

Oil production economics

Part of [Field Development Planning](#) and [Production Performance Monitoring](#) based on [NPV](#) and [EUR](#).

$NPV = -I_0 + \sum_{i=1}^n \frac{FCF_i}{(1+r)^i}$	$PI = \frac{1}{I_0} \cdot \sum_{i=1}^n \frac{FCF_i}{(1+r)^i}$
$FCF = (\text{Sales} - \text{COGS} - \text{OPEX} - \text{Interest}) \cdot (1 - \text{Income TaxRate}) + \text{CAPEX}$	$\text{COGS} = m_F \cdot C_F + m_F \cdot C_F + q_O \cdot C_O + q_G \cdot C_G + q_W \cdot C_W + q_G \cdot C_G + q_W \cdot C_W$
$\text{Sales} = q_1 \cdot \text{Price}_{\text{income}}$	$\text{Price}_{\text{income}} = \text{Tax}_{\text{mining}} \cdot \text{Price}_{\text{market}}$

where

FCF_i	Free Cash Flow for i-th year	q_O	surface oil volumetric production
Sales_i		q_G	surface gas volumetric production
COGS_i		q_W	surface water volumetric production
		q_G	surface gas volumetric injection
OPEX_i		q_W	surface water volumetric injection
CAPEX_i		C_O	production oil processing/transportation cost
Interest_i		C_G	production gas processing/transportation cost
IncomeTaxRate		C_W	production water processing/transportation cost
$\text{Tax}_{\text{mining}}$		C_G	injection gas processing/transportation cost
$\text{Price}_{\text{market}}$		C_W	injection water processing/transportation cost
$\text{Price}_{\text{income}}$		m_F	fluid production lift cost
q_1		m_F	fluid injection lift cost
		C_F	$\cdot g \cdot H \cdot C_E$
		C_F	$\cdot g \cdot H \cdot C_E$
		H	TVD of the hydrocarbon pay
		C_E	electricity cost per energy unit
		g	Standard gravity constant (= 9.80665 m/s ²)

			fluid production efficiency (frac)
			fluid injection efficiency (frac)

The link between the above [FCF](#) algorithm and the general principals of [P&L](#) is given below:

FCF = OCF + CAPEX
OCF = Net Income = EBT · (1 - IncomeTaxRate)
EBT = EBIT - Interest
EBIT = Sales - COGS - OPEX

See also

[Petroleum Industry](#) / [Upstream](#) / [Production](#) / [Field Development Plan](#)

[[Petroleum Asset NPV](#)][[Petroleum Asset PI](#)]

[[Statement of Income \(P&L\)](#)]

[[Netback](#)]

Reference
