

## RESERVES, PRODUCTION, AND DELIVERIES

### Bitumen

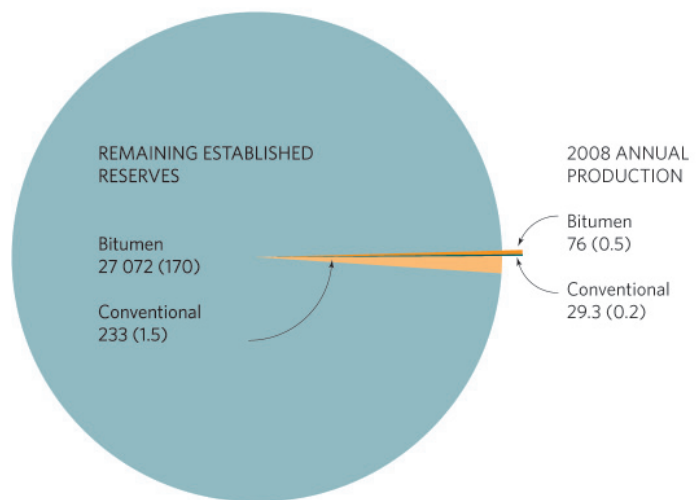
Alberta sits atop the largest oil sands resource in the world. Estimates indicate that 27.07 billion cubic metres (m<sup>3</sup>) (170.4 billion barrels [bbl]) of bitumen are recoverable with today's technology and economic conditions. Annual production of bitumen and conventional crude oil is just a sliver of the existing bitumen reserves. Alberta remains at an early stage in the likely long development history of the oil sands resource.

For more details of this year's review, as well as a complete picture of all of Alberta's energy resources, see *ST98-2009: Alberta's Reserves 2008 and Supply/Demand Outlook 2009-2018*.

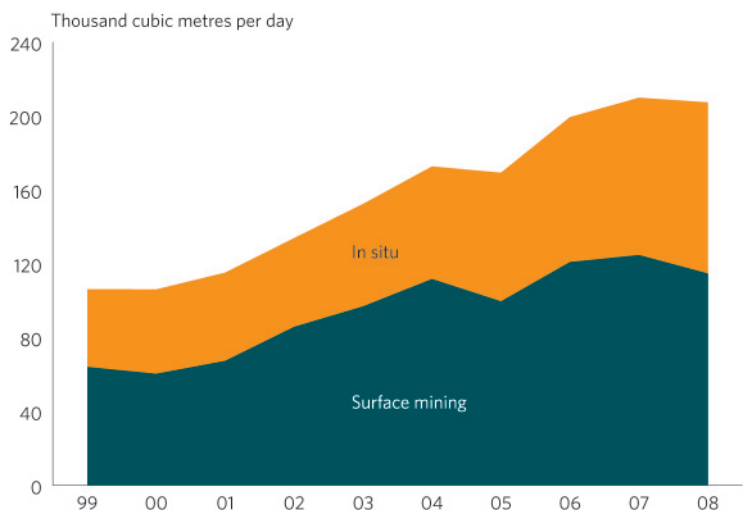
Bitumen production has more than doubled in the past 10 years. In 2008, Alberta produced 207 400 m<sup>3</sup> per day (m<sup>3</sup>/d) (1 305 000 bbl/d) of bitumen. Surface mining accounted for about 55 per cent and in situ accounted for about 45 per cent of the total bitumen production. From surface mineable bitumen, about 104 000 m<sup>3</sup>/d (654 000 bbl/d) of synthetic crude oil (SCO) was produced.

**Alberta's Crude Bitumen Remaining Reserves and Production, Compared to Conventional Remaining Reserves and Production**

Million cubic metres (billion barrels)



**Alberta's Crude Bitumen Production**



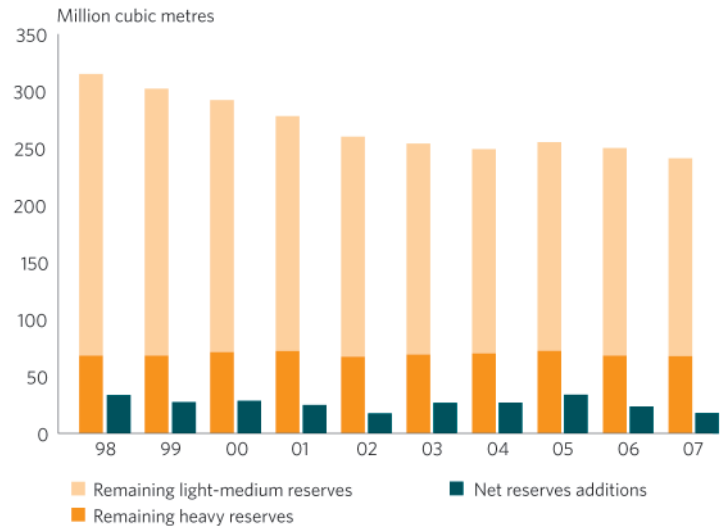
## Conventional Crude Oil

In 2008, new drilling and enhanced recovery techniques added reserves of 22 million m<sup>3</sup> (140 million bbl), which replaced about 77 per cent of 2008 production. Alberta's remaining established crude oil reserves decreased by 3 per cent to 233 million m<sup>3</sup> (1.5 billion bbl), resulting from revisions to existing pool reserves, new drilling, and production during 2008. Of remaining reserves, 74 per cent is classified as light-medium and 26 per cent as heavy crude.

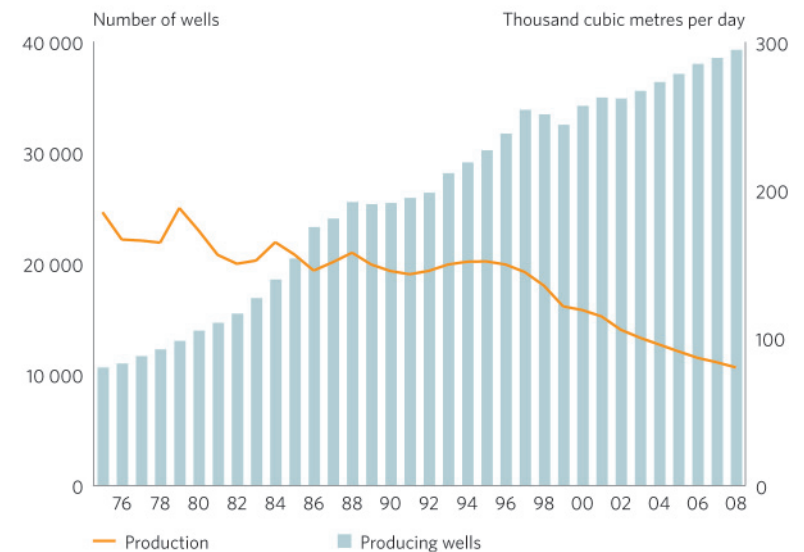
Alberta's production of conventional crude oil peaked in 1973 and has been in decline since then. In 2008, total crude oil production declined to about 80 000 m<sup>3</sup>/d (500 000 bbl/d), a decrease of 4 per cent from 2007.

As production of light-medium and heavy crude oil has decreased, nonupgraded bitumen and SCO production has increased. In 2008, total production of crude oil and equivalent decreased 1 per cent from 2007 levels.

**Net Reserves Additions and Remaining Reserves of Conventional Crude Oil**



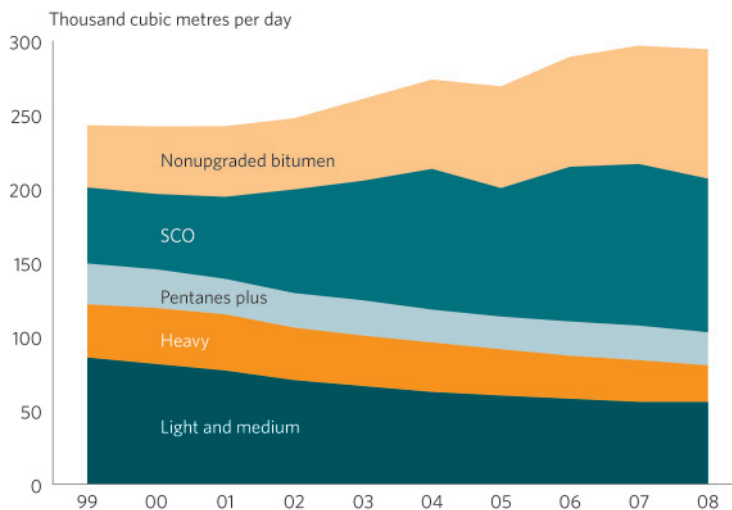
**Conventional Crude Oil Production and Producing Oil Wells**



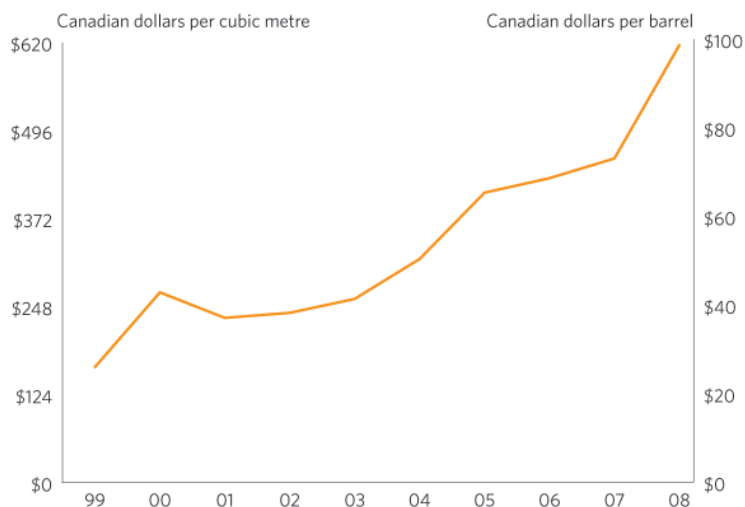
In 2008, the price of light oil at the Alberta wellhead averaged \$616.28/m<sup>3</sup> in Canadian dollars (\$97.93/bbl). This is a 35 per cent increase over the 2007 price of \$456.75/m<sup>3</sup> (72.58/bbl). For 2008, the price reached a record high in July, at \$838.54/m<sup>3</sup> (\$133.25/bbl) and was lowest in December, at \$240.70/m<sup>3</sup> (\$38.25/bbl).

In 2008, 80 per cent of Alberta's crude oil, crude bitumen, SCO, condensate, and pentanes plus was delivered to other provinces, the U.S., and offshore.

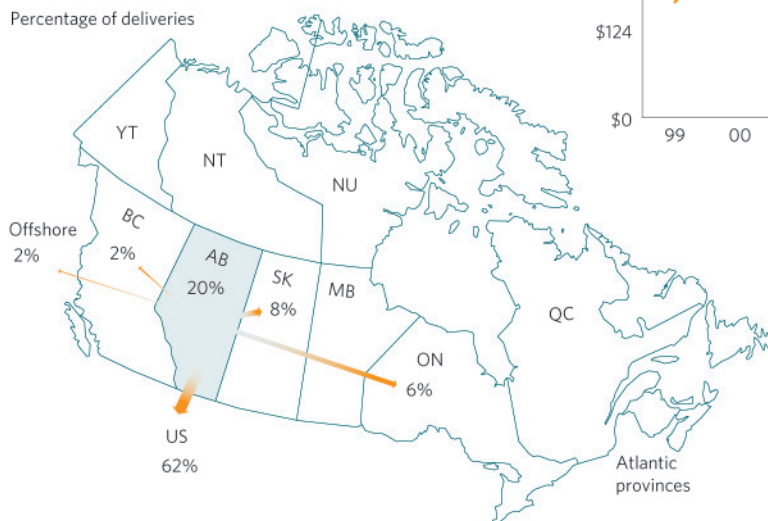
**Alberta Supply of Crude Oil and Equivalent**



**Average Price of Oil at Alberta Wellhead**



**Deliveries of Crude Oil, Crude Bitumen, Synthetic Crude Oil, Condensate, and Pentanes Plus**



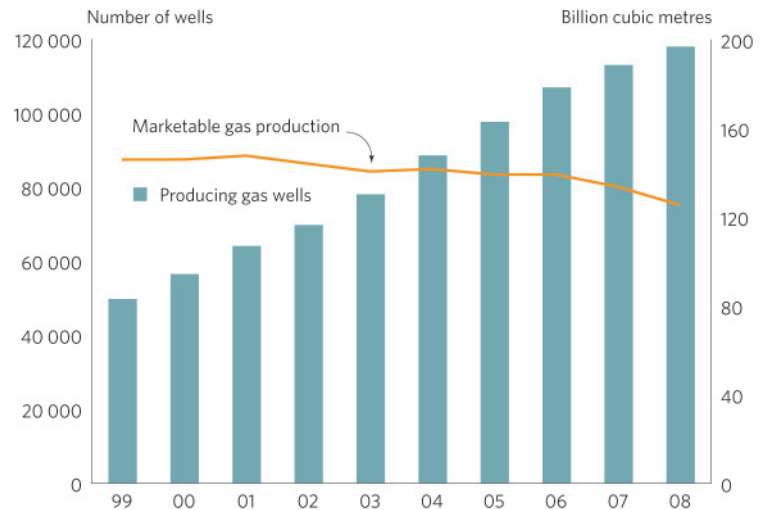
## Natural Gas, Natural Gas Liquids, and Sulphur

In 2008, 155 billion m<sup>3</sup> (5.5 trillion cubic feet) was added to Alberta's initial established reserves of marketable gas. This is the result of new drilling and reassessment of existing reserves. Reserve additions from new drilling alone replaced 81 per cent of production in 2008. Significant positive revisions to existing reserves contributed to a 2.7 per cent increase in the total remaining established reserves of marketable gas to 1098 billion m<sup>3</sup> (39 trillion cubic feet) as of year-end 2008.

The number of producing gas wells has increased significantly year over year, while gas production has stabilized after reaching its peak in 2001. It now takes an increasing number of new gas wells each year to offset production declines in existing wells. This is due in part to the large number of new wells in southeastern Alberta, where well productivity is low.

New well connections were at 7907 for conventional natural gas in 2008, down 15 per cent from the previous year's level.

Conventional Marketable Gas Production and Producing Gas Wells

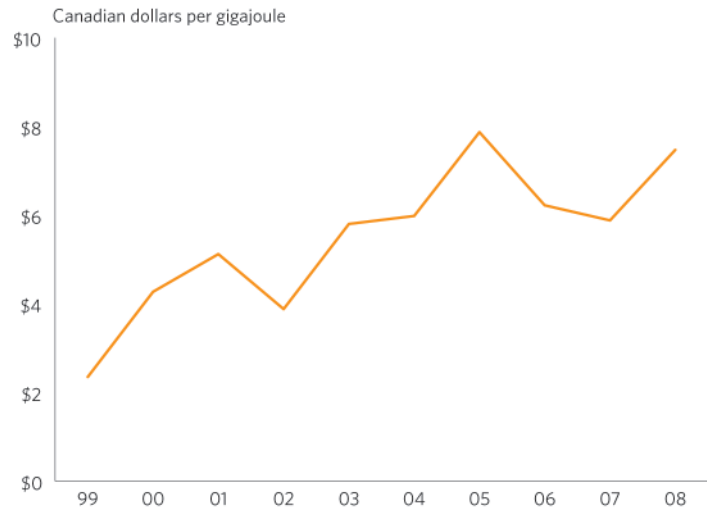


At December 31, 2008, there were a total of 17 902 coalbed methane (CBM) wells and CBM well licences in Alberta. This CBM well count includes all wells completed or planned to be completed in coals. In 2008, 1926 CBM wells were added. Of the total CBM wells, 11 593 had produced or were producing by December 31, 2008. These wells may have produced from only coals or from a combination of coals and other gas zones.

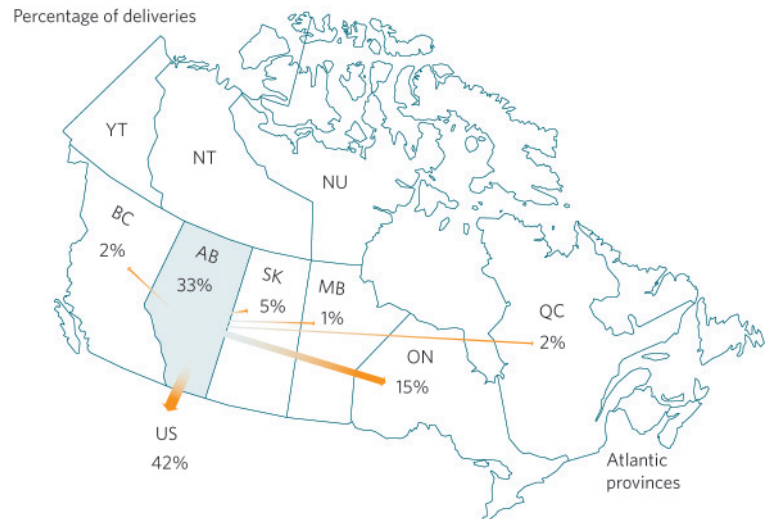
In 2008, the average price of natural gas at the plant gate increased to \$7.47 per gigajoule (GJ) (\$7.88/thousand cubic feet). This is a 27 per cent increase over the 2007 price of \$5.88/GJ (\$6.20/thousand cubic feet). For 2008, the price was highest in July, at \$9.84/GJ (\$10.38/thousand cubic feet), and lowest in January, at \$6.19/GJ (\$6.53/thousand cubic feet).

In 2008, 67 per cent of Alberta's gas was delivered to other provinces and the U.S.

**Average Price of Natural Gas at Plant Gate**



**Deliveries of Gas**



### Percentage of Sulphur Deliveries

|              |     |
|--------------|-----|
| Alberta      | 8%  |
| Other Canada | 1%  |
| U.S.         | 24% |
| Offshore     | 67% |

Demand for sulphur within Alberta in 2008 was about 0.5 million tonnes. Sulphur was used in the production of phosphate fertilizer and for other chemical operations.

A portion of the sulphur volume may include sulphur dispositions between gas processing plants in Alberta for transportation purposes. Although they were reported as Alberta sales, the sulphur may not have been consumed in the province.

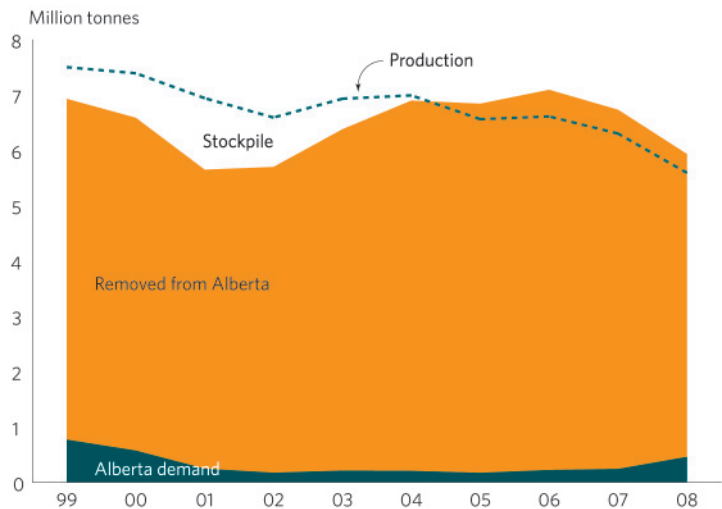
Because elemental sulphur is fairly easy to store, imbalances between production and demand have traditionally been accommodated through adding to or removing from sulphur stockpiles. In 2008, 92 per cent of sulphur marketed by Alberta producers was shipped outside the province, primarily offshore.

### Deliveries of Sulphur

Percentage of deliveries



### Alberta Sulphur Demand and Supply



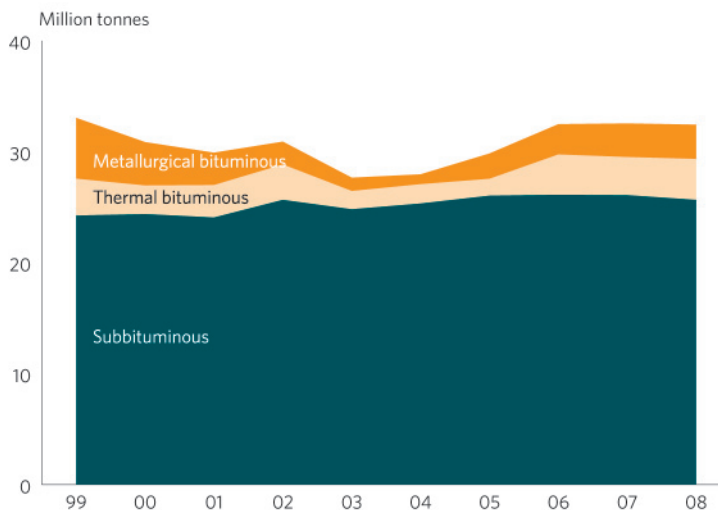
## Coal

The current estimate for remaining established reserves for all types of coal is about 33.4 billion tonnes. This massive resource continues to help meet the energy needs of Albertans, supplying fuel for about 59 per cent of the province's electricity generation. Alberta's coal reserves represent about 1000 years of supply at current production levels.

Alberta marketable coal production totaled 32.5 million tonnes in 2008.

In 2008, 81 per cent of Alberta's coal production stayed in the province, 3 per cent was delivered to the U.S., and 16 per cent was delivered offshore. Very small quantities of metallurgical and thermal bituminous coal were delivered to other Canadian provinces and the U.S.

**Alberta Marketable Coal Production**



**Deliveries of Coal**



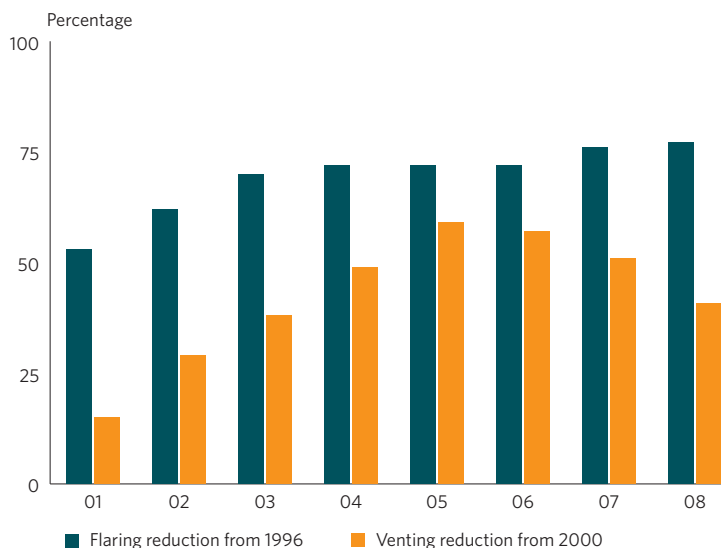
## Solution Gas Flaring and Venting

The ERCB reports flared and vented volumes of gas for a variety of upstream oil and gas industry sources, such as well tests, gas plants, gas gathering systems, and transmission lines, as well as oil, bitumen, and gas batteries. In 2008, further gains were made in flare reduction. However, vented volumes of solution gas rose for the third year in a row.

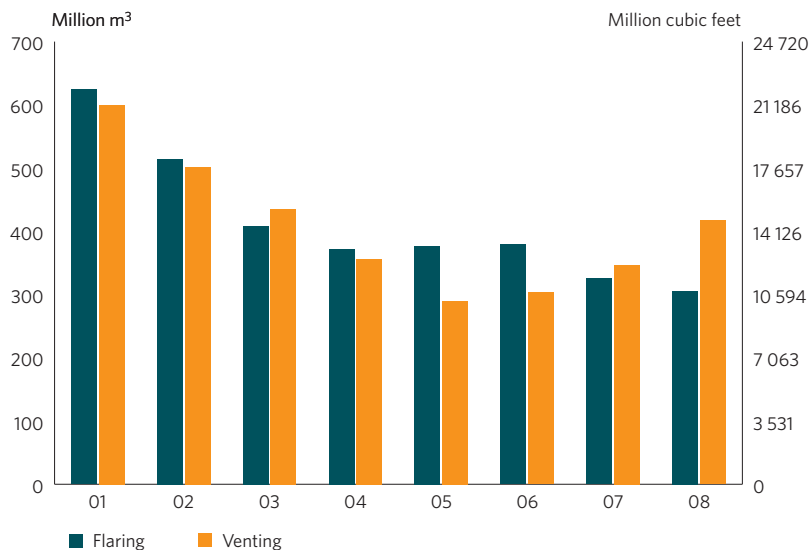
Solution gas is gas that is separated from oil and bitumen production, which represents the largest source of flaring and venting in Alberta. The volume of solution gas produced in 2008 was 14 948 million m<sup>3</sup> (530 564 MMcf), a decrease of 7.3 per cent from 2007. This decrease in production of solution gas can be attributed to lower gas production from conventional oil.

In 2008, volumes of solution gas flared decreased, while vented volumes modestly increased. As in 2007, an important consideration is that solution gas conservation is primarily economics based. While solution gas conservation remains a top priority for the ERCB, economic factors such as the lower

Solution Gas Flaring and Venting Reduction Trend



Solution Gas Flared and Vented Volumes



overall price of gas and increasing cost of services and equipment led to the reduction in solution gas conservation.

The volume of solution gas flared and vented declined from the 1996 level of 1808 million m<sup>3</sup> (63 849 MMcf) to 750 million m<sup>3</sup> (26 620 MMcf) in 2008.

A 95.1 per cent solution gas conservation rate was achieved in 2008, a decrease of 0.7 per cent from 2007.

The flaring of solution gas decreased significantly from 2007 to 306 million m<sup>3</sup> (10 861 MMcf) in 2008, a 5.8 per cent drop. This represents a reduction of 77.2 per cent from the 1996 flaring baseline 1340 million m<sup>3</sup> (47 322 MMcf).

The venting of solution gas increased from 2007 to 417 million m<sup>3</sup> (14 801 MMcf) in 2008, which represents a reduction of 40.7 per cent from the 2000 venting baseline of 704 million m<sup>3</sup> (24 862 MMcf).

The ERCB is concerned about the year-over-year increase in solution gas venting. The ERCB is working with the Clean Air Strategic Alliance's (CASA) Flaring and Venting Project Team to examine other ways of conserving gas besides the economics-based test. Any results of this team's work that leads to reductions in solution gas venting may be incorporated into future regulation.

For more information on upstream petroleum industry flaring and venting, see *ST60B-2009: Upstream Petroleum Industry Flaring and Venting Report*.