



# Peaking of the oil age

## Defined

**Peak oil:** the year beyond which less worldwide oil is produced each year.

## Oil, the lifeblood of our industrial society

This liquid fuel is our most versatile and compact form of energy — and it's cheaper than bottled water. A gallon of oil generates as much energy as the work of 50 people toiling all day. Past growth in yearly production has made possible rapid population growth, plastics and chemicals, inexpensive food, and a highly mobile lifestyle. On average, each Minnesotan uses 25 barrels of it each year.

- Oil provides 40% of the world's energy needs.
- 2/3 of the oil consumed in the U.S. is used for transportation.
- More than 15% of all U.S. fossil fuel use is devoted to supplying us with food.



Drill head from an oil rig

## U.S. oil production peaked in 1970

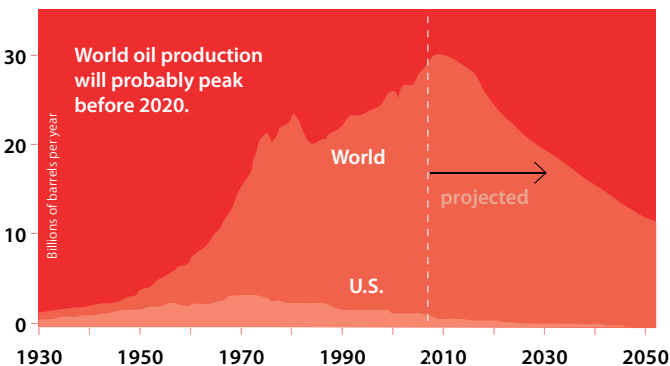
- In 1956, Shell Oil geologist M. King Hubbert correctly predicted that U.S. yearly production (extraction) of oil would peak in 1970.
- Despite new oil finds, advances in technology and increased drilling, U.S. yearly oil production continues a geologically inevitable decline.
- Over 60% of the oil used in the U.S. comes from outside the country.

## World oil production will also peak – probably before 2020

- "Hubbert curves" for the world show oil peaking about 40 years after the mid-1960s exploration peak.
- Peaking of world oil, like peaking of an individual oil field, will occur when about half of the total recoverable oil stock remains, and when less oil flows each year.
- Costs of remaining oil and oil substitutes like ethanol will increase.
- The ability of oil substitutes and remaining oil to meet rising energy demands is very uncertain.

## Reaching the top

### World and U.S. production of oil



Of the 65 largest oil-producing countries responsible for most of the world's oil, 54 have already peaked.

"We've embarked on the beginning of the last days of the Age of Oil."

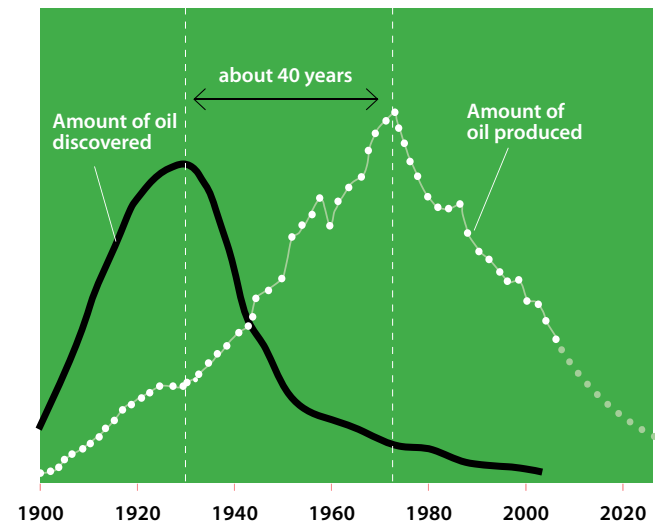
Michael Bowlin  
CEO, ARCO (U.S. oil company)  
February 11, 1999



Gas didn't seem cheap in March 2007. Will we see prices this low again?

## 40 years from peak to peak

### U.S. oil discovery vs. production



The trend: Just as oil discovery rises and falls, so goes oil production decades later (illustrated above by the U.S. experience). Will the world follow in these footsteps?

"The world has never faced a problem like this. Without massive mitigation more than a decade before the fact, the problem will be pervasive and will not be temporary." — Robert Hirsch, U.S. Dept. of Energy report, 2005

“Invest far more aggressively in the necessities of a post-petroleum era — which may be arriving sooner than we like to think.”

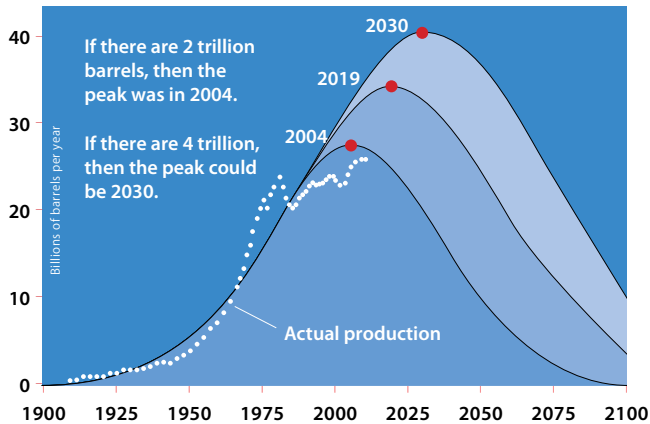
Star Tribune editorial, August 27, 2005



Abandoned oil drill pumps litter the southern and western United States. U.S. production reached its peak in 1970.

## When will production peak? It hinges largely on how much oil the earth has

Demand for oil is increasing but the total supply is geologically fixed, and uncertain. Predicting the peak oil year depends most on predicting the total amount of conventional oil that will ultimately be extracted. About 1 trillion barrels of oil - 95% of it conventional - have been extracted to date.



## The peak year is affected by other underground and above-ground factors

- **Unconventional oil:** How much oil will be produced from oil shale, heavy oil, tar sands, deepwater oil, polar oil, natural gas liquids and coal liquids?
- **Technology and capital:** How much will oil exploration and extraction technology improve? How fast will current shortages in skilled labor, drilling rigs and financing be overcome?
- **Net energy:** How fast will the energy return on energy invested in exploration and extraction decrease?
- **Energy efficiency:** How efficiently can we use oil?
- **Substitutes:** To what extent can we substitute natural gas and electricity for liquid fuels?
- **Natural gas and coal:** Has North American natural gas already peaked? Will world coal production peak as early as 2050?
- **Renewables:** How much energy can we produce from renewable fuels (biodiesel, ethanol, biomass gas-to-liquids)?
- **World oil demand:** How will world population and the price of oil change? To what extent can people decrease energy use? How will economic growth and lifestyles change? How politically unstable will the Middle East become?

## A lower-energy, reallocated future Challenges, opportunities and next steps

The challenges and risks of peak oil present an opportunity to redesign how humans can exist within the limits of the natural world while also improving our quality of life. Communities can benefit in particular by saving money through energy conservation and by producing renewable energy locally. These actions will also help to address the related issue of climate change, as dozens of Minnesota cities have committed to do. Key steps that citizens and cities can take to create a lower-carbon, energy-secure future and to increase local sustainability include:

- **Increase the efficiency** of energy and raw materials use.
- **Meet more needs locally:** local energy production, more local and seasonal food, more local products and jobs.
- **Mix land uses and keep distances short** between work and home.
- **Develop more local transit:** bus, train, carpooling, carsharing.
- **Walk and bike more,** increasing citizen health.
- **Keep more money circulating in the community** as a result of relocalization efforts.
- **Strive for better connections to each other** and to our only home: the earth.



Locally produced and sold goods



More transit options



Mixed use, walking-friendly design



Regionally produced biofuels, locally produced wind and solar energy

“There are lots of opportunities in our society to live well and comfortably using a lot less energy.”

Roscoe Bartlett, U.S. Representative (R-Maryland), Jan. 2007 address to Congress: The Problems with Fossil Fuels: Peak Oil Production and Global Warming

More information on actions government, business, and citizens can take:  
[www.nextstep.state.mn.us](http://www.nextstep.state.mn.us)

Minnesota Pollution Control Agency

August 2007

### More information on peak oil and sources for this fact sheet

NextStep: [www.nextstep.state.mn.us](http://www.nextstep.state.mn.us) [search for “peak oil”]

Robert Hirsch: *Peaking of World Oil Production: Impacts, Mitigation and Risk Management* (U.S. Energy Information Agency: 2005) [www.tinyurl.com/gqwgw](http://www.tinyurl.com/gqwgw)

U.S. Government Accountability Office: *Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production* (2007) [www.tinyurl.com/2uztad](http://www.tinyurl.com/2uztad)