

The New Strategic Petroleum Reserve - Shale Oil, An Opportunity to Increase Energy and Economic Security*

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Search and Discovery Article #40561 (2010)

Posted July 19, 2010

* Adapted from an oral presentation at AAPG Annual Convention and Exhibition, New Orleans, Louisiana, USA, April 11-14, 2010

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Abstract

America was once the world's energy exporter and it was built on inexpensive energy. Today, the future is challenged not only by increasing concerns on supply, but more importantly on the reliability of supply and price. The Strategic Petroleum Reserve was created in the 1970's specifically to address the concern of supply and price in the event of an embargo or war. However, at the time of its conception the reserve would have provided an extended reserve with 1 billion barrels. Today with less than 750 million barrels of oil, any president would hesitate to use it as no one is certain what constitutes an emergency. This is primarily driven by the fact that today's reserve can only 'produce' 2-4 million barrels a day covering 15-30% of imports for up to one year. And we can provide no assistance to any other country.

Today, an opportunity exists to address this hole in our energy, environmental and economic security. The technology exists to develop our shale oil resources and have them available on demand to satisfy at least the same amount of imports for an essentially indefinite period. Furthermore, produced with new technology these resources could be extracted with minimal carbon emissions in comparison to either the tar sands of Canada or potentially even the oil fields of the Middle East (especially when we consider the impact of shipping emissions).

Selected References

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Nummedal, D., Y. Bartov, R. Sarg, and J. Boak, 2009, Oil Shale Stratigraphy — A Global Perspective: AAPG Search and Discovery Article #30083, Web accessed 7 July 2010, http://www.searchanddiscovery.net/documents/2009/30083nummedal/ndx_nummedal.pdf



The New Strategic Petroleum Reserve: Shale Oil, An Opportunity to Increase Energy and Economic Security

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History

- Until 1947, United States major petroleum exporter.
- Following 1948 imports increased significantly thru 1970's.
- In 1973-74 prices increased 4x and then 3x again in 1979.
- Rapid price increases, result utilities shifted away from oil, governments (US) felt vulnerable with Arab Oil Embargo.
- The shock resulted in the US studying the concept of a Strategic Petroleum Reserve.



Strategic Petroleum Reserve (SPR)

- Formulated after Arab Oil Embargo of 1973/74.
- Protect US national and economic security by developing a reserve to replace 'interrupted' petroleum imports.
- Original plan = 1 billion barrels.
- Current capacity 727 million barrels, 715 million in storage.
- With oil price at \$147/barrel (2008), value of petroleum in SPR was worth \$105.1 billion.
- Today at a price of approximately \$80 to \$85/barrel the SPR reserves are worth between \$57.2 and \$60.8 billion.



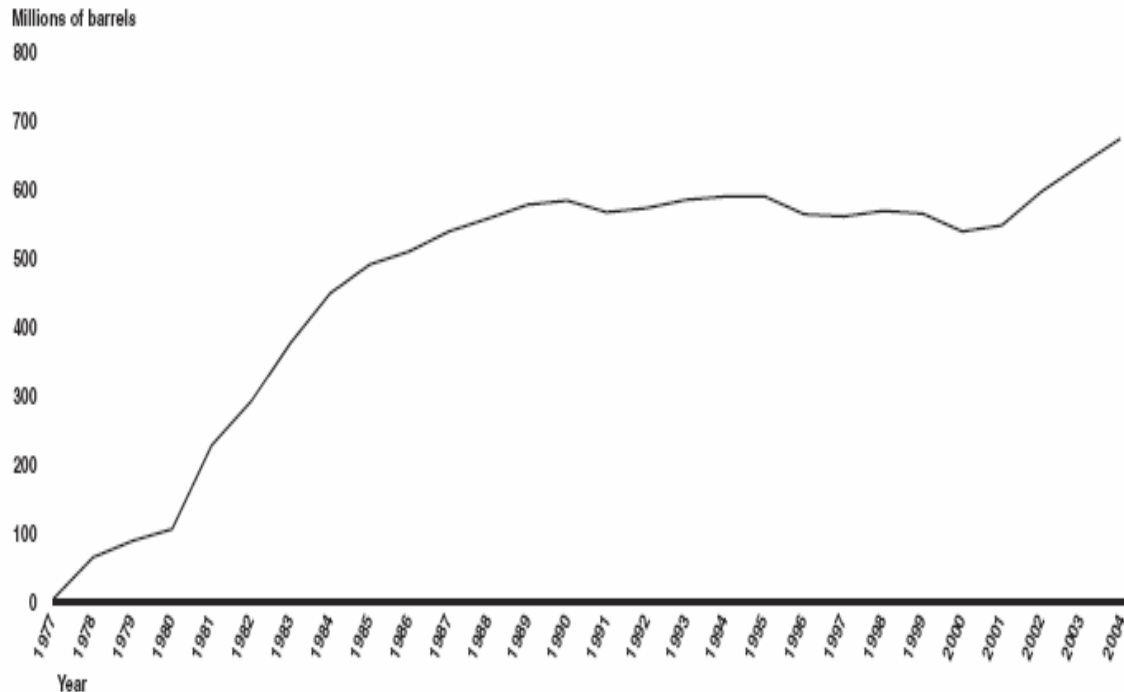
Strategic Petroleum Reserves

- US is not the only country with an SPR
- These include:
 - Japan (~ 320 million barrels),
 - Korea (~ 76 million barrels),
 - Germany, France and Italy (pool reserves (~ 90 days of imports)
 - India (started in 2004, goal 45 days imports by 2016) and
 - China (~ 272 million barrels by 2010).
- SPR have a limited time frame for production...
- Long-term event depletes reserves w/in 3-6 months



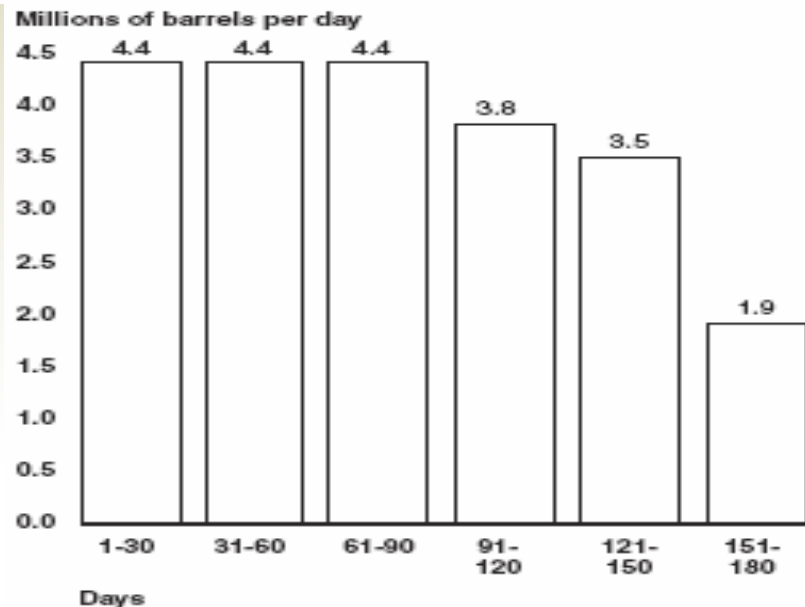
US Strategic Petroleum Reserve

- US has spent \$45.2 billion in today's \$ to build, maintain, fill & manage.
- At peak imports 2007/08, 50-55 days of imports
- Physical production limit of 4.4 MMB/D for 3 MO.
- Production then declines as reserves deplete.



Source: GAO analysis of EIA data.

Note: Congress authorized the SPR in 1975, but filling the reserve did not begin until 1977.

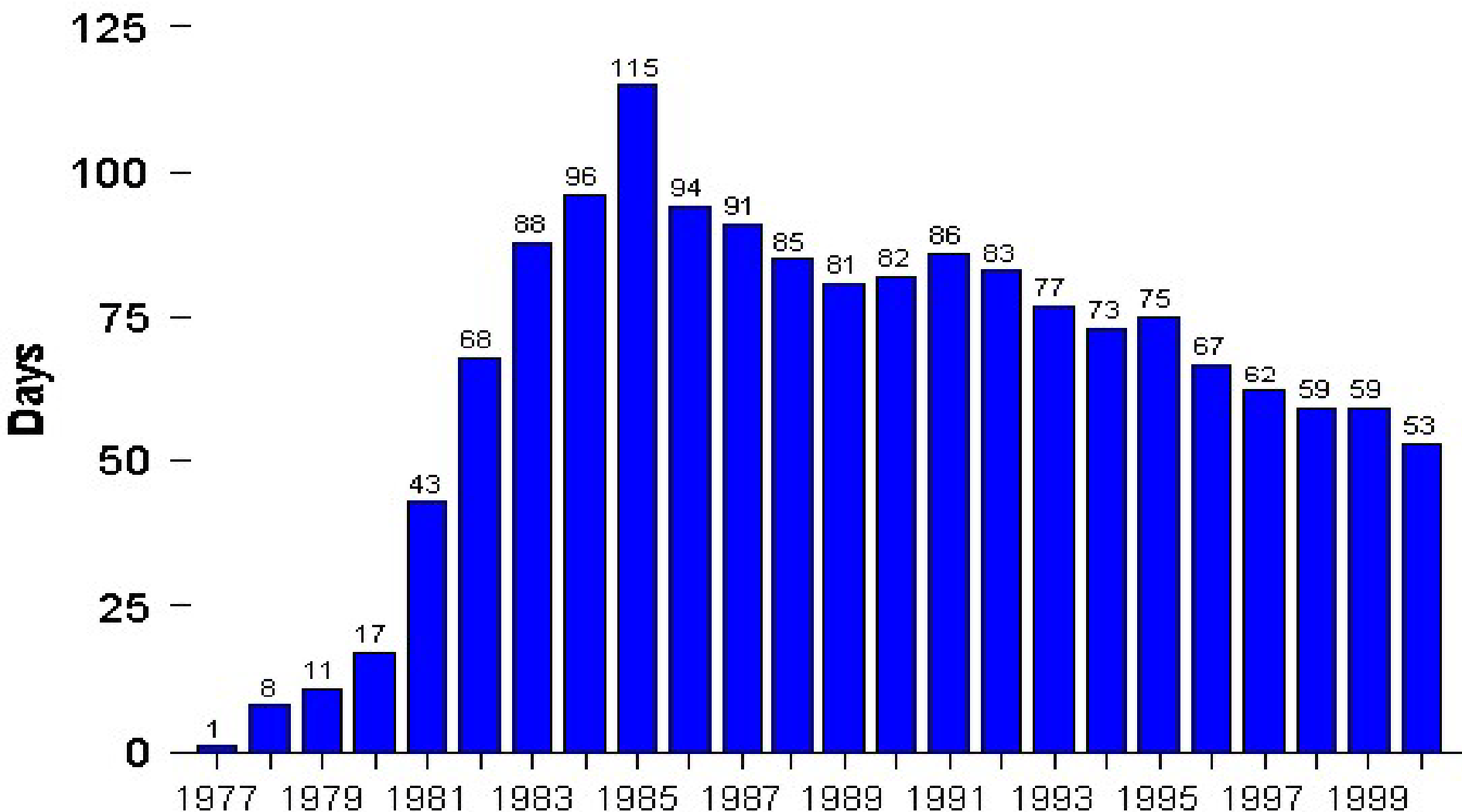


Source: DOE's Office of Petroleum Reserves.

GAO-06-872 Strategic Petroleum Reserve



SPR Stock as Days Worth of Net Imports



<http://www.eia.doe.gov/emeu/aer/eh/frame.html>

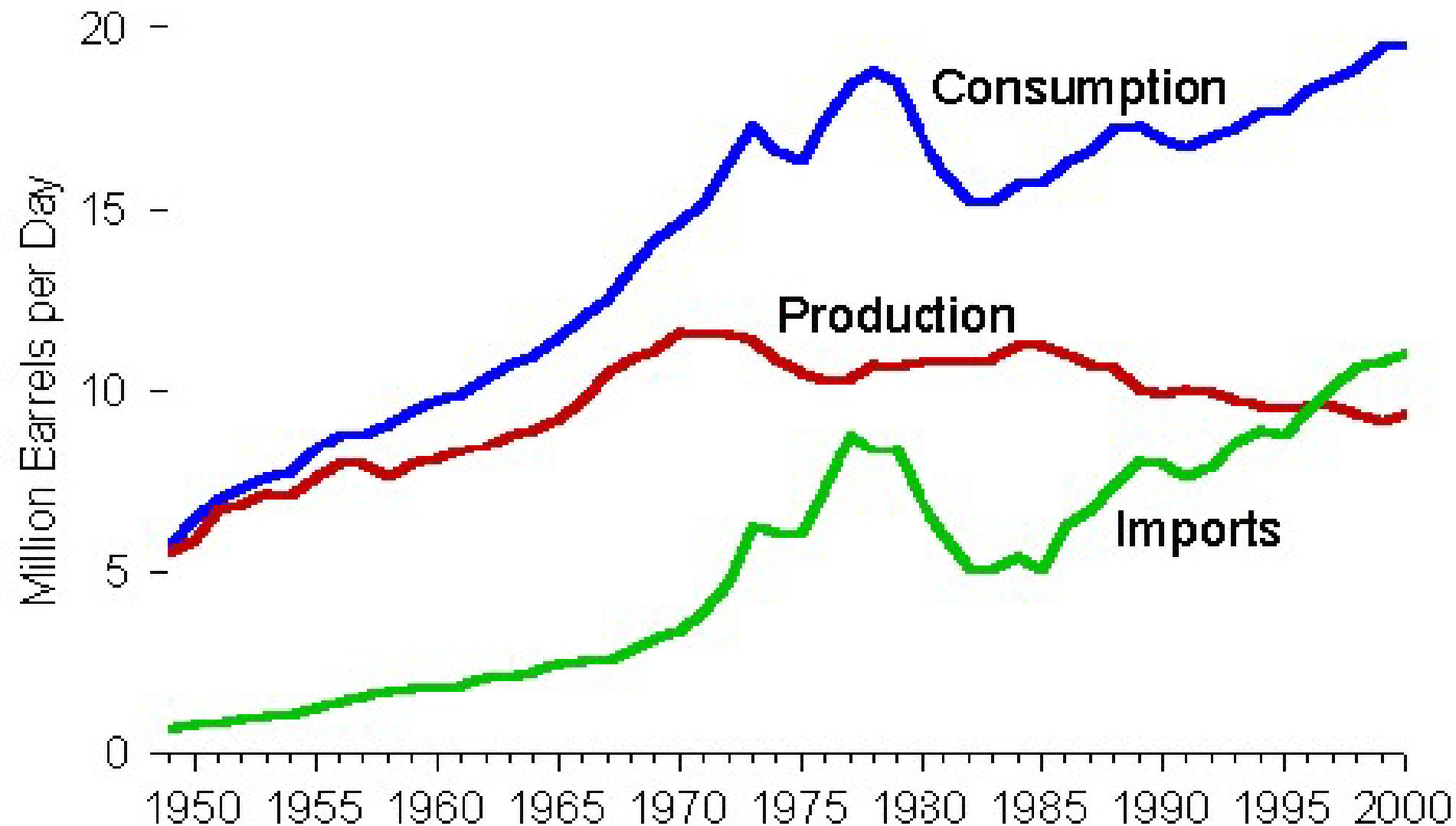


Why has the Import Coverage Declined as Reserves have Increased?

- US oil production peaked in 1970/71, has steadily declined,
- US domestic consumption increased significantly, especially transport sector, where alternatives essentially non-existent.
- The combination of declining production and increasing consumption led to significant increases in imports.

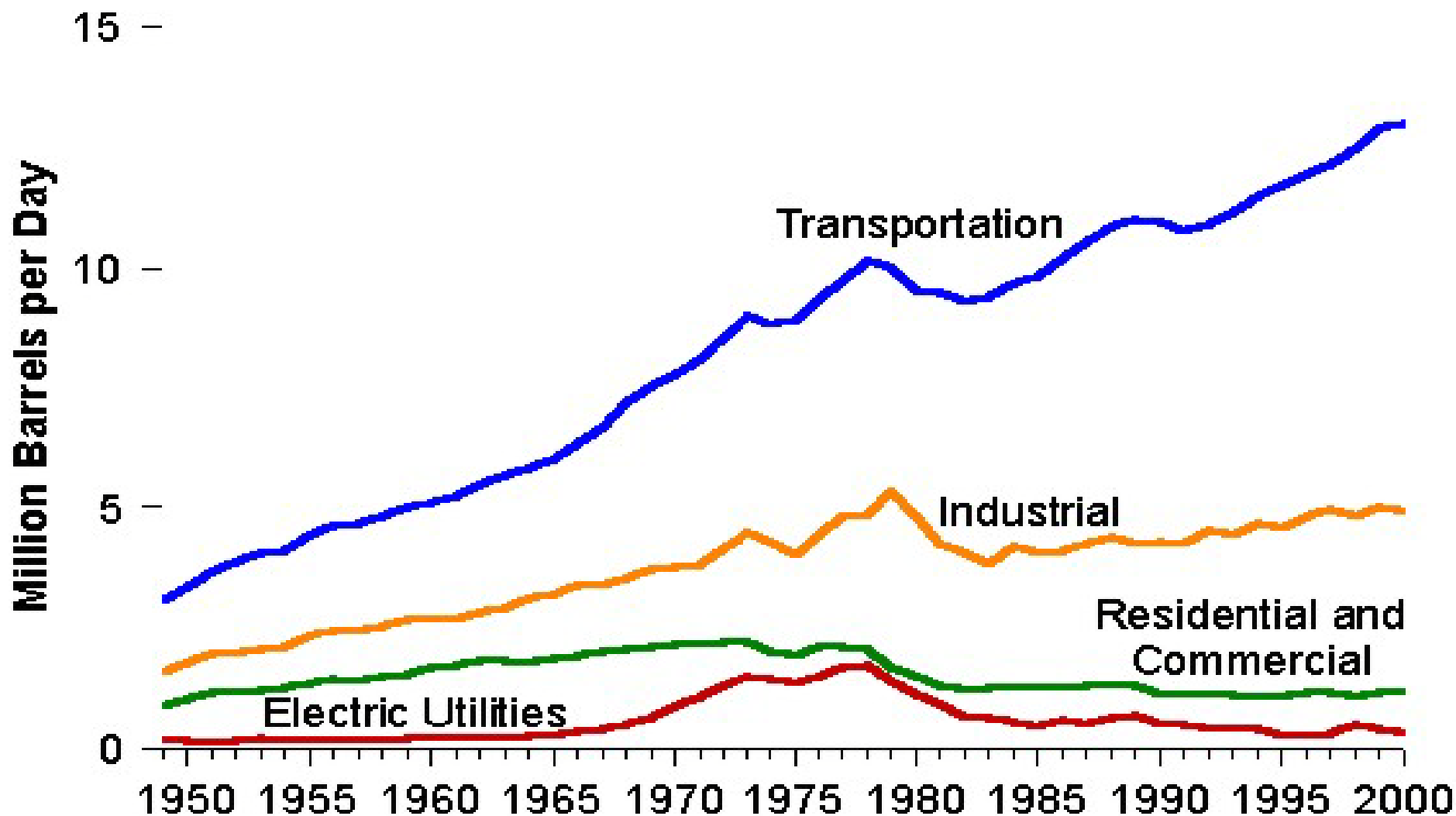


Consumption, Production and Imports of Petroleum (USA)





Petroleum Consumption by Sector





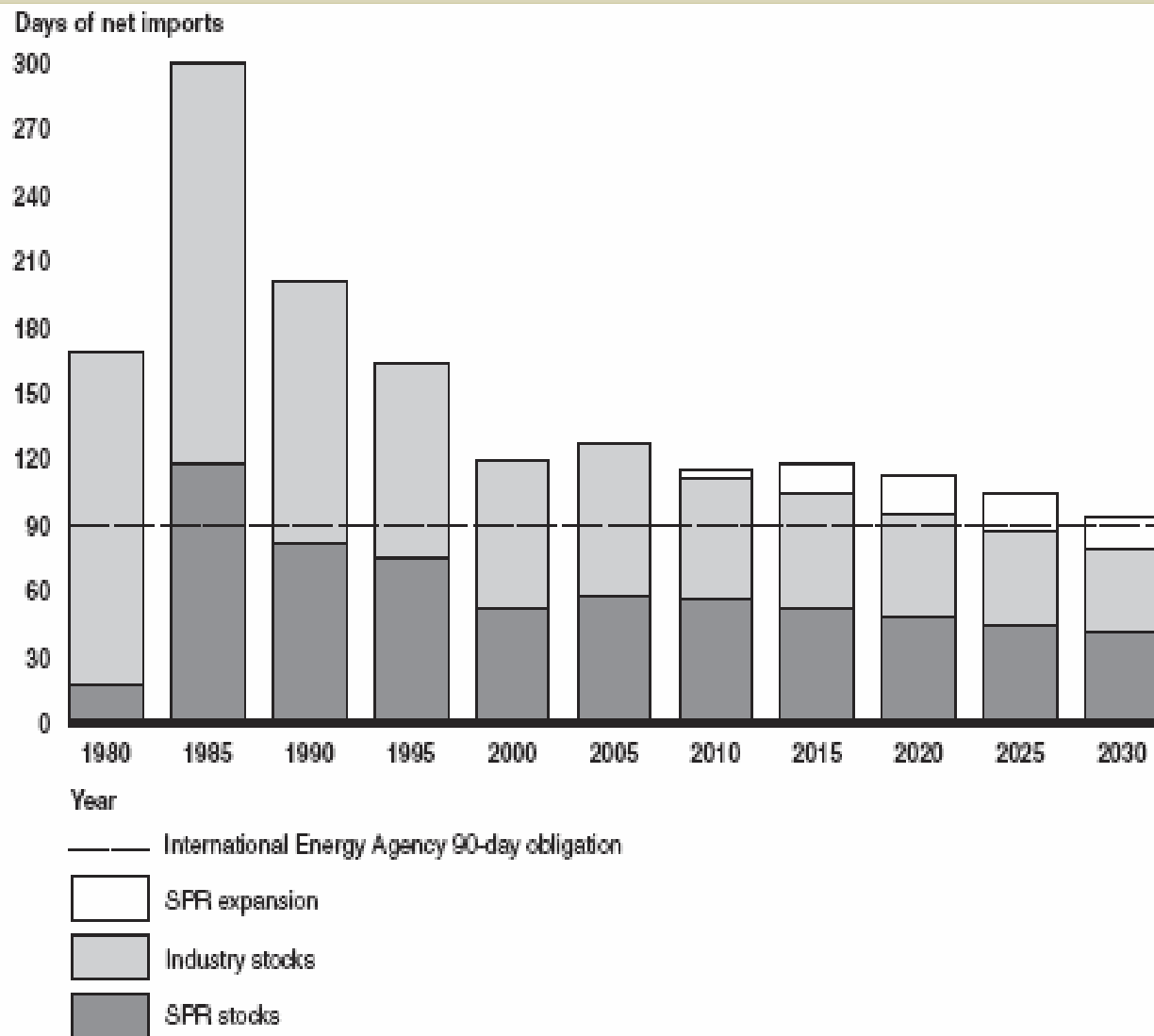
SPR Use

- During the first Iraq Gulf War, 30 million barrels released.
- Hurricane Katrina, ~22 million barrels released.
 - Key problem – crude oil storage does not equal refined products
- As prices soared above \$100, reaching \$147/barrel
 - US and other countries were put in a 'hopeless' position
 - No ability to use reserves to moderate prices
 - Fear that they increase their own vulnerability (reserve depletion)
 - Prices could skyrocket even higher (if strategic reserves depleted)



US Current and Estimated Compliance with IEA Obligation to Hold Reserves

- US / OECD agree to maintain 90 days of reserves to cover net imports.
- Public / Private storage.
- US keep up needs 1 billion barrels.



Source: DOE's Office of Petroleum Reserves.



Peak Oil

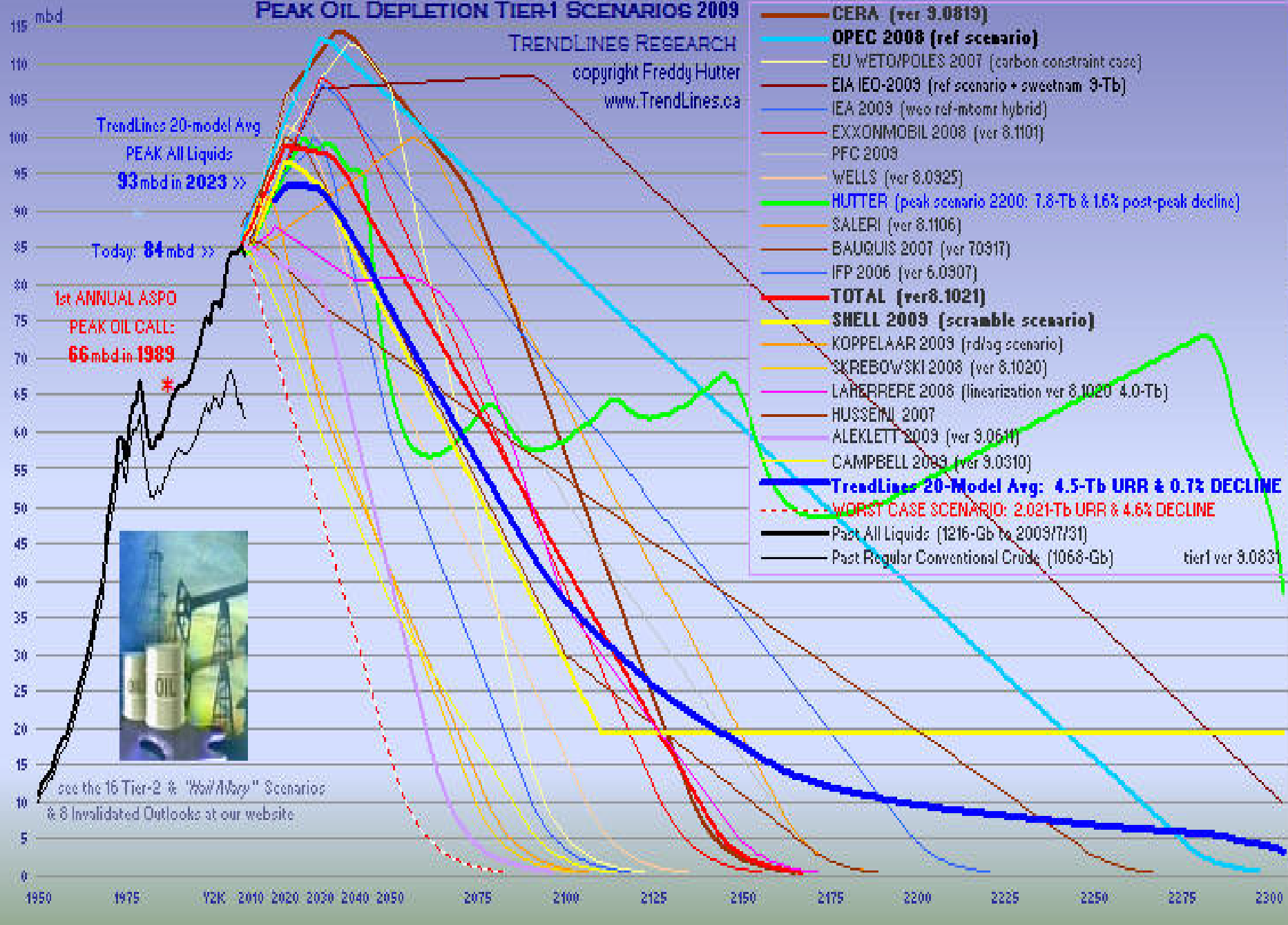
- Global oil production could peak / plateau in near future.
- Peak due to: 1) Geology or 2) Politics
- Concerns – 1) stated reserves inflated, 2) sufficient natural resources, not enough political ability to drill/produce.
- Estimates range from today to next several years.
- 50+ countries have potentially peaked in conventional oil.

PEAK OIL DEPLETION TIER-1 SCENARIOS 2009

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Peak Oil Concerns

- Price spikes could severely weaken global/US economy
- Cause a rush for resources potentially leading to war
- When oil fields peak, production proceeds to decline fairly rapidly, with decline rates of 3-12% per year being typical
- A shortfall of 1-3% in global production has lead to increases of 30-300% in the price of oil.

Peak Oil and the Price of Oil

BARREL METER

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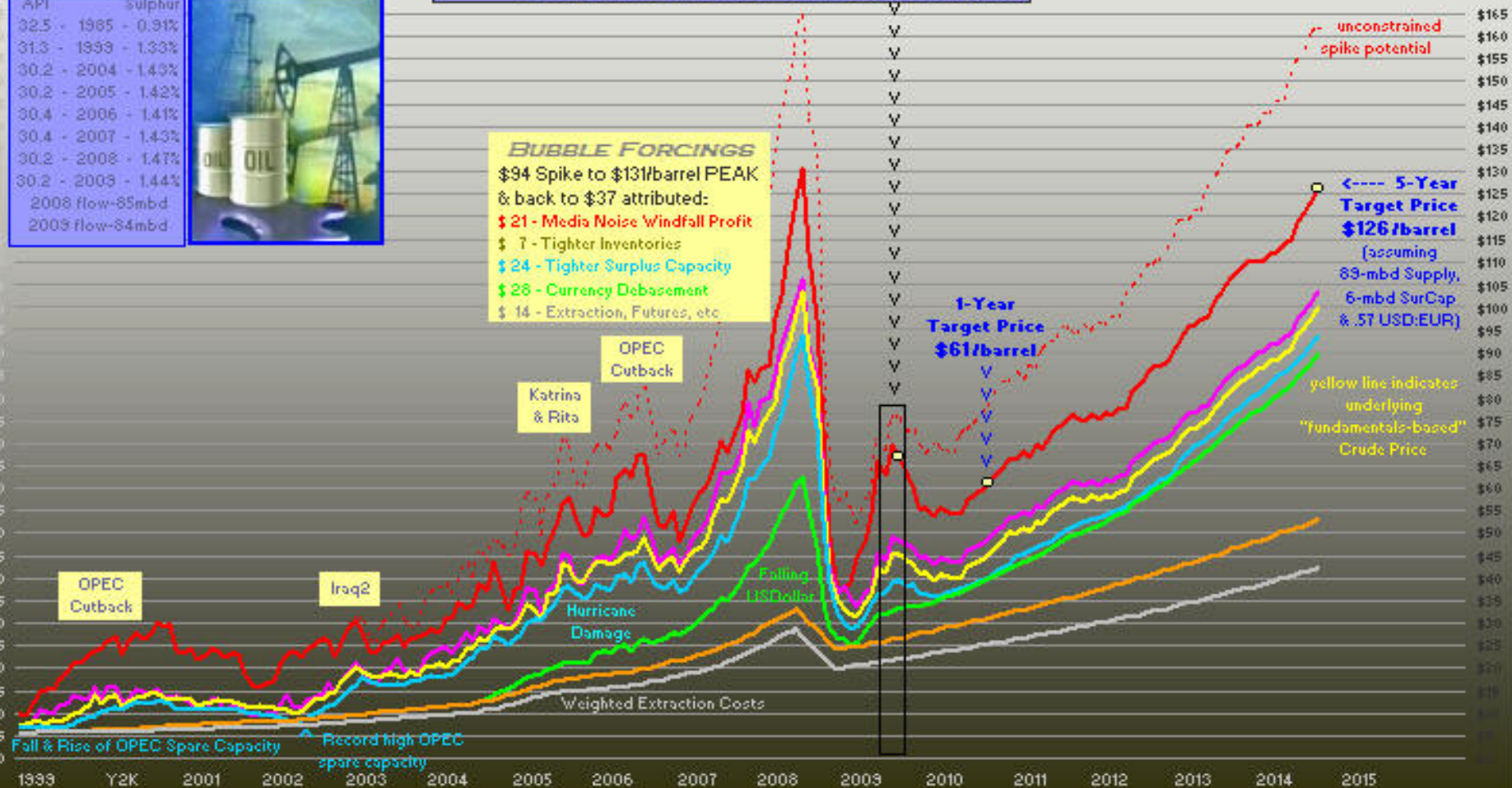


API	Sulphur
32.5 - 1985	- 0.31%
31.3 - 1999	- 1.33%
30.2 - 2004	- 1.43%
30.2 - 2005	- 1.42%
30.4 - 2006	- 1.41%
30.4 - 2007	- 1.43%
30.2 - 2008	- 1.47%
30.2 - 2009	- 1.44%
2008 flow-85mbd	
2009 flow-84mbd	



BUBBLE FORCINGS

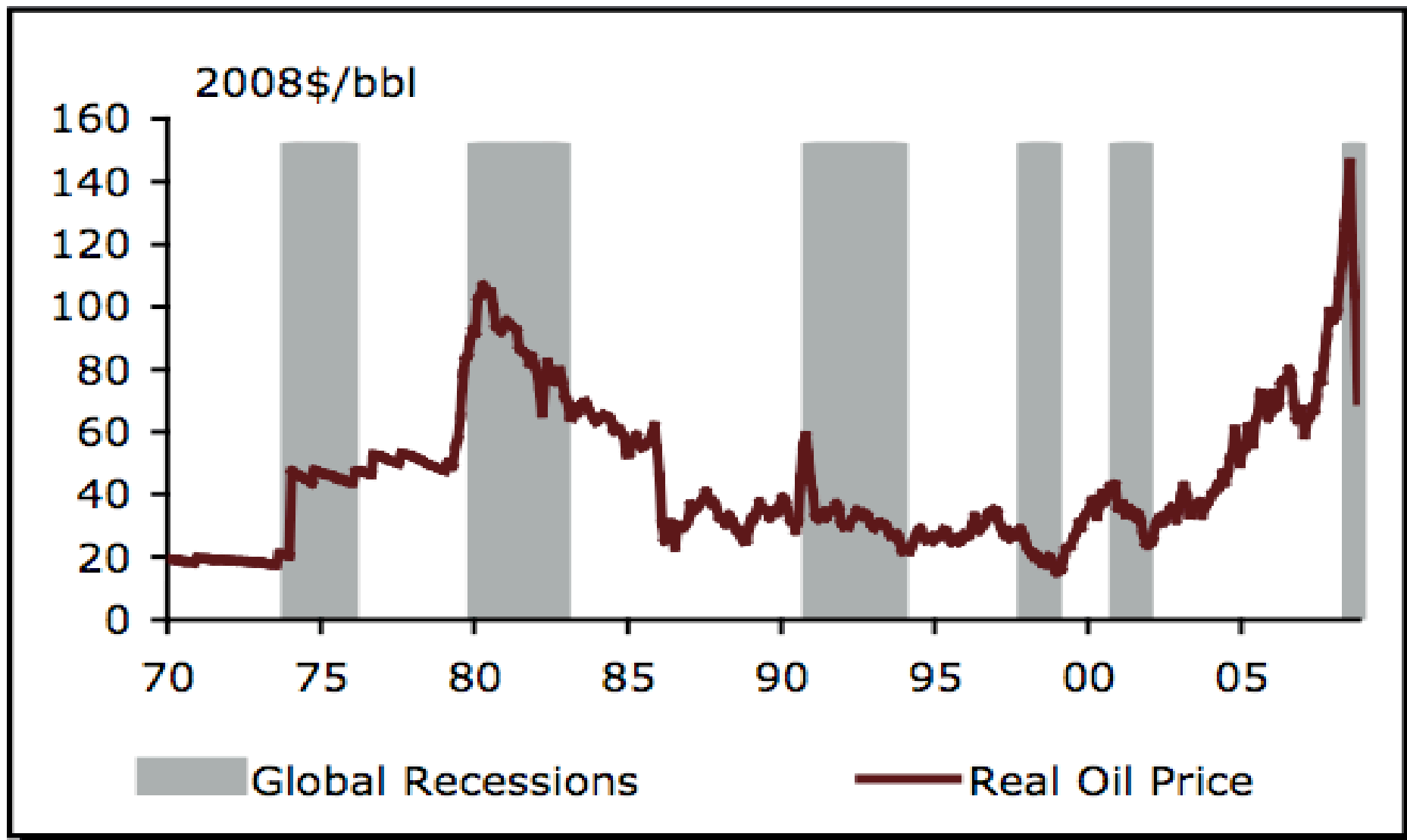
\$94 Spike to \$131/barrel PEAK
& back to \$37 attributed:
 \$ 21 - Media Noise Windfall Profit
 \$ 7 - Tighter Inventories
 \$ 24 - Tighter Surplus Capacity
 \$ 28 - Currency Debasement
 \$ 14 - Extraction, Futures, etc





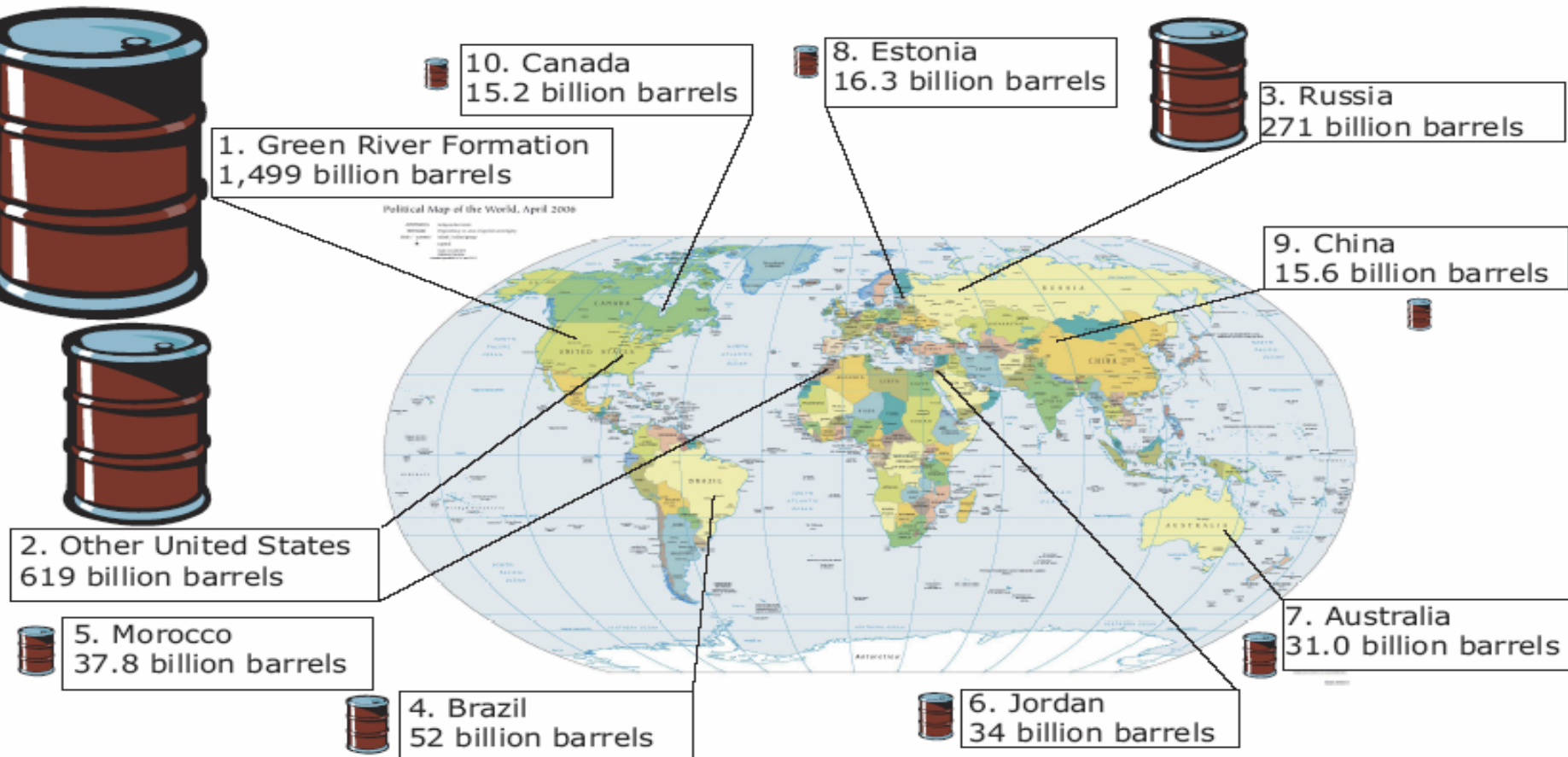
Price of Energy and Economic Growth

Past Recessions and Oil Spikes



Shale Oil – THE Alternative

- Largest deposits (96%) based in US, Russia & Brazil. The US accounts for 70% of total.
- Shale oil is produced in Estonia, Russia, Scotland, Brazil, China, Australia and Germany.





Why Develop Shale Resources

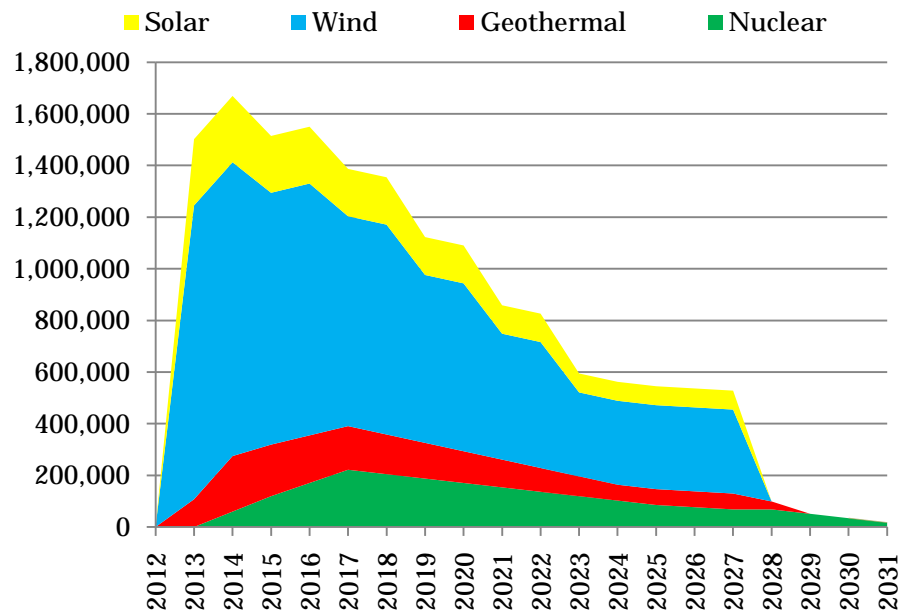
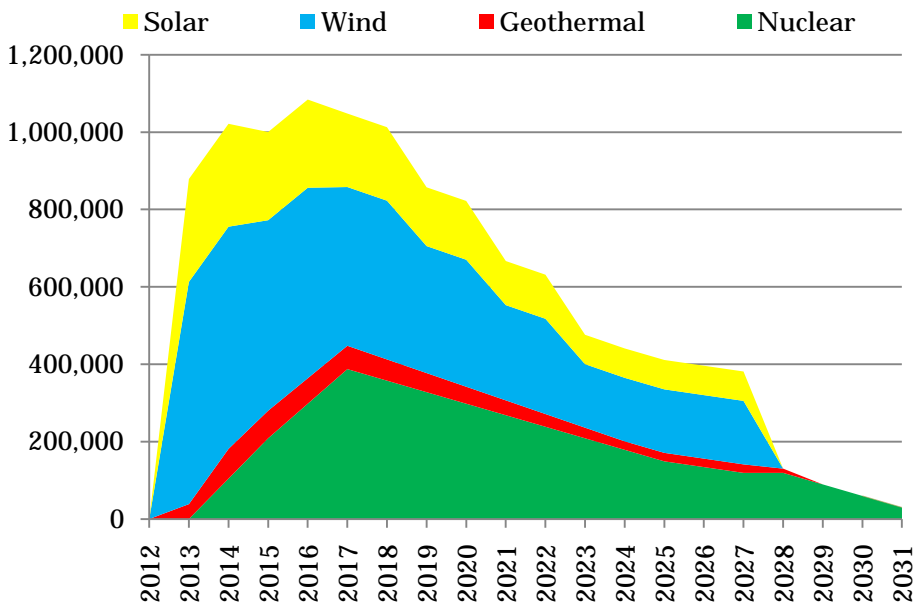
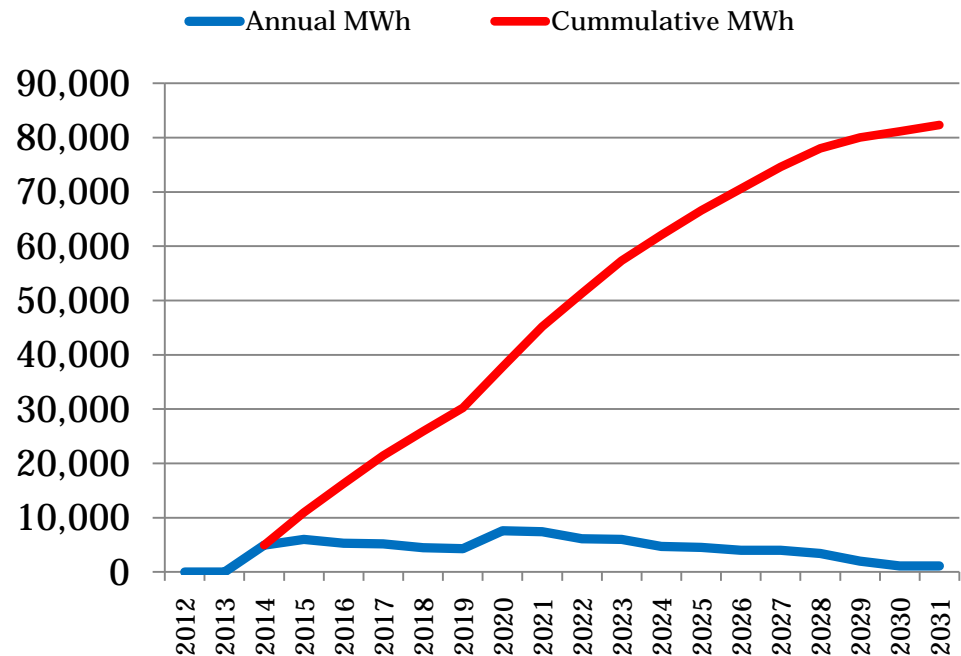
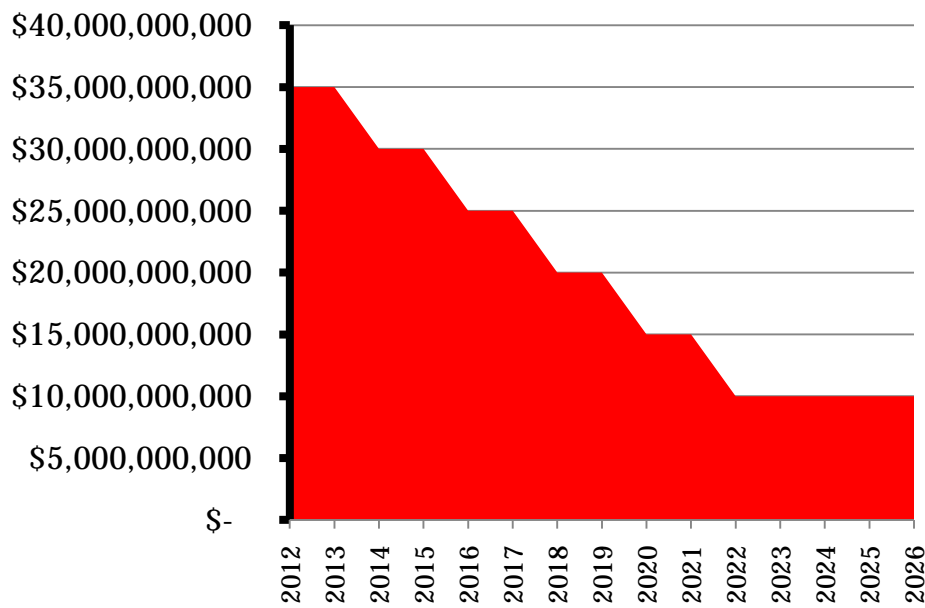
- New Strategic Petroleum Reserve
 - Strategic leverage, surge capacity, unlimited timeframe
- Shale oil produced in-situ results in a very light hydrocarbon
 - Akin to diesel or gasoline without the “processing” and “transport” emissions
- Investment in technology know-how
 - Shale oil and alternative energy resources
- Provide excellent stimulus for the economy
 - Over 300,000 jobs / Construction and Energy industries benefit
- Development of 1-2-4 MMBD capacity within 5-7-9 years
 - Cost of \$70-\$120 billion.
 - Could be expanded to 8-10 MMBD within 12-15 years (~ \$300 billion).
- Finance by selling off the current SPR when oil prices are high.
 - Refill with market purchases and shale oil when prices decline



Benefits

- Investment covered by planned selling of current SPR
- Investment by the Government in National & Energy Security
- Significant increase in jobs (300k+)
- Creates a 'long-term' production capacity for emergencies / panic
- In 7 years surge capacity 8.4 MMBD, sustained capacity is 4 MMBD.
- Strategy includes producing 15-20% of capacity to keep SPR full and finance expansion to 10-12 MMBD.

Shale Oil Investment





Conclusion

- Shale can become the New Strategic Petroleum Reserve
- Government should build based on
 - 1) economic stimulus/jobs
 - 2) national and economic security (political/geologic peak)
 - 3) dynamic SPR with real 'unlimited' capacity,
 - 4) buys time to transition to low carbon/low GHG
 - 5) investment in alternative and nuclear energy technology
- Investment can pay for itself - sell oil during times of high prices.
- By producing at 15-20% of capacity, keeps all systems working and finances expansion to 10-12 MMBD
- Shale produced using geothermal, solar, wind, and nuclear power (long-term) would result in lower emission gasoline compared with imported oil while adding 'green' energy to the power grid