

White Paper on Refining Capacity

Investment in U.S. refining capacity has fluctuated significantly over the past 40 years due to the effects of government policies and market forces. The federal crude oil allocation and price control system that was in effect in the 1970's stimulated investment in capacity until, in 1981, there were 324 refineries with a total U.S. refining capacity of 18.6 million barrels per day which were collectively operating at less than 70% of capacity. However, the U.S. abandoned those controls in 1981 and allowed market forces to take over which quickly forced the closure of the most inefficient and unsophisticated refineries. Since 1981, 175 refineries have closed leaving the U.S. with 149 refineries with a total U.S. refining capacity of 17.3 million barrels per day and a collective capacity usage greater than 90%. The refining industry's capacity reached its nadir in 1994, but since then has seen increasing capacity and throughput fueled by billions of dollars in new investment. Since 2000, the pace of refinery capacity investments has increased and has now reached a point where investments are being constrained by a lack of resources (manpower and materials) rather than will.

There are generally four types or categories of capacity additions at a refinery.

1. **Greenfield project** – This is used to describe a refinery project on a site where there is no existing petroleum facility and the land has to be converted from another use. These projects have extensive environmental permitting and zoning requirements and often face significant resistance from local residents. They are usually very large (>150,000 BPD).
2. **Grassroots project** – This is used to describe a refinery project which includes all of the support facilities required by a refinery (tankage, cooling towers, steam and electricity generation, wastewater treatment, emergency flare system(s), laboratories, buildings, etc.). Although it is common to use the terms “greenfield” and “grassroots” interchangeably, I would include in “grassroots” those refinery capacity projects which are built on or adjacent to the property of an existing refinery, but which are so large that they cannot avoid the construction of new support facilities. Typically, additions to capacity on the site of an existing refinery are called “expansions”, but I find this inadequate for describing projects that are usually very large (>150,000 BPD) and have the same extensive environmental permitting requirements as greenfield projects.
3. **Expansions** - This is used to describe a refinery project which increases capacity by adding process units or modifying some (but not all) of the existing process units to remove bottlenecks. Expansions usually increase crude oil inputs by 10-35% and will require significant permitting work to modify the refinery's operating permit, but not of the same magnitude as a grassroots project.
4. **Capacity creep** – This is used to describe the cumulative result of many small projects and productivity enhancements that enable a refinery to increase crude oil input. Capacity creep has produced an average increase in aggregate US refining capacity of approximately 1%/year over the last 10 years, which has added an average of 170,000 BPD of capacity, the equivalent of adding one large refinery to the nation's infrastructure each year.

US refiners have invested in projects with the specific goal of increasing refinery capacity. Below are links to announcements of some industry projects that go significantly beyond capacity creep. Other expansions or grassroots projects are presently being considered. NPRA estimates that US refiners have invested or are in the process of investing \$26 billion in refining capacity expansions that will add almost 2 MMBPD to US capacity of 17.3 MMBPD.

Arizona Clean Fuels

<http://www.arizonacleanfuels.com/index.htm>

Chevron

<http://www.chevron.com/news/press/2006/2006-12-18.asp>

<http://www.chevron.com/news/press/2006/2006-12-07.asp>

CITGO

<http://onlinepressroom.net/citgo/> (See April 21, 2005 announcement)

Coffeyville Resources

<http://www.coffeyvillegroup.com/Pdfs/2006CoffeyvilleExpansion.pdf>

ConocoPhillips

http://www.conocophillips.com/newsroom/news_releases/2006+News+Releases/120706.htm

Frontier Oil

<http://www.shareholder.com/FTO/ReleaseDetail.cfm?ReleaseID=236842>

Holly Corp.

http://www.hollycorp.com/press_release.cfm?id=268&Archive=Yes

Marathon Petroleum

http://www.mapllc.com/news/news_2006/garyville_approved.html

http://www.mapllc.com/news/news_2005/detroit.htm

Motiva Enterprises

<http://www.motivaenterprises.com/index.cfm>

Pasadena Refining

<http://www.pasadenarefining.com/news.htm>

Tesoro

http://www.tsocorp.com/stellent/groups/public/documents/published/tsi_md_pr_2006_prod_039939.hcsp