Petroleum and Petroleum Products in Montana

Montana Petroleum Quick Facts
(in round numbers)

Recent production: 19 million barrels per year

Amount of crude production exported: 90 percent

Refineries in state: Billings (2), Laurel, Great Falls

Total refinery capacity: 180,000 barrels/day

Crude oil receipts at refineries: 60 million barrels per year

Source of crude oil refined in state in recent years:
Montana – 4 percent
Alberta – 75 percent
Wyoming – 21 percent

Amount of liquid fuel refined products exported: 55 percent

States petroleum products are exported to:
Washington
North Dakota
Wyoming (and points south)

Montana consumption of petroleum products: 30 million barrels (includes refinery usage)

Gasoline sold in-state: 500 million gallons

Diesel fuel sold in-state: 350 million gallons (includes railroad usage)

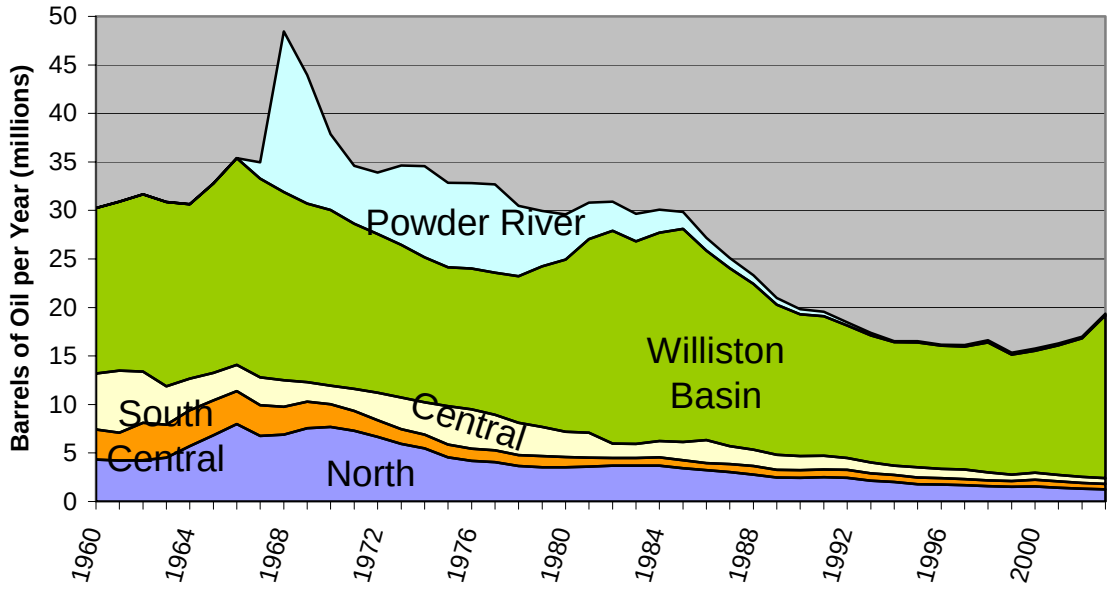
1. Production History

The first oil wells drilled in Montana were located in the Butcher Creek drainage between Roscoe and Red Lodge, beginning in 1889. These wells were not very successful. The first significant oil production in the state came from wells drilled in the northward extension of Wyoming's existing Elk Basin field in 1915, southeast of Belfry. Montana's first new oil field was Cat Creek, near Winnett, discovered in 1920. That soon was followed by the Kevin Sunburst field discovery in 1922. Over the next 40 years, more oil fields were developed in the Williston Basin (northeast Montana), the Sweetgrass Arch (northern Montana), the Big Snowy Uplift (central Montana), the northern extensions of Wyoming's Big Horn Basin (south central Montana) and the Powder River Basin (southeastern Montana).

Montana's petroleum production peaked in 1968 at 48.5 million barrels (1 barrel = 42 gallons), the result of cresting Williston Basin production combined with a surge of

production from the newly discovered Bell Creek field in the Powder River Basin (Table P1 and Figure P1). Production then declined quickly until 1971, when a series of world oil supply shocks began to push prices upward, stimulating more drilling. Production remained relatively stable between 1971 and 1974 as Powder River Basin output increased to match a decline in Williston Basin output. After 1974 production began to decline, despite the continued escalation of oil prices (Table P2).

Figure P1. Historical Oil Production



Source: Table P1.

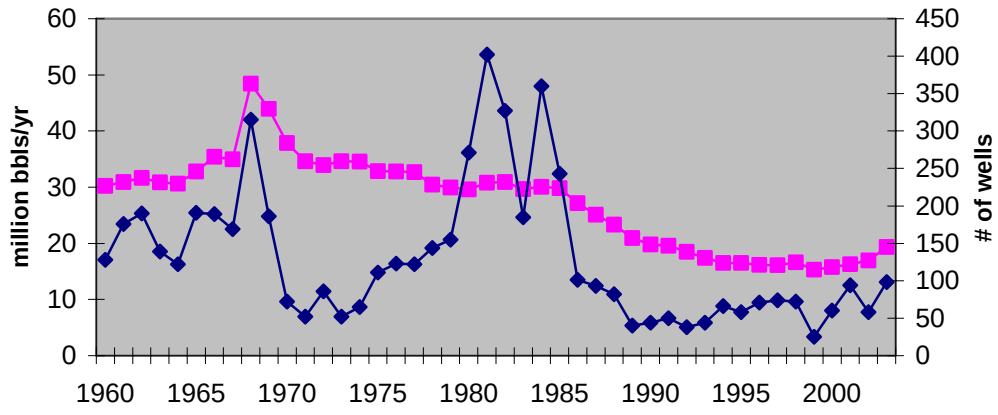
World oil price shocks following the Iran crisis in 1979 sparked a drilling boom, which peaked at 1,149 new wells of all types in 1981 (Table P3). That year, the average price of Montana crude climbed to almost $35 per barrel. While the increase in the price of oil encouraged more drilling, it did little to increase Montana production (Figure P2). The drilling produced a high percentage of dry holes and was unable to slow the decline in statewide production (Figure P3). Output increased in the Williston Basin during the early 1980s, but this was matched by a steep decline in output from other areas. Production declined significantly following the drop in world oil prices in 1985, stabilizing around 16 million barrels per year in the mid-1990's, before climbing back over 19 million barrels in 2003. Wells in Montana are not that prolific, averaging 15-18 barrels per day in recent years (Table P1).

2. Refineries and Pipelines

Petroleum pipelines serving Montana consist of three separate systems (see Map, below). One bridges the Williston and Powder River Basins in the east and the other two link the

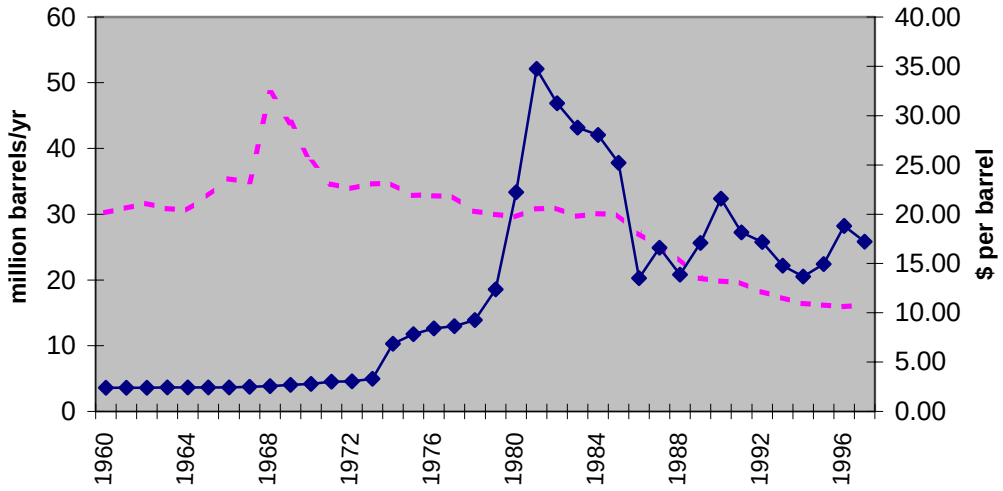
Sweetgrass Arch, Big Snowy and Big Horn producing areas in central Montana. All these systems also move crude oil from Canada to Montana and Wyoming. (A fourth—Express—primarily carries Canadian crude through Montana.) In recent years, around 90 percent of oil production has been exported from the state, mostly to Wyoming and beyond through the eastern pipeline system. This pipeline system is not connected to any of the Montana refineries, which limits the amount of Montana crude they can use.

Figure P2. Oil Production and Well Completions, 1960-2003



Source: Table P1 and P3

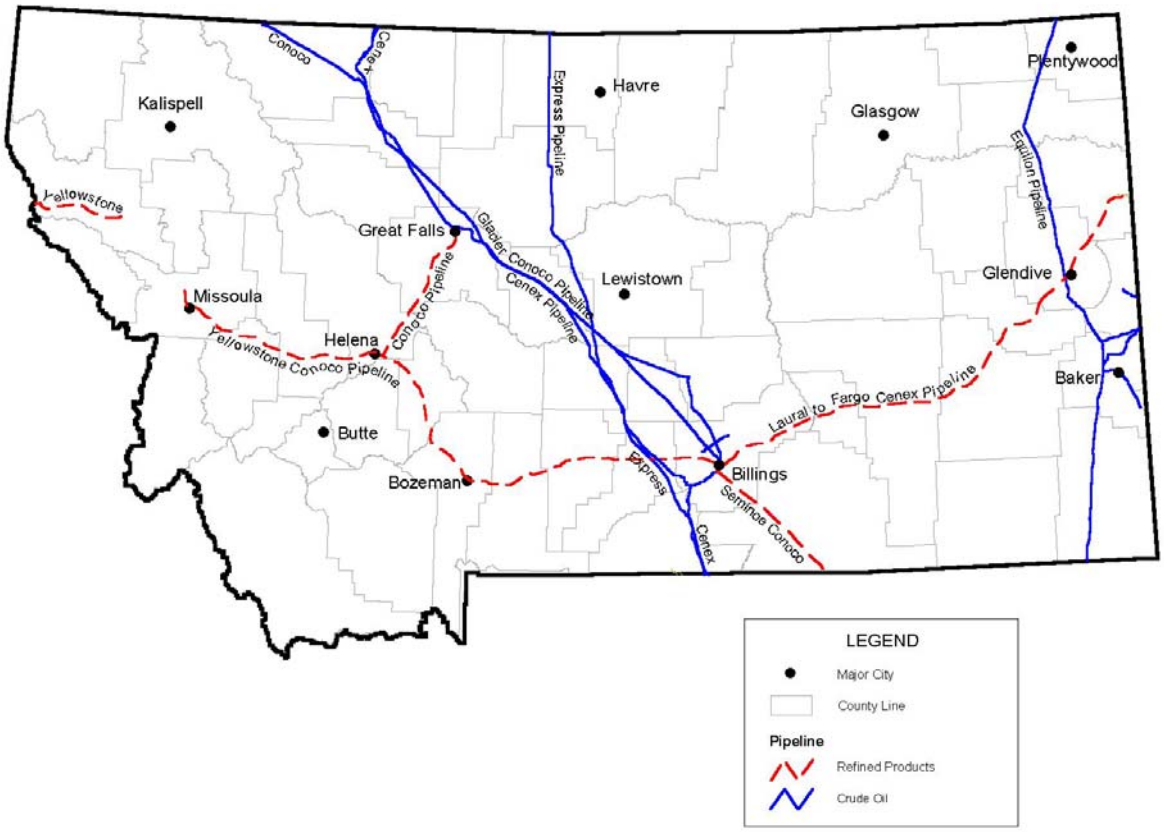
Figure P3. Production vs. Price, 1960-1997



Source: Table P2

Montana has four refineries, with a combined capacity of 181,200 barrels/day: ConocoPhillips (60,000 bbl/day) and ExxonMobil (58,000 bbl/day) in Billings, Cenex (55,000 bbl/day) in Laurel, and Montana Refining (8,200 bbl/day) in Great Falls. Montana refineries now use around 60 million barrels of crude a year (Table P4). In the last decade, less than 5 percent of that came from Montana crude. Oil fields in the Sweetgrass Arch, Big Snowy and Big Horn areas provided crude to the Montana refineries. Collectively, around 75 percent of the refinery crude inputs came from Alberta, Canada and around 20 percent came from Wyoming. The shipments from Canada have increased since the late 1960s, as Montana oil production and imports of Wyoming crude declined. (Figure P4, below)

MAP: Petroleum Pipelines in Montana



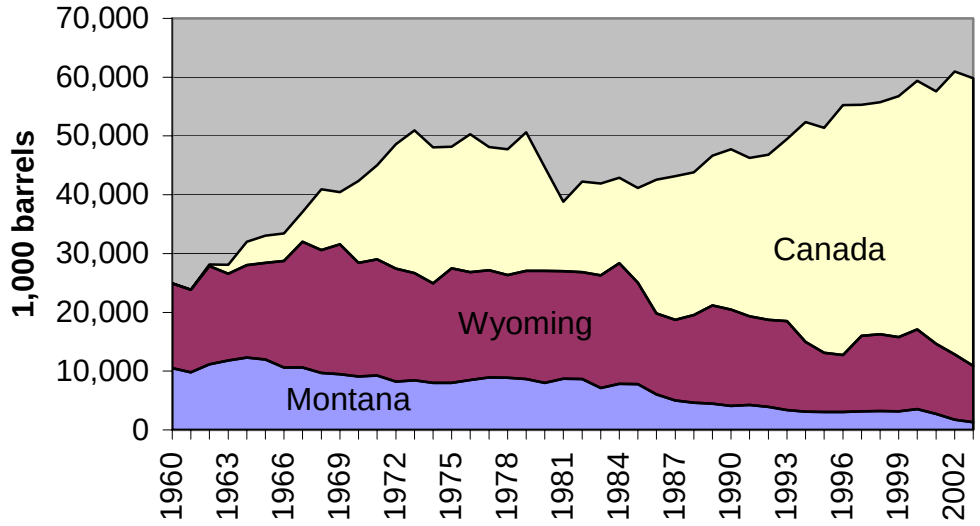
The refineries vary in their sources of crude inputs (Table P5). ConocoPhillips is the most dependent on Canadian crude, taking an average (1998-2003) of 94 percent of its total receipts from Canada. ExxonMobil is the least dependent on Canadian crude (43 percent of receipts) but by far the most dependent on Wyoming (54 percent of receipts).

Almost all of refinery output is moved by pipeline. The Billings area refineries ship their products to Montana cities and east to Fargo, North Dakota (Cenex pipeline), to Wyoming and further south (Conoco Seminoe pipeline) and west to Spokane and Moses Lake,

Washington (Conoco Yellowstone pipeline). In 2003, 23 million barrels of product were shipped out of state, with nearly half heading south and the remainder split roughly between east and west.

The four refineries provided almost all of the petroleum products consumed in Montana. Beyond that, around 55 percent of the liquid fuel produced at the refineries is exported. Montana refineries provided about 10 percent of Washington's combined gasoline and distillate use in recent years. North Dakota received over one-third of its combined gasoline and distillate use from Montana refineries. For both states, Montana provided more gasoline than diesel.

Figure P4. Refinery Receipts by Source of Oil, 1960-2003



Source: Table P4

3. Petroleum Products Consumption

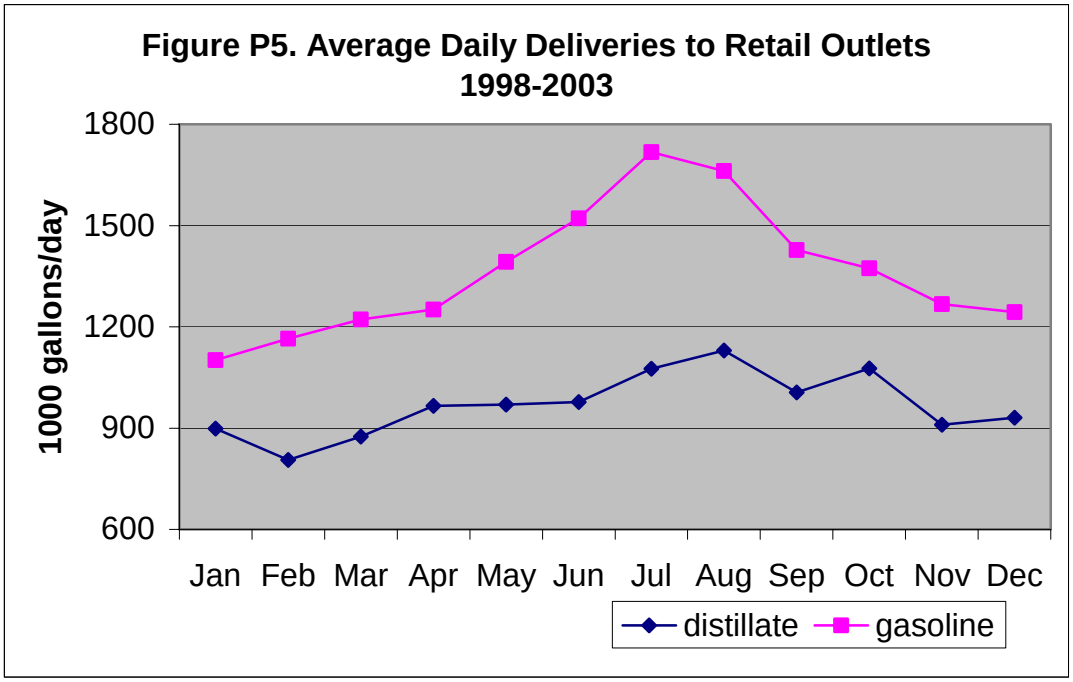
Petroleum product consumption in Montana peaked at 33 million barrels in 1979 (Table P6). It then drifted lower, settling in the mid-1980's around 24 million barrels per year. After that, consumption began a slow climb, to around 30 million barrels per year at present.

The transportation sector is the single largest user of petroleum and the second largest user of all forms of energy in Montana. In 2001, 38 percent of petroleum consumption was in the form of motor gasoline and 28 percent was distillate, mostly diesel fuel. Around 20 percent was consumed in petroleum industry operations (Table P6).

Gasoline use peaked in 1978, at half a billion gallons, dropped and slowly climbed back to near that level currently, with minor fluctuations since the mid-1990s (Tables P10 and P11). Diesel use generally has increased since the 1970's. In the last decade, highway diesel use grew at a far greater rate than did gasoline use (Table P11).

The fluctuations in demand for gasoline and diesel fuel since 1970 reflect changes in the state and national economy and the international price of oil. The embargo by the Organization of Petroleum Exporting Countries (OPEC) in 1973-1974 and the Iranian crisis of 1979-1980 drove prices up and demand down. The increase in prices prompted advances in vehicle efficiency and a fuel switch by heavy-duty trucks from gasoline to diesel. The crash in international prices in 1985, the economic growth of the 1980's and 1990's, along with the decline in vehicle fleet fuel efficiency in recent years pushed gasoline and diesel demand back up.

Fuel use shows a cyclical rise and fall through the year (Tables 12a and 12b; Figure P5). Use tends to rise during the summer months and taper off during the winter. The winter trough in fuel use is a third lower from the summer peak. This seasonal pattern is caused by variations in the use of Montana's one million vehicles, by the increase in tourist traffic during the summer, and by seasonal agricultural uses.

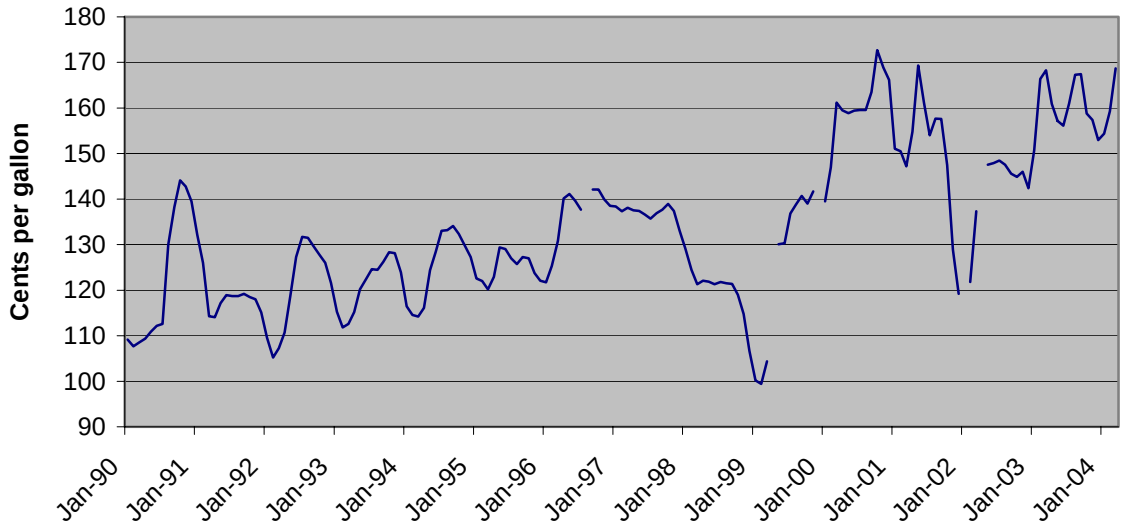


Note: Deliveries are to retail outlets for sale.

The price of gasoline has been rising over the last decade, hitting all-time highs (not adjusted for inflation) in the past year (Table P13 and P14; Figure P6). The price of gasoline can vary significantly around the state, a fact that is masked by the data, which only are available as

statewide averages. (Complete data on the Montana price of diesel were not available.) The price of gasoline has a cyclical rise and fall, just like demand for gasoline; however, price lags demand, with peak prices tending to appear after the peak driving season (Figure P7).

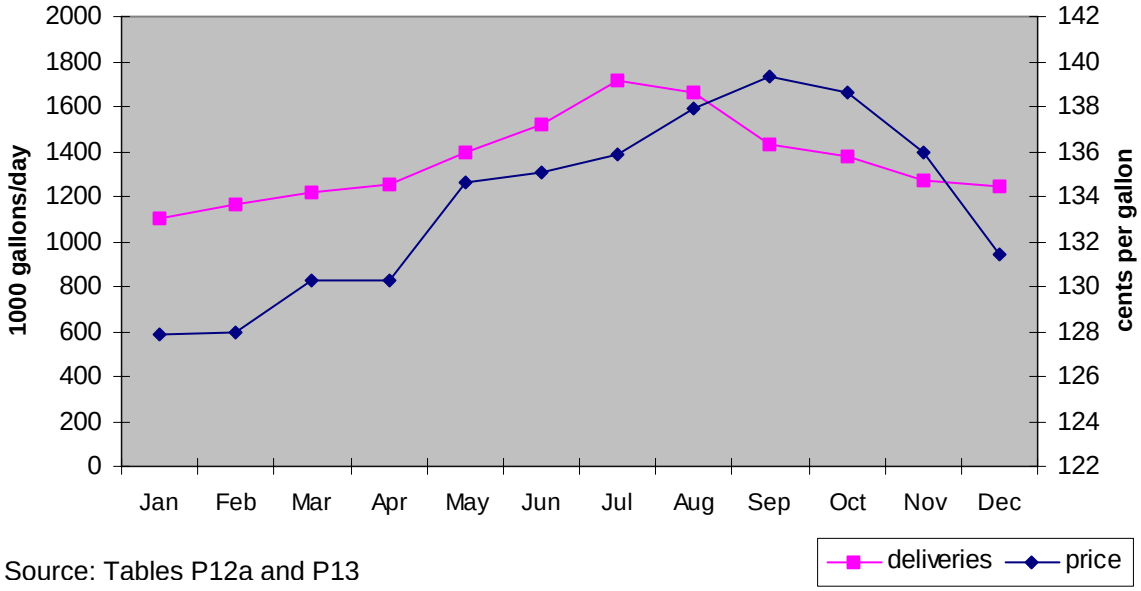
Figure P6. Retail Price of Gasoline, 1990-2004*



* Average of all grades of gasoline statewide, in nominal dollars (some data missing).

Source: EIA 782a database

Figure P7. Average Monthly Price of Gasoline vs Delivery for Sale (1998-2003)



Source: Tables P12a and P13

Comments on the data

Data for this report come from a variety of sources, which don't always agree exactly. In part this is due to slightly different data definitions and methods of data collection. The reader should always consider the source and context of specific data