320	25%	137
Bolivia to Brazil	Bolivia to Brazil	1,059	7%	140
TGS	Argentina	1,900	35%	472
Centragas	Columbia	150	50%	95
Promigas	Columbia	410	39%	100

Source: Commerzbank Securities, Enron

TABLE 14: Enron's international distribution companies (1999 volumes)

Name	Country	Volumes	Stake	Cost (\$Millions)
Elektro (electric)	Brazil	10,767 MWh	99%	1,487
Calife (electric)	Brazil	NA	94%	10
CEG-Rio (gas)	Brazil	46 MMcf/d	25%	576
CEG (gas)	Brazil	79 MMcf/d	50%	Included
Gaspart - North (5 LDCs) (gas)	Brazil	125 MMcf/d	42%	ND
Gaspart - South (2 LDCs) (gas)	Brazil	1 MMcf/d	25%	ND
Korean LDCs	S. Korea	NA	50%	308

Source: Commerzbank Securities, Enron

4.9 Forecast methodology

We forecast the earnings from each of Enron's wholesale businesses separately

We forecast the earnings and cash flows from Enron's wholesale energy businesses by examining each business and set of assets separately. We examine the local market conditions where the businesses operate and the unique cost structures and operating profiles of the assets that Enron operates. A more detailed description of our methodology can be found in Appendix 2.

Local market conditions

We examine the unique local market conditions

The profitability of Enron's wholesale energy businesses depends on the local markets for electricity and gas, as well as the general state of the local economy. In our sum of the parts analysis, we consider:

- **Market rules and regulatory structures:** These are unique in each country where Enron operates. We examine the local rules and regulatory structures in each country and forecast the operations of Enron's businesses based on the unique features of the local market. When Enron owns assets that operate under contract we take into account the unique contract terms.
- **Macroeconomic conditions:** These are also different in each country where Enron operates. We examine country-specific interest rates, equity risk premiums, and exchange rates in our analysis. We forecast future exchange rates based on differentials in interest rates between the US and the local market. Enron Corporation generally hedges all of the foreign exchange exposure of its subsidiaries at the corporate level.

Cost structure and margins

We examine the cost structure of Enron's businesses and assets

Profitability also depends on the cost structure of each of Enron's businesses and assets relative to the prevailing local market prices. Maintaining margins enhances profitability at Enron's commodity sales and services business. We examine:

- **Trading and marketing margins:** We examine the historic margins earned by Enron's commodity sales and services business and project future margins based on Enron's ability to create more sophisticated trading products and expand into higher margin energy commodities.
- **Electric generating unit costs:** We examine the cost structure and efficiency of each of Enron's electric generating plants. This is important because the cost of these plants relative to competing generators will determine how often the units will generate and the margins they will earn when they generate. The primary inputs in our analysis are heat rate, fuel costs, variable operating and maintenance costs, and fixed operating and maintenance costs.
- **Gas pipeline costs:** We also examine the cost profile of Enron's gas pipelines, including the variable operating and maintenance costs and the fixed operating and maintenance costs.
- **Gas and electric distribution costs:** We examine the cost structure of Enron's gas and electric distribution companies based on the historic gross margins achieved by these businesses.

We forecast market prices, contract prices, and regulated tariff prices

Price forecasts

We forecast market prices, contract prices, and regulated tariff prices for the energy products and services sold by Enron:

- **Wholesale electricity prices:** For Enron's merchant generating plants, we forecast electricity prices in the local markets. We take into account current prices in the electricity market, project future capacity and energy prices based on the long-run costs of the future marginal generating plant, and examine the construction schedule for new electric generating units in the local market.
- **Contract electricity prices:** For Enron's electric generating plants that operate under contract, we project future contract prices.
- **Gas pipeline tariff prices:** We project average revenues at Enron's pipelines based on local tariff rates, which set caps on the maximum prices that can be charged for pipeline capacity and gas transportation.
- **Distribution tariff prices:** We project average revenues at Enron's gas and electric distribution companies based on local tariff rates, which set the prices that can be charged for electricity and gas delivery.

We forecast physical volumes for each product marketed

Volume estimates

For Enron's commodity sales and services business, we forecast the growth in physical volumes for each of the energy products that Enron trades and markets, by region of operation. To do this, we examine the historical growth in Enron's volumes, the speed of liberalisation in each region, and the relative market size compared to North America.

TABLE 15: 2000-2004 forecast of trading & marketing physical volumes (Bbtue/d)

Product	1999	2000E	2001E	2002E	2003E	2004E
Gas						
North America	13,380	16,424	19,249	22,056	24,778	27,364
UK	1,520	1,859	2,205	2,550	2,883	3,199
Continental Europe	29	87	261	783	1,958	3,915
Other	23	66	148	269	415	563
Total Gas	14,952	18,436	21,864	25,658	30,034	35,041
Growth		23%	19%	17%	17%	17%
Gas Transport	575	575	575	575	575	575
Growth		0%	0%	0%	0%	0%
Power						
North America	10,382	15,054	19,570	25,441	33,073	42,995
UK	99	149	206	266	325	381
Nordic Energy Market	29	43	60	78	95	111
Continental Europe	202	606	1,515	3,030	4,976	7,027
Australia	30	90	208	386	604	828
Latin America	0	1	3	7	12	18
Total Power	10,742	15,943	21,561	29,207	39,086	51,361
Growth		48%	35%	35%	34%	31%
Other Products						
Oil	5,407	6,488	7,588	8,677	9,733	10,736
Liquids	753	930	1,111	1,291	1,466	1,631
Total Other	6,160	7,418	8,699	9,969	11,199	12,367
Growth		20%	17%	15%	12%	10%
Total Physical	32,429	42,372	52,699	65,410	80,893	99,344
Growth		31%	24%	24%	24%	23%

Source: Commerzbank Securities

We also project the sales volumes and output for each of Enron's assets

We also project the sales volumes and output for each of Enron's energy assets. For Enron's power plants we estimate annual generation based on their variable production costs versus local market prices for electrical energy, or based on their contract terms. We estimate throughput volumes for Enron's gas pipelines and gas and electric distribution companies based on local demand growth for the gas and electricity.

4.10 Earnings projections

We forecast EBITDA and equity income for Enron's wholesale business

Based on our market analysis, we forecast EBITDA and equity income for each of Enron's wholesale energy assets and businesses. We forecast that EBITDA increases significantly in 1999 and 2000 as a result of Enron's recent acquisitions and high growth in commodity sales and services volumes in Europe. EBITDA grows at a somewhat slower rate thereafter, as market prices of electricity fall in the US and volume growth slows in Enron's commodity sales and services business.

TABLE 16: 2000-2004 forecast of earnings for wholesale business (\$Millions)

EBITDA	1999	2000E	2001E	2002E	2003E	2004E
Revenues	35,528	57,377	71,301	87,975	108,135	132,064
Growth		61%	24%	23%	23%	22%
Operating Costs						
COGS + SG&A	34,208	55,481	68,985	85,352	105,177	128,741
D&A	294	359	434	462	481	495
Total Operating Costs	34,502	55,840	69,420	85,814	105,658	129,236
Growth		62%	24%	24%	23%	22%
Other Income/(Expense)	54	54	54	54	54	54
EBIT	1,080	1,590	1,935	2,216	2,531	2,882
EBITDA	1,374	1,950	2,369	2,678	3,012	3,377
Growth		42%	22%	13%	12%	12%
Equity in Earnings	237	232	301	316	328	340

Source: Commerzbank Securities

4.11 Capital expenditures

We project capital expenditures for Enron's wholesale energy business

We project capital expenditures for Enron's wholesale energy business based on the recurring maintenance required at existing power plants, gas pipelines, gas and electric distribution companies, and other assets. In our forecasts for 2000 and 2001, we include the cost of completing construction of new domestic and international power plants, which are currently under construction. We do not include capital expenditures for future acquisitions or construction activities in 2002 and after that have not already been announced. Therefore, Enron is likely to spend more in 2002 and after than we project below.

TABLE 17: 2000-2004 forecast of capital expenditures (\$Millions)

	1999	2000E	2001E	2002E	2003E	2004E
Capital Expenditures	1,035	1,640	1,163	302	315	328

Source: Commerzbank Securities

5. Enron Energy Services

5.1 Overview

EES helps to manage the energy needs of commercial and light industrial customers

Enron Energy Services (EES) is Enron's retail energy business. EES helps to manage the energy needs of commercial and light industrial customers. EES is one of Enron's newest businesses, having started operations in 1997, and has recently turned profitable. We expect EES to be one of Enron's fastest growing businesses.

EES manages the energy commodity needs and the energy-related asset infrastructure of its customers. This infrastructure includes boilers, chillers, lighting, heating and air conditioning systems, private substations, and private power plants. EES refers to this infrastructure as the *private utility*. EES generally guarantees customers total energy cost savings of around 8% to 10%.

EES's retail customers are located primarily in the US

EES's retail customers are located primarily in the US and operate businesses in numerous states. Some of these states have retail gas and electricity markets that are regulated and others have retail energy markets that are competitive. In states with regulated retail gas or electricity markets, EES cannot supply gas or power commodities to its customers. However, Enron will represent its customers in negotiations with local utilities and help to negotiate the best tariff rates for gas and power. In states with competitive retail energy markets, EES is able to supply energy commodities directly to its customers. In all states in which its customers operate, EES offers energy services that help its customers to reduce their energy expenditures and optimise their energy usage, regardless of whether or not EES is able to supply the energy commodities directly.

As the US continues to deregulate, EES believes that the retail energy services market will present market opportunities as large as those in the wholesale natural gas and power markets.

5.2 Market opportunity

The energy outsourcing market may have enormous potential

EES believes that the energy outsourcing market offers enormous potential for future profits for several reasons:

- **Large market:** EES estimates that the private utility for commercial and light industrial customers in the United States consists of assets worth \$625 billion. Moreover, EES's target customers currently spend around \$243 billion annually to manage their private utility, including purchasing energy commodities.
- **Huge inefficiencies:** Managing energy needs optimally is not a core competency for most commercial and light industrial customers. The private utility of EES's large commercial and industrial customers is often grossly inefficient and starved of both investment capital and quality managerial talent. In addition, EES's customers are often poorly equipped to manage energy commodity price risks.
- **Little competition:** EES is the largest energy outsourcing firm in the US and has only two other competitors with national reach. In certain regions of the US, EES faces competition from local energy suppliers. EES believes that its national reach and its integrated energy capabilities give it an advantage over these small, regional competitors in signing up national accounts.

5.3 Business activities

Enron Energy Services performs five principal activities

Enron Energy Services performs five principal activities related to managing the private utility of its customers:

- 1. Commodity management:** EES procures gas, electricity, and other energy commodities from wholesale markets and supplies these commodities to its customers. EES can provide its customers with price certainty and can typically offer commodity prices below those of the local utility supplier. EES's commodity management business generally has margins of around 1% to 3%. However, commodity management contracts allow EES to establish relationships with customers. EES hopes that these initial relationships will create future opportunities to sell more profitable energy products and outsourcing services to its customers. More complex energy outsourcing services can have margins of around 8% to 10%. EES's commodity exposures are managed by Enron's wholesale energy trading group.
- 2. Energy information management:** EES can monitor the energy usage patterns of its customers and help them identify opportunities for savings, as well identify any need for new investment in infrastructure. This information management service helps customers to lower their administrative costs while identifying savings opportunities.
- 3. Energy asset management:** EES can directly manage the energy infrastructure assets of its customers, such as on-site generators and fuel storage facilities.
- 4. Facilities management:** EES can directly manage the entire private utility of its customers. EES can bring in best practices learned from around the country and improve performance.
- 5. Financing services:** Finally, EES can provide investment capital to customers for energy efficiency investments.

5.4 Customer Types

EES serves a variety of different customers

EES serves a variety of different commercial and light industrial customers. While these customers are diverse, their underlying energy requirements all involve similar items, such as cooling systems, lighting systems, steam generators, boilers, motors, and compressed air systems. EES often provides services to customers that have multiple, national sites. EES's customers include:

- **Food processing:** Ocean Spray, Tricon, Suiza Foods, and packaged ice companies.
- **Hotels:** Hilton, Hyatt, Simon Real Estate, Excelsior Hotels.
- **Technology Firms:** Applied Materials, GTE, Infomart, Pac Bell, Cisco, Lucent, IBM.
- **Manufacturing:** Polaroid, Owens Corning, Lockheed Martin, World Color, Sonoco.
- **Banking:** Chase, First Interstate, Bank of America.
- **Sporting Facilities:** San Francisco Giants stadium, Enron Field, Cleveland Browns stadium.
- **Government:** GSA facilities, Fort Hamilton, Department of Defense.

Recent Energy Services Contracts

- **Sonoco:** in April 2000, EES signed a 6-year, \$210 million deal with Sonoco to provide and manage the electricity supply at more than 150 manufacturing plants and facilities nationwide, including managing Sonoco's commodity price risk.
- **Chase Manhattan:** in February 2000, EES signed a 10-year, \$750 million deal with Chase Manhattan Corp. to provide energy management services for 860 facilities nationwide. Enron will provide commodity management, bill consolidation, and project management for energy infrastructure upgrades.
- **Simon Property Group:** in October 1999, EES signed a 10-year, \$1.5 billion deal with Simon Property Group, the nation's largest real estate investment trust. Enron will provide and manage all of Simon's commodity requirements at its real estate properties and assist in the design and implementation of energy infrastructure upgrade projects.
- **Suiza Foods:** in July 1999, EES signed a 10-year deal to provide comprehensive energy management services at more than 50 of Suiza's manufacturing facilities in 24 states.

5.5 Acquisitions and affiliations

EES has developed its capabilities through acquisitions and an affiliation

Although EES is fairly new to the private utility management business, EES has quickly created a competitive energy asset management business. EES has developed its energy services capabilities through several acquisitions and a strategic business affiliation.

Acquisitions

Enron Facility Services (EFS): EES has purchased several energy services firms in the past several years and has brought them together to form EFS. EFS is currently active at 17,000 sites and employs 4,500 field employees. Some of the major firms that EES has acquired to create EFS are:

- **Affiliated Building Services** provides facility management services for over 70 million square feet of building space.
- **Limbach Company, Williard Inc., and Harper Mechanical** are firms that provide mechanical and electrical construction services, as well as heating, ventilating, and air conditioning (HVAC) services.
- **The LINC Corporation** is a national network of mechanical contractors that offers comprehensive HVAC services and preventive maintenance programs.

Strategic affiliation

Hartford Steam Boiler: EES has developed a strategic affiliation with Hartford Steam Boiler, which is the leading equipment breakdown insurance company in the US, with a 40% market share. Hartford owns a proprietary database containing performance and service data on three million HVAC systems in the US. Enron has access to this data and to Hartford's 1,700 field-located engineers on a pay-as-needed basis.

5.6 Competitors

EES operates in a growing market with little competition

EES operates in a growing market with little competition. It is the largest retail energy services firm in the US and has only two other competitors that have national reach. EES's two national-level retail energy services competitors are Duke Energy's DukeSolutions subsidiary and AES Corporation's New Energy subsidiary. In certain regions of the US Enron faces competition from local energy suppliers, which are typically subsidiaries of local utilities.

EES recently purchased the energy services contract portfolio of Pacific Gas & Electric (PG&E), which was another national competitor. Enron spent \$85 million to purchase PG&E's retail services contract portfolio, which consists of deals with roughly \$1 billion in total contract value. These contracts are mostly for the supply of energy commodities to customers in California.

5.7 Business drivers

EES's profitability will depend upon four principal business drivers

EES's profitability will depend upon four principal business drivers:

- 1. Signing new customers:** Future profitability will be dependent upon EES's success at signing up new customers. EES estimates that it currently takes 9 to 12 months to negotiate long-term contracts of \$1 billion or larger. As EES's track record and brand recognition grows, this time period may be reduced. EES has also begun to serve customers with operations in Europe. These are primarily EES's US-based customers that have facilities in Europe. EES believes that Europe is a promising market for expansion and that future opportunities to sign new customers will gradually come from companies based in Europe as well. EES expects about 12% of its business to come from Europe in 2000.
- 2. Up-selling new services:** Profitability will be enhanced if EES can add more complex and profitable energy services products and outsourcing to initial low-margin commodity contracts. Complex energy services have margins of around 8% to 10%, while commodity services have margins around 1% to 3%.
- 3. Increasing margins:** Most energy service contracts provide the customer with a fixed level of savings, generally around 10%. EES can increase its profits to the extent it is able to serve the energy requirements of its customers more cheaply than planned for under its contracts.
- 4. Holding down costs:** Overall costs should grow more slowly than revenues in this business, because overhead costs should not increase with new contract sales. To the extent that EES can reduce growth in overhead costs, profitability will be enhanced.

5.8 Forecast assumptions

We forecast earnings for EES using three principal assumptions

We forecast earnings for EES using the following assumptions:

- Revenues:** we forecast that revenues from energy service deals will nearly double in 2000 to nearly \$2.8 billion, as new deals are signed and as revenues from recently signed deals begin to materialise. EES's energy services revenues in the first quarter of 2000 were \$642 million. EES should continue to sign new deals in 2000 that will immediately begin generating revenues and contribute to our revenue target for the year. We project that revenue growth will trend down toward 10% by the end of our forecast period in 2009. By 2009, we project that EES will have around a 10% share of its target market. EES believes that its market share could reach 15%.

- **Gross margins:** we project that gross margins earned on EES's revenues will fall from today's high levels to around 6% by 2009. EES has earned gross margins of 11% to 13% since 1998. These are significantly higher than its estimate of long-term sustainable margins of 4% to 8%. EES has been able to earn higher margins in recent years because competition has been lighter than expected and the level of potential savings at customer facilities has been higher than expected. We believe that EES's current high margins will fall as competition increases.
- **Overhead:** we forecast that overhead costs will grow more slowly than revenues, because EES's energy services network is largely in place. New service contracts generally should not require significant additional overhead expenses. We forecast that overhead expenses including D&A rise to \$240 million in 2000, up 17% from 1999. After 2000, we project that the growth of overhead costs will decrease over time, trending down to the rate of inflation by the end of our forecast period.

5.9 Earnings projections

We project that EES will be profitable in 2000 and will grow rapidly through 2004

Based on our forecast assumptions described above, we forecast aggregate earnings for Enron Energy Services. We project that EES will be profitable in 2000 and will grow rapidly through 2004.

TABLE 18: 2000-2004 forecast of earnings (\$Millions)

EBITDA	1999	2000E	2001E	2002E	2003E	2004E
Revenues	1,518	2,767	4,151	6,226	8,787	11,760
Growth Rate		82.3%	50.0%	50.0%	41.1%	33.8%
Operating Costs						
COGS	1,329	2,421	3,672	5,565	7,927	10,699
D&A	29	35	37	39	41	42
Overhead	236	240	275	307	336	361
Total Operating Costs	1,594	2,696	3,984	5,911	8,303	11,102
Growth Rate		69.1%	47.8%	48.3%	40.5%	33.7%
Other Income	8	8	8	8	8	8
EBIT	(68)	79	174	323	492	666
EBITDA	(39)	114	211	362	532	708
Growth Rate		-392.3%	85.3%	71.4%	47.0%	33.0%

Source: Commerzbank Securities

5.10 Capital expenditure projections

We forecast capital expenditures based on recurring investment requirements

We forecast capital expenditures based on recurring investment requirements at Enron Energy Services.

TABLE 19: 2000-2004 forecast of capital expenditures (\$Millions)

	1999	2000E	2001E	2002E	2003E	2004E
Capital Expenditures	64	47	51	52	53	55

Source: Commerzbank Securities

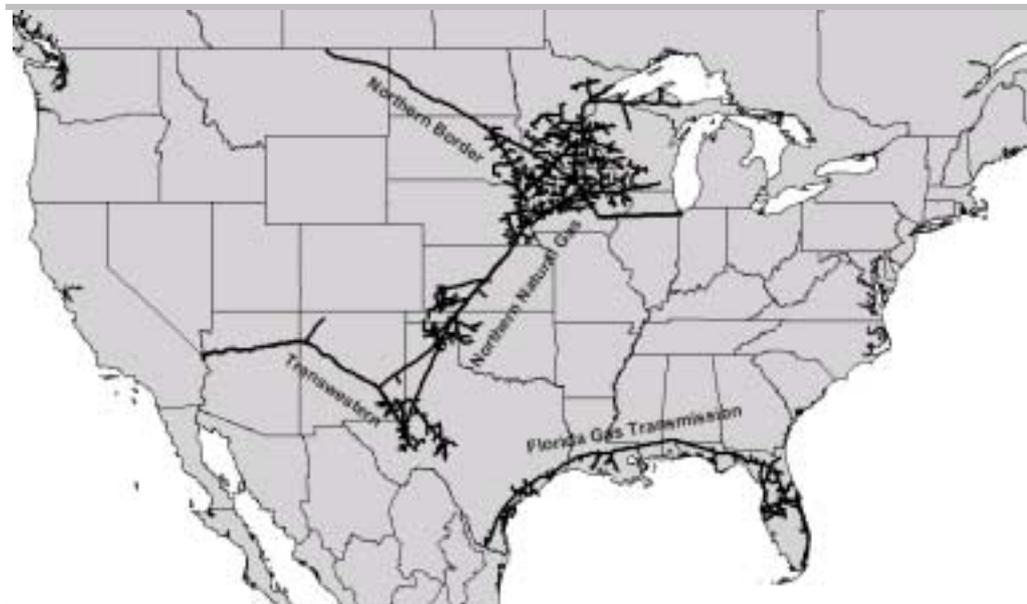
6. Gas Pipelines

6.1 Overview

Enron operates one of the largest natural gas pipeline and storage systems in the US

Enron operates one of the largest natural gas pipeline and storage systems in the US.

CHART 2: **Enron's existing interstate pipelines**



Source: Resource Data International

Enron's gas pipeline group owns two pipelines and has equity interests in two others

Interstate Pipelines

Enron wholly owns two pipelines and has significant ownership interests in two others. Several of these pipelines are currently undergoing expansion projects.

- **Northern Natural Gas (NNG)** is Enron's largest pipeline and transports gas over 16,463 miles and across 10 states from Texas to Minnesota and Michigan.
- **Transwestern** is a 2,487-mile pipeline serving customers in five states from Texas to the California border. Transwestern interconnects with NNG in Texas. Transwestern has bi-directional flow capability, which increases its optionality. Transwestern is currently expanding its capacity into California by 140 MMcf/d.
- **Florida Gas Transmission (FGT)** is a 4,795-mile pipeline serving customers in five states from Texas to Florida. FGT is the only pipeline serving peninsular Florida. Enron owns 50% of the pipeline, while El Paso Energy owns the balance. FGT has added several expansions to add service to additional parts of peninsular Florida. The pipeline is currently completing its Phase IV, 250 MMcf/d expansion, which will be finished by the spring 2001. Phase V and Phase VI are expected to be completed by 2002 and 2003 and will add 400 MMcf/d and 300 MMcf/d respectively.
- **Northern Border** is a 1,214-mile pipeline serving customers in seven states from Montana to Indiana. The pipeline transports Western Canadian gas to the Chicago area gas market. Enron operates the pipeline and owns an 8% stake. Northern Border is currently building an eastern expansion that will provide access to customers in Indiana.

The FGT pipeline is the only pipeline serving peninsular Florida

6.2 Business activities

The gas pipeline group sells transportation and storage services

Enron's natural gas pipeline group provides two broad services to its customers:

- **Gas transportation service:** Enron sells pipeline capacity and transportation service between specified injection and withdrawal points, or by capacity entitlements along a specified route. The majority of Enron's gas transportation revenues come from fixed reservation charges. Most of Enron's gas transportation customers have long term contracts for gas transportation service.
 - **Firm service:** gives the customer guaranteed rights to use a specified amount of transport capacity. Rates for firm service include a fixed monthly reservation component (including return on equity and taxes) and a variable rate based on the quantity of gas transported.
 - **Interruptible service:** allows a customer to utilise capacity subject to day to day pipeline capacity availability. Rates for interruptible service are generally based on what a firm customer would pay per unit of gas transported at a 100% load factor.
- **Gas storage service:** Enron sells access to underground gas storage space (generally depleted gas production fields). Customers may inject or withdraw gas from storage for load balancing purposes. Enron offers both firm and interruptible storage service.

Enron offers firm and interruptible services to its customers

Enron offers gas storage services to its customers

6.3 Customer types

Enron serves a variety of customers including: local gas distribution companies (LDCs), municipalities, wholesale gas marketers, natural gas producers, interstate pipelines, intrastate pipelines, industrial customers, independent power generators, and other end-users. As states open local gas distribution markets to competition, Enron expects to sell relatively more gas to wholesale gas marketers and less to LDCs.

6.4 Competitors

Enron's gas pipeline system is the second largest in the US

Enron operates the second largest natural gas pipeline system in the US based on mileage and transports the third highest amount of gas in the US. Approximately 5,800 miles of Enron's total pipeline mileage are from its two intrastate pipelines, the Houston Pipeline and Louisiana Resources. Enron's gas pipeline group operates these two intrastate pipelines, but their earnings are recorded at Enron's wholesale energy business, because these pipelines are not regulated and are used to support Enron's wholesale commodity sales and services operations.

TABLE 20: **Statistics for major US gas transportation companies**

Company	Pipeline (miles)	Annual Deliveries (Tcf)
El Paso Energy	44,200	6.2
Enron	32,000	3.2
Williams	27,000	5.4
Columbia Gas	16,700	1.2
Duke Energy Gas	11,500	1.5
CMS Energy	10,400	1.6

Source: *Commerzbank Securities*

6.5 Business Drivers

The pipelines have three business drivers: volume growth, regulation, and cost control

Enron's gas pipelines have three principal business drivers: gas volume growth, the regulatory environment, and cost control.

Volume growth

Enron expects to grow its income primarily through expanding the throughput along its system to serve growing demand. Enron is anticipating strong demand for gas in the US, driven in large part by the construction of gas fired electric generating plants. Peak electric generating demand occurs largely in the summer, which has historically been an off-peak period for gas pipelines. Accordingly, added sales to electric generating customers should help to improve Enron's load factor. Enron expects to satisfy the growth in demand for gas in part by expanding its existing projects.

Regulatory environment

Interstate pipelines are regulated by the Federal Energy Regulatory Commission (FERC). The FERC allows Enron to recover the costs of operations and earn a return on invested equity in exchange for providing open access gas transportation service under FERC approved tariffs.

Enron's gas pipelines have allowed returns on equity of 11.5% to 13.9%

- **Allowed returns:** Enron earns returns on equity of approximately 11.5% to 13.9%, which are around the industry average.
- **Stable regulatory situation:** Enron's approved tariff rates and levels of allowed return are stable. Enron has a history of success in working with regulators and customers to develop innovative rate structures that preserve Enron's returns. In response to a large customer turn-back of gas at Transwestern, FERC allowed Enron to share part of the costs of this turn-back with customers, in exchange for contracting rates with customers through 2006. Enron worked with FERC to develop a seasonal rate structure at NNG. The earliest rate case for the pipeline group will be for FGT in 2001. NNG will next have a rate case in 2003 or 2004.

Cost control

The pipeline group can keep profits from cost savings between regulatory rate cases

Enron's pipelines provide service under regulated fixed and variable rate tariffs, which are adjusted infrequently through regulatory proceedings and target a level of allowed returns on equity. Enron has an incentive to reduce costs at these pipelines because it is allowed to retain profits from cost savings initiatives between rate cases. Enron has been able to hold its costs below inflation for the past several years.

6.6 Forecast assumptions

We forecast the earnings from Enron's pipelines based on our expectations of growth in sales volumes, our outlook on Enron's regulatory environment, and our projections of Enron's ability to control costs.

Sales volumes

We forecast that underlying sales volumes will grow at 3.6% annually

We estimate that underlying retail sales volumes will grow by 3.6% annually through the end of our forecast period. This is consistent with growth estimates for gas consumption by the American Gas Association. We believe that the growth in gas demand in the Midwest, California, and Florida will be strong going forward, in large part because of the gas-fired electric generating capacity that is being constructed in these regions. Enron will see higher near-term sales volume growth at its pipelines that are in the process of implementing capacity expansions. Expansions are being completed at Transwestern in 2000, Northern Border in 2001, and at Florida Gas Transmission between 2001 and 2003. Customers already contract for the capacity from these expansion projects.

Expansions are being completed at three pipelines

TABLE 21: 2000-2004 forecast of gas throughput

Throughput (Bbtu/d)	1999	2000E	2001E	2002E	2003E	2004E
Northern Natural Gas	3,820	3,958	4,100	4,248	4,401	4,559
Transwestern	1,462	1,647	1,706	1,768	1,832	1,897
Florida Gas	1,495	1,549	1,819	2,327	2,755	2,855
Northern Border	2,405	2,492	3,167	3,281	3,400	3,522
Total	9,182	9,645	10,792	11,624	12,387	12,833
Growth Rate	4.3%	5.0%	11.9%	7.7%	6.6%	3.6%

Source: Commerzbank Securities

Regulatory rates

We forecast stable future regulated rates at Enron's pipelines

Enron's regulated tariff rates are stable. We project that average tariff rates will stay flat at Enron's pipelines up until the next rate case at each of the pipelines. Following each pipeline's rate case, we forecast that average rates will continue to stay flat in nominal terms at prior levels. Based on our forecasts, we project that Enron's gas pipelines will earn future rates of return between 11.5% and 13.5%.

O&M costs

We project that O&M costs will fall in real terms

We project that Enron's operation and maintenance costs will fall at 1% per year in real terms. We believe that this is conservative compared to its recent performance and is consistent with industry trends.

6.7 Earnings projections

Equity earnings will grow rapidly due to significant market expansion projects

Based on our revenue and cost expectations outlined above, we forecast overall revenues, costs, and EBITDA for Enron's gas pipeline group. EBITDA should grow modestly for Enron's wholly owned pipelines through 2004. Enron's equity earnings from Northern Border and FGT should grow more rapidly, driven primarily by the significant market expansion projects.

TABLE 22: 2000-2004 forecast of earnings (\$Millions)

	1999	2000E	2001E	2002E	2003E	2004E
Revenues	634	667	689	712	736	761
Growth Rate		5.1%	3.4%	3.4%	3.4%	3.4%
Operating Costs						
D&A	66	74	80	87	93	100
Other O&M	272	280	290	300	311	322
Total Operating Costs	338	354	370	387	404	421
Growth Rate		4.8%	4.5%	4.5%	4.4%	4.4%
Other Income	46	46	46	46	46	46
EBIT	342	358	365	372	379	386
EBITDA	408	433	445	458	472	486
Growth Rate		6.0%	2.9%	2.9%	3.0%	3.0%
Equity in Earnings	38	37	43	54	63	65
Growth Rate		-3.6%	18.7%	24.4%	16.6%	3.6%

Source: Commerzbank Securities

6.8 Capital expenditure projections

We forecast capital expenditures for near-term construction and future maintenance

We forecast capital expenditures for Enron's gas pipeline group, based on recurring maintenance requirements and near-term construction projects. These figures include capital expenditures for Enron's consolidated pipelines. Enron does not expect that it will need to make any new equity contributions to its equity interest pipelines in order to complete the planned expansions at these pipelines.

TABLE 23: 2000-2004 forecast of capital expenditures (\$Millions)

	1999	2000E	2001E	2002E	2003E	2004E
Capital Expenditures	207	150	154	158	162	166

Source: Commerzbank Securities

7. Enron Broadband Services

7.1 Overview

EBS is designed to profit from inefficiencies in the broadband market

Enron Broadband Services (EBS) is Enron's nascent communications business, which is designed to profit from inefficiencies in the existing broadband communications market. EBS is creating a tradable commodity market for bandwidth capacity, is helping customers to manage and optimise their use of broadband networks, and is selling value-added broadband delivery services to customers. Enron is trying to change the way the traditional broadband market operates and has developed EBS's broadband strategy to respond to several important features of the existing broadband industry:

- **Growing demand:** Internet usage has increased dramatically over the past several years. This growth in usage is creating large demand for access to high capacity fiber-optic networks to transmit data. Moreover, sophisticated applications that require high capacity, or high bandwidth, transmission at fast speeds over long distances are growing rapidly. Streaming video and audio applications are examples of the data types that require high bandwidth, broadband networks.
- **Falling prices:** The construction of broadband networks in the US and internationally has proceeded rapidly with the growth in demand for access to broadband capacity. In turn, prices for access to broadband networks have been falling. Many market analysts believe that existing broadband supply significantly exceeds current demand and may continue to exceed demand for some time. EBS believes that prices will keep falling, as communications providers continue to add additional broadband capacity.
- **Inefficient, proprietary networks:** Existing broadband networks consist of proprietary networks operated by multiple competitors. These networks are interconnected, but generally only through bilateral pairing arrangements involving two networks and negotiated contracts. Few pooling points exist, where multiple networks are interconnected and the flow of data is optimised and directed across the most efficient, appropriate network route. The existing networks generally utilise proprietary software and hardware for their operations and manage the flow of data across their networks independently. Owners of proprietary broadband networks include AT&T, Qwest, MCI WorldCom, and Williams Communications.
- **Large potential savings and efficiency gains:** Because the existing networks lack interoperability and do not have efficient interconnections involving multiple networks at common pooling points, current broadband networks are operated inefficiently and lack flexible pricing and contract terms. Customers of one network have limited options for re-routing data traffic across alternative networks in a flexible manner, even when other networks are able to transmit the data more cheaply or more quickly. The market today is dominated by long-term, fixed price contracts for broadband access.

Broadband markets have few interconnections and lack flexible pricing

7.2 Strategy

EBS's strategy in the market for high bandwidth has four parts:

- **Establish an initial asset position:** EBS initially focused on building its own broadband network in order to develop an understanding of the broadband market and establish a physical asset position for future market opportunities. EBS has partly developed its network by swapping for capacity along competitors' existing fiber-optic networks. Compared to other broadband network owners, EBS has a relatively small physical network.

EBS is creating pooling points to interconnect multiple carriers' broadband networks

EBS is creating standardized trading contracts for bandwidth capacity

- **Create interconnections:** EBS is developing pooling points where competing carriers' long-distance fiber-optic networks are interconnected with EBS's network and multiple other networks. These pooling points will enable the transfer of data traffic between numerous networks at one common interconnection and should contribute to flexibility and efficiency in network routing. These pooling points should create new opportunities for trading access to broadband capacity and routing data across optimal network routes. At many of the pooling points that EBS is developing, EBS will play a network management role.
- **Commoditize bandwidth:** EBS is creating standardised, tradable contracts for bandwidth capacity and transport. EBS has already created a standard one-month term contract for broadband transportation from New York to Los Angeles with pre-specified quality of service requirements. Additional New York to Los Angeles contracts are available, with prices at a premium or discount to the standard one-month contract that EBS has created. EBS also plans to develop a standard one-month contract for transportation between Washington, DC and San Francisco. EBS believes that the commoditization of bandwidth will lead to the development of a liquid market for bandwidth capacity, with transparent market prices.
- **Add complex services:** As liquidity in broadband trading increases, EBS plans to focus its business strategy on creating innovative products and establishing market share in the network management and applications businesses. This is similar to Enron's wholesale and retail energy strategy.

7.3 Business activities

EBS engages in the following primary business activities:

- **Operating its fiber-optic network:** EBS transmits and routes data over the Enron Intelligent Network, which is EBS's long-distance fiber-optic communications network.
- **Creating and administering pooling points:** EBS is developing pooling point interconnections between multiple, competing long-distance fiber-optic networks. EBS helps deploy the technology that will be needed by carriers to interconnect their networks and also acts as a pooling point administrator at proprietary pooling points, which are run by EBS.
- **Providing complex services:** EBS is selling network management and applications services to businesses, including bandwidth intermediation services and content delivery services.
 - **Bandwidth intermediation:** EBS manages the bandwidth needs of national and global corporations. EBS schedules and provides broadband transportation service, ensures quality of service, provides certainty of pricing, and guarantees the availability of required bandwidth capacity. EBS aggregates portfolios of bandwidth customers and optimises its portfolio of bandwidth demand by trading and swapping access to bandwidth supply. Unlike other bandwidth providers, EBS has flexible access to multiple networks, offers real-time pricing, and can provide flexible, short-term contracts to its customers.
 - **Content Delivery Services:** EBS provides premium broadband content delivery services primarily to Internet-enabled businesses. These services include streaming broadband services and data management services. Examples of streaming broadband services are high quality streaming video delivery and Internet-based video conferencing. Data management services include video file transfer services, data storage services, and archiving services. Unlike competing

EBS manages the bandwidth needs of its customers

EBS delivers reliable, high-quality data content to customers

content delivery providers, EBS owns the communications network over which it transports its content.

7.4 Customer types

- **Bandwidth Intermediation:** The primary customers are Internet Service Providers, competitive local exchange carriers, regional bell operating companies, and telecommunications resellers. Customers also include traditional businesses with multiple Internet-enabled locations, media companies, electronic commerce firms, and technology companies. These customers pay EBS to secure bandwidth capacity and manage their bandwidth needs.
- **Content Delivery:** is currently targeted at financial services and consulting firms, media and entertainment businesses, electronic commerce companies, and technology companies. These customers pay EBS to provide and guarantee high speed, high quality transportation and delivery of electronic content to end-users.

7.5 The Enron Intelligent Network

Enron calls its communications network the Enron Intelligent Network (EIN). EIN consists of a fiber-optic network and a collection of distributed servers. The network utilises proprietary network management software called InterAgent. EIN has several features embedded in its hardware and software platform that distinguish it from competing broadband networks.

EBS operates a 15,000 mile fiber-optic network, utilising pure Internet Protocol technology

Hardware: a long-distance fiber-optic network

The core component of EIN is a 15,000-mile national fiber-optic telecommunications network, based on pure Internet Protocol (IP) technology. The network is connected with local telecommunications networks at points of presence and with multiple third-party long-distance fiber-optic networks at pooling points. The broadband assets of EIN consist of fiber-optic equipment fully-owned by EBS and broadband capacity leased and operated by EBS. EBS does not plan to add significant amounts of new bandwidth capacity to its network.

The EIN also consists of a collection of distributed servers

The second component of EIN’s hardware platform is a collection of distributed servers and routing equipment. EBS is installing distributed servers at the edges of its communications network. These servers act as on- and off-ramps to and from EIN from local communications networks and from interconnected fiber-optic networks. They also provide storage for frequently accessed data content that will be delivered to end-users in local markets. This allows EBS to keep premium delivery content as close to its end-users as possible.

TABLE 24: **The reach of the Enron Intelligent Network**

	1999	2000E
Cities Served	15	45
Installed Points of Presence (Millions)	80	500
Direct Desktops Accessed (Millions)	2.4	25.0
Indirect Desktops Accessed (Millions)	140	215
Fiber Route Miles (Owned)	12,325	15,000
Servers	222	1,500
Pooling Points	3	13

Source: Commerzbank Securities, Enron

The InterAgent software manages the flow of data across broadband networks

Software: InterAgent middleware

The principal component that differentiates EIN from competing fiber-optic networks is a proprietary software platform called InterAgent. InterAgent is a software platform acquired by EBS that finds the most efficient path along the broadband network for data transfer and minimises the number of server connections that are required before the data reaches the end-user. InterAgent manages the flow of data across EBS's own broadband network and is compatible with third-party networks. This compatibility allows EBS to route data efficiently along third-party broadband capacity that is connected to EBS's network at pooling points. InterAgent ensures that the appropriate quality of service will be achieved during data transfer, meters system usage, and allows for usage-based billing.

Differentiating features

EIN has four primary features that differentiate it from competing broadband networks:

- **Uses multiple networks efficiently:** EIN is connected to multiple broadband networks at common pooling points and is designed to find the optimal path for data transfer along the interconnected networks. The proprietary InterAgent software manages the flow of data across the interconnected networks.
- **Lowest-cost route selection:** Through InterAgent, EIN identifies the cheapest route of delivery that will also meet the quality of service needs of the data being transmitted.
- **Usage-based billing:** InterAgent can fully meter usage of bandwidth capacity by customers on a real-time basis and can provide for usage-based billing. This allows for more complex pricing of broadband usage, which is currently priced by EBS's competitors based primarily upon fixed-price, long-term contracts.
- **Pure IP network:** EIN is a pure IP network, which ensures the highest quality for data delivery. Competing carriers do not always offer pure IP. InterAgent ensures that high priority, high bandwidth data will transfer along a purely IP-based network architecture and will avoid low-quality legacy networks.

Distribution partners

EBS's distribution partners allow EBS to co-locate its servers in local markets and establish interconnections with the distribution partners' last-mile distribution networks. These partners include ISPs, regional bell operating companies (RBOCs), and other competitive telecommunications companies, such as:

- **ISPs:** cerbernet (UK), EasyStreet Online Services, Epoch, FirstWorld, GST, HarvardNet, InterNap, NetRail, NorthPoint Communications, OrcoNet, PDQ.net, RMI.NET, Verio, VillageNet, X-Stream.
- **RBOCs:** BellSouth, GTE, US West.
- **Other telecommunications companies:** Electric Lightwave, Level 3, RCN.

How the network works

A customer in New York might demand high bandwidth content, such as a streaming video application, from a content provider in Los Angeles. EIN manages the transportation of this data from the content provider in Los Angeles to the end-user in New York:

Distribution partners allow Enron to co-locate servers and interconnect with local networks

EIN transports data between content providers and end-users

- **Content providers** create electronic content, such as the streaming video application produced in Los Angeles. Content providers include traditional businesses, financial services firms, electronic commerce businesses, and media companies. The content is initially delivered over a short distance to an Internet Service Provider.
- **Internet Service Providers (ISPs)** receive data from content providers and inject this data into the long-distance communications network at points of presence. EBS has partnerships with a number of ISPs that utilise EIN for the transmission of data between local markets.
- **Points of presence (PoPs)** are locations, usually within large cities, where data is transferred from long-distance broadband networks to local distribution networks. ISPs place data onto the long-distance network and take data off of the long-distance network at PoPs.
- **Distributed servers** are located at PoPs and at ISPs and are the physical on- and off-ramps between long-distance broadband networks and local communications networks. Distributed servers, which are at the edges of the broadband network, also provide storage for frequently accessed data content, improving the speed of delivery of data by keeping data close to end-users.
- **Pooling points** are locations where the long-distance fiber-optic networks of multiple, competing broadband owners are interconnected at a central switching point. A pooling point allows data to be switched from one carrier's broadband network to one of several other networks, making it possible for long-distance data transmission to occur over multiple communications backbones. EBS is leading the development of new pooling points, which will be both public and proprietary. EIN will switch data from its own network to competing networks and later back to its own network at pooling points, if this will allow for more efficient, low cost delivery of data.
- **End-user** receives data produced by content providers, which is generally delivered by an ISP. The ISP takes the data off of the long-distance broadband network, from a PoP, and transports it over the last-mile to the end-user via the local communications network. If the ISP has a partnership with a content provider who co-locates distributed servers with the ISP, the ISP will occasionally take stored data right off of a distributed server, for delivery to the end-user.

EBS is creating pooling points to switch data across multiple networks

7.6 Competitors

Bandwidth intermediation

As a market for standardised broadband services is developed EBS expects to face competition in broadband intermediation. The Williams Companies, Dynegy, and El Paso Energy have all announced their interest in developing bandwidth trading and intermediation businesses. Of these competitors, only Williams, through its Williams Communications subsidiary, has a national broadband network to support its nascent bandwidth trading business.

Other potential competitors are today's fiber-optic network owners, including Level 3, MCI Worldcom, Qwest, AT&T, and Touch America. EBS will compete to some degree with these firms as a basic owner of a fiber-optic network. However, at the present time, these competitors primarily offer fixed-price, long-term contracts for bandwidth capacity on their own networks. Their networks typically do not have the level of routing intelligence that EIN's InterAgent software provides. These competing carriers

EBS's competitors should include Williams, Dynegy, and El Paso Energy

also generally do not have in-house trading and risk management groups that can manage their bandwidth supply and demand portfolios and their customers' needs.

Content delivery services

EBS believes it has an advantage over its content services competitors

Akamai, CacheFlow, and Digital Island are examples of competitors that offer route selection and content delivery services. Unlike EBS, these companies do not own their own fiber-optic networks and do not offer a full package of bandwidth management and content delivery services. Additionally, these companies are not active participants in the developing market for interconnected, tradable bandwidth capacity, nor do they have much experience with commodity trading and risk management. EBS believes that it will have a competitive advantage over these competitors as a result of its trading and risk management experience.

7.7 EBS growth targets

EBS developed a standardized contract for bandwidth capacity between New York and Los Angeles

EBS has developed a standard contract for bandwidth capacity, called a DS-3 month, which consists of bandwidth capacity for one month along the New York to Los Angeles city route at 44.7 megabits per second. Alternative trading contracts have been developed, which are priced off of the DS-3 month standard. These include a one month T-1 contract for transportation at 1.6 megabits per second, as well as six month and one year variations of the DS-3 and T-1 contracts. EBS plans to develop a second standardised contract, which will be a contract for bandwidth capacity between Washington, DC and San Francisco. EBS plans to have delivered on the equivalent of 5,000 one month DS-3 contracts by the end of 2000, with the number growing to 1,740,000 by the end of 2004.

EBS is gauging its success in the content delivery services business by the value of content delivery services contracts that are signed each year. By the end of 2000, EBS plans to have contracts signed with a total value of \$160 million. This is expected to increase to \$5.39 billion in value under contract by 2004.

TABLE 25: **Target size of broadband intermediation and content services businesses**

	2000E	2001E	2002E	2003E	2004E
DS-3 Months Delivered	5,000	41,000	170,000	640,000	1,740,000
Content Services Contract Value (\$Millions)	160	920	1,940	3,720	5,390

Source: Commerzbank Securities, Enron

7.8 Business drivers

Bandwidth intermediation

There are three primary drivers of EBS's bandwidth intermediation business:

Bandwidth intermediation is in the early stages of development

- **Size of the market:** The market for bandwidth intermediation services is in the early stages of development. In order for EBS's bandwidth intermediation business to be successful, there must be a significant increase in the share of the bandwidth transportation market that is intermediated and the velocity of bandwidth intermediation transactions.
- **Market share:** Success in this market will also depend on EBS establishing and maintaining market share for intermediated volumes, which will be necessary to cover the fixed costs of doing business as well as to generate profits.

Bandwidth intermediation will likely be a low margin, volume driven business

- **Margins:** Bandwidth intermediation is expected to have low margins. Maintaining margins is critical and will be determined partly by the ability to develop new intermediation products and to provide complex packages of intermediation services.

Content services

There are four primary drivers for EBS's content delivery services business:

Usage time for premium content is expected to grow rapidly

- **Size of the market:** The market for premium content delivery services is a new market that has emerged with the growth of the larger Internet services market and the growth in demand for high bandwidth media applications. Currently, Internet users spend minimal time utilising premium delivery content, but usage time is expected to grow quickly. Success of EBS's content delivery business will depend highly on the growth of this new market.

Prices for content delivery services are expected to drop 80% over the next 8 years

- **Pricing:** Prices should decrease over time as competition for content delivery services increases. The rate at which prices decrease and the magnitude of their decrease will affect Enron's profitability. Enron is currently paid 3.5 to 5 cents per megabyte to provide content delivery services, but expects that average prices will fall to 2.9 cents by the end of 2000 and will decrease by more than 80% over the next 8 years.
- **Market share:** The market for Internet services is highly competitive and continues to attract new entrants. Enron's ability to establish and maintain market share in the market for premium content delivery services will be an important driver of success.
- **Margins:** The margins earned in the premium content delivery services business are currently much higher than in the bandwidth intermediation business, as the content delivery services business function is more value-added. Enron's ability to maintain high margins, while prices are decreasing and competition is increasing will be crucial to profitability.

7.9 Forecast assumptions

Bandwidth intermediation

- **Size of the market:** We project that the market for bandwidth intermediation in the US will grow from \$1 billion in potential revenues in 2000 to \$68 billion in potential revenues in 2004. We forecast that this growth will be driven in part by growth in the bandwidth transportation market, as well as by an increase in the share of the market that is intermediated and the number of intermediation transactions. By 2004 we forecast that the same bandwidth capacity will change hands 2.4 times, generating revenues for intermediaries each time, although with small margins. This transaction velocity is fairly small compared to a velocity of 2.5 in Enron's existing electricity trading business and 4.0 in Enron's existing gas trading business.

TABLE 26: **Size of the US bandwidth intermediation market**

	2000E	2001E	2002E	2003E	2004E
US Bandwidth Transport Market (\$Billions)	30	38	50	68	95
Share Intermediated	2%	8%	15%	25%	30%
Transaction Velocity (Ratio)	1.0	1.2	1.5	1.9	2.4
Intermediation Market (\$Billions)	1	4	12	33	68
Growth of Market		300%	200%	175%	106%

Source: Commerzbank Securities, Enron

We project that there will also be international opportunities for bandwidth intermediation. The global telecommunications market is currently three times the

size of the US market. EBS believes that the opportunity for bandwidth intermediation internationally will be two times as large as in the US by 2004. We forecast that EBS's international income from bandwidth intermediation will equal domestic income from bandwidth intermediation by 2004.

We project that Enron will establish a 20% market share in the intermediation market

- **Market share:** Enron currently has a 20% market share in electricity and gas trading in the US. We forecast that EBS will establish a 20% initial market share in US bandwidth intermediation and will maintain this market share over time. In the early years we believe that this is a conservative estimate, as EBS is creating the US market for bandwidth intermediation and should have a first-mover advantage. We believe that EBS will be successful at maintaining market share over time. We forecast that EBS will capture a share of the international market for bandwidth intermediation as well, with a 10% market share by 2004.

Intermediation margins will fall to 4% by 2004

- **Margins:** EBS is currently generating high operating margins in the range of 8% in its nascent bandwidth intermediation activities. We forecast that margins will decrease 50% by 2004, as competition in the bandwidth intermediation business increases. The resulting 4% margins by 2004 are consistent with margins at Enron's existing gas and electricity trading businesses, where margins are in the range of 4.5% to 5%.

TABLE 27: **Operating margins for EBS's bandwidth intermediation business**

	2000E	2001E	2002E	2003E	2004E
Operating Income Margin	8%	5%	5%	4%	4%
Growth		-37.50%	0.00%	-20.00%	0.00%

Source: Commerzbank Securities, Enron

Content delivery services

- **Size of the market:** We project that the US market for premium content delivery services will grow from \$1 billion in potential revenues in 2000 to \$57 billion in potential revenues in 2008. We forecast that this growth will be driven by increases in the size of the US broadband Internet market, more time spent on-line viewing premium delivery content, and higher access speeds.

TABLE 28: **Size of the US Internet services market**

	2000E	2001E	2002E	2003E	2004E
US Internet Services Market (\$Billions)	35	45	60	87	117
Growth		29%	33%	45%	34%

Source: Commerzbank Securities, Enron

TABLE 29: **Size of the US premium broadband delivery services market**

	2000E	2001E	2002E	2003E	2004E	2008E
US Broadband Internet Users (Millions)	31	44	58	70	83	122
Premium Delivery (Minutes/day)	0.75	3	8	15	30	65
Average Access Speed (Kbps)	350	400	440	470	490	670
Service Charge (Cents/Megabyte)	2.9	2.1	1.6	1.2	0.9	0.5
Delivery Services Market (\$Billions)	1	2	7	13	24	57
Growth of Market		100%	250%	86%	85%	138%

Source: Commerzbank Securities, Enron

The international market for content delivery services should eventually be larger than in the US. Currently, there are three times as many broadband Internet users globally as in the US and there are expected to be five times as many by 2004. EBS believes that international opportunities for premium delivery services should be twice the size of the US market by 2008. We forecast that international income

from content delivery services will equal US income from content delivery services by 2008.

We project that EBS will establish a 10% market share in the content delivery services market

- **Pricing:** We forecast that prices will decline by more than 80% over the next eight years, from an average of 2.9 cents/megabyte for premium content delivery in 2000 to .5 cents/megabyte by 2008. This will be driven by competition and technology improvements.
- **Market share:** EBS has first-mover advantage in developing the market for premium content delivery services. Unlike other content delivery competitors, Enron has a pure IP fiber-optic network combined with intelligent networking technology to support its delivery services. EIN utilising InterAgent software gives EBS a competitive advantage relative to competitors who cannot guarantee the same quality of service and who must route data over existing, lower quality Internet networks. We forecast that EBS will initially establish a 10 percent market share in the premium content delivery services market in the US, which it will maintain over time.

TABLE 30: **EBS's US market share and revenues from premium content delivery services**

	2000E	2001E	2002E	2003E	2004E	2008E
US Delivery Services Market (\$Billions)	1	2	7	13	24	57
Market Share	10%	10%	10%	10%	10%	10%
Enron's Revenues (\$Billions)	0.1	0.2	0.7	1.3	2.4	5.7

Source: Commerzbank Securities, Enron

In the international market for content delivery services, we project that EBS will establish a 5% market share by 2008.

- **Margins:** We forecast that EBS will maintain a 30% operating income margin over time. We expect EBS to continue to identify and offer innovative premium delivery service packages for its customers that will offset declines in product pricing.

7.10 Earnings projections

We forecast that EBS will lose money in 2000 and 2001, but will profit thereafter

Based on the assumptions outlined above, we forecast earnings from Enron Broadband Services. We project that EBS will turn profitable by 2002 on an EBIT basis and will grow quickly in the years thereafter.

TABLE 31: 2000-2004 forecast of earnings (\$Millions)

EBITDA	2000E	2001E	2002E	2003E	2004E
Revenues	245	1,310	4,598	14,675	30,907
Growth Rate		433.8%	250.9%	219.2%	110.6%
Operating Costs					
COGS + SG&A	302	1,308	4,280	13,784	28,945
D&A	4	62	292	392	492
Total Operating Costs	306	1,370	4,572	14,176	29,437
Growth Rate		348.4%	233.7%	210.0%	107.7%
EBIT	(60)	(60)	26	499	1,470
EBITDA	(56)	2	318	891	1,962
Growth Rate		-104.0%	13944.0%	180.6%	120.1%

Source: Commerzbank Securities

7.11 Capital expenditures

Capital expenditures will be required for additional route miles and distributed servers

We forecast capital expenditures required for the construction of additional fiber-optic route miles along the Enron Intelligent Network in 2000 and 2001, as well as for the installation of additional distributed servers and pooling points.

TABLE 32: 2000-2004 forecast of capital expenditures (\$Millions)

	2000E	2001E	2002E	2003E	2004E
Capital Expenditures	650	500	500	500	500

Source: Commerzbank Securities

8. Other businesses

Enron has significant investments in two additional businesses: Azurix and Portland General Electric (PGE).

8.1 Azurix

Azurix is a water company formed by Enron in 1998 and partially spun-off in June 1999

Enron owns a 34% interest in Azurix, a publicly traded water distribution and wastewater services company that Enron formed in January 1998 and partially spun-off in June 1999. Enron entered the water business in 1998 to participate in global privatisations of water distribution companies and wastewater services companies.

In October 1998, Enron purchased Wessex Water Ltd., a water company based in southwestern England, for \$2.4 billion. In addition to the Wessex purchase, Azurix has purchased water-related businesses in Mexico, Argentina, and Brazil, as well as water properties in California. Azurix also manages water-related businesses in nine US states and five Canadian provinces. At the end of 1999, Azurix owned concessions serving 8.3 million water customers and 7.6 million wastewater customers worldwide. Azurix has expressed an interest in developing a market for water trading in the US, particularly the western US, and in other world markets.

Enron decided to offer Azurix's shares to the public in June 1999 and to decrease its overall ownership stake, citing that Azurix's business was non-core and did not fit in well with its energy network businesses or its desire to concentrate on a less asset-intensive business strategy. Currently Azurix trades approximately 64% below its IPO price of \$19 per share.

8.2 Portland General Electric

Enron acquired PGE in July 1997, but is now closing on the sale of the business

Enron is currently in the process of selling Portland General Electric (PGE), an integrated US electric utility serving Portland, Oregon and the surrounding region in the Pacific Northwest. Enron acquired PGE in July 1997. Enron purchased PGE in order to obtain greater expertise and credibility in US electricity markets.

PGE was particularly attractive to Enron, because PGE had a talented staff of wholesale power marketers. PGE was short on generating capacity and relied upon its power marketers to purchase power and supply a portion of its retail customers' power needs. Enron viewed PGE's power marketing team as a significant component of value, particularly in light of Enron's desire to grow its power marketing presence in the West.

A significant amount of value has been extracted by Enron from PGE

PGE has provided Enron with a substantial amount of information about Western US power markets. In addition, the initial assets owned by the current Enron Broadband Services business, as well as the current head of EBS, came from PGE. In 1999, Enron announced that it planned to sell PGE. Enron made this decision in part because the state of Oregon would not allow Enron to split PGE's generation business from PGE's transmission and distribution business, nor would the state support faster moves toward deregulation. Having extracted a significant amount of knowledge and human capital from PGE, Enron decided to sell PGE so that it could re-deploy its investment in PGE into its higher growth, competitive businesses.

Sierra Pacific Resources is buying PGE for \$2 billion in cash plus debt

Sierra Pacific Resources reached an agreement with Enron in November 1999 to buy PGE for \$2 billion in cash, plus the assumption of \$1 billion in debt. The sale price almost exactly matches the price paid by Enron in 1997, despite Enron's retention of a significant portion of PGE's former telecommunications business and former wholesale marketing staff. The sale is expected to close at the end of the third quarter or beginning of the fourth quarter in 2000.

8.3 Business activities

After the PGE sale closes, Enron's non-core business activities will be limited to those associated with Azurix's water business:

- **Water distribution:** Azurix's water businesses provide drinking water to customers in the US, Canada, the United Kingdom, Mexico, Argentina, and Brazil.
- **Waste water services:** Azurix also engages in wastewater management in these countries, operating sewer services and water purification businesses.

8.4 Business drivers

Success at Azurix will depend upon tariff rates, sales volumes, and cost cutting

Future profitability at Enron's non-core water businesses at Azurix will depend upon the following factors:

- **Tariff rates:** Azurix's profitability will depend upon local tariffs for water-related services.
- **Volumes:** growth in demand for residential water and wastewater services will also affect Azurix's profitability.
- **Cost cutting:** Azurix intends to significantly decrease the cost structure at the water businesses it acquires, by decreasing the number of employees, bringing best business practices, and when possible taking advantage of opportunities to secure lower cost water supply.
- **Future water privatisations:** Part of Azurix's business plan involves participating in future global water privatisations. To the extent that Azurix is able successfully to acquire new water businesses at low cost, Azurix may be able to create new value by cutting costs at these businesses.

8.5 Forecast assumptions

We forecast revenues and costs from PGE's operations in 2000, up to the point when Enron transfers its ownership to Sierra Pacific. We also project equity earnings from Enron's stake in Azurix:

We include earnings for PGE through Q3 2000

- **Portland General Electric:** We assume that the sale of PGE to Sierra Pacific will be completed at the end of the third quarter in 2000. We forecast revenues and costs for 2000 based on last year's results, through the end of September.

We project that equity earnings from Azurix will grow modestly

- **Azurix:** We forecast that equity in earnings from Azurix will grow at the rate of nominal economic growth in future years, and use last year's earnings as the starting point for our forecast. We do not take into account any future water acquisitions by Azurix. For our valuation of Azurix, we use its traded market value.

8.6 Earnings projections

After 2000, earnings from PGE will disappear, with the sale to Sierra Pacific

Based on the forecast assumptions outlined above, we forecast earnings from Enron's other businesses and corporate activities.

TABLE 33: 2000-2004 forecast of earnings from Other and Corporate (\$Millions)

	1999	2000E	2001E	2002E	2003E	2004E
Revenues						
PGE Revenues	1,379	1,034	0	0	0	0
Corporate Revenues	1,053	624	624	624	624	624
Total Revenues	2,432	1,658	624	624	624	624
Operating Costs						
PGE COGS + SG&A	893	670	0	0	0	0
PGE D&A	180	628	628	628	628	628
Corporate COGS + SG&A	1,061	135	0	0	0	0
Corporate D&A	301	90	93	95	97	100
Total Operating Costs	2,435	1,523	721	723	725	728
Other Income	73	0	0	0	0	0
EBIT	70	135	(97)	(99)	(101)	(104)
EBITDA	551	361	(4)	(4)	(4)	(4)
Growth Rate		-35%	-101%	0%	0%	0%
Equity in Earnings						
Azurix	13	13	14	15	15	16
Other	21	21	21	21	21	21
Total Equity in Earnings	34	35	35	36	37	37
Growth Rate		2%	2%	2%	2%	2%

Source: Commerzbank Securities

8.7 Capital expenditure projections

We forecast recurring capital expenditures for PGE in 2000 and from Enron's recurring corporate level investment.

TABLE 34: 2000-2004 forecast of capital expenditures (\$Millions)

	1999	2000E	2001E	2002E	2003E	2004E
Capital Expenditures	963	228	100	103	105	108

Source: Commerzbank Securities

9. Group level results

We aggregate our segment analyses to determine the group level financial results

We aggregate our business segment analyses to determine the group level financial results and to derive the free cash flows to the total firm. Our group level forecasts only take into account results from existing businesses and projects, and do not include forecasts of results from businesses or assets that are not already in place or in construction.

9.1 Group level EBITDA

We forecast significant EBITDA growth in 2000 as the retail business becomes profitable on a cash basis and as the wholesale business adds new projects and significant new trading volumes. Growth trends down slightly in 2001 as Enron loses the EBITDA contribution from PGE. EBITDA grows quickly again in 2002 through 2004, as the broadband business begins to capitalise on significant demand growth.

TABLE 35: 2000-2004 forecast of EBITDA by business segment (\$Millions)

Business Segment	1999	2000E	2001E	2002E	2003E	2004E
Retail	(39)	114	211	362	532	708
Gas Pipelines	408	433	445	458	472	486
Wholesale	1,374	1,950	2,369	2,678	3,012	3,377
Broadband	n/a	(56)	2	318	891	1,962
Corporate and Other	551	361	(4)	(4)	(4)	(4)
Total EBITDA	2,294	2,801	3,024	3,812	4,904	6,529
Growth		22%	8%	26%	29%	33%

Source: Commerzbank Securities

9.2 Group level capital expenditures

We aggregate the capital expenditure requirements for all of Enron's consolidated businesses to derive the group total. We project that total company capital expenditures of \$2.3 billion in 1999 will decrease to around \$1.2 billion by 2004. We do not include capital requirements for future acquisitions or new projects that have not yet been announced, as we only value Enron based on assets in place.

TABLE 36: 2000-2004 forecast of recurring capital expenditures (\$Millions)

Capital Expenditures	1999	2000E	2001E	2002E	2003E	2004E
Retail	64	47	51	52	53	55
Gas Pipelines	207	150	154	158	162	166
Wholesale	1,035	1,640	1,163	302	315	328
Broadband	n/a	650	500	500	500	500
Corporate and Other	963	228	100	103	105	108
Total Capital Expenditures	2,269	2,715	1,968	1,115	1,135	1,156

Source: Commerzbank Securities

9.3 Group level financial statements

At the group level, we project Enron's Income Statement, Balance Sheet, cash flows, and free cash flows.

TABLE 37: 2000-2004 forecast of Income Statement (\$Millions)

Income Statement	1999	2000E	2001E	2002E	2003E	2004E
Revenues	40,112	62,714	78,075	100,136	132,957	176,117
COGS and SG&A	37,999	60,021	75,158	96,432	128,161	169,696
D&A	870	698	706	975	1,105	1,230
Total Operating Expenses	38,869	60,719	75,865	97,406	129,266	170,925
Other Income	181	108	108	108	108	108
EBIT	1,424	2,103	2,318	2,837	3,799	5,300
EBITDA	2,294	2,801	3,024	3,812	4,904	6,529
Equity Income	309	303	379	406	427	442
Net Interest Expense	570	658	710	784	754	698
Income Tax Provision	104	316	405	568	866	1,352
Minority Interests	135	169	176	187	198	210
Extraordinary Items, Net of Tax	(31)	0	0	0	0	0
Net Income	893	1,263	1,406	1,704	2,409	3,482

Source: Commerzbank Securities

TABLE 38: 2000-2004 forecast of Balance Sheet (\$Millions)

Balance Sheet	1999	2000E	2001E	2002E	2003E	2004E
Assets						
Cash & Current Assets	10,184	12,243	13,841	16,130	19,538	24,016
Plant, Property, & Equipment	10,681	9,751	11,086	11,299	11,403	11,404
Non-Current Assets	12,516	13,050	14,473	14,399	14,326	14,253
Total Assets	33,381	35,044	39,400	41,829	45,267	49,673
Liabilities & Equity						
Current Liabilities	9,749	12,614	16,376	18,316	20,865	23,287
Long Term Debt	7,151	4,912	4,480	3,986	3,493	3,493
Preferred Stock	2,130	2,130	2,130	2,130	2,130	2,130
Other Non-Current Liabilities	3,481	3,535	3,610	3,702	3,805	3,918
Minority Interests	2,430	2,765	2,986	2,986	2,986	2,986
Common Equity	8,440	9,089	9,817	10,709	11,988	13,858
Total Liabilities & Equity	33,381	35,044	39,400	41,829	45,267	49,673

Source: Commerzbank Securities

TABLE 39: 2000-2004 forecast of Cash Flow Statement (\$Millions)

Cash Flow Statement	1999	2000E	2001E	2002E	2003E	2004E
Net Income	893	1,263	1,406	1,704	2,409	3,482
Depreciation and Amortization	870	698	706	975	1,105	1,230
Other Non-Cash Items	600	223	252	278	301	323
Changes in Working Capital	(1,041)	328	(380)	(578)	(855)	(1,137)
Change in Other Assets	41	0	0	0	0	0
Net Operating Cash Flow	1,363	2,512	1,984	2,380	2,959	3,898
Cash From Investing Activities	(3,507)	(302)	(3,464)	(1,115)	(1,135)	(1,156)
Cash From Financing Activities	2,321	(2,498)	1,480	(1,265)	(1,824)	(2,742)
Increase/(Decrease) in Cash	177	(288)	0	0	0	0
Cash at Beginning of the Period	111	288	0	0	0	0
Cash at End of the Period	288	0	0	0	0	0

Source: Commerzbank Securities

TABLE 40: 2000-2004 forecast of Free Cash Flows (\$Millions)

Free Cash Flow	1999	2000E	2001E	2002E	2003E	2004E
Net Income	893	1,263	1,406	1,704	2,409	3,482
Add Back: D&A	870	698	706	975	1,105	1,230
Add Back: Adjusted Interest & Minorities	622	662	688	728	700	654
Less: Adjusted Equity in Earnings	(309)	(296)	(371)	(396)	(417)	(432)
Add Back: Other Non-Cash Items	465	54	76	92	103	113
Net Changes in Working Capital	(1,041)	328	(380)	(578)	(855)	(1,137)
Net Change in Other Items	41	0	0	0	0	0
Debt-Free Operating Cash Flow	1,541	2,708	2,125	2,525	3,045	3,910
Recurring Capital Expenditures	(2,363)	(2,715)	(1,968)	(1,115)	(1,135)	(1,156)
Asset Sales/(Acquisitions)	(422)	3,020	0	0	0	0
Free Cash Flow	(1,244)	3,014	158	1,410	1,909	2,754

Source: Commerzbank Securities

9.4 Dividend policy

Enron has traditionally paid dividends at a rate of around 45% of earnings available to common shareholders. We expect that Enron will maintain a payout ratio of around 45% in the future.

9.5 Effective tax rate

Enron's effective tax rate will be 20-25% over the next several years

Enron's effective tax rate has recently been much lower than its combined federal and state statutory tax rates of around 37%. Enron's effective tax rate for 1999 was slightly below 10% and Enron has indicated that it expects that its effective tax rate will be around 20% in 2000 and around 25% for several years before trending up toward the statutory rate. Enron's effective tax rate has been and will be lower than the statutory rate for two primary reasons. First, Enron has a high proportion of equity earnings that have already been taxed at the corporate level. Second, Enron has approximately \$2.9 billion in tax loss carry-forwards that lowered its effective tax rate in 1999 by approximately 10%. We project that Enron will continue to utilise tax loss carry-forwards, but that these carry-forwards will gradually be used up over our forecast period. Accordingly, we forecast that Enron's effective tax rate will trend up over time.

10. Valuation

10.1 Methodology

We value Enron using the Adjusted Present Value discounted cash flow method

Our primary valuation methodology is a sum of the parts, discounted cash flow analysis using the Adjusted Present Value (APV) method. We use the APV method because it provides the most straightforward estimate of a company's value when leverage changes over time. It also allows us to separate out the various components of overall firm value. Our APV method has four principal steps:

- **Calculate unlevered enterprise value:** We discount the after-tax, free cash flows from Enron's projects and businesses at their unlevered cost of equity (the cost of equity if the project or business had zero debt), to estimate the unlevered enterprise value of each of Enron's projects and businesses. We combine the unlevered enterprise value of Enron's projects and businesses to get an unlevered enterprise value for Enron as a whole.
- **Calculate value of tax shields:** We then calculate the present value of Enron's expected future debt tax shields.
- **Determine total enterprise value:** We add the present value of debt tax shields to Enron's unlevered enterprise value to obtain the total enterprise value.
- **Calculate equity value:** We then subtract the value of debt, preferred stock, and minority interests, and add the value of Enron's equity investments to obtain the fair value of Enron's equity.

We value only the cash flows from businesses in place or under construction

In our analysis, we value only the expected future cash flows generated from existing businesses and projects that Enron currently has in place or under construction. We do not include projects that have been announced but are still in the planning stages, primarily because we cannot be certain these projects will materialise. We also cannot be certain of their timing or their costs if they do materialise. We assume, a priori, that future projects will have zero net present value and will neither create nor destroy value.

10.2 Cost of capital assumptions

We use the following cost of capital assumptions in our APV analysis

We use the following cost of capital assumptions in our APV analysis:

- **Nominal risk-free rate:** 6.44% based on the current yield of the ten-year US Treasury bond.
- **Equity risk premium:** 4% for the US equity market. We calculate this using a multi-stage dividend discount model, based on analyst consensus estimates of market growth, and the current market prices of companies in the Standard & Poor's 500 equity index.
- **Equity beta:** For Enron's gas pipelines, we use an unlevered equity beta of 0.19 for our APV analysis. For Enron's unregulated North American businesses, we use an unlevered equity beta of 0.69. We value Enron's international investments using unlevered equity betas specific to each project, based on the country in which the project is operating. The weighted average, unlevered equity beta for Enron's international power plant investments is 1.40. For Enron's broadband businesses, we use an unlevered equity beta of 1.25 to value the bandwidth intermediation business and an unlevered equity beta of 2.75 to value the content services business.

TABLE 41: **Cost of capital assumptions**

Cost of Capital	Domestic Wholesale	Int'l Power Plants	Retail	Gas Pipes	Bandwidth	Content
Risk Free Rate	6.44%	6.44%	6.44%	6.44%	6.44%	6.44%
Equity Risk Premium	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Unlevered Equity Beta	0.69	1.40	0.69	0.19	1.25	2.75
Unlevered Cost of Equity	9.21%	12.04%	9.21%	7.19%	11.44%	17.44%
Levered Industry Cost of Equity	10.44%	14.22%	10.44%	7.44%	11.44%	17.44%

Source: Commerzbank Securities

10.3 Enterprise value results

We calculate a consolidated enterprise value for Enron of \$64.5 billion

We calculate a consolidated enterprise value for Enron of \$64.5 billion. We calculate that the market value of Enron's equity investments is \$3.2 billion.

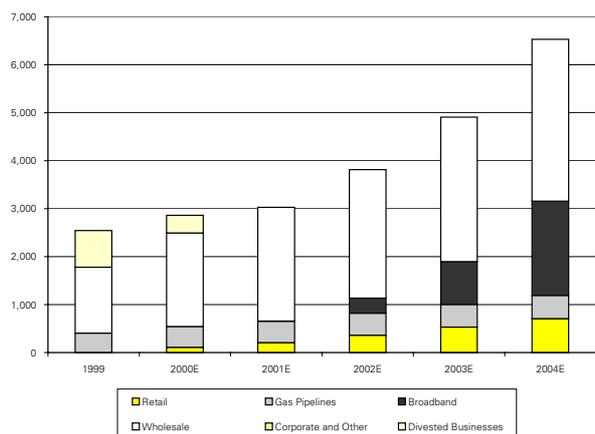
TABLE 42: **Enterprise values and equity investment values by business segment (\$Millions)**

Business	Total EV	Value of Equity Investments
Retail Energy Services	10,240	0
Gas Pipelines	5,926	1,635
Wholesale Energy	32,664	921
Corporate and Other	(925)	708
Broadband	13,601	0
PGE Sale	3,020	0
Total	64,526	3,263

Source: Commerzbank Securities

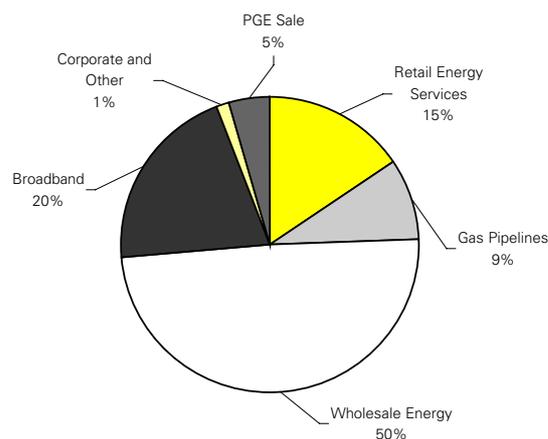
Enron's wholesale energy and broadband businesses contribute the majority of Enron's enterprise value. However, the retail energy services business, which turned profitable in 1999, is projected to contribute substantial value to Enron as well, exceeding the enterprise value of Enron's gas pipeline group.

CHART 3: **EBITDA by business (\$Millions)**



Source: Commerzbank Securities

CHART 4: **Share of enterprise value by business (%)**



Source: Commerzbank Securities

10.4 Equity value results

We calculate a fair value for Enron's equity of \$55.8 billion, or \$76 per share.

We calculate a fair value for Enron's equity of \$55.8 billion, or \$76 per share. This is 4% above the current market price of Enron's shares. Based on our analysis, we believe that Enron is trading at near fair value and our recommendation is that Enron is a HOLD.

TABLE 43: Derivation of total enterprise value and equity value

Component	Total (\$Millions)	Per Share (\$/Share)
Unlevered Enterprise Value	55,463	75.76
Value of Debt Tax Shields	9,063	12.38
Total Enterprise Value	64,526	88.15
Investments in Affiliates	3,263	4.46
Net Debt Value	(9,994)	(13.65)
Preferred Shares Value	0	0.00
Minority Value	(2,003)	(2.74)
Equity Value	55,793	76.22

Source: Commerzbank Securities

Enron's energy businesses are worth \$58 per share

Based on our sum of the parts analysis, we believe that Enron's ongoing energy businesses are worth \$42 billion to equity holders, or \$58 per share, after allocating the negative value of corporate level expenses and investments.

TABLE 44: Sum of the parts valuation (\$Millions)

Business Segment	Enterprise Value		Net Debt & Preferred Allocation	Minority Interests Valuation	Equity in Earnings Valuation	Equity Value		
	\$Millions	\$/Share				\$Millions	\$Millions	\$Millions
Wholesale Energy	32,664	44.62	(4,910)	(1,343)	921	27,332	37.34	49%
Retail Energy	10,240	13.99	(1,539)	(659)	0	8,041	10.98	14%
Gas Pipelines	5,926	8.10	(500)	0	1,635	7,061	9.65	13%
Corporate & Other	(925)	(1.26)	0	0	708	(217)	(0.30)	0%
Energy Net of Corporate	47,905	65.44	(6,949)	(2,003)	3,263	42,217	57.67	76%
Broadband	13,601	18.58	(2,045)	0	0	11,556	15.79	21%
PGE Sale	3,020	4.13	(1,000)	0	0	2,020	2.76	4%
Total	64,526	88.15	(9,994)	(2,003)	3,263	55,793	76.22	100%

Source: Commerzbank Securities

Enron's broadband business is worth \$16 per share

We project that Enron's broadband business, which is its newest business, is worth \$11.5 billion, or \$16 per share to equity holders. Some published estimates have indicated that the value of the broadband business may exceed \$30 per share. We believe that a number of these analyses are incorrectly based on illustrative valuations provided by Enron, which do not account for necessary capital expenditures and taxes.

Appendix 1: Enron wholesale assets

Domestic assets

Generating assets in operation

TABLE 45: Enron's domestic generating plants in operation

Generating unit	Location	Type	Fuel	Gross MW	Enron Stake	Owned MW	Heat Rate (Btu/kWh)	Non-Fuel VOM (\$/MWh)	FOM (\$/kW)
Brownsville	Brownsville, TN	CT	Gas	500	100%	500	10,000	1.00	7.00
Caledonia	Caledonia, MS	CT	Gas	450	100%	450	10,000	1.00	7.00
New Albany	New Albany, MS	CT	Gas	390	100%	390	10,000	1.00	7.00
Las Vegas	Las Vegas, NV	CC	Gas	53	100%	53	7,000	1.00	15.00
Camden	Camden, NJ	CC	Gas	146	51%	74	8,500	1.00	15.00
Bayonne	Bayonne, NJ	CC	Gas	176	51%	90	8,500	1.00	15.00
Linden	Linden, NJ	CC	Gas	715	51%	365	8,500	1.00	15.00
Total				2,430		1,922			

Source: Commerzbank Securities, Enron

- **Brownsville** is a 500 MW combustion turbine unit located in Brownsville, Texas that was developed and constructed by Enron. The plant came on-line in the summer of 1999.
- **Caledonia** is a 450 MW combustion turbine unit located in Caledonia, Mississippi that was developed and constructed by Enron. The plant came on-line in the summer of 1999.
- **New Albany** is a 390 MW combustion turbine unit located in New Albany, Mississippi that was developed and constructed by Enron. The plant came on-line in the summer of 1999.
- **Las Vegas** is a 53 MW combined cycle unit located in Las Vegas, Nevada. Enron acquired the plant in September 1999 for an undisclosed sum. The plant delivers power to Nevada Power under a long-term contract and steam to a local facility. The location has space for a plant expansion.
- **Camden** is a 146 MW combined cycle facility located in Camden, New Jersey. The facility sells power to Public Service Electric & Gas under a 20-year contract expiring in 2013 for prices estimated to be around \$64 per MWh. The facility is one of three purchased from Cogen Technologies in February 1999 for \$1.45 billion. The site can be expanded. Enron sold 49% of this unit to El Paso Energy in August 1999 for an undisclosed sum.
- **Bayonne** is a 176 MW combined cycle facility located in Bayonne, New Jersey. The facility sells power to Public Service Electric & Gas and Jersey Central Power & Light under 20-year contracts expiring in 2008 for prices estimated to be around \$80 per MWh. The facility is one of three purchased from Cogen Technologies in February 1999 for \$1.45 billion. The site can be expanded. Enron sold 49% of this unit to El Paso Energy in August 1999 for an undisclosed sum.
- **Linden** is a 715 MW combined cycle facility located in Linden, New Jersey. The facility sells power to Consolidated Edison under a 25-year contract expiring in 2017 for prices estimated to be around \$75 per MWh. The facility is one of three purchased from Cogen Technologies in February 1999 for \$1.45 billion. The site can be expanded. Enron sold 49% of this unit to El Paso Energy in August 1999 for an undisclosed sum.

Generating plants in construction

TABLE 46: Enron's domestic generating plants in construction

Generating Unit	Location	Type	Fuel	Gross MW	Enron Stake	Owned MW	Heat Rate (Btu/kWh)	Non-Fuel VOM (\$/MWh)	FOM (\$/kW)
Des Plains Green	Manhattan, IL	CT	Gas	650	100%	650	10,000	1.00	7.00
West Fork	Wheatland, IN	CT	Gas	514	100%	514	10,000	1.00	7.00
Gleason Power	Gleason, TN	CT	Gas	544	100%	544	10,000	1.00	7.00
Doyle	Monrose, GA	CT	Gas	342	100%	342	10,000	1.00	7.00
Pastoria Energy	Pastoria, CA	CC	Gas	750	100%	750	6,700	1.00	15.00
Total				2,800		2,800			

Source: Commerzbank Securities, Enron

- **Des Plains** is a 650 MW combustion turbine unit being constructed in Manhattan, Illinois that is being developed and constructed by Enron. It is expected to start operating in the summer of 2000.
- **West Fork** is a 514 MW combustion turbine unit being constructed in Wheatland, Indiana that is being developed and constructed by Enron. It is expected to start operating in the summer of 2000.
- **Gleason** is a 544 MW combustion turbine unit being constructed in Gleason, Tennessee that is being developed and constructed by Enron. It is expected to start operating in the summer of 2000.
- **Doyle** is a 342 MW combustion turbine unit being constructed in Monrose, Georgia that is being developed and constructed by Enron. It is expected to start operating in the summer of 2000.
- **Pastoria** is a 750 MW combined cycle unit being constructed in Pastoria, California that is being developed and constructed by Enron.

International

Generating plants in operation

TABLE 47: Enron's international generating plants in operation

Plant	Location	Type	Fuel	Gross MW	Enron Share	Owned MW	Heat Rate (Btu/kWh)	Non-Fuel VOM (\$/MWh)	FOM (\$/kW)
Teeside	UK	CC	NG	1,875	50%	937.50	8,000	1.00	15.00
Wilton	UK	CC	NG	154	50%	77.00	7,000	1.00	15.00
Trakya (Marmara)	Turkey	CC	NG	478	50%	239.00	6,700	1.00	15.00
Cuiaba Phase I	Brazil	CT	NG	150	56%	83.63	10,000	1.00	7.00
Puerto Quetzal	Guatemala	IC	Resid	110	50%	55.00	12,000	1.00	7.00
Puerto Plata	Dom. Rep.	CC	Resid	185	50%	92.50	7,000	1.00	15.00
Haina	Dom. Rep.	ST	Resid	329	100%	329.00	12,000	1.50	20.00
Corinto	Nicaragua	CT	Diesel	71	50%	35.50	10,000	1.00	7.00
Bahia Las Minas	Panama	ST	Diesel	355	51%	181.05	12,000	1.50	20.00
Dabhol Phase I	India	CC	LNG	826	60%	495.60	6,700	1.00	15.00
Batangas	Philippines	IC	Resid	110	100%	110.00	12,000	1.00	7.00
Subic Bay	Philippines	IC	Resid	116	50%	58.00	12,000	1.00	7.00
Hainan Island	China	CT	Diesel	160	100%	160.00	12,000	1.00	7.00
Piti Power	Guam	CC	Diesel	80	50%	40.00	7,000	1.00	15.00
Total				4,999		2,894			

Source: Commerzbank Securities, Enron

- **Teeside** is a 1,875 MW gas-fired generating station located in Northeast England that began commercial operations in April 1993. The US \$1.2 billion facility can supply approximately four percent of the average daily power requirements for England and Wales and up to 1.5 million pounds per hour of process steam to an adjacent 2,300 acre petrochemical complex. Enron operates and maintains the facility and manages the commercial contracts.
- **Wilton** is a 154 MW generating station located in Northeast England.
- **Marama** is a 478-megawatt, approximately US \$600 million natural gas-fired power project at Marmara Ereğlisi in Turkey. The power plant is one of the first privately owned build-operate-transfer power plants in Turkey. Construction began in September 1996 and commercial operation was achieved early 1999. The facility supplies power to the state power utility, Türkiye Elektrik Uretim, İletim, A.S. (TEAS), under a power purchase agreement. Turkey's state gas company, Boru Hatları İle Petrol Tasıma A.S. (BOTAS), provides natural gas for the project. Enron is a 50% owner of the project and serves as operator.
- **Cuibá Phase I** is a 480-megawatt, combined-cycle natural gas power plant under construction in Cuiabá, Brazil. The plant is being built in three phases, with the 150-megawatt Phase I already in operation. In Phase II, the project will expand to 480 megawatts. The plant, together with a 626-kilometer (385-mile) natural gas pipeline between Bolivia and Cuiabá, represents a total investment of approximately US \$500 million. The pipeline will connect to the Bolivia-to-Brazil pipeline at kilometer 242 (mile 150) in Bolivia. Enron owns 56 percent of the plant and 40 percent of the pipeline.
- **Puerto Quetzal** is a 110-megawatt, barge-mounted Puerto Quetzal Power project located in Puerto Quetzal, the largest port on Guatemala's Pacific Coast. The plant supplies approximately 20 percent of the electrical energy that Guatemala requires. The project began commercial operations in February 1993. Power from the project is sold to Empresa Eléctrica de Guatemala S.A. Enron owns 50 percent of the project, operates the plant, and serves as its fuel supplier.
- **Puerto Plata** is located in Puerto Plata on the northern coast of the Dominican Republic. The 185-megawatt facility provides more than 15 percent of the country's average electric generation capacity. The oil-fired, barge-mounted power facility began simple-cycle operation in August 1994, and moved into combined-cycle operation in January 1996. The plant provides electricity to government-owned Corporación Dominicana de Electricidad. Enron supplies fuel and shares in the operation and maintenance of the facility.
- **Haina** is a 329 MW oil-fired power plant located in Haina, Dominican Republic.
- **Corinto** is a 71-megawatt, barge-mounted power plant located in the Pacific port of Puerto Corinto in Nicaragua. Enron and a partner signed a 15-year power purchase agreement with Nicaragua's state utility, Empresa Nicaragüense de Electricidad. The facility will represent approximately 15 percent of Nicaragua's electricity generation, based on the country's current production levels. The barge was constructed in the U.S. and the mooring facility, pier, and fuel storage facility were constructed in Nicaragua. Commercial operation began June 1999. Enron owns a 50 percent interest in the project.

- **Bahia Las Minas** is a 355-megawatt electric generation company located near Colón, Panamá. Plant capacity is sold to local distribution companies through five-year power purchase agreements. Enron acquired a 51 percent interest in the project.
- **Dabhol** is a 2,450-megawatt combined-cycle power plant project. Enron is importing liquefied natural gas (LNG) to fuel the plant and provide natural gas for other purposes within the country. The approximately US \$2.9 billion facility, located south of Mumbai, is being constructed in two phases. The 826-megawatt Phase I began commercial operation in May 1999. Phase II is scheduled to come on-line in 2001. Enron, as majority owner of the Dabhol project, will operate the plant and serve as fuel manager.
- **Batangas** is a 110-megawatt, approximately US \$136 million facility located south of Manila in Batangas City, Batangas on the island of Luzon. The project began generating power in July 1993, less than 10 months from the signing of the power contract. Enron holds a power purchase agreement with the state-owned National Power Corporation (NPC) and owns and operates the plant. Under an agreement between NPC and Batangas Power Corp., plant ownership will be transferred to NPC in 2003.
- **Subic Bay** is a 116-megawatt Bunker C fuel-fired plant located on the island of Luzon in Olongapo City, Philippines. The plant began commercial operation in February 1994. The project sells power to the National Power Corporation (NPC), which supplies fuel for the project. Enron operates and owns 50 percent of this project. Under an agreement between NPC and Subic Bay Power Corp., ownership of the plant will be transferred to NPC after 15 years.
- **Hainan Island** is a 154-megawatt, distillate-fired power project on Hainan Island and is the first build-own-transfer power project developed by a U.S. company in China. The project, which began commercial operation in January 1996, was brought on-line in only 14 months. Electricity is sold to Hainan Electric Power Company (HEPCO), the provincial electric utility on Hainan Island. Enron owns a 100 percent interest. Ownership will be transferred to HEPCO in 2008.
- **Piti Power** is an 80-megawatt baseload, slow-speed diesel plant in Piti, Guam. In September 1996, Enron signed an Energy Conversion Agreement with the Guam Power Authority to build the facility. The fast-track project reached construction phase less than one year after signing the agreement, and the plant began commercial operation in February 1999. Enron is a 50 percent equity partner in the project and operates the power plant. Ownership will be transferred to the Guam Power Authority after 20 years.

Generating plants in construction

TABLE 48: Enron's international generating plants in construction

Plant	Location	Type	Fuel	Gross MW	Enron Share	Owned MW	Heat Rate (Btu/kWh)	Non-Fuel VOM (\$/MWh)	FOM (\$/kW)
EcoElectrica	Puerto Rico	CC	NG	507	50%	253.50	6,700	1.00	15.00
Nowa Sarzyna	Poland	CC	NG	116	98%	113.10	6,700	1.00	15.00
Sarlux (Saras-Sarlux)	Italy	CC	Syn. Gas	551	45%	247.95	6,700	1.00	15.00
Cuiaba Phase II	Brazil	CC	NG	330	56%	183.98	6,700	1.00	15.00
Puerto Quetzal Expansion	Guatemala	IC	Resid	124	100%	124.00	12,000	1.00	7.00
Dabhol Phase II	India	CC	LNG	1,624	80%	1,299.20	6,700	1.00	15.00
Total				3,252		2,222			

Source: Commerzbank Securities, Enron

- **EcoElectrica** is a 507-megawatt, gas-fired cogeneration plant and LNG import terminal under construction in Puerto Rico capable of supplying up to 20 percent of the island's electricity. The power plant is expected to begin commercial operation in the second half of 2000. The plant configuration will consist of two gas combustion turbines and a steam turbine, as well as its own water desalination facility. The Puerto Rico Electric Power Authority will purchase the plant's entire output under a power purchase agreement. Enron owns a 50 percent interest in the joint venture and will serve as operator.
- **Nowa Sarzyna** is a 116-megawatt natural gas-fired, cogeneration plant under construction on the grounds of Organika Sarzyna (OSCW) in Nowa Sarzyna, Poland. The approximately US \$132 million facility is expected to begin commercial operation in the first half of 2000. Enron signed a power purchase agreement with the Polish Power Grid Company in April 1997. The facility will provide steam to OSCW and to the city of Nowa Sarzyna. Enron is managing the construction process and will operate the plant.
- **Sarlux** is a 551-megawatt, integrated-gasification, combined-cycle power plant located on the island of Sardinia, Italy. Construction on the approximately US \$1.4 billion plant began in January 1996, with commercial operation expected in the year 2000. The plant will employ gasification technology to convert refinery residue from SARAS, Italy's largest oil refinery, into synthetic gas. Electricity from the plant will be sold to Ente Nazionale per l'Energia Elettrica S.p.A (ENEL), the Italian state owned utility, under a power purchase agreement. Enron owns 45 percent of the project.

Gas pipelines and other assets

TABLE 49: Enron's Latin American gas pipelines

Pipeline	Country	Capacity (MMcf/d)	Stake	Cost (\$Millions)
Transredes	Argentina	320	25%	137
Bolivia – Brazil	Brazil/Bolivia	1,059	7%	140
TGS	Argentina/Brazil	1,900	35%	472
Centragas	Columbia	150	50%	95
Promigas	Columbia	410	39%	100

Source: Commerzbank Securities, Enron

- **Transportadora de Gas del Sur (TGS):** In 1992, Enron acquired an ownership interest in Argentina's 6,604-kilometer (4,104-mile) Transportadora de Gas del Sur (TGS) pipeline system, the largest pipeline system in South America. Since the acquisition, the system's capacity has expanded 33 percent to 2.0 billion cubic feet per day of natural gas and achieved significant operating and cost efficiencies. The pipeline, which stretches from the southern tip of the continent to Buenos Aires, is well positioned to contribute to the South American energy grid and should benefit from the region's population growth and economic expansion. Enron operates the facility and serves as technical manager.
- **Transredes:** In May 1997, Enron reached financial close on the capitalisation of the transportation segment of Bolivia's state oil and gas company, Yacimientos Petrolíferos Fiscales Bolivianos. At financial close, Enron and partners formed Transredes, which is headquartered in Santa Cruz. As a partner in Transredes, Enron holds a 25 percent stake in Bolivia's hydrocarbon transportation assets including 3,000 kilometers (1,860 miles) of natural gas pipelines and 2,500 kilometers (1,550 miles) of oil/liquid pipelines.

- **Bolivia to Brazil:** The approximately US \$2 billion, 3,000-kilometer (1,864-mile) Bolivia-to-Brazil natural gas pipeline is one of the largest gas projects ever undertaken in South America. With a capacity of 30 million cubic meters per day, the pipeline system stretches from Santa Cruz de la Sierra, Bolivia to São Paulo, Brazil in its first phase scheduled to begin commercial operation in second quarter 1999. The second phase, which was scheduled to be operational in fourth quarter 1999, extends to Porto Alegre, Brazil. Enron, other private partners, Petrobras, the national oil and gas company of Brazil, and Transredes, the oil and gas pipeline distribution company of Bolivia, are jointly developing the pipeline.
- **Centragas:** The Centragas pipeline was Enron's first greenfield international pipeline development project, under a 15-year build-operate-transfer contract with Ecopetrol, Colombia's state-owned oil company. The 578-kilometer (357-mile) natural gas transmission system, which began commercial operation in February 1996, is well positioned in the emerging South American power grid, and plays a key role in Colombia's national plan to deliver clean-burning natural gas to major consumer markets. With a capacity of 150 MMcf/d, the pipeline system stretches from Ballena, on the northern coast, to Barrancabermeja in Colombia's central region. Ecopetrol is the sole customer for the system's natural gas transportation services. Enron owns a 50 percent interest and serves as operator.
- **Promisgas:** In early 1996, Enron procured an equity interest in Colombia's premier natural gas pipeline operator, Promigas. Enron acquired the interest from Ecopetrol, Colombia's state-owned oil company. Promigas' operations include natural gas transmission, compression and services, compressed natural gas conversions and sales, as well as investments in various gas distribution businesses and a 25 percent interest in Centragas. The company operates 1,500 kilometers (1,062 miles) of gas pipelines, stretching from Ballena in Guajira state to Cerromatoso in Córdoba state, with a capacity of 410 MMcf/d.

Gas and Electric Distribution

TABLE 50: **Enron's Latin American distribution companies**

Distributor	Country	Volumes	Stake	Cost (\$Millions)
Elektro Power Distribution (electric)	Brazil	10,767	99%	1,487
Calife (electric)	Brazil	n/a	94%	10
CEG-Rio (gas)	Brazil	46	25%	576
CEG (gas)	Brazil	79	50%	(with CEG-Rio)
Gaspart - North (5 LDCs) (gas)	Brazil	125	42%	ND
Gaspart - South (2 LDCs) (gas)	Brazil	1	25%	ND

Source: *Commerzbank Securities, Enron*

- **CEG-Riogas:** Enron holds an equity interest in both CEG and Riogas, previously government-owned gas distribution companies. CEG serves 550,000 residential and 1,000 industrial customers with a 2,200-kilometer (1,368-mile) pipeline network in the municipalities of Rio de Janeiro. Riogas serves large industrial customers with average sales of 56 million cubic feet per day (MMcf/d) or 10.5 percent of Brazil's gas consumption.
- **Elektro:** Enron acquired Elektro Eletricidade e Serviços S.A (Elektro), Brazil's sixth largest electricity distributor in 1998. The company serves approximately 1.5 million customers in the state of São Paulo through 82,000 kilometers (51,000 miles) of distribution network and 1,400 kilometers (868 miles) of transmission lines. Elektro serves the high demand growth area of São Paulo.

- **Gaspart:** At the end of 1997, Enron acquired a significant stake in the gas distribution companies of seven coastal states through the purchase of Gaspart. Enron is a member of the board of directors. Petrobras is also a partner in the companies. Currently, five of the seven companies in contiguous northeast states are delivering 95 MMcf/d gas to industrial clients. The remaining gas companies, located in southern Brazil, will commence gas deliveries following completion of the Bolivia-to-Brazil pipeline.
- **Calife:** Through Industrias Ventane, S.A., Enron holds a 94 percent stake in the Venezuelan utility Compañía Anónima Luz y Fuerza Eléctricas de Puerto Cabello (CALIFE). CALIFE supplies electricity to the city of Puerto Cabello and its surrounding area. The utility serves approximately 50,000 customers, of which 40,000 are residential. The remaining customers are industrial and commercial.
- **SK-Enron:** Enron and Korea's SK Corporation finalised a joint venture agreement in January 1999 to form SK-Enron, which distributes natural gas and imports/markets liquefied petroleum gas (LPG) in South Korea. The partnership has a total capitalisation of approximately US \$500 million. SK-Enron is the leading distributor and marketer of natural gas in South Korea, with approximately 20 percent of the natural gas market and 50 percent of the LPG market. SK-Enron owns stakes in SK Gas, Daehan City Gas Co., Pusan City Gas Co., Kumi City Gas Co., Chongju City Gas Co., and Pohang City Gas Co. In December 1999, SK-Enron spent \$130 million to add stakes in Bobae City Gas Co., Daeil City Gas Co., Dongbu Haeyang City Gas Co., and Byucksan Energy, owner of a 21 MW coal-fired cogeneration plant in Iksan South Korea.

Appendix 2: Merchant plant valuation

Forecast methodology

We forecast the earnings and cash flows from electric power generation facilities by examining each generating station separately. We look at each generating plant's unique cost structure and operating profile, as well as the local market prices for energy and capacity in the regions in which the plants operate.

Generating unit costs

We examine the cost structure of each asset

We begin our forecast by examining the cost structure and efficiency of each generating plant. This is important because the cost of the plants determines the number of hours that the plants operate and the margin they will earn when they generate. The primary inputs in our analysis of generating plant costs are:

- **Heat rate:** The measure of the unit's efficiency in converting fuel to electricity expressed in Btu/kWh. A heat rate of 10,000 Btu/kWh equates to an efficiency of around 35 percent. New gas-fired combined cycle generators have efficiencies of 50 percent or better.
- **Fuel cost:** The cost of the fuel needed to generate power at the facility.
- **Variable operation and maintenance costs (VOM):** Non-fuel operation and maintenance costs that vary with the unit's output.
- **Fixed operation and maintenance costs (FOM):** Non-fuel operation and maintenance costs that do not vary with output.

Market prices of electricity

We forecast market prices of electricity starting from current hourly prices

We forecast the market prices of electrical energy and capacity for each region. We begin with estimates of current market prices and then project future market prices based on our outlook for new generation in the various US power pools.

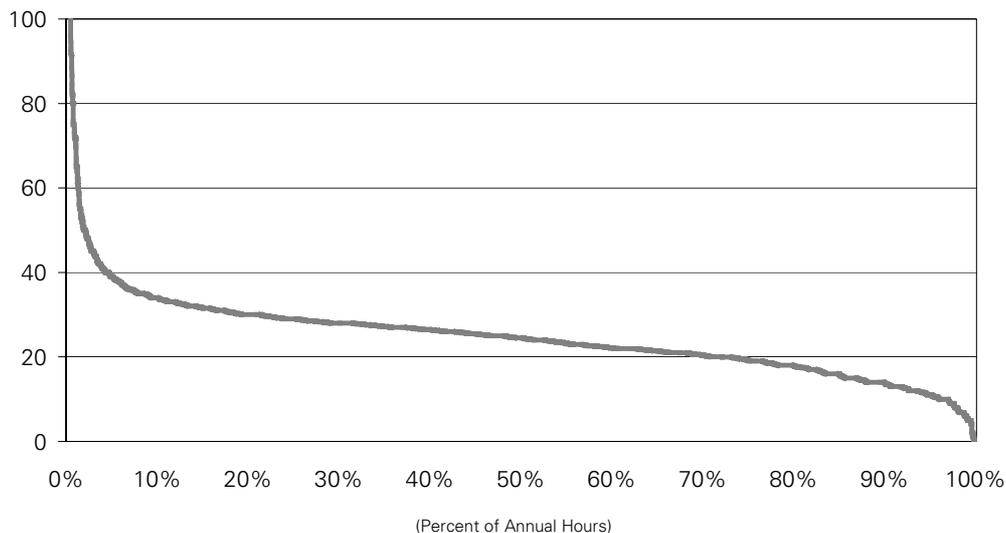
Capacity and energy markets

Electric generators in the US are typically paid a fixed monthly or annual **capacity price** for their generating capacity (expressed in \$/kW) as well as a variable **energy price** for their generating output (expressed in \$/MWh). Electric energy markets generally clear on an hourly basis and generators are paid an energy price for each hour of operation based on their total level of output during an hour. Hourly wholesale energy prices vary depending on the demand for energy, generator outages, weather, and the efficiency of the marginal generating unit that sets the price.

Generating unit utilisation

A generating unit's utilisation depends upon its efficiency compared to the efficiency of the generating units that are setting the price. Below is a sample graph of the prices over the past year in the California Power Exchange, arranged from highest to lowest. A unit with variable production costs under \$20/MWh will operate virtually all of the time in California. By contrast, a unit with production costs of \$40/MWh will operate less than 10% of the hours in the year.

CHART 5: 1998-1999 California Power Exchange price duration curve (\$/MWh)



Source: Commerzbank Securities

Current prices

Below we summarise the average all-hour and average on-peak prices for some power pools in the US. On-peak periods are generally defined as business hours during weekdays when system loads are highest. However, California defines a larger on-peak period that includes some weekend hours. California also does not have a separate market for capacity payments, so fixed cost recovery is included in energy prices.

TABLE 51: Approximate average energy prices (\$/MWh) (12 months ending Mid-1999)

California defines a larger on-peak period that includes some weekend hours.

Region (Power Pool)	All-Hours	On-Peak
New England (Nepool)	24.22	33.30
New York (NYPP)	23.26	35.01
California (CALPX)	26.15	29.62
Midwest (MAIN)	19.10	34.00
Texas (ERCOT)	18.23	33.00

Source: Commerzbank Securities

We believe that the recent market prices of electricity have been high because of regulatory uncertainty associated with deregulation

We believe that the market prices of electricity in the past two years have generally been high in US power pools because of regulatory uncertainty associated with imminent deregulation. This has caused utilities to delay construction of new generating units. Together with load growth, the paucity of new construction has reduced reserve margins and consequently inefficient generating units are often setting market prices.

Market prices for electricity in the Northeast, California, and Florida in particular have tended to be higher than in other regions, because a larger portion of the existing generating capacity consists of relatively old and inefficient generating plant. Prices in these regions are likely to decline faster than prices in other regions as new generation is built. Transmission constraints and problems with siting electrical generation have also been a problem in these three regions.

New generation and future market prices

We believe that the market prices for energy will generally fall in high priced regions as new generating units are built. The state-of-the-art generation technology for new

baseload power is a gas-fired combined cycle generating unit. New gas-fired combustion turbines will be built for peaking power. A summary of the variable costs associated with new combined cycle generators and combustion turbines is presented below.

TABLE 52: **Estimated cost data for combined cycle and combustion turbine technology**

Unit Specifications	Combustion Turbine	Combined Cycle
Heat Rate (Btu/kWh)	10,000	6,700
Delivered Gas Cost (\$/MMBtu)	2.50	2.50
Variable O&M (\$/MWh)	1.00	1.00
Variable Production Costs (\$/MWh)	26.00	17.75
Capital Costs (\$/kW)	300	450
Fixed O&M (\$/kW)	7	15

Source: Commerzbank Securities

We expect market prices to fall as new generating units are constructed

In order for new generating units to be built, new generating units will need to receive annual revenue from market prices of energy and capacity sufficient to cover these variable production costs, as well as their fixed production costs and a return on capital and of capital.

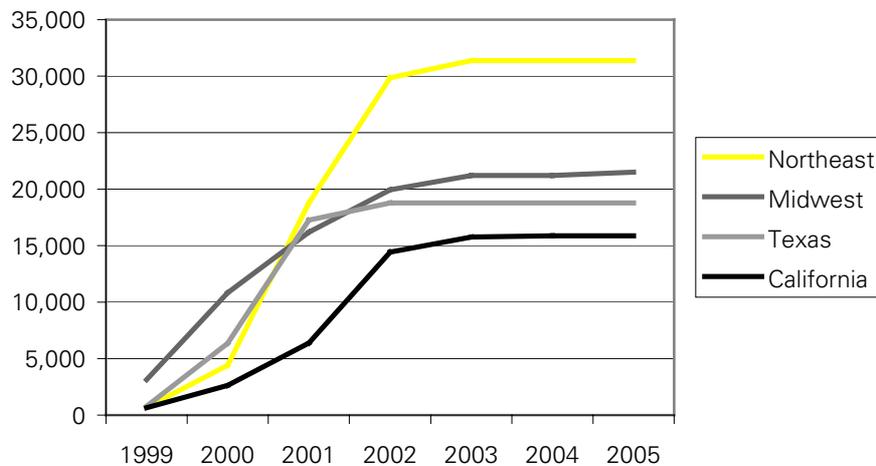
In each market we calculate the market prices in the energy and capacity markets that will be necessary for new combined cycle and combustion turbine units to break even.

We expect that the market prices for energy, after accounting for fixed capacity payments received by the electric generators, will move toward the break even costs of new gas-fired generation in all US electricity markets. Eventually, we expect that market prices in all US power pools will approximate the long-run marginal cost of new gas-fired generating units.

We expect electricity markets to reach an equilibrium state in 2004 where prices approach the costs of new entry

Developers are planning to build significant amounts of MW of new generating units between 2000 and 2004. The annual amount increases through 2001 and then decreases. Based on the pattern of announced new construction, we expect that wholesale electricity prices will reach an equilibrium state in 2004. At this point, we expect that new combined cycle generating units will be setting the average all-hours price for electricity and that new combustion turbines will be setting the average peak price for electrical power.

CHART 6: 1999-2005 cumulative announced generating capacity by region (MW)



Source: Commerzbank Securities, Research Data International

New units will not only meet growth in demand but will also displace existing inefficient capacity

New units will not only meet growth in demand but will also displace existing inefficient capacity. As newer, more efficient units enter the market, prices will decrease in markets that are dominated by large amounts of inefficient capacity and in all markets the utilisation of less efficient units will fall.

Forecast of generating output

Using our forecasts of energy market prices we project generating output by comparing the variable production costs of each plant to the price duration curve in each year. The power plants will generate when their variable production costs are below prevailing market prices for electrical energy. Generation from any of the older, relatively inefficient units with high variable production costs will decline over time as average energy prices fall to equilibrium with the marginal costs of newer, more efficient generating capacity.

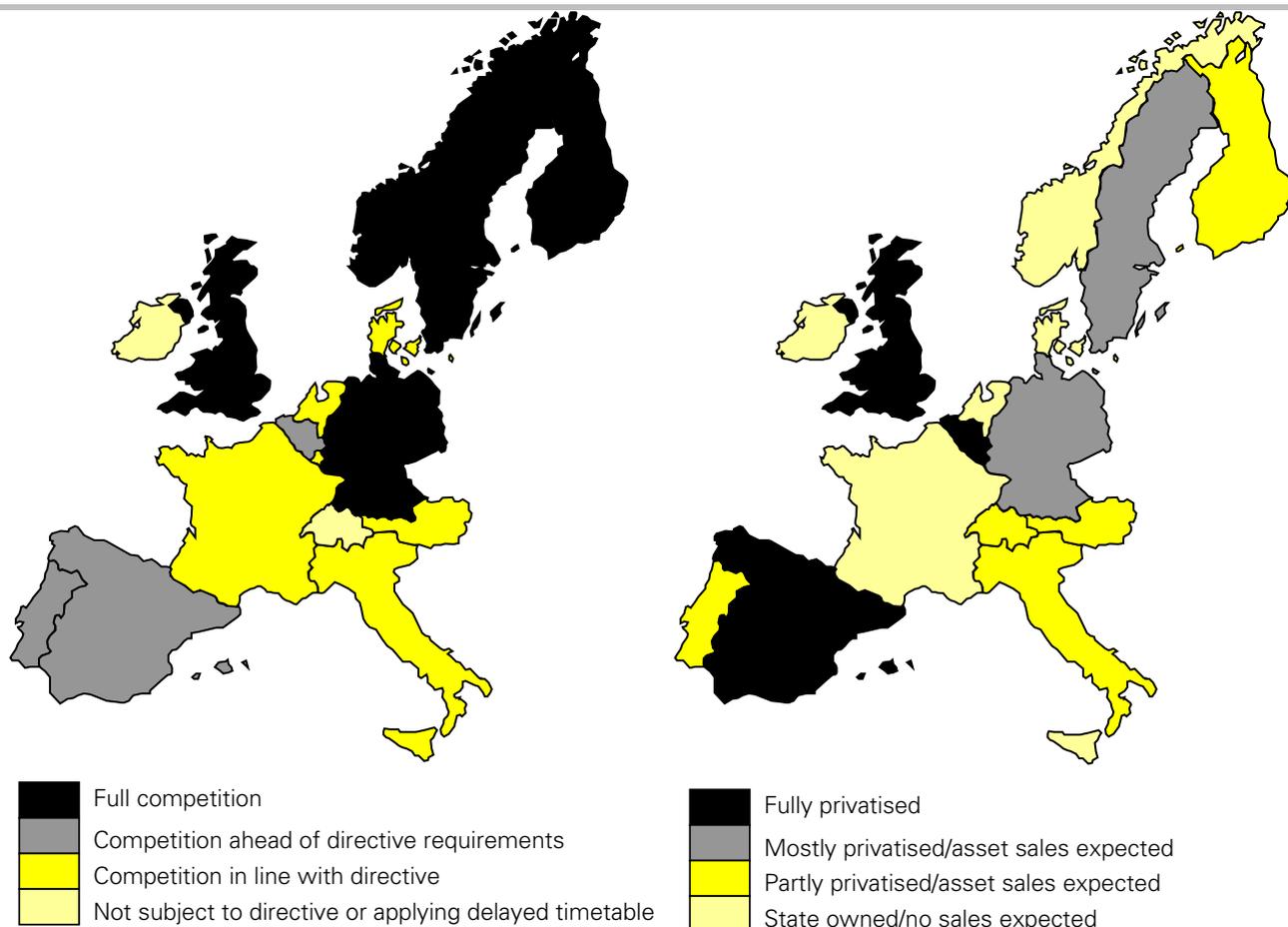
Appendix 3: Global regions

Europe

Energy Markets in Europe are well developed. Liberalisation of the energy sector is generally proceeding faster than in the US in the UK and more slowly than in the US on Continental Europe. Enron is pursuing its business in a similar manner as in North America centred on energy trading and marketing with a relatively low level of asset ownership. Principle features of European energy markets include:

- **Well-developed infrastructure:** European gas and electricity markets are well developed and have strong interconnections between regions.
- **History of public ownership:** Utility companies in Europe have traditionally been run by the public sector and liberalisation of the energy sector generally involves a round of privatisation prior to deregulation. Even after privatisation, governments in Europe often own large minority stakes or golden shares that provide veto power over the board.
- **Local dominance and cross holdings:** Large and entrenched utilities dominate many of the local markets in Europe and create large barriers to entry. Additionally, many utilities have systems of cross-ownership with other electric and gas utilities. These ownership links can stifle competition and slow the development of liquid markets.
- **Varying speed of deregulation:** There are varying degrees of state ownership and divergent liberalisation timetables in Europe. Liberalisation of electricity in Europe was set in motion by the European Union electricity directive. The directive dictated that certain large customers could select their energy provider beginning in February 1999. Increasing numbers of smaller customers will be given the ability to select providers through 2006 when approximately 35% of the market is expected to be open to competition. Individual countries can opt for a more rapid timetable than the directive.
- **Power before gas:** Electricity markets are being liberalised much faster than gas markets. This can create difficulties for power plant developers in securing competitively priced fuel supply.
- **Transmission access unclear:** The rules for transmission access are less developed than in the US, making it difficult to get access to the transmission grid at competitive prices. These rules are expected to be clarified shortly.

CHART 7: Competition and ownership structure in Western European electricity markets



Source: Commerzbank Securities

Asia-Pacific

Enron's assets in the Asia-Pacific region are scattered among several countries: Australia, India, Korea, and Japan. The largest emphasis is in India.

India

The Indian electricity market is largely a contract generation market as opposed to one with competitive wholesale generation. In a contract market, a developer wins the right to build a plant under a long-term power sales agreement. India has a significant shortage of electrical capacity and reliability is poor. Political and regulatory difficulties are limiting the activity of foreign firms willing to build generating capacity to meet the demand. Demand for generating capacity is estimated to be roughly 10,000 MW per year for the foreseeable future. Natural gas demand is outstripping gas production and LNG is filling the gap.

Australia

The Australian electricity and gas markets are in the process of deregulating and several states have privatised assets. Prior to 1995, each Australian state operated its own electricity and gas network with little interaction between states. As in the US, the speed of deregulation and privatisation varies from state to state. The Australian state electricity and gas markets are still poorly interconnected and largely isolated.

- **Electricity markets:** The recent moves to privatise and deregulate electric power include the unbundling of the generation, transmission, distribution, and supply functions. Each Australian state is in charge of determining the way in which it intends to proceed with deregulation. The Eastern states of Victoria, New South Wales, Queensland, and South Australia are participating in the **National Electricity Market**. By 2001, the majority of electricity customers in Australia will be able to choose their electricity supplier. Western Australian states are moving more slowly on the deregulation process, account for only a small portion of overall Australian demand, and are not interconnected with the Eastern states. 80% of Australia's 41 GW generating capacity is coal-fired and there is currently a surplus of generating capacity.
- **Gas markets:** Privatisation and deregulation of the Australian gas sector began in 1995. Prior to 1995, the distribution networks for natural gas in Australia were primarily state owned monopolies and the transmission networks were a mixture of private and state-owned entities. National legislation guaranteeing third party access to gas transmission and distribution was passed in 1998. Australian governments are encouraging the development of new pipelines, additional distribution monopoly privatisations are expected, and full retail gas competition is expected in Australia's most populous states by 2001. The Australian Competition and Consumer Commission (ACCC) regulates natural gas transmission at the national level. The ACCC also sets caps on the prices that pipelines can charge wholesale customers. Gas consumption is expected to continue to grow in coming years because of the increased use of gas at electric power facilities. Consumption is projected to increase threefold by 2003.

South Korea

South Korea's energy markets are still largely closed although the legislature is considering a deregulation bill. Korea Electric Power Corporation (KEPCO) dominates the electricity market. The company is an integrated utility, is the only company in the transmission and distribution business in South Korea, and generates over 90% of the country's electricity. KEPCO is in the process of divesting some of its 41 GW of generating capacity. South Korea's gas market is more fragmented than its electricity market and foreign firms have taken minority equity stakes in several local gas distributors.

Japan

Japan is one of the largest energy markets in the world and is beginning to liberalise. 25% of Japan's power market opened up in March 2000, including 50% of the industrial load. Japan currently has the world's highest power prices (currently about 50% higher than in Germany). Demand for new electric generating capacity has been estimated to be around 5,000 MW annually, not including retirements of existing generation plants.

Latin America

Brazil

Brazil has approximately 59 GW of total capacity, with hydroelectric plants accounting for over 90% of this capacity. Electric companies in Brazil were traditionally owned and operated by the federal government and state governments. Brazil began privatising its electricity sector in 1993. Since 1993, many Brazilian states and the federal government have separated transmission, generation, and distribution and have sold assets.

The generation market is currently in transition from a state-owned monopoly system into a fully deregulated wholesale market. Most privatised generators were sold with electricity sales contracts that run for eight years. These contracts have fixed tariff prices that will apply to all sales during the first four years. After four years, the contracts are gradually replaced with market prices over the remaining four years of the contracts. The electricity market in Brazil consists only of an energy market and there is no separate market for capacity payments to generators.

Argentina

Argentina has approximately 19 GW of installed capacity, which is mostly thermal. Argentina's electricity market was privatised starting in 1992 and is considered to be one of the world's most competitive electricity markets. The transmission, distribution, and generation functions were separated and generators sell their power into the wholesale electricity market. Generators are dispatched in Argentina based on their declared marginal cost, with the last unit called setting the market price. Prices in the energy market are fairly low, generally in the range of \$20-25/MWh, and have been driven down since market liberalisation by competition and oversupply. There is a market for bilateral contracts, which are generally of one year or less in duration. There is a separate capacity market with prices set by low cost peaking units.

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Period: During the forthcoming 12 months, at any time during that period and not necessarily just at the end of those 12 months.

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2. All other stocks are compared to their relevant local country index and Neuer Markt stocks are compared to the Neuer Markt Index.

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