



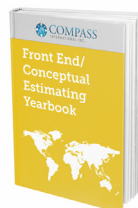
CAPEX & OPEX Refinery Cost per Barrel a Day Benchmarks Total Installed Engineering, Procurement & Construction (EPC) 2018 Cost Basis

#	Description	\$ Low Cost per barrel	\$ High Cost per barrel
CAPEX Costs for various greenfield & add on refineries			
1	S. E. Asia 125,000 b/d hydrocracker including ISBL & OSBL	\$22,700	\$26,700
2	West Africa 225,000 b/d Greenfield ISBL / OSBL Refinery	\$18,500	\$19,700
3	Middle East 250,000 b/d ISBL / OSBL Greenfield Refinery	\$24,100	\$26,800
4	USA – Gulf Coast Gasoline / Diesel ISBL / OSBL 60,000 b/d Refinery	\$12,700	\$15,300
5	Middle East 300,000 b/d ISBL / OSBL Greenfield Refinery	\$22,600	\$26,900
6	USA – Gulf Coast Refinery ISBL / OSBL 50,000 b/d Refinery Add on to existing facility	\$13,200	\$22,200
OPEX Costs per Year for a 50,000 b/d refinery			
7	Management (7 to 10 Staff)	\$800,000	\$1,300,000
8	Operators (30 to 60 hourly)	\$2,100,000	\$2,700,000
9	Maintenance / Repairs	\$1,300,000	\$2,000,000
10	Catalysts / Chemicals	\$1,000,000	\$1,400,000
11	Other Costs (Utilities / Insurance / Office / Guards / Misc.)	\$700,000	\$1,500,000
Total OPEX Costs per Year		\$5,900,000	\$8,900,000
12	50,000 b/d x 350 Production Days = 17.5 Million barrels / year	17,500,000	17,500,000

For additional benchmarks and similar types of construction cost refer to our 2018 Front End / Conceptual Estimating Yearbook:

If you have any questions or comments on this report please contact:

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