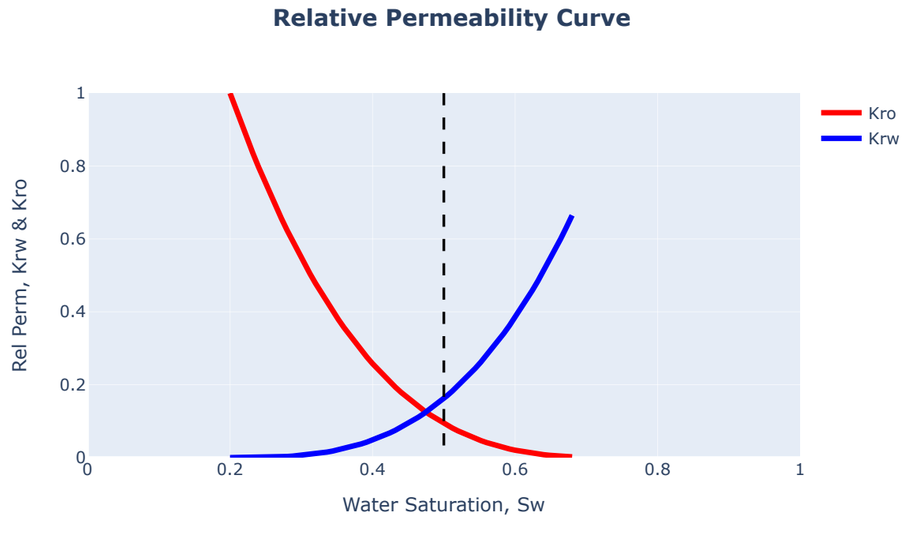
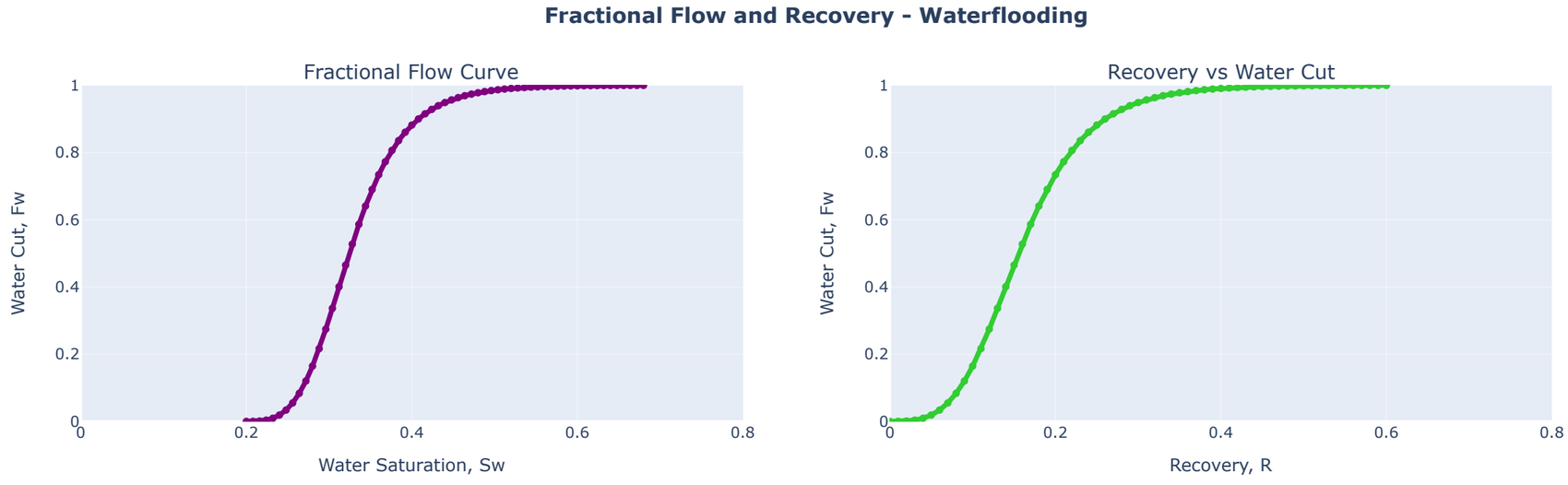
# Field Develpment Model

This is an interactive dashboard to model Recovery through Waterflood and different EOR techniques, and perfoem economic Analysis based on different Production Profiles by generating Petroleum Project Net Cash Flows (NCF), Net Present Value (NPV), Internal Rate of Return (IRR) and Different plots for Sensitivity Analysis through Tornado Charts and Spider Plots based on given CAPEX, OPEX, Tax, Royalty, and Oil Prices.

### WaterFlooding

| Reservoir & Fluid Parameters | Data |
|---|---|
| Initial Water Saturation, Swi, % | 0.2 |
| Initial Oil Saturation, Soi, % | 0.8 |
| Residual Oil Saturation to Water, Sorw, % | 0.25 |
| Oil Viscosity, Muo, cP | 40 |
| Water Viscosity, Muw, cP | 1 |

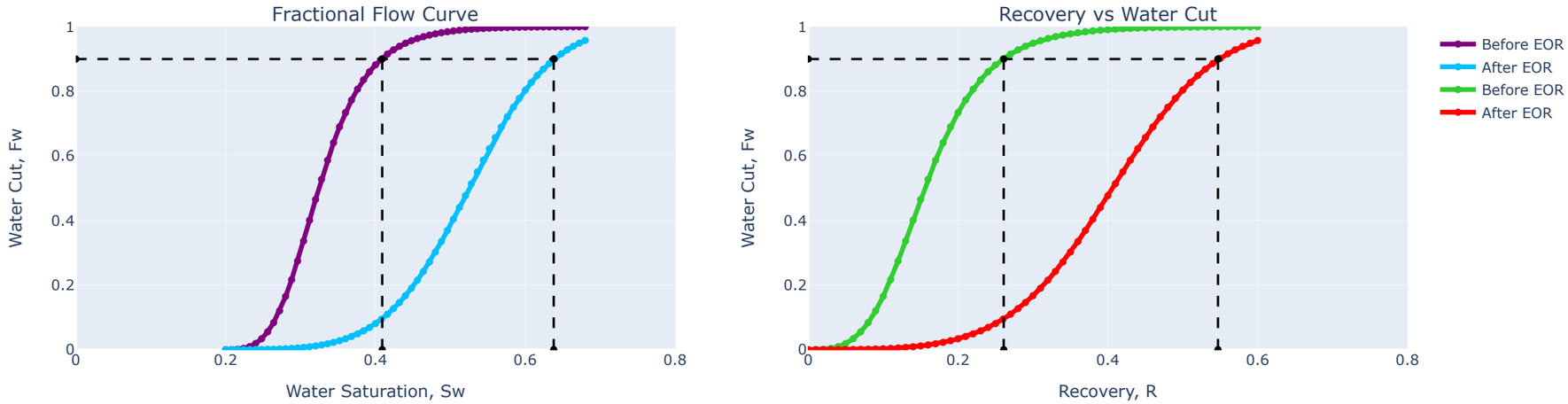


## Enhanced Oil Recovery

| Reservoir & Fluid Parameters | Data |
|---|---|
| Initial Water Saturation, Swi, % | 0.2 |
| Initial Oil Saturation, Soi, % | 0.8 |
| Residual Oil Saturation to Water, Sorw, % | 0.15 |
| Oil Viscosity, Muo, cP | 40 |
| Water Viscosity, Muw, cP | 40 |

## Comparision - WF vs EOR




The approximate recovery at 90% water cut before EOR was 26% and after applying EOR the approximate recovery was 54%. The approximate water saturation at 90% water cut before EOR was 40% and after applying EOR the approximate water saturation was 63%.

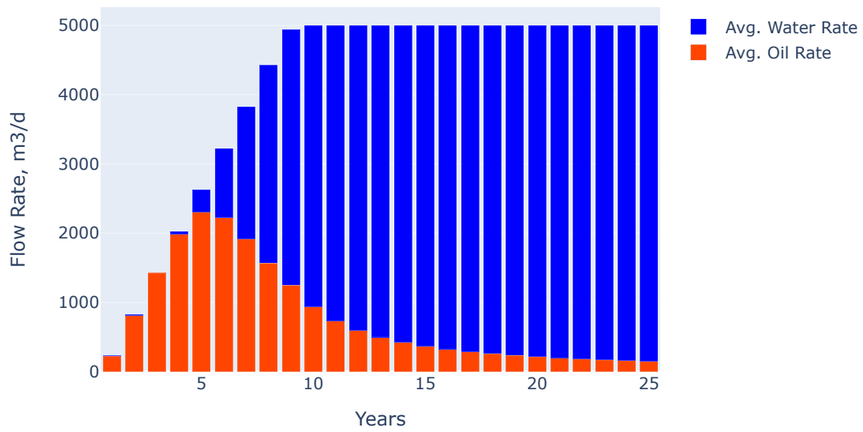
## Field Data

| Field Parameters | Data |
|---|---|
| Field Area, Km2 | 20 |
| Oil Initially in Place, MMm3 | 25 |
| Test Liq. Rate, m3/d | 25 |
| Years on Production | 25 |

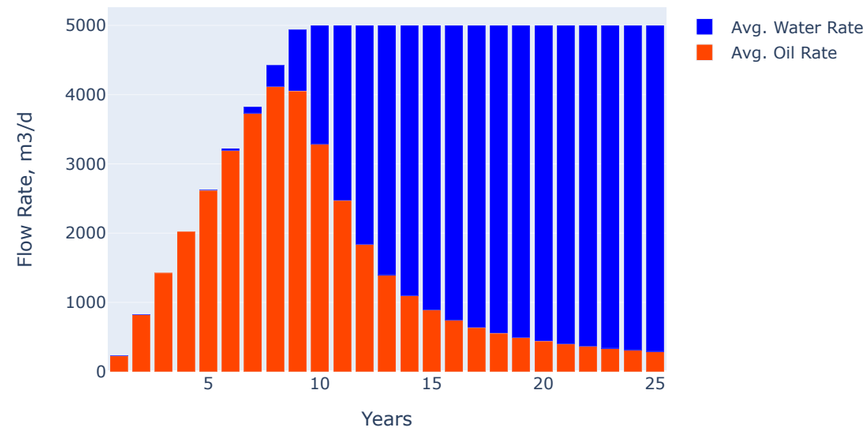
## Economic Variables

| Economic Variables | Data |
|---|---|
| CAPEX, Mn$ | 100 |
| OPEX, $/bbl | 40 |
| Well Cost, Mn$/well | 0.25 |
| Oil Price, $/bbl | 60 |
| Discount Rate, % p.a | 0.14 |
| Royalty, % Gross Rev. | 0.15 |
| Tax, % p.a. | 0.2 |

## Year-wise Average Oil and Water Flow Rate - Before EOR




## Year-wise Average Oil and Water Flow Rate - After EOR




Spacing:

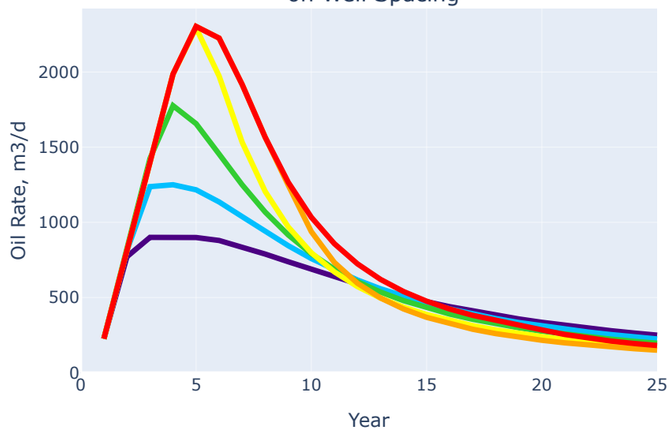
200 300 400 500 600 700

Spacing:

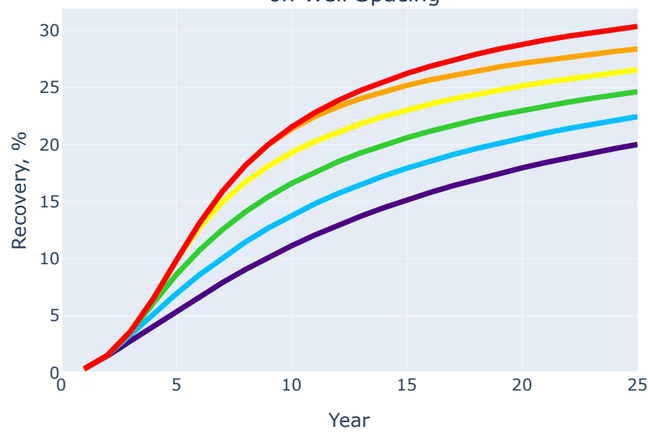
200 300 400 500 600 700

## Before EOR

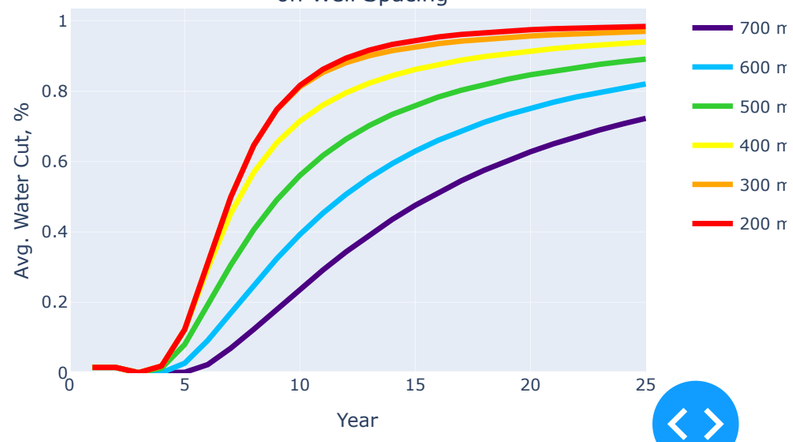
Yearly Oil Rate based on Well Spacing

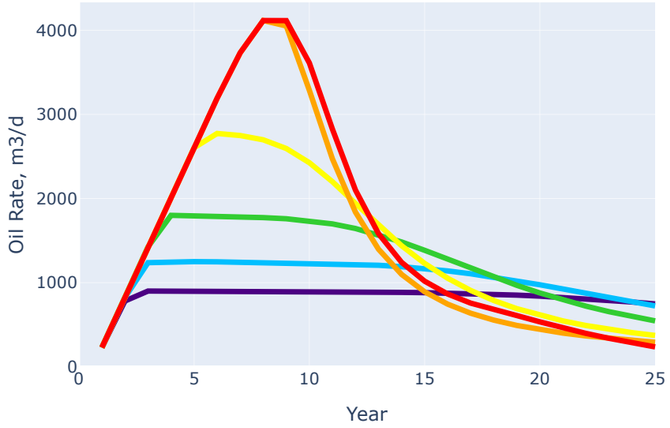



Yearly Recovery based on Well Spacing

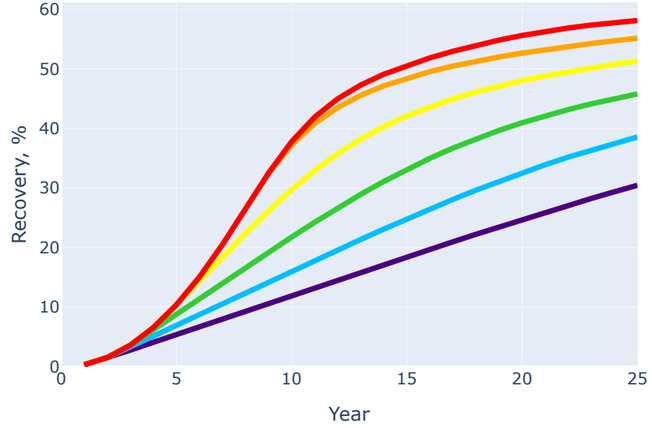


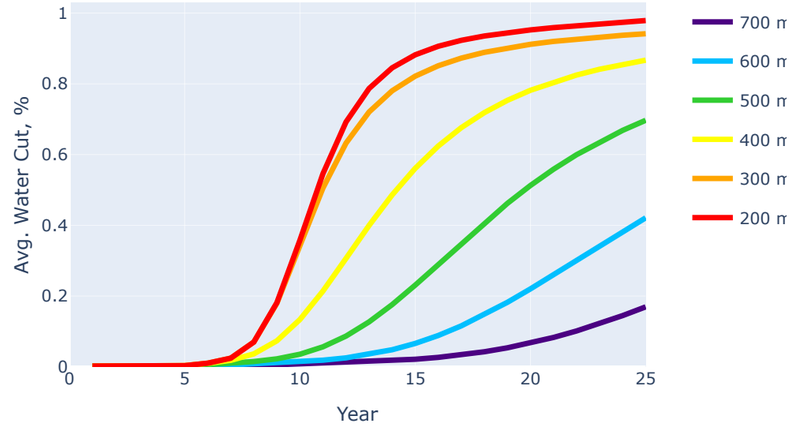

Yearly Avg. Water Cut based on Well Spacing






**After EOR**

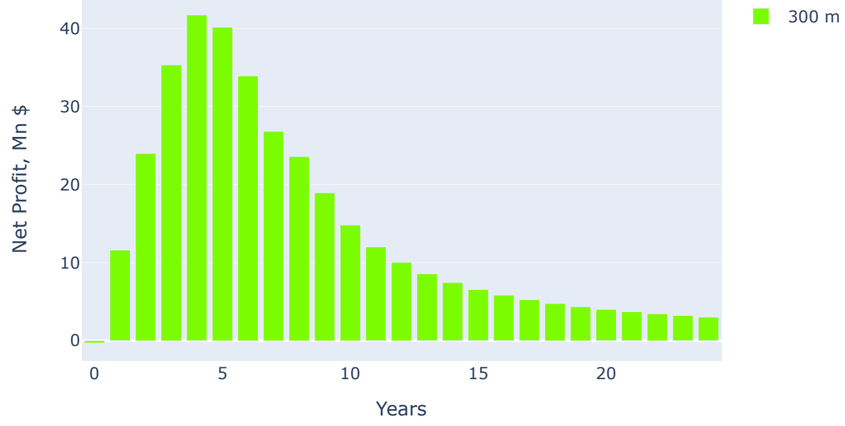



## Master Table - Waterflooding

| Master Table | 700 m | 600 m | 500 m | 400 m | 300 m | 200 m |
|---|---|---|---|---|---|---|
| Present Value of CAPEX (Mn $) | -100 | -100 | -100 | -100 | -100 | -100 |
| Present Worth of Revenue-Pre Tax (Mn $) | 108.67 | 129.6 | 149.46 | 164.34 | 168.62 | 162.88 |
| Present Worth of Revenue-Post Tax (Mn $) | 86.88 | 103.63 | 119.51 | 131.42 | 134.84 | 130.25 |
| Net Present Value-Pre Tax (Mn $) | 8.67 | 29.6 | 49.46 | 64.34 | 68.62 | 62.88 |
| Net Present Value-Post Tax (Mn $) | -13.12 | 3.63 | 19.51 | 31.42 | 34.84 | 30.25 |
| Internal Rate of Return-Pre Tax (%) | 15.41 | 18.82 | 22.01 | 24.23 | 24.69 | 24.22 |
| Internal Rate of Return-Post Tax (%) | 11.76 | 14.62 | 17.35 | 19.33 | 19.81 | 19.26 |
| Payback Period (Years) | 6.88 | 5.62 | 4.86 | 4.68 | 4.7 | 4.7 |

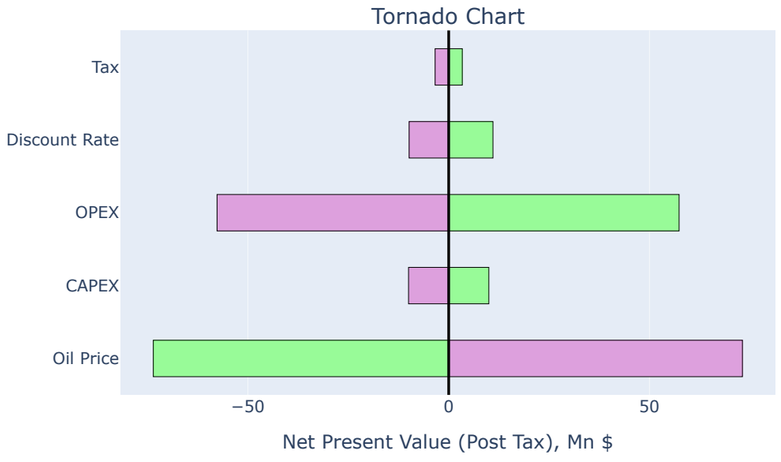
**Yearly Cashflows - Before EOR**

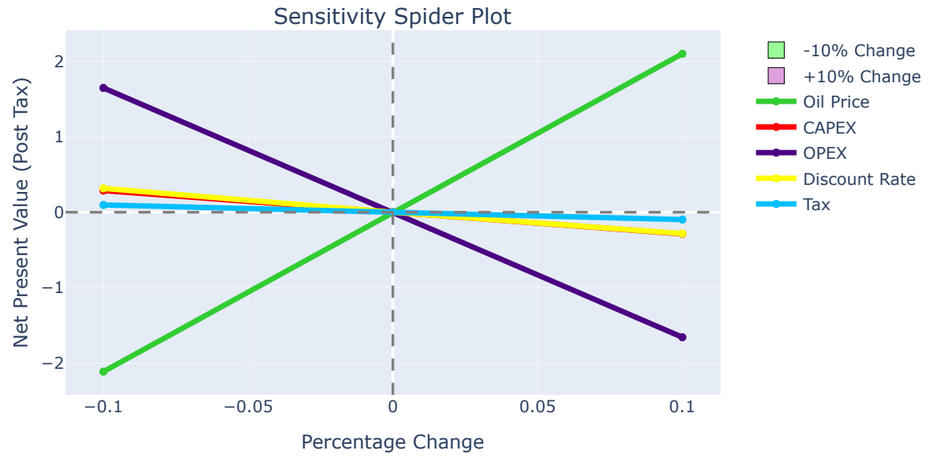



Waterflooding - Spacing:


The best spacing pattern for this case would be 300 m becuase this spacing pattern generates the highest NPV (Post Tax) equal to $34.84 Million and IRR (Post Tax) equal to 19.81%.

## Before EOR

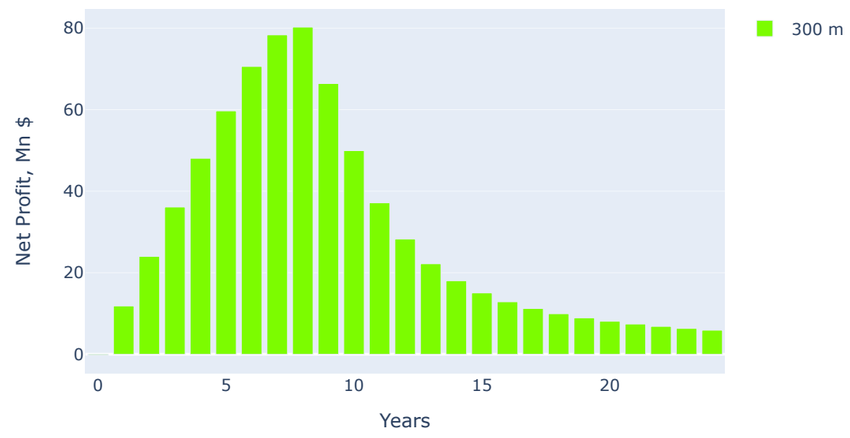



## Master Table - Enhanced Oil Recovery

| Master Table | 700 m | 600 m | 500 m | 400 m | 300 m | 200 m |
|---|---|---|---|---|---|---|
| Present Value of CAPEX (Mn $) | -100 | -100 | -100 | -100 | -100 | -100 |
| Present Worth of Revenue-Pre Tax (Mn $) | 129.91 | 169.4 | 216.17 | 264.76 | 294.02 | 292.84 |
| Present Worth of Revenue-Post Tax (Mn $) | 103.89 | 135.48 | 172.89 | 211.77 | 235.18 | 234.23 |
| Net Present Value-Pre Tax (Mn $) | 29.91 | 69.4 | 116.17 | 164.76 | 194.02 | 192.84 |
| Net Present Value-Post Tax (Mn $) | 3.89 | 35.48 | 72.89 | 111.77 | 135.18 | 134.23 |
| Internal Rate of Return-Pre Tax (%) | 17.95 | 22.52 | 27.37 | 31.79 | 33.93 | 33.91 |
| Internal Rate of Return-Post Tax (%) | 14.54 | 18.61 | 22.96 | 27.05 | 29.12 | 29.1 |
| Payback Period (Years) | 6.78 | 5.53 | 4.77 | 4.57 | 4.59 | 4.59 |

## Yearly Cashflows - After EOR

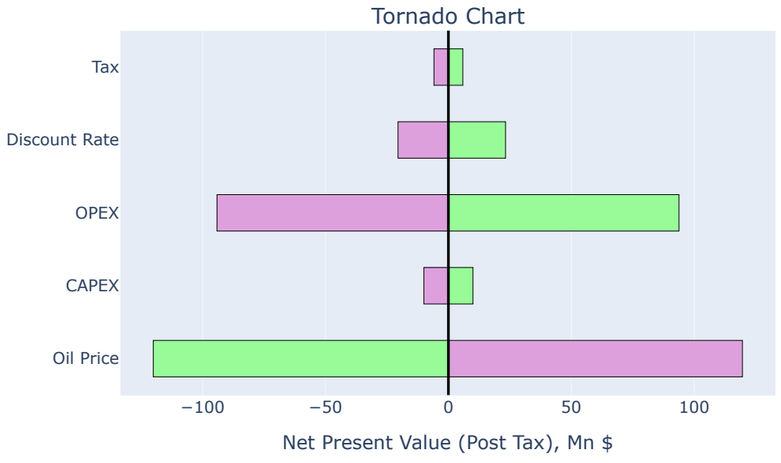


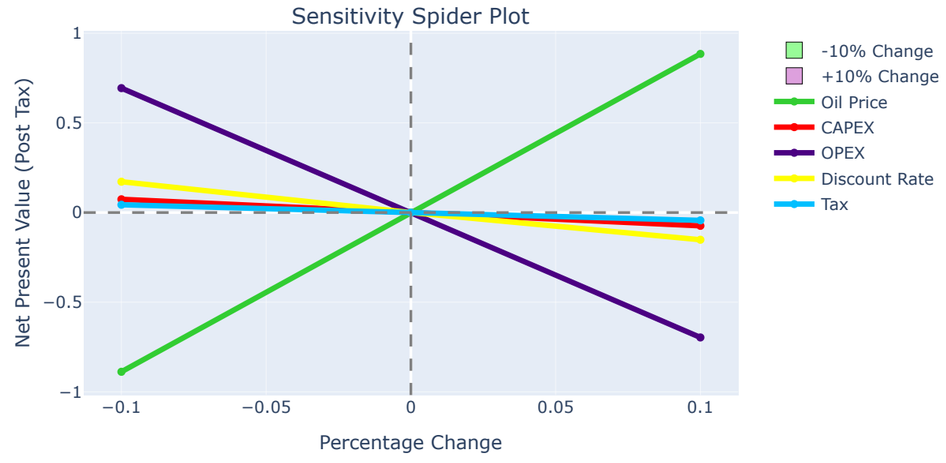

EOR - Spacing:

200 300 400 500 600 700

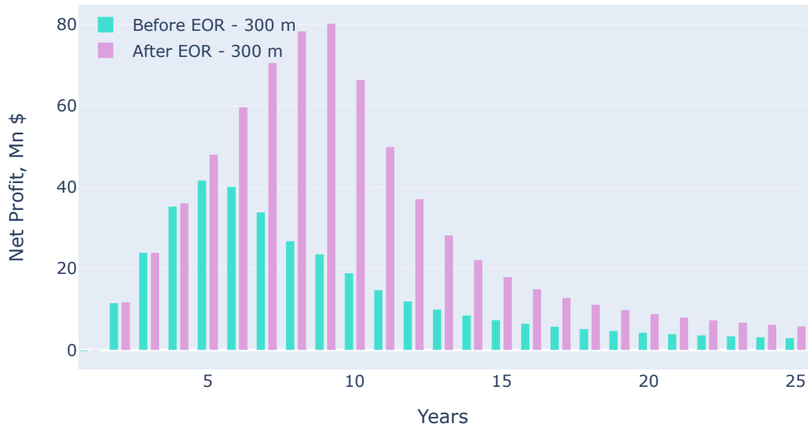
The best spacing pattern for this case would be 300 m becuase this spacing pattern generates the highest NPV (Post Tax) equal to $135.18 Million and IRR (Post Tax) equal to 29.12%.

## After EOR




## Yearly Cashflows




WF - Spacing:

200 300 400 500 600 700

EOR - Spacing:

200 300 400 500 600 700