

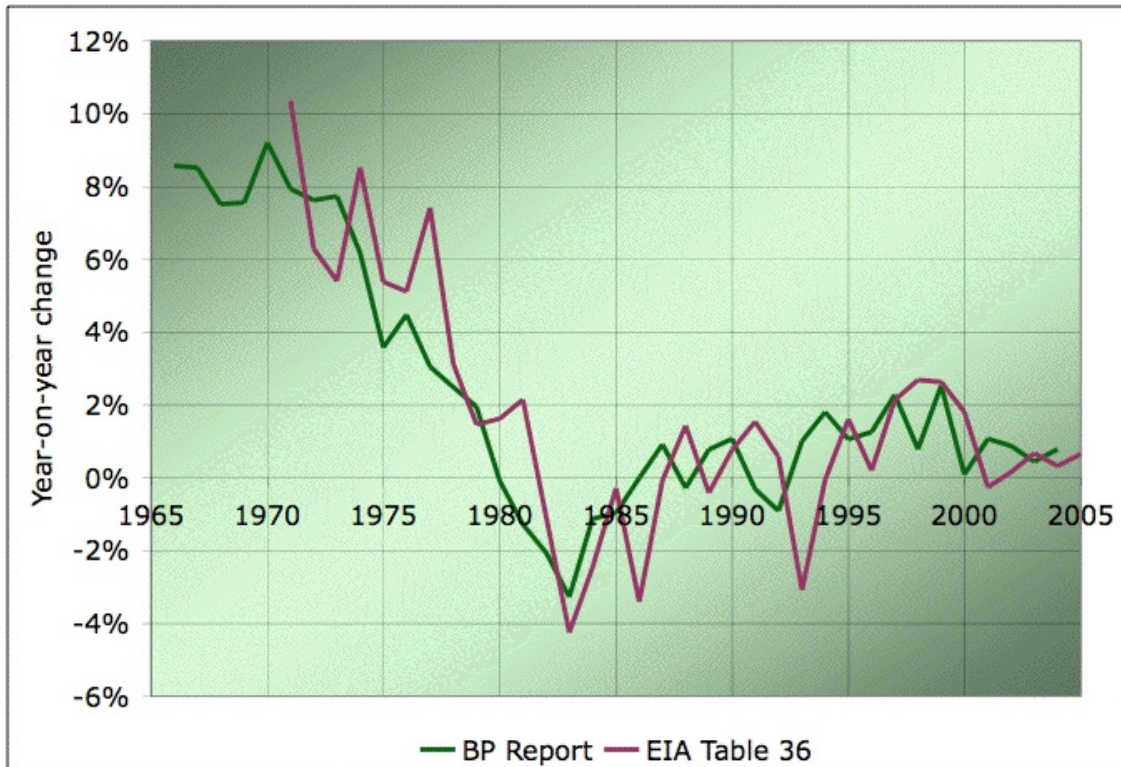


Refining the Plateau

Posted by [Stuart Staniford](#) on January 5, 2006 - 7:07am

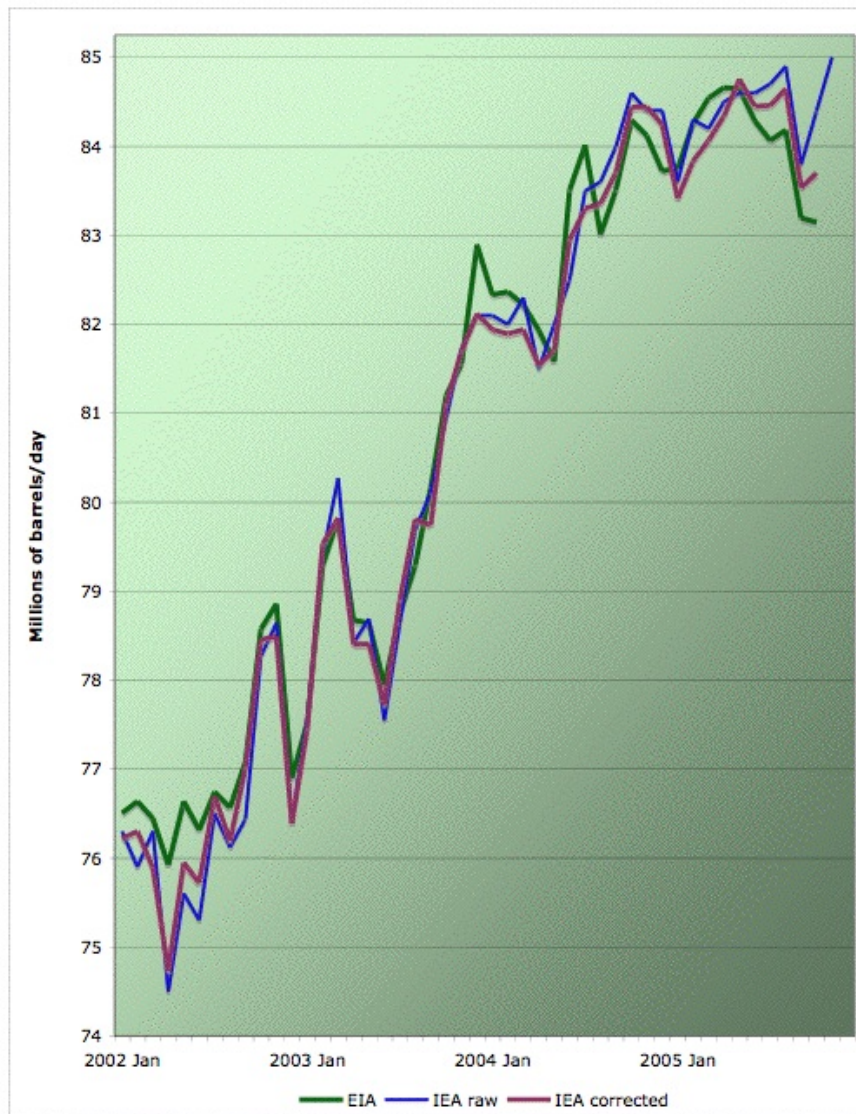
Topic: [Supply/Production](#)

Tags: [hubbert peak](#), [oil prices](#), [peak oil](#), [plateau](#), [refinery capacity](#) [[list all tags](#)]



Year-on-year change in refinery capacity 1965-2005 by two different estimates. Click to enlarge. Sources: [BP Statistical Review of World Energy 2005](#), and [EIA Crude Oil Distillation Capacity \(Table 36\)](#).

Let's continue with the discussion of the production plateau since last year that we first discussed [at Thanksgiving](#), and then resumed [just before Christmas](#). If you aren't sick of it yet, this is the phenomena we are seeking to explain:



Average monthly oil production from various estimates. Click to enlarge. Believed to be all liquids. Graph is not zero-scaled. Source: [IEA](#), and [EIA](#). The IEA raw line is what they initially state each month. The IEA corrected line is calculated from the month-on-month production change quoted the following month.

Note the leveling off that began last summer. Our task is to understand why that occurred in the face of a rapidly growing world economy and ever higher prices for several years, which our economist friends would tell us should be calling forth more and more supply. Are we at, or almost at, the peak, is there some more innocent explanation?

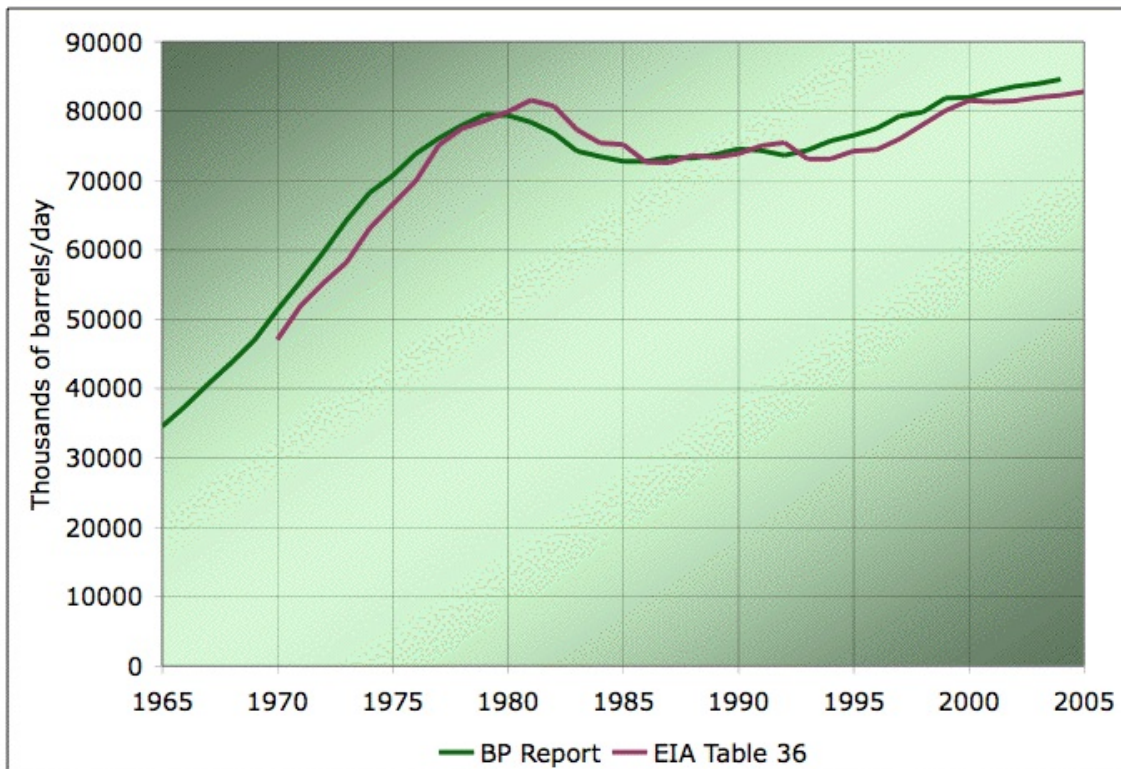
The ever-optimistic Freddy Hutter [suggested that](#)

Peaksters can get excited all they want watching the mid 2005 plateau and read into it what they want but the rest of us know it was hurricane and refinery related and the trendline will continue into 2010 amid the gnashing of teeth.

Now yesterday, I think we [put the hurricane explanation out of it's misery](#). So that leaves the refinery capacity idea. Of course Freddy is not alone in proposing that story. As Alexander's Oil and Gas Connections [reported](#)

Saudi Arabia's Minister of Petroleum and Mineral Resources Ali al-Naimi blamed lack of refining capacity to handle sour and heavy crude for the spiralling global prices. "What the global oil industry confronts today is a challenge of deliverability," said al-Naimi addressing a packed session [...] "This is because there is a major constraint in the refining system. There is a mismatch between the configuration of refineries and availability of sour and heavy crude," he pointed out.

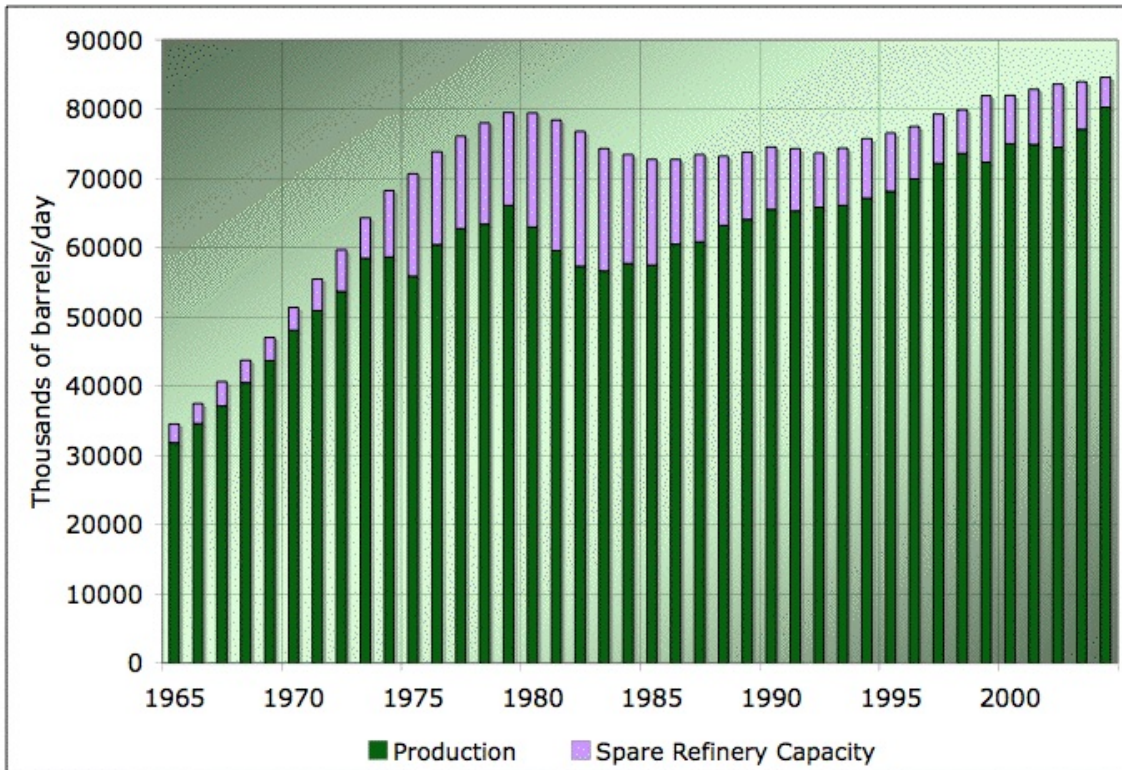
Firstly, let's orient ourselves to the overall history of refinery capacity. Alas, I was not able to find a monthly series for global refinery capacity, but I found two annual series, and I think they definitely shed some interesting light on the question. One is from the [BP Statistical Review of World Energy 2005](#), and the other is from the [EIA](#). As usual in this game, the data from different sources agree in the big picture, but not on the details. Here's the story on capacity:



Refinery capacity 1965-2005 by two different estimates. Click to enlarge. Sources: [BP Statistical Review of World Energy 2005](#), and [EIA Crude Oil Distillation Capacity \(Table 36\)](#).

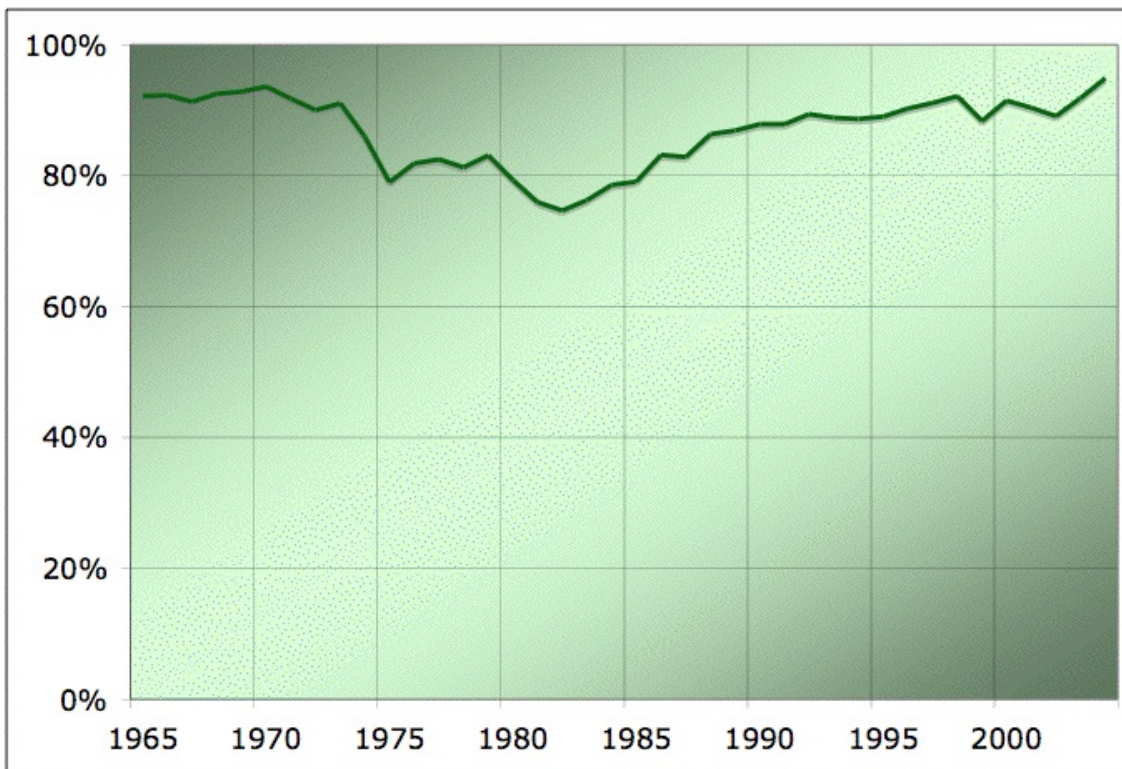
Before we compare capacity to production, I would just like you to note how rapidly capacity grew in the late sixties and seventies. I would also draw your attention to the difference in slope between the late nineties, and the anemic climb of the last few years. We will return to these points in a few graphs. First though, how much of this capacity was being utilized?

It turns out not to be easy to compare EIA production numbers with their refinery capacity, so I stuck to the BP numbers for this next bit. Here's a graph showing how much of refinery capacity each year was actually taken up with production.



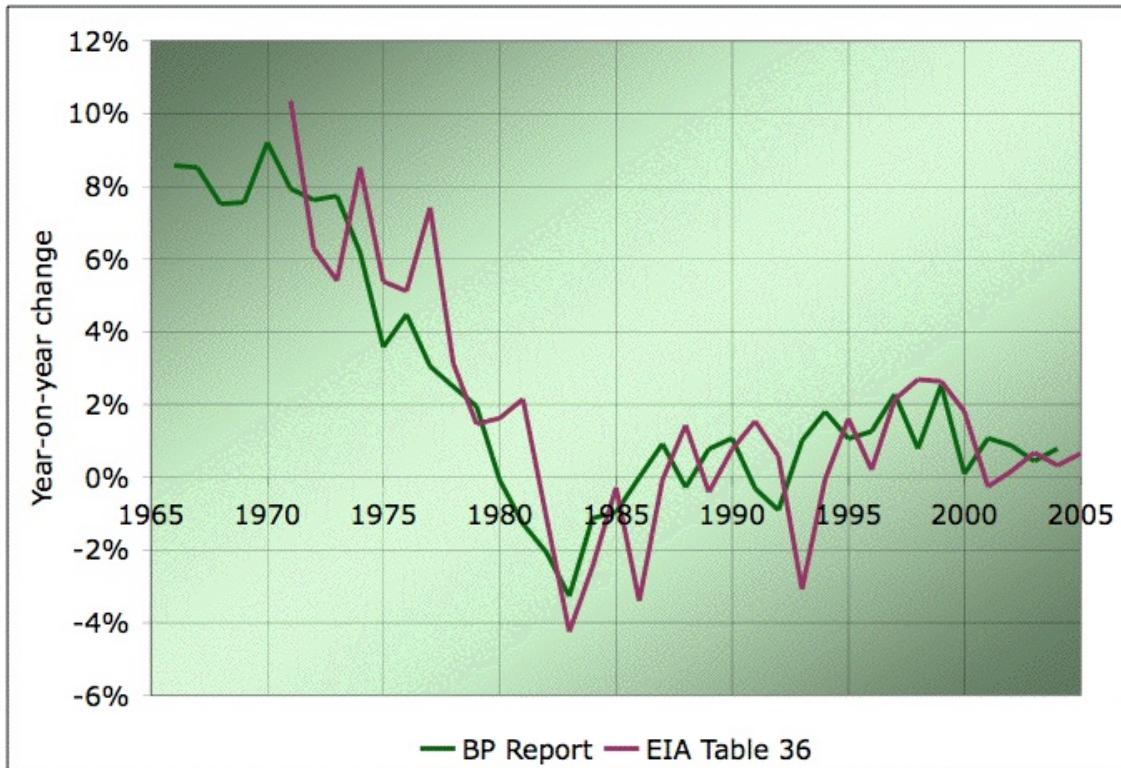
Refinery production and spare capacity 1965-2004. Click to enlarge. Source: [BP Statistical Review of World Energy 2005](#).

We can see that things are starting to get a bit tight at the end there. However, if we look at the ratio of production as a proportion of refinery capacity, we see that it's no tighter in recent years than it was in the 1960s, when neither oil nor gasoline were particularly expensive.



Refinery utilization 1965-2004. Click to enlarge. Source: [BP Statistical Review of World Energy 2005](#).

So we might wonder why the big fuss now? To me, the most revealing graph is this one. This shows the year-on-year growth rate in refinery capacity.

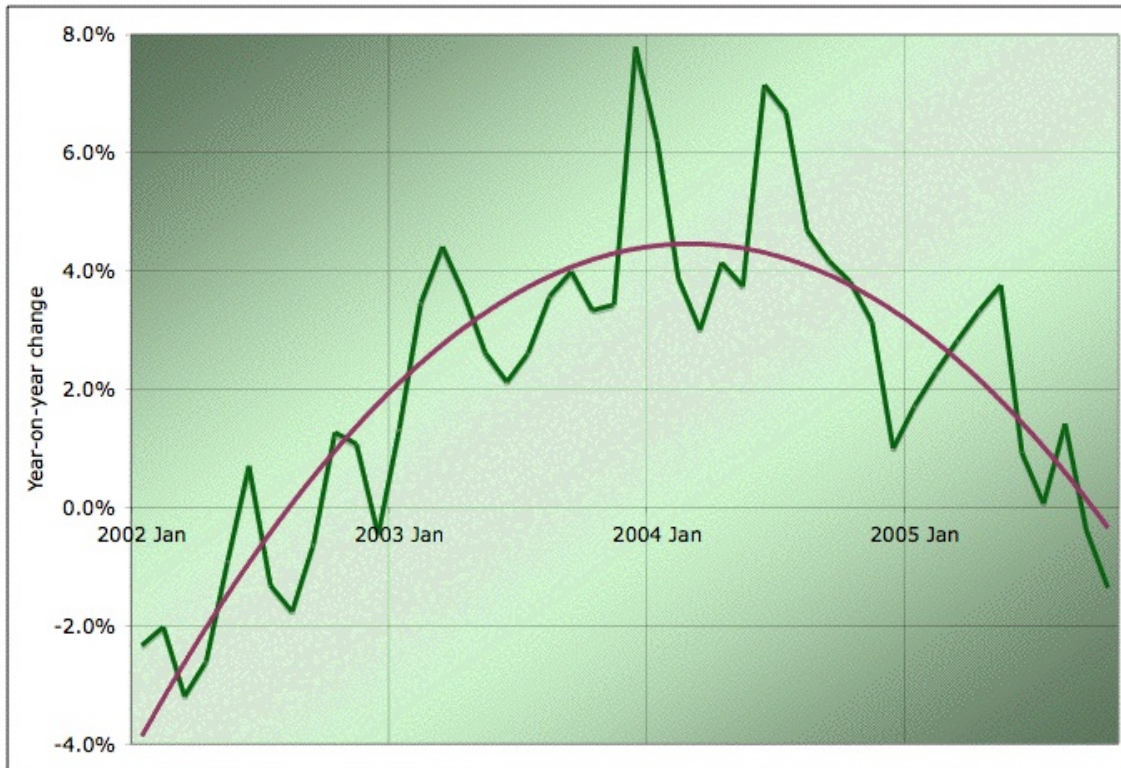


Year-on-year change in refinery capacity 1965-2005 by two different estimates. Click to enlarge. Sources: [BP Statistical Review of World Energy 2005](#), and [EIA Crude Oil Distillation Capacity \(Table 36\)](#).

Points to note:

1. In the late sixties and seventies, we knew how to grow global refinery capacity by 6%-10% annually.
2. As recently as the late nineties, we were growing global refinery capacity at 2% a year.
3. On several occasions, we have increased the growth rate in refinery capacity by one or two percentage points within the space of a year or two. Eg in the late eighties, and again around 1993-1994.
4. The **only** period of near-constant very slow, nay positively anemic, only 1/2%, growth in refinery capacity is the period 2001-2004.
5. If we had grown refinery capacity at 1%-2% from 2002 on, there would have been no problem with refinery capacity. The problem was not just that demand grew, it was also that refinery capacity growth was very minimal during that period.

Just how fast was production growth in the run-up to the plateau? Here it is:



Year-on-year change in monthly EIA oil production Jan 2002-October 2005. The dark green line is the data, and the plum curve is a quadratic fit to the data to illustrate the smooth trend. Click to enlarge. Source: [EIA](#).

So demand growth certainly became respectable -- getting up to about 4% in the smoothed trend -- but nothing out of the historical norm, and generally inline with GDP growth in a healthy economic recovery. Given all this, I cannot believe that we just **couldn't** increase refining capacity in time to avoid the bottleneck this year. On the historical record, we certainly should have been able to get it up to 2% annually, or even a little better, by now, and that would have been enough to avoid the bottleneck. No, it's not that we **couldn't**, it's that we **didn't**. We chose not to.

I can think of only two reasons why we might not have chosen to increase refinery capacity in the way that we obviously could. One is a secret refining cartel. The other is peak oil. I think Calculated Risk made the key argument [back in the summer](#). If the problem was just a refinery cartel, crude oil, or at the very least heavy grades of crude oil, would be selling for \$10/barrel. It's not - even the heavy stuff is \$50/barrel. That implies there's very little of it to spare, not that there's quite a bit but it's not making it through the refining cartel.

What it looks to me like is the refinery market, explicitly or implicitly, understands that ramping up to compete for market share on CERA's 100mbpd+ of production in the near future would be a very dumb business move. Instead, it looks like they are inching their capacity up in the most gingerly manner possible. They're acting like their big fear is getting caught with too much capacity.

So I call bullshit on this refinery explanation.

Anybody got any other ideas for why this plateau might have happened besides imminent peak oil?



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