

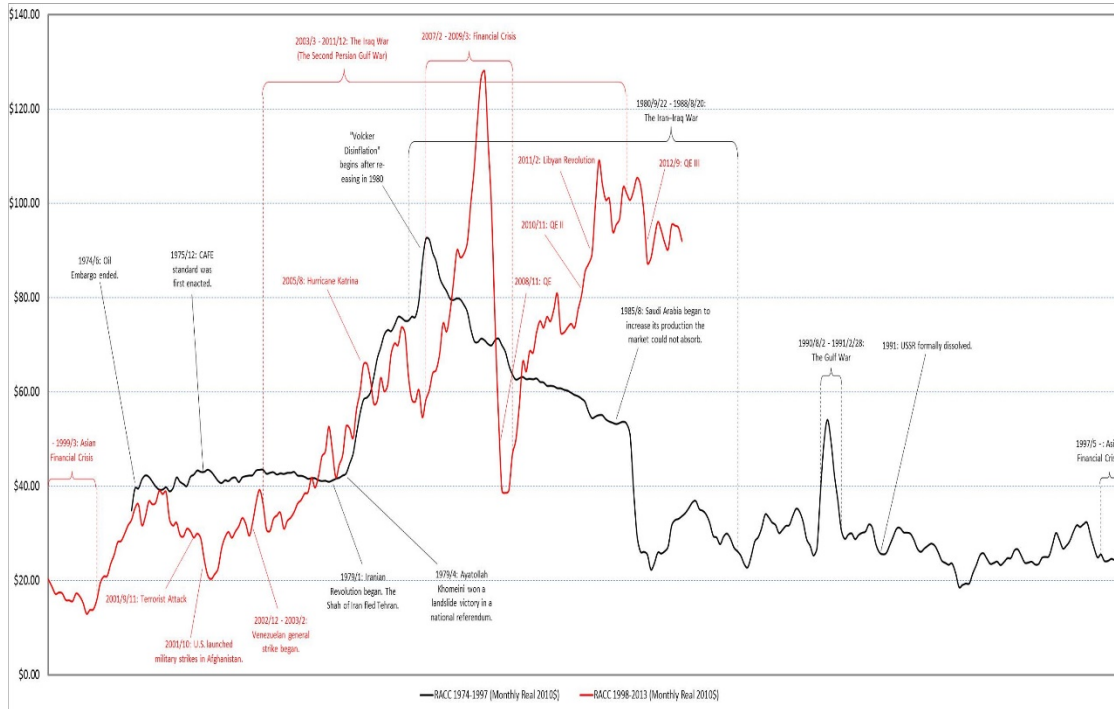


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The Oil Price Cycle, Geopolitics and U.S. Shale

Oil is a cyclical industry, linked in large measure to the global business cycle.



Source: Medlock, K.B., Amy Jaffe, "The price of crude oil: deja vu all over again?" (2013), EIA

Current oil price collapse mirrors similar cyclical downturns seen in past decades. Cycle shifts tend to have similar characteristics:

- **Demand destruction:** A decade of high oil prices, combined with policy intervention in the OECD and China slowed oil demand growth and enabled innovation and advanced clean energy solutions. Financial crises also associated with high oil prices and recession curtails demand.
- At the same time, high oil prices stimulated drilling innovations, leading to a supply bubble. Shale technology is game changing, just as deepwater drilling in the North Sea and US Gulf of Mexico was in the 1980s.

How to Assess the Nature of Current Downside Price Risk: Is it shortlived or structural?

Three Major Lynchpins to High Price Psychological “Exuberance” Have Dissipated

- **2002- 2015 up end of the price cycle was mainly driven by three characteristics that no longer prevail:**
 - “Peak Oil” theory
 - Steady, Rapid Chinese “Demand” based on Industrial Growth
 - Rising upstream services costs

How has Wall Street calculated the bottom? Analysts could be presuming oil is reverting to its historical mean...

- **Adjusted for inflation, oil has reverted back to a historical mean ~\$25 / barrel (1982-84 real prices)**
 - Risk to the downside for oil prices still considered larger than upside for the rest of the year
 - Real prices averaged ~\$14/bbl for a period of 15 years (1986-2001) or ~45% lower than current levels; the implied nominal price would be ~\$33/bbl
 - Wall Street analysts Barclays, Citi, JP Morgan and Goldman Sachs have cited nominal oil price levels in the \$35-55 range for 2015E growing to the \$60-73 by the end of 2016E. Goldman Sachs puts long term oil prices (to 2020) at \$50
 - Operating costs for E&P companies have reduced by ~20-30% with break-evens in certain basins in the \$40 range

Oil price collapse has geopolitical element



Saudi price war accelerating downward cyclical trend

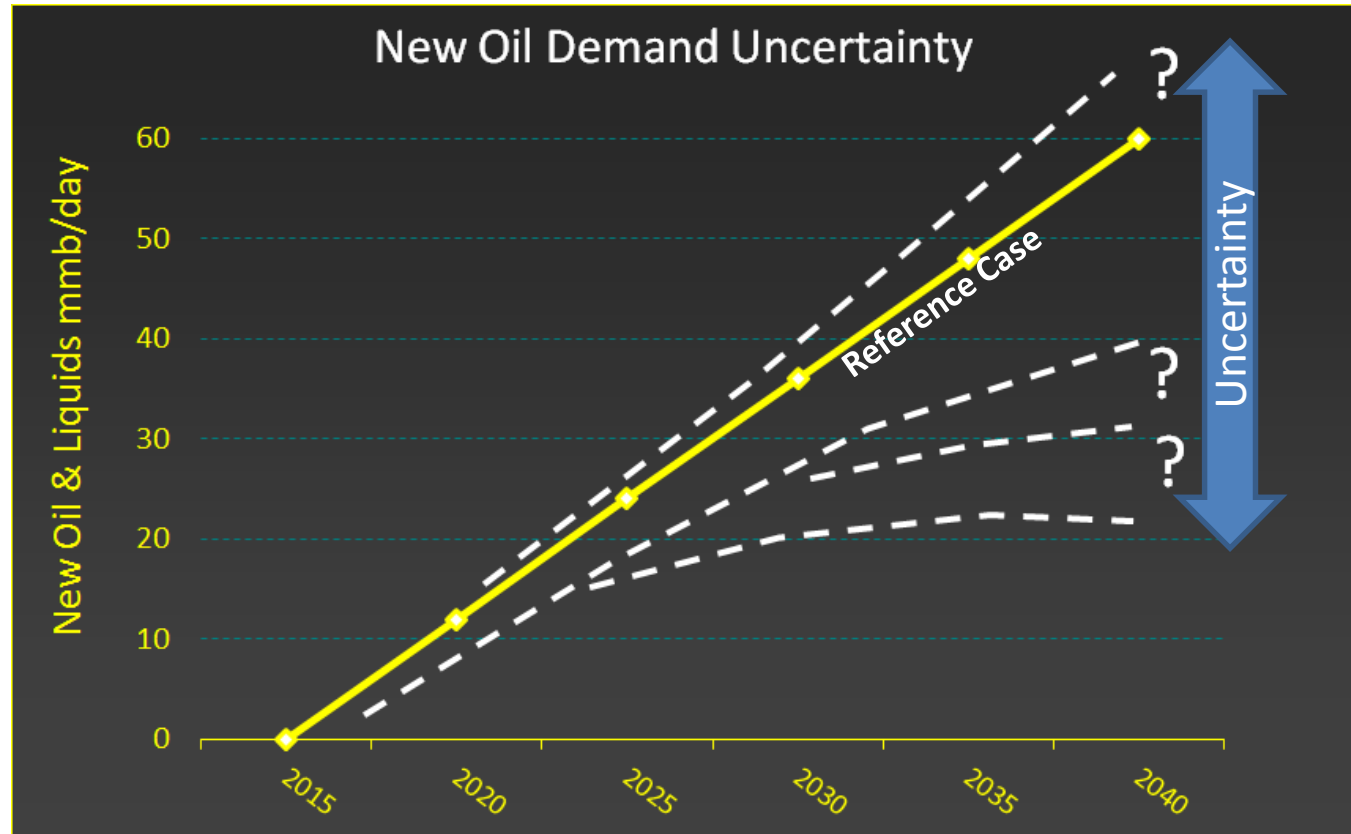
Falling oil prices and escalating conflict over Syria coming to a head

Russian military moves have uncertain outcomes.

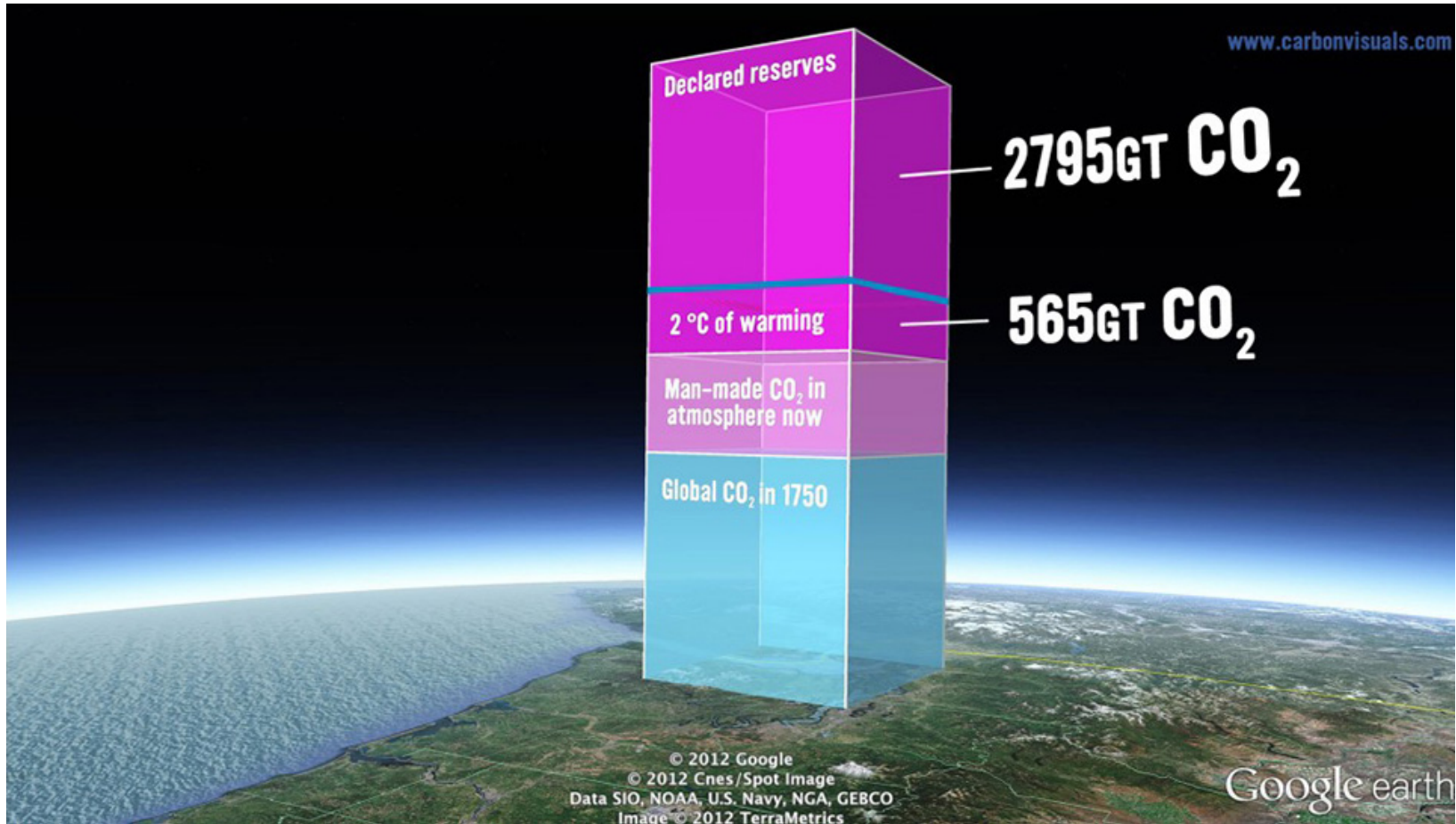
2 to 5 Year Horizon: Possible Supply Gap Depending on Trends in Saudi, Iraq and Iran

- ISIS military campaigns damaging facilities
- Regime change in Mideast destabilizing oil industries
- Iran's oil fields likely more damaged than assumed
- Russia struggling against loss in access to foreign capital
- Venezuelan industry pressed by low oil prices
- Major oil sands cancellations, Canada seeking to diversify economy
- Arctic drilling delays, majors slashing mega project budgets, including some deepwater
- US shale could bump up against constraints unless export ban is lifted, but surge potential remains if prices go back up.

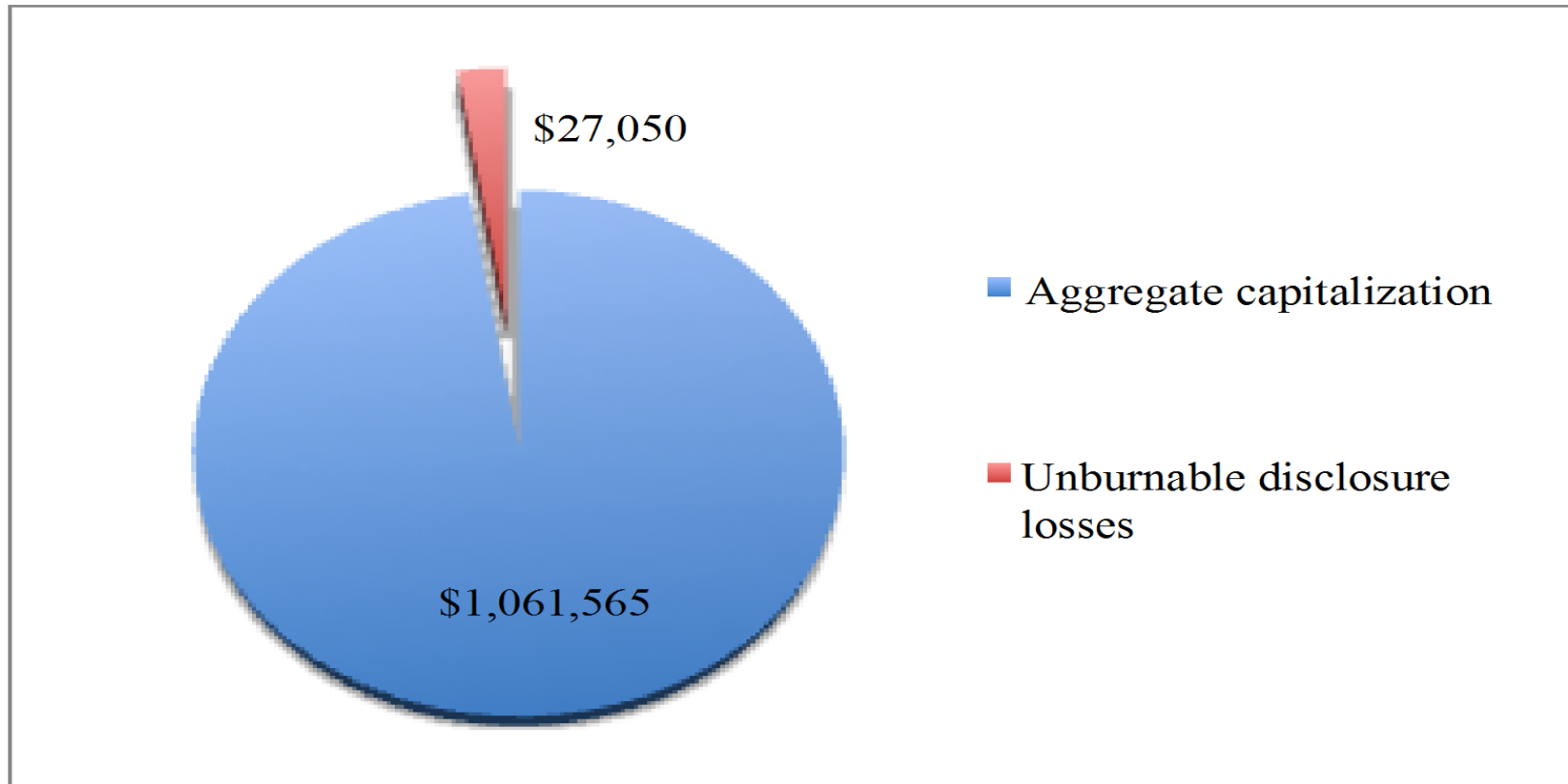
On balance the potential disruptions to oil supply and demand seem to be skewed towards slower consumption growth (driven by technology, fuel efficiency and environmental restrictions). Urbanization and the sharing economy movement has set the stage for possible changes in oil consumption patterns. On the supply side it is expected that productivity will increase from both existing and new oil provinces, as long as restrictions to E&P investment are removed/mitigated.



Unburnable carbon



Aggregate loss (2.48% of market capitalization) (after controls)



Griffin, Lont, Jaffe, Dominguez-Faus, *Energy Economics*, Fall 2015