

ECONOMIC MODELS ? ⚠

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- > \$75 Oil 10k Lateral Econo...
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- > \$100 Oil 10k Lateral Econ...

Economic models

Extending production to economics

Economic Models

Output Options Tab

$$\textit{DiscountedCost} = \frac{\textit{Cost}}{(1+r)^y}$$

$$\textit{DiscountedRevenue} = \frac{\textit{Revenue}}{(1+r)^y}$$

At any point in time during a simulation the discounted cost and revenue are calculated.

All the outputs are post processed at the end of the simulation in a economicmodel.csv file in the results folder. This allows changes in the economic model to be run from the very last restart or from the economics navigator (found by right clicking on the simulation). The economics models are **separate** from the ResFrac model and so changes made in the 'main' ResFrac well spacing, cluster spacing etc. must also be made in the economic model.

Multiple economic models can be specified to output different results. For instance, different prices of oil or cost of sand can be evaluated.

Please read through the help file as it very thorough.

Economic Models Inputs

Users specify the following cost parameters: drilling cost per well, fixed fracturing cost per well, land cost per acre, marginal fracturing proppant cost, marginal injection water cost, overhead rate, marginal cost for surface facilities for produced oil, water, and gas, miscellaneous up-front cost, and operational costs (described below).

Users specify the following revenue parameters: price of oil, price of gas, royalty and tax rate.

Users also specify discount rate and whether to include individual wells in the economics calculation.

Economic Models - Outputs

- Discounted revenue
- Discounted cost (OPEX plus CAPEX)
- Discounted OPEX
- Discounted CAPEX
- Final cash
- Cumulative Net Present Value (NPV) = Cumulative discounted revenue minus the cumulative discounted cost
- Investment Efficiency = NPV divided cumulative cost
- Internal rate of return = The discount rate at which the NPV equals zero
- Discounted Return on Investment (DROI) = (Discounted revenue – discounted OPEX) / discounted CAPEX
- NPV/Section

Economic Models Inputs

ECONOMIC MODELS ?

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▼ \$75 Oil 10k Lateral Econo...

Name

\$75 Oil 10k Lateral Economics ?

Price of oil [dollars/bbl]

75 ?

Gross oil shrinkage

0 ?

Price of gas [dollars/Mscf]

2.5 ?

Most inputs are self explanatory.

There are a few that need a little extra explanation.

- Economic calculation start time
- Well spacing considerations
- Wellbore drilling times

Economic Models Inputs – Economic Model Start Times

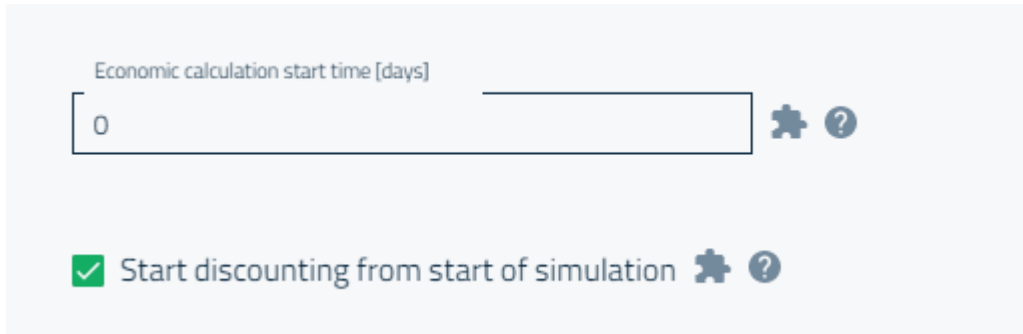
Most economic models start at the beginning of a simulation.

However, like in the case of child well, you may want to start the economics when the child wells are drilled, and assume the parent well is a sunk cost.



Even then there are some nuances. Do you apply the discount rate from the time the child wells are drilled or from time zero in the simulation?



First, decide when you want to start running the economics and enter that value.

Then, if you check the box ‘start discounting from start of simulation’ the discount rate will start from the beginning. If you uncheck, the discount rate will start at the specified start time.



Economic calculation start time [days]

Start discounting from start of simulation  

Economic Models – Defining the Area

STAGES PER WELL ?

	Well name ?	Stages per well ?
1	Well_High Noon	40
2	Well_Sunset	40
3	Well_Sunrise	40

Number of stages per well. Entering more or less stages scales the production up or down accordingly depending on how many stages were simulated. Since the economic model is separate and we are only simulating a portion of the wellbore in ResFrac, this does not have to equal the actual number of stages.

LATERAL LENGTH PER WELL [FT] ?

	Well name ?	Lateral length per well [ft] ?
1	Well_High Noon	10000
2	Well_Sunset	10000
3	Well_Sunrise	10000

This is used in conjunction with average well spacing to determine the footprint of the well to determine the acreage. Once again, this does not have to be the actual lateral length and can be a hypothetical value, it is used for scaling purposes.

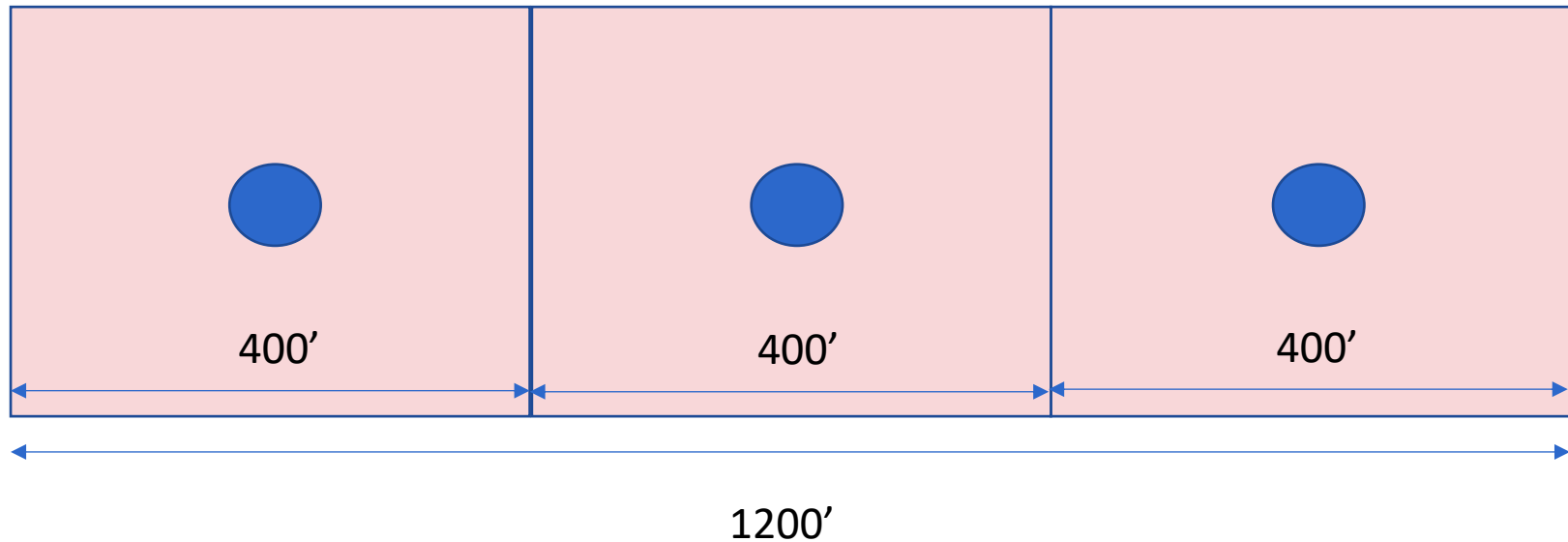
Economic Models – Average Well Spacing

AVERAGE WELL SPACING PER WELL [FT] ?

	Well name ?	Average well spacing per well [ft] ?
1	Well_High Noon	400
2	Well_Sunset	400
3	Well_Sunrise	400

The well spacing of each well can be specified here and will be used to determine the total footprint of all the wells in the simulation so that land costs can be calculated correctly.

This can get tricky when doing optimizations. Please refer to the complex optimization presentation to understand the nuances of specifying the average well spacing.



Economic Models – Defining the Area

INCLUDE IN MODEL ?

	Well name ?	Include in model ?
1	Well_High Noon	<input checked="" type="checkbox"/>
2	Well_Sunset	<input checked="" type="checkbox"/>
3	Well_Sunrise	<input checked="" type="checkbox"/>

WELL SCALING FACTOR ?

	Well name ?	Well scaling factor ?
1	Well_High Noon	21.8
2	Well_Sunset	21.8
3	Well_Sunrise	21.8

Check whether you want to include wells in the model. The most common instance of unchecking would be not including a parent well in the economic model.

Since most simulations only look at a few stages, the production is scaled up depending on the number of stages entered previously. Alternatively, you can scale the production up using this parameter.



Thank You!

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