

# EUB Backgrounder: Alberta's Reserves 2000 and Supply/Demand Outlook 2001-2010

Every year the Alberta Energy and Utilities Board (EUB) issues a reserves report, providing stakeholders with one of the most reliable sources of information on the state of reserves for Alberta's diverse energy resources and by-products - crude bitumen, crude oil, natural gas, natural gas liquids, sulphur, and coal.

Providing information to support good decision-making is a key EUB service. Making energy resource data available to everyone involved – the EUB, landowners, communities, industry, government, and interested groups - makes for better decisions affecting the development of Alberta's resources.

The EUB's reserves report is the principal report on Alberta's reserves. It includes estimates of initial reserves, remaining established reserves (reserves we know we have) and ultimate potential (reserves we expect to be ultimately recovered.) This year's report, *Alberta's Reserves 2000 and Supply/Demand Outlook 2001-2010*, also includes information on the demand for Alberta's energy, as well as a 10-year supply forecast for each of the resources.

Resource supply, costs of development, energy demands, conservation, as well as important social and environmental considerations influence the economic factors that shape the development of Alberta's energy resources. Higher prices, record drilling activity and planned investments of billions of dollars for oil sands projects all contributed to the energy development picture in 2000, and shape the forecast for the years to come.

This backgrounder provides a brief summary of the EUB's report on reserves and production for each resource at the end of 2000, and a forecast of resource supply and demand to 2010.

The following table summarizes Alberta's energy reserves at the end of 2000.

## MEASUREMENT

A **cubic metre (m<sup>3</sup>)** is the volume held by a cube one metre by one metre by one metre. The space taken up by a kitchen range is almost one cubic metre.

- This amount of gas would heat water for about 600 cups of coffee.
- 1 thousand cubic metres = the energy used by one water heater for a year.
- 1 million cubic metres = enough to heat 180 homes for one year.
- 1 billion cubic metres = enough to heat 180,000 homes for one year.
- One cubic metre of oil would fill 1,000 one-litre milk cartons.

A **barrel** is a common unit for measuring petroleum.

- One barrel contains approximately 159 litres.
- A standard bathtub holds about one barrel of oil.

Source: Our Petroleum Challenge, Petroleum Communication Foundation, 1999.

**Natural Gas:** 1 cubic metre = 35.5 cubic feet

**Oil:** 1 cubic metre = 6.293 barrels

## 2000 Reserves Summary

	Crude Bitumen		Crude Oil		Gas		Coal	
	million cubic metres	billion barrels	million cubic metres	billion barrels	billion cubic metres	trillion cubic feet	billion tonnes	billion tons
Initial In-Place	259 200	1 631	9 586	60.3	7 070	251	94	104
Ultimate Potential (recoverable)	50 000	315	3 130	19.7	5 600	200	620	683
Initial Established	28 330	178	2 554	16.1	4 064	144	35	39
Cumulative Production	520	3.3	2 263	14.2	2 853	101	1.1	1.2
Remaining Established	27 810	175	291	1.8	1 211	43	34	37
Annual Production	39	0.245	43.5	0.274	141	5.0	0.034	0.037

## CRUDE BITUMEN AND CRUDE OIL

### Crude Bitumen Reserves

Alberta has the largest oil sands (crude bitumen) resource in the world.

- Approximately 50 billion cubic metres (315 billion barrels) are considered potentially recoverable under anticipated technology and economic conditions.
- Total in situ and mineable remaining established reserves are 27.8 billion cubic metres (175 billion barrels). This value is unchanged from 1999.
- To date, only 1% of the ultimately recoverable crude bitumen resource has been produced.

Recovery is expected to improve with new technologies, such as a special thermal technique called Steam Assisted Gravity Drainage (SAGD).

Planned investments of billions of dollars signal increased development of this abundant resource over the next decades.

### Crude Bitumen Production

- Production in 2000 totaled 39 million cubic metres (245 million barrels):
  - 22 million cubic metres (138 million barrels) came from mining and 17 million cubic metres (107 million barrels) from in situ projects.
- Total production represents 51,000 m<sup>3</sup>/day (320,000 barrels/day) of synthetic crude oil (SCO) and 46,000 m<sup>3</sup>/day (288,000 barrels/day) of non-upgraded crude bitumen.

Approximately 40% of Alberta's total oil production in 2000 was from oil sands.

### ALBERTA'S OIL SANDS RESOURCE

*Oil Sands* are naturally occurring mixtures of bitumen, water, sand and clay that are found in three areas of Alberta – Athabasca, Peace River and Cold Lake.

*Bitumen* is a thick, sticky form of crude oil. At room temperature, bitumen is like cold molasses. It must be heated or diluted before it will flow into a well or through a pipeline.

If the oil sands deposits are close to the surface, bitumen can be recovered from the oil sands by open-pit **mining** and hot-water processing methods. Deeper deposits require **in-situ** methods such as steam injection through vertical or horizontal wells.

Source: Canada's Oil Sands and Heavy Oil, Petroleum Communication Foundation.

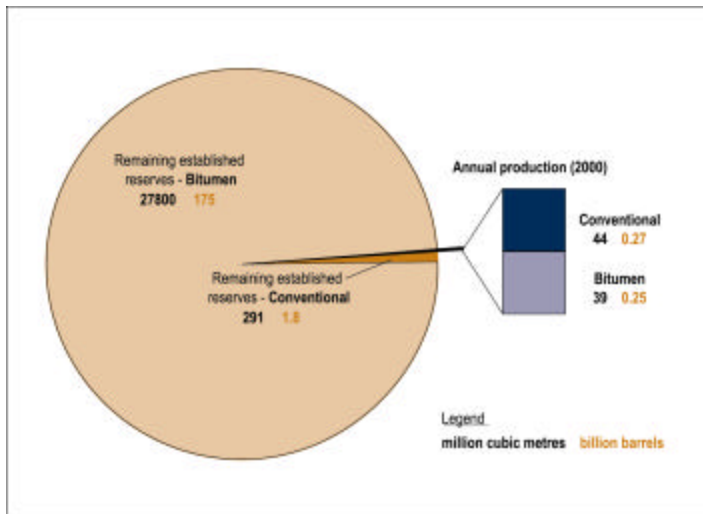
### Crude Oil Reserves

Exploratory and development drilling, along with enhanced recovery methods continue to add to Alberta's conventional crude oil reserves.

- In 2000, 32.7 million cubic metres (206 million barrels) were added to the initial established reserves of conventional crude oil.
- The EUB estimates that, at year-end, Alberta's remaining established reserves of conventional crude oil were 286 million cubic metres (1.8 billion barrels) – a 3.4 % reduction from 1999, but a smaller decline than occurred between 1998 and 1999.
- The EUB estimates the ultimate potential recoverable reserves of crude oil at 3.1 billion cubic metres (19.7 billion barrels).

Future improvements in technology should improve the current overall average conventional crude oil recovery efficiency of 27%.

The following figure shows annual production and remaining established reserves for crude bitumen and crude oil.



### Crude Oil Production and Drilling

Despite declining production over the past two decades, Alberta still produces 119,000 m<sup>3</sup>/day (750,000 barrels/day) of conventional crude oil. Higher prices allowed for strong production performance in 2000 and created some momentum in crude oil drilling activity for the year.

- Production of conventional crude oil in 2000 totaled 44 million cubic metres (274 million barrels).
- The number of successful oil wells increased 65%, from 1,630 in 1999, to 2,700 in 2000.
- Increased activity helped slow the annual decline in production from 11% in 1999, to 2% in 2000.

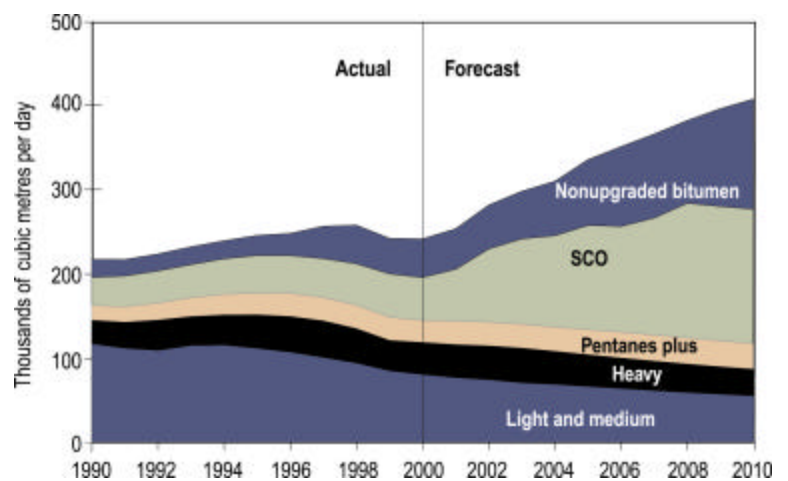
With a forecast of continuing strong oil prices the EUB expects some 2,700 successful oil wells to be drilled in each of 2001 and 2002, levelling to about 2,500 wells per year over the remainder of the forecast to 2010.

### Total Oil Supply and Demand

- Alberta's 2000 production from conventional oil, oil sands sources and pentanes plus was 242,000 m<sup>3</sup>/day (1.52 million barrels/day) – about the same as 1999.
- Production is forecast to reach 413,000 m<sup>3</sup>/day (2.6 million barrels/day) by 2010 – nearly a 71% increase.

A comparison of conventional oil production and bitumen production over the last 10 years clearly shows a trend towards a larger percentage from bitumen. This ability to shift from conventional oil to bitumen sources is unique to Alberta, allowing the province to offset the expected decline in conventional oil with bitumen production.

The EUB estimates production of bitumen will triple by 2010, accounting for as much as 70% of Alberta's oil supply.



## NATURAL GAS

### Natural Gas Reserves

Alberta has a large natural gas resource base. Current EUB estimates of the remaining ultimately recoverable conventional natural gas reserves stand at 2,747 billion cubic metres (98 trillion cubic feet). This reserve does not include Alberta's non-conventional natural gas potential (i.e. coal-bed methane and tight gas).

- In 2000, a slight increase to the remaining established reserves stemmed a reduction trend.
- At the end of 2000, Alberta's remaining established reserves of conventional natural gas stood at 1,211 billion cubic metres (43 trillion cubic feet).
- The EUB's ultimate marketable gas potential estimate of 5,600 billion cubic metres (200 trillion cubic feet) appears conservative and is being reviewed as a part of a new study targeted for completion in 2003.

### Natural Gas Production and Drilling

Alberta continues to be the largest producer of natural gas in Canada, with current production representing approximately 83% of Canada's total natural gas production.

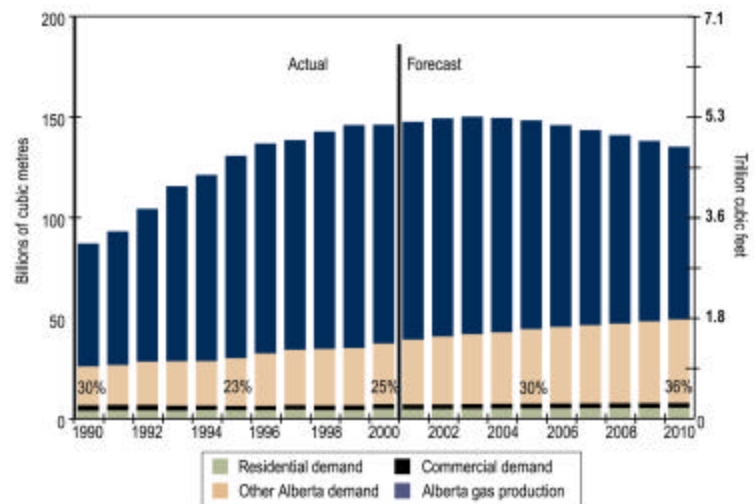
- In 2000, Alberta produced 141 billion cubic metres (5 trillion cubic feet) of marketable natural gas.
- There were 8,228 successful gas wells drilled in Alberta in 2000 – a 37% increase over the 6,015 drilled in 1999.
- New drilling hasn't replaced gas production since 1982, however last year's record drilling replaced 90% of the production for 2000, compared to a replacement rate of 56% in 1999.

While Alberta's gas development has typically centred on shallow gas in southeastern Alberta, exploration is expected to expand in the western portion of the province. Improved cash flow will fuel investment in exploration and increase drilling. An estimate of some 10,000 successful wells per year is expected over the forecast period.

### Natural Gas Supply and Demand

Although natural gas supply from conventional sources is expected to start moderately declining towards 2010, sufficient supply exists to meet Alberta's growing demand. As Alberta requirements increase and production declines over time, the volumes available for removal from the province will decline.

- Natural gas production is expected to decline by about 2% per year over the last five years of the forecast period.
- The EUB forecasts Alberta's natural gas requirements to be one-third of total Alberta production by the end of the forecast period.



The EUB's mandate ensures that Albertans have access to reliable energy supply within the province. This means natural gas requirements for Alberta's core market (residential, commercial and institutional consumers) are met into the future, before any new gas removal permits are approved by the EUB.

Non-conventional sources of natural gas, such as coal-bed methane, offer considerable potential for supplementing future supply of conventional gas.

## ETHANE, OTHER NATURAL GAS LIQUIDS AND SULPHUR

- The supply of ethane is expected to meet demand over the forecast period.
- Remaining established reserves of ethane declined slightly to 252 million cubic metres (1.6 billion barrels) in 2000.
- The remaining established reserves of propane, butane and pentanes plus increased slightly to 222 million cubic metres (1.4 billion barrels) in 2000.
- The supply of propane and butane is expected to meet demand over the forecast period, however, a shortage of pentanes plus as a diluent for heavy oil and non-upgraded bitumen is expected by 2005. Other alternatives will be required to replace pentanes plus as a diluent.
- The remaining established reserve of sulphur is 98 million tonnes. Sulphur demand is not expected to increase and Alberta's sulphur inventory will continue to grow over the forecast period.

## COAL

Recent sharp increases in coal prices, due to high oil and gas prices and record high global steel production, improved prospects for Alberta's low-sulphur coal and created opportunities for extending coal production.

- The current estimate for remaining established resources for all types of coal is about 34 billion tonnes.
- Alberta's coal reserves represent over a thousand years of supply at current production levels.
- Alberta's total coal production in 2000 was 34 million tonnes.
- Subbituminous coal production is expected to increase, beginning in the middle part of the forecast period, to meet demand for additional electricity generation.

This massive resource continues to contribute to the energy needs of Albertans, supplying about 80% of the province's electricity.

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