

How to Calculate the Break Even Cost of Oil & Gas Production



Evaluate Energy's Methodology for estimating the
"Full Cycle" cost of oil and gas production and
development

What do we mean by the “Break Even cost of oil and gas”?

Here’s a summary of some of the many definitions of “break even costs”. Our preferred definition of Breakeven cost is shown in bold.

Breakeven Cost	Definition (all per barrel)	Comment
Accounting Breakeven	Production costs (including Taxes) + Transportation costs + Exploration Expense + DD&A	This definition gives the breakeven cost on a pure accounting basis
Full Cycle (Basic)	Production costs + F&D costs	Is partial as it excludes SG&A, Transportation costs and WACC
Full Cycle (exc WACC)	Production costs (inc. Taxes) +F&D costs + SG&A + Transportation costs	Excludes allowance for return on capital.
Full Cycle (Inc WACC)	Production costs (inc. Taxes) + F&D costs + SG&A + Transportation costs + WACC	Evaluate Energy definition of Full Cycle Cost including allowance for return on capital. This cost definition covers all long term costs. If this cost is not covered in the long run, operations are not sustainable.
Cash Cost	Production costs + SG&A	If an IOC can cover these cash costs it will continue to produce from the asset. However, just covering this cost is not sustainable in the long run because no allowance has been made for capital replacement or return on capital.

Why is the Break Even Cost of Oil & Gas Important?

Over the long term, the oil and gas industry must incur certain costs in order to find, develop and produce oil and gas. This full set of costs the industry needs to incur in order to sustain or grow production is known as “Full Cycle costs”.

If crude or natural gas prices are generally persisting above these Full Cycle costs, the industry has an incentive to sustain investment and activity in the sector. However, if the margin between Full Cycle costs and prices is squeezed for prolonged periods, the industry finds, before too long, that investment is not sustainable and capital spending, production and reserve replacement will begin to fall off as a result.

So an understanding of what determines Full Cycle costs of oil and gas is central to predicting what is likely to happen to oil and gas prices in the future, as well as understanding the outlook for oil and gas production, reserve replacement and capital spending in the industry, in climates of either falling or increasing oil prices.

This paper sets out Evaluate Energy’s methodology for estimating the breakeven or full-cycle costs of producing oil and gas. We hope it will lead to a clearer understanding of cost components in the oil and gas industry and stimulate debate on the outlook for oil and gas prices.

What are the Key Components of Full Cycle Costs

From the point of view of an Independent Oil Company (IOC), we suggest the following key cost components **must** be covered in order for the company to remain viable in the medium to long term:

Cost	Explanation
SG&A	The company must cover its selling, general and administrative expenses.
Property Acquisition Costs	The cost of acquiring unproved property is an on-going part of the business.
Finding Costs	The company must cover the cost of geological and geophysical work (G&G), licensing rounds, signature bonuses and the costs of drilling exploration wells.
Development Costs	The company must cover the costs of acquiring, constructing, and installing production facilities and drilling development wells. Finding and development costs are often grouped together under the term F&D costs.
Production Costs	Also known as Lifting Costs. These are the costs incurred to operate and maintain wells and related equipment and facilities, including depreciation and applicable operating costs of support equipment and facilities and other costs of operating and maintaining those wells.
Transportation Costs	The company must cover the cost of transporting its product to market.
Production Taxes	An IOC must pay production taxes or royalties to the host state. This may be in the form of a fixed royalty % or in the form of a more complex production sharing agreement.
Return on Capital	An IOC must at least cover its cost of capital over the medium term. Otherwise it is destroying value for its shareholders. Evaluate Energy calculates this for each company based on the cost of its debt and equity.
Risk Premium	IOCs will be looking for a risk premium over and above its cost of capital to cover the uncertainties inherent in oil and gas investments.

Together, the above cost components make up the **Full Cycle costs** of finding, developing and producing oil and gas.

How do we Calculate Each Component?

Below is a short explanation to how each cost is handled in the Evaluate Energy database.

Cost	Explanation
SG&A	These costs are not reported for the upstream sector alone by large integrated companies, so Evaluate Energy bases its per barrel SG&A on a large sample of pure upstream companies in its database.
Unproved Property Acquisition Costs	These costs are reported by companies that submit filings to the US Securities and Exchange Commission (SEC).
F&D Costs	These costs are calculated from SEC filings based on exploration and development costs and the cost of unproved property acquisition divided by discoveries, revisions to reserves (included because they form part of long term reserve replacement) and reserves added through improved recovery.
Production Costs (or lifting costs)	These are reported by companies to the SEC.
Transportation Costs	These costs are reported in varying ways by companies but are included where known.
Production Taxes	Severance taxes and taxes paid under production sharing or concession agreements (inc. royalties) are reported by companies to the SEC.
Return on Capital	Evaluate Energy calculates each company's weighted average cost of capital. Cost of equity is calculated via the Capital Asset Pricing Model (Risk free rate + beta x market risk premium). Cost of debt is calculated as interest expense plus interest capitalised divided by total debt.
Risk Premium	Evaluate Energy has designed a unique country risk rating that differentiates risk levels in different countries. There may be technical and commercial risk premia that may be required in addition and will depend on individual circumstances.

Some of the Pitfalls of Calculating Costs

Calculating the cost components outlined above on a per barrel basis is not without its challenges. Some of the key things to watch out for are outlined below.

Distortion of per barrel costs by large reserve shifts caused by exceptional revisions, or by reserve impairments caused by price fluctuations. For example, at the end of 2012 many US-based companies initiated large gas reserve impairments due to depressed prices of domestic natural gas. We can smooth out these effects by using 3 year averages.

Distortion of per barrel costs by the timings of reserve bookings. Costs incurred in one year may result in reserve bookings in future years. Again, using 3 year averages is a way of mitigating this effect.

F&D cost data based on 1P reserves means that calculated F&D costs may be conservative and would be substantially lower if 2P reserves were used to calculate per barrel reserve replacement costs.

Companies don't distinguish between the cost of crude and the cost of natural gas development. Although they split reserve changes between oil and gas, companies do not report crude oil costs separately from costs relating to natural gas. Evaluate Energy has developed a methodology, based on the performance of a wide range of companies with different oil weightings, for adjusting the cost data so that the Full Cycle costs of crude oil may be distinguished from those for natural gas.

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