Type Curves in Oil & Gas Modeling:

Modeling Master Key or Academic Curiosity?

The Return of the ~~King~~ Oil & Gas Modeling

We used to have an **Oil & Gas Modeling course** but discontinued it in 2021…

…but brought it back this year (2025) and recently replaced it with a **new version** (2.0) that covers all 3 verticals (Upstream, Midstream, Downstream).

The Return of the ~~King~~ Oil & Gas Modeling

For the files and resources, go to:

https://breakingintowallstreet.com/kb/oil-gas-modeling/type-curve-oil-and-gas/

(This is a **summary** from our full Oil & Gas Modeling course.)

Type Curves in Oil & Gas Modeling

- **Type Curve:** Shows you the **initial production (IP)** from a well in a specific region and how it **declines over time**; used to estimate the revenue, expenses, and CapEx for the well

- **Importance:** In oil & gas, you normally go down to the **asset level** to model the individual wells a company drills and then aggregate the cash flows with functions like OFFSET

- **So:** The Type Curve is a critical component of an exploration & production company's "future growth" or "future cash flows" from the wells it has *not yet drilled* but plans to

Type Curves in Oil & Gas Modeling

- **But:** In real life, it's often quite difficult to use Type Curves and the accompanying formulas/equations due to partial/incomplete information in the filings

- **Also:** Type Curves are not useful for the company's production from existing, operational wells ("PDP" or "Proved Developed Producing" wells), and these account for most of an E&P company's implied value

Plan for This Tutorial

- **Part 1:** What is a Type Curve? Key Vocabulary   **3:18**

- **Part 2:** From Type Curves to Models and Cash Flows   **8:48**

- **Part 3:** Real-Life Problems with Type Curves   **17:14**

- **D&C Costs:** "Drilling & Completion" or the upfront CapEx required to drill a new well (huge regional variations)

- **EUR:** "Estimate Ultimate Recovery" or the total oil, gas, and NGLs the company can recover *in an economically feasible way* over the well's life (**not** just the total amount – careful!)

- **IP or IP Rate:** The "Initial Production" of the well when it first starts operating; measured in Million Cubic Feet Equivalent per Day (Mmcfepd) or Thousands of Barrels of Oil Equivalent per Day (Mboepd)
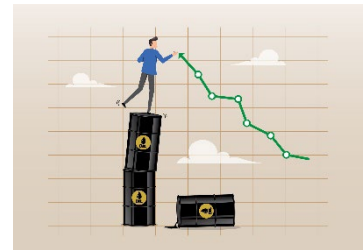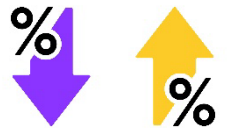
- **B-Factor:** This roughly measures the "steepness" of the decline curve after the initial production period; *higher* numbers often mean a *shallower* decline, but varies based on the curve

β

- **Terminal Decline:** The minimum decline rate the well will reach

- **LOE:** "Lease Operating Expense"; the fixed and variable expenses associated with production from the well

- **NPV-10 / IRR:** The NPV at a 10% Discount Rate (industry standard) and the "annualized rate of return" from the well

- **Common Production Formula:**
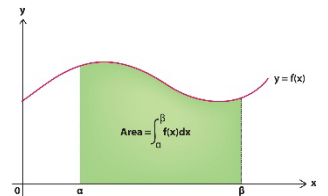
Hyperbolic Decline

Hyperbolic decline is the generic case where $0 < b < 1$.

$$q_0 = \frac{q_i}{(1 + bD_i t)^{\frac{1}{b}}}$$

- **Use Cases:** Get the initial Daily Production from the company's information and use this formula to forecast it at the end of each year

- **Annual #s:** Should use an **integral** to get the area under the curve, but we can use approximations via weightings/averages

- **Next Steps:** Need to *limit* annual production based on the EUR and *limit* the declines based on the Terminal Decline Rate

- **Revenue:** Split the production into oil, gas, and natural gas liquids (NGLs) and assume $ / Mcf or $ / Bbl prices for these

- **Expenses:** Normally have a fixed expense while the well produces and variable expenses linked to production

- **Cash Flows:** Revenue – Asset-Level Expenses – CapEx (D&C Costs in the first period)

- **Next:** Aggregate all the production and cash flows from all the wells drilled each year (OFFSET and waterfall schedule)

- **And:** Create a "roll-up" schedule that summarizes the production and cash flows by region, Reserve type, etc.

- **Why:** New wells (from PUD, PROB, POSS Reserves) tend to work best when oil/gas prices are high, so we like to see how much of the company's value depends on these "higher prices"

Part 3: Real-Life Problems with Type Curves

- **Most Companies:** Do **NOT** disclose all the information you need in a nice, easy, single-slide format like SilverBow here

- **More Common:** This type of schedule from Range Resources:

Gross Estimated Cumulative Recoveries by Year

Year	Condensate (Mbbls)	Residue (Mmcf)	NGL (Mbbls)
1	19	1,976	343
2	25	3,188	553
3	28	4,133	717
5	34	5,650	981
10	41	8,369	1,453
20	50	11,807	2,049
EUR	60	15,797	2,742

- **Also:** Type Curves are not useful for existing, producing wells because you don't know the age of each one, remaining EUR, where it is in the lifecycle, etc.
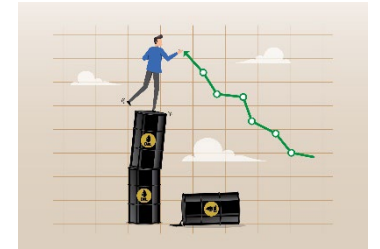
- **So:** You often must accept approximations, such as fixed decline rates via Goal Seek or simple percentages each year

- **Idea:** Guesstimate a decline rate that *results in* the total cumulative production equaling the PDP Reserves by their "estimated life span" (~Reserve Life Ratio)

Recap and Summary

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- **Part 2:** From Type Curves to Models and Cash Flows

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