Operating Model → Valuation

To move from the operating model of an oil & gas company into the valuation, you need to calculate **Enterprise Value** and **key metrics and ratios**.

I'm assuming that you already know what Equity Value and Enterprise Value mean so I'm not going to repeat that here – we're only going to cover how they're **different** from the calculations for normal companies.

Equity Value: No changes. You still use the Treasury Stock Method, the current share price, and take into account common shares, RSUs, options, warrants, convertibles, performance shares, and anything else that might be dilutive.

Enterprise Value: Similar, but you might also take into account an oil & gas-specific asset – the **net value of hedges** or the **net value of derivatives** – and then one oil & gas-specific liability, the **asset retirement obligation**.

Example Enterprise Value calculation for XTO Energy:

Diluted Equity Value:				**$ 24,542**
Enterprise Value Calculation:				
Less: Cash & Cash-Equivalents:				$ (9)
Less: Net Value of Hedges:				(1,117)
Plus: Debt:				10,487
Plus: Asset Retirement Obligation:				783
Plus: Preferred Stock:				-
Plus: Noncontrolling Interests:				-
Enterprise Value:				**34,686**

If they had unfunded pension obligations or capital leases, we would also add those to calculate Enterprise Value.

You can find the net value of hedges or derivatives on the balance sheet (take the total on the assets side and subtract the total on the liabilities side); the asset retirement obligation is also on the balance sheet.

This is not a universally accepted standard. Not all oil & gas groups include these items in Enterprise Value. I am mentioning this just to show you one possible difference, but not everyone does it this way.

OK, now onto the key metrics and ratios.

Key Operating Metrics and Ratios

There are dozens of industry-specific metrics and ratios for oil & gas companies, but here are the most important ones that you'll see in models all the time:

Metric	How to Calculate It	What It Tells You
EBITDA	Operating Income + DD&A	How healthy is our cash flow?
EBITDAX	EBITDA + Exploration Expense on Income Statement	How healthy is our cash flow, regardless of whether we expense or capitalize Exploration?
Production Costs Per Mcfe or BOE	Total Production Expense / Total Production Volume	How much does it cost us to produce 1 unit of energy from the ground?
Finding & Development (F&D) Costs – All Sources (Per Mcfe or BOE)	(Development + Exploration + Acquisition Expenses) / Net Reserve Additions	How much does it cost us to add 1 unit of energy to our reserves?
Finding & Development (F&D) Costs – Excluding Purchases and Sales (Per Mcfe or BOE)	(Development + Exploration Expenses) / (Reserve Revisions, Extensions, Additions, and Discoveries)	How much does it cost us to add 1 unit of energy to our reserves without buying assets or other companies?
Production Replacement Ratio – All Sources	Net Reserve Additions / Annual Production Volume	Are we replacing all the reserves we're depleting each year?
Production Replacement Ratio – Excluding Purchases and Sales	(Reserve Revisions, Extensions, Additions, and Discoveries) / Annual Production Volume	Are we replacing all the reserves we're depleting each year, even without acquiring other assets or companies?
Proved Reserves	Search in the annual report	How much more energy can we produce if we never find or purchase additional reserves?
Proved Developed Reserves / Proved Reserves	Search in the annual report	What % of the Proved Reserves are we 100% certain to produce?
Reserve Life Ratio or R / P Ratio	Proved Reserves / Annual Production Volume	How many years until we run out of energy completely?
Daily Production	Annual Production Volume / Days in Year	How much energy do we produce each day?
Mix Oil %	Proved Oil Reserves / Total Proved Reserves or Oil Production / Total Production	Are we mostly an oil company, or mostly a natural gas company?

A couple important notes on all these metrics:

- Many oil & gas groups still use EBITDA rather than EBITDAX even though EBITDAX normalizes different accounting methods.
- Some people calculate **Finding & Development Costs** using different standards, including 3-year averages, tweaks to the numbers in the filings, and so on.
- You can find all these numbers in the Oil & Gas Supplemental Information in a company's annual filing – for non-US companies the location varies, but if you search for "Proved Reserves" or "Proved Developed" the rest is usually nearby.

After calculating these metrics, you then select which ones to display in the operating model and/or valuation. The most common ones are EBITDA or EBITDAX, Proved Reserves, Daily Production, and the Reserve Life Ratio.

You do **not** use traditional metrics like revenue, revenue growth, or EBITDA margins because they are not meaningful for commodities companies – they have no control over prices and therefore little control over revenue, so it's better to look at profitability-based metrics like EBITDA or production-based metrics like the Reserve Life Ratio instead.

XTO Energy Inc. - Key Metrics and Ratios			
		Historical	
December 31,	2007	2008	**2009**
EBITDA ($ in Millions):	$ 4,173	$ 5,819	**$ 6,912**
EBITDAX ($ in Millions):	4,225	5,907	**6,989**
Production Costs per Mcfe:	$ 0.93	$ 1.10	**$ 0.96**
F&D Costs - All Sources (per Mcfe):	$ 2.00	$ 4.35	**$ 1.61**
F&D Costs - Excl. Purchases / Sales (per Mcfe):	$ 1.36	$ 2.70	**$ 1.50**
Production Replacement Ratio - All Sources:	512.2%	401.1%	**192.3%**
Production Replacement Ratio - Excl. Purchases / Sales:	308.5%	168.0%	**190.1%**
Proved Reserves (Bcfe):	11,289.1	13,862.7	**14,827.3**
Proved Developed Reserves / Proved Reserves:	66.1%	63.7%	**60.7%**
Reserve Life Ratio (Years):	17.0	16.2	**14.2**
Daily Production (Bcfe/d):	1.8	2.3	**2.9**
Proved Reserves % Oil:	12.8%	11.6%	**11.9%**
EV / EBITDA:	8.3x	6.0x	**5.0x**
EV / EBITDAX:	8.2x	5.9x	**5.0x**
EV / Proved Reserves:	$ 3.07	$ 2.50	**$ 2.34**
EV / Daily Production:	$ 19,044	$ 14,853	**$ 12,112**

Valuation Multiples

The 4 most common valuation multiples for oil & gas companies are EV / EBITDA, EV / EBITDAX, EV / Proved Reserves, and EV / Daily Production.

You use Enterprise Value because each of these metrics is available to all different types of investors. It's not as if the Proved Reserves are only available **only** to the equity investors – **everyone**, including the debt investors, will benefit from the cash flow from those reserves.

P / E and Net Income-based multiples are less relevant because energy companies often have strange tax situations and a lot of non-recurring and non-cash items like Impairment Charges that affect Net Income.

You could look at Book Value or Net Asset Value-based multiples as well, but they are less common than the ones listed above.

Usually there is a **correlation between the Reserve Life Ratio and the EV / EBITDA or EV / EBITDAX multiples**, just like there's a correlation between revenue growth and revenue multiples for normal companies.

The longer-lasting a company's reserves are, the more highly investors will value the company. A company with a Reserve Life Ratio of 20 years might trade at a premium to a company with a Reserve Life Ratio of 10 years because investors expect to earn a return on their investment further into the future.

For more on valuation, see the next quick reference guide in this course on Oil & Gas Valuation, including differences in public comps, precedent transactions, and the DCF, and a NAV tutorial.