

# SAN FRANCISCO PEAK OIL PREPAREDNESS TASK FORCE REPORT

## II) INTRODUCTION

A) **WHAT IS PEAK OIL?** Oil is a finite resource. It is the linchpin of all modern economies. In addition to serving as the fuel for 95% of all transportation, tractors, and other heavy equipment, it is used as a feedstock for plastics, chemicals, fabrics, cosmetics, and pesticides. Like most commodities, its price is determined by market forces of supply and demand. Demand for oil has been rising sharply, as developing economies of China and India demand their share. Supply of oil is the central topic of "Peak Oil".

We are not yet "running out of oil". There are still vast reserves of oil in the ground. What matters to the world's economy, however, is not the oil in the ground, but rather the flow of oil, or oil production. This is conventionally measured in millions of barrels per day. Today, worldwide production of petroleum liquids is about 86 million barrels per day.<sup>1</sup> The production of oil is constrained by both geological limits of physically how fast it can be pumped out of the ground, and by human constraints, such as political decisions or wars, retarding development rates.

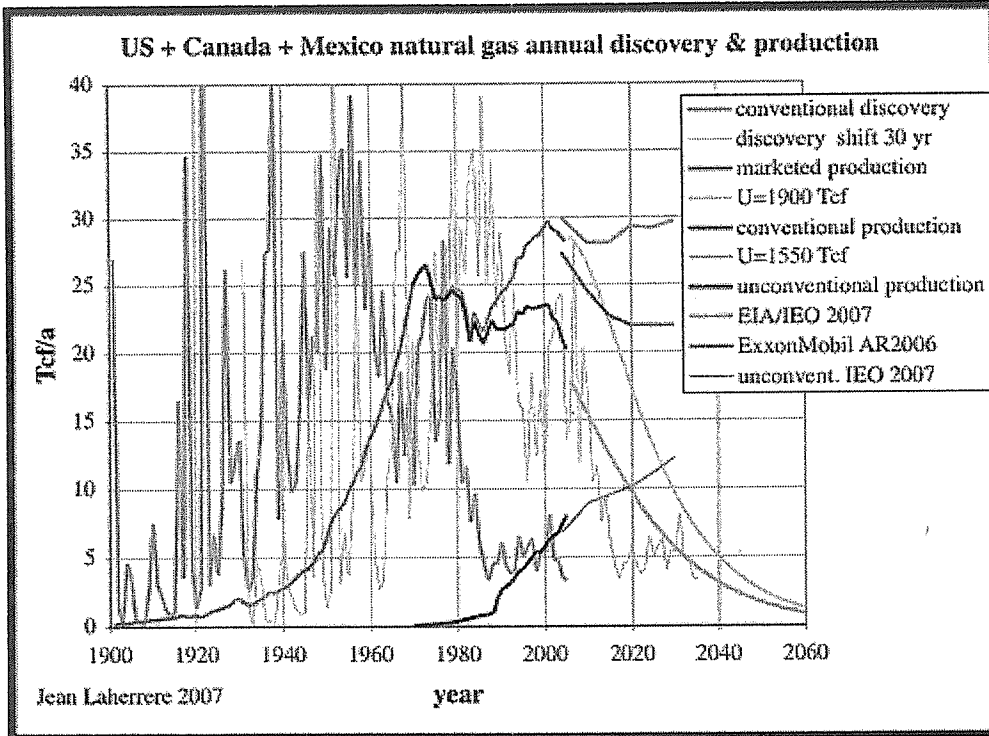
The concept of peak oil asserts that the world is at or approaching the physical limit to how fast oil can be produced. Any given oil field produces oil at a flow rate that roughly follows a bell-shaped curve over time. When you add up all those bell curves, total production forms something like a bell curve.

Though not all production curves are exactly bell-shaped, certain key features are present in the production curve for an oil reservoir: Production increases over time, reaches a peak when approximately half the available oil has been pumped, and begins a steady and inexorable decline thereafter.

Oil exports will fall faster than production. The volume of total oil exports are actually more important to the US than total production. (For example, if Canada increases production by 500,000 barrels, but chooses to keep 750,000 more barrels for its internal use, the amount available to the US economy will have dropped by 250,000 barrels.) Oil exports will follow a different curve than overall oil production. Oil producing nations gradually use more oil, thus leaving less for export, even if their production is unchanged. There is some evidence that oil producing countries are also beginning to withhold production, believing that prices will be higher later on, or planning to ensure their own future supply of oil. Worldwide net oil exports reached a maximum in late 2005, and have been trending downward since then. Exports are currently 1.3% below their peak, as shown below.

{to add - graph of oil exports over time}

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B) Peak Natural Gas:  
Historically, the United States has supplied its own natural gas, or purchased it from Canada. However, natural gas production in North America is in decline.

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The United States is hoping to make up for declining gas production with imports of liquified natural gas (LNG). This strategy has been unsuccessful because the world price of LNG is higher than the north american price. Over the past twenty years, natural gas prices have been 86% correlated with oil prices.<sup>30</sup> We expect this connection to continue, since energy is somewhat fungible.

{graph of natural gas prices}

Electricity prices will follow the price of natural gas, especially in California, where most power plants are fueled by natural gas. In June, 2008, PG&E asked for a 6.5% increase in electric rates, specifically citing the rise in natural gas prices.

### C) SCENARIOS FOR PEAK: {expand or replace}

The exact shape of the peak can vary. In a report published in the journal *Energy Policy*, Robert Hirsch of the consulting firm SAIC has identified three basic possible scenarios for the worldwide peak<sup>2</sup>:

Scenario #1: The US-style peak. US (lower 48) oil production peaked in 1970. The peak was quite sharp, with a subsequent steady decline of about 3% per year that no changes in oil price have been able to reverse.

Scenario #2: The European-style plateau. European oil production peaked in 1996. Following the peak, there was a 6 year plateau, in which oil production oscillated within a 3% range. Since 2002, European oil production has declined by approximately 5% per year.

Scenario #3: Resource nationalism. Regardless of the shape of the peak, exporting countries may choose to keep increasing amounts of oil for their own use as its price rises. There is already some evidence that this is beginning to happen, as Russia and Saudi Arabia have both announced that they will not attempt to increase production. Of known world oil reserves, nearly 90% are controlled by state-owned enterprises, which may not be as strongly influenced by market forces as private oil companies are.

### D) STAGES OF POST-CARBON FUTURE:

Phase I: Rising oil and gas prices. Oil rising to \$250 per barrel, gasoline to \$10 per gallon. Expect to see this 2008-2015.

Phase II: Energy descent; shortages or demand destruction due to prohibitively high prices. Begins 2015 or so.

{Need to expand}

