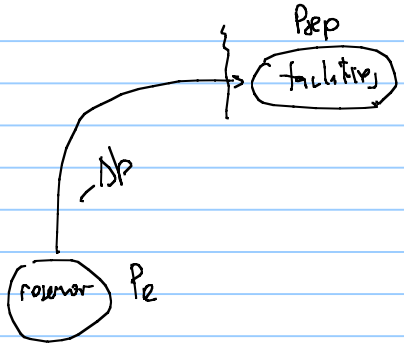
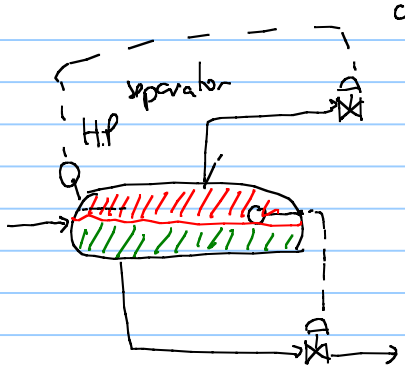
Notes for Youtube video nr. 4

why does plateau end?

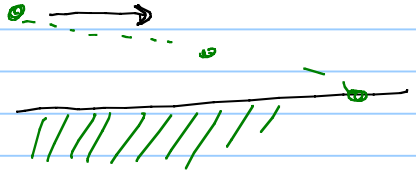
separator pressure is kept constant during the life of field





HHL
HLL
LHL
LLL

Cross section view of the separator



the operation of sep is dependant on $q_{local\,g}$, V_g residance time

$$V_g = \frac{q_g(R,T)}{(A_r/2)}$$

almost always

Psep must be kept constant and of all downstream equipment and processes to ensure proper functioning and acceptable performance

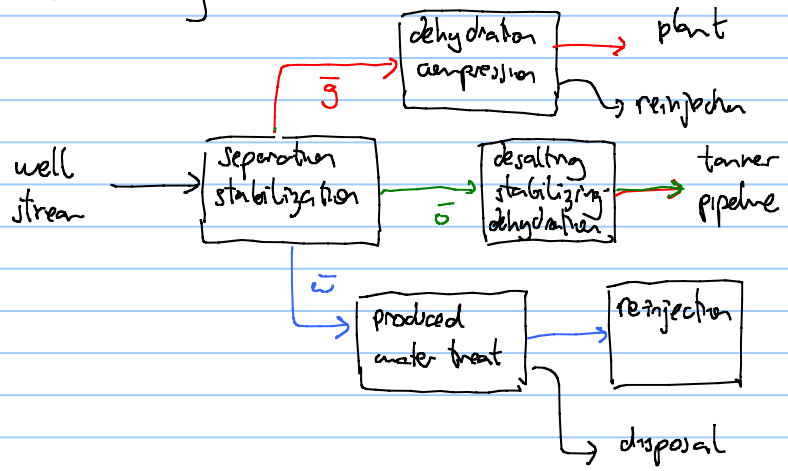
plateau ends because the system doesn't have enough energy to flow against Psep with the specified plateau rate

q_g

Reservoir → bottom-hole → wellhead → separator

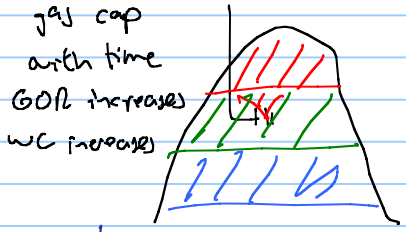
formation	"pipe"	"pipe"
drawdown	tubing flow	gathering network
$-\Delta p$	$-\Delta p$	$-\Delta p$

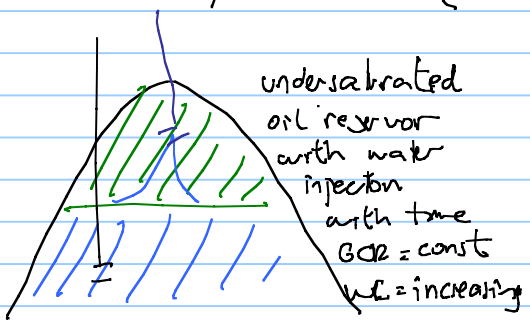
- Bottlenecking

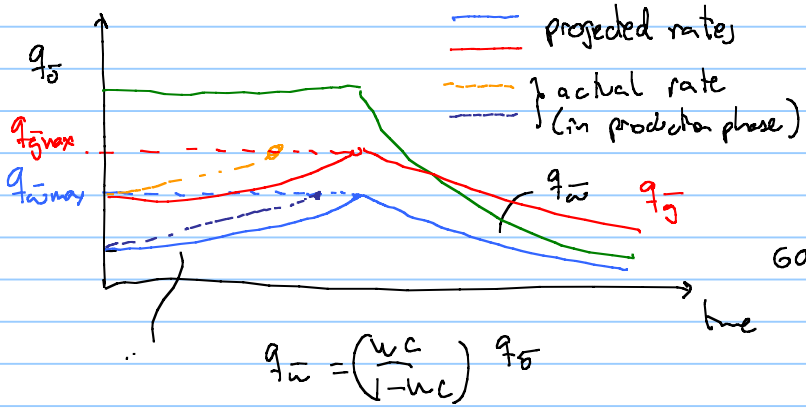


examples of variations of GOR and WC with time

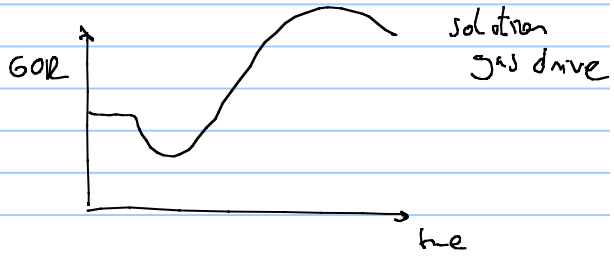
saturated oil reservoir with gas cap







$$q_{\bar{w}} = \left(\frac{WC}{1-WC}\right) q_{\bar{o}}$$



$$WC = \frac{q_{\bar{w}}}{q_{\bar{l}}} = \frac{q_{\bar{w}}}{q_{\bar{w}} + q_{\bar{o}}}$$

$$q_{\bar{g}} = GOR \; q_{\bar{o}}$$

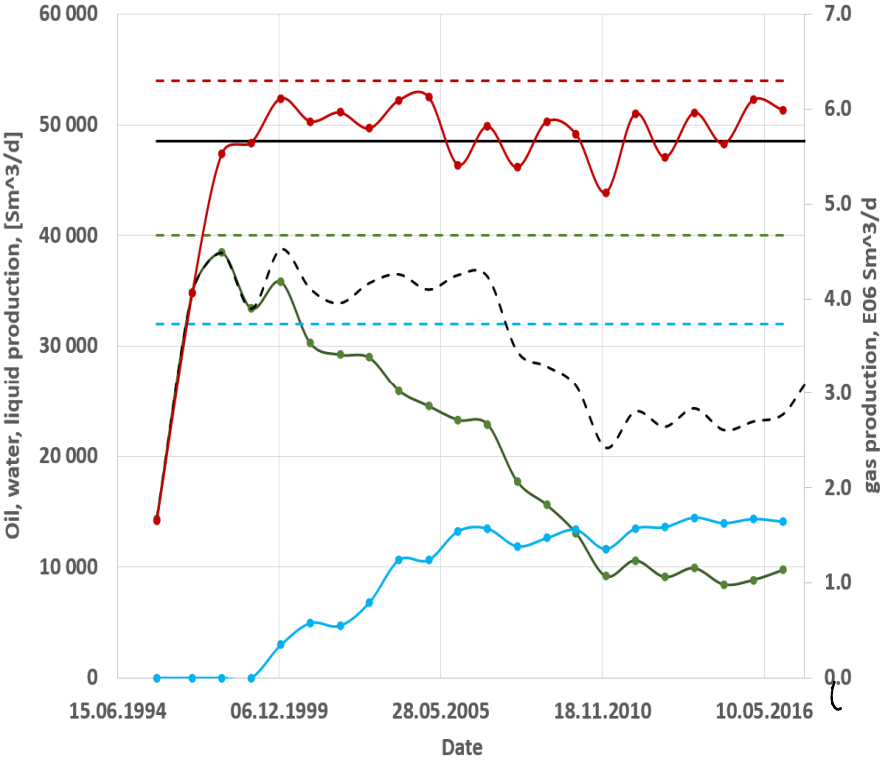
$q_{\bar{g}max}$ and $q_{\bar{w}max}$ are used to design facilities

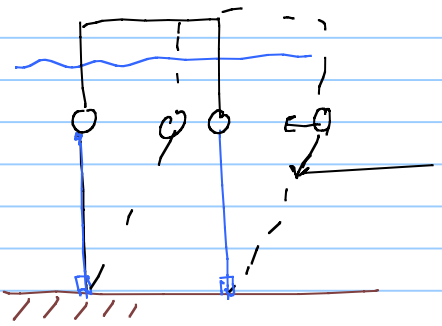
if $q_{\bar{g}}$ or $q_{\bar{w}}$ increase quicker than anticipated the only choice is to reduce $q_{\bar{o}}$ (enter in decline phase)

$$q_{\bar{g}} = GOR \cdot q_{\bar{o}}$$

$$q_{\bar{w}} = \frac{WC}{1-WC} q_{\bar{o}}$$

Maybe? a case where bottlenecking caused a premature plateau end

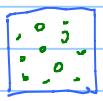




TLP tevion leg platform

Bottlenecking can also occur due to problems in the proces

- water injectors plugging
- gas injector problems
- higher than anticipated separation times → foam → fine dispersion of gas in liquid
  → emulsion → water-oil dispersion "fine"



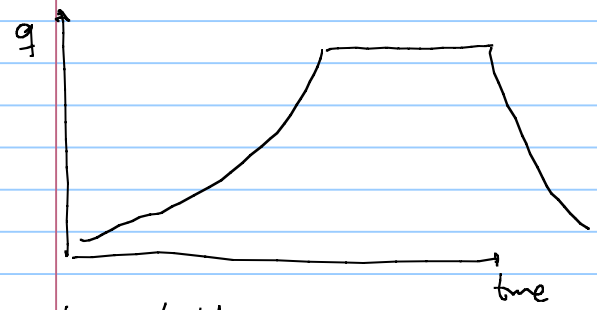
↳ can sometimes be mitigated with chemical or with different technology

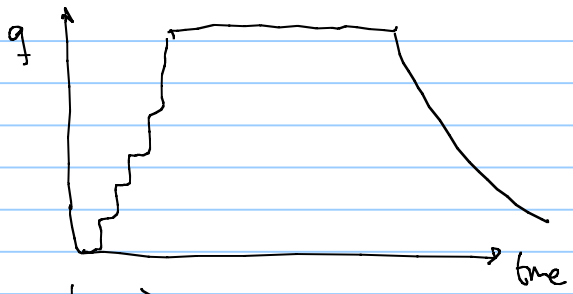
- onshore

vs. offshore

if neighbouring facilities are available, it is possible to produce from few wells gather more information and then plan better field

it is necessary to design, construct and install facilities before producing



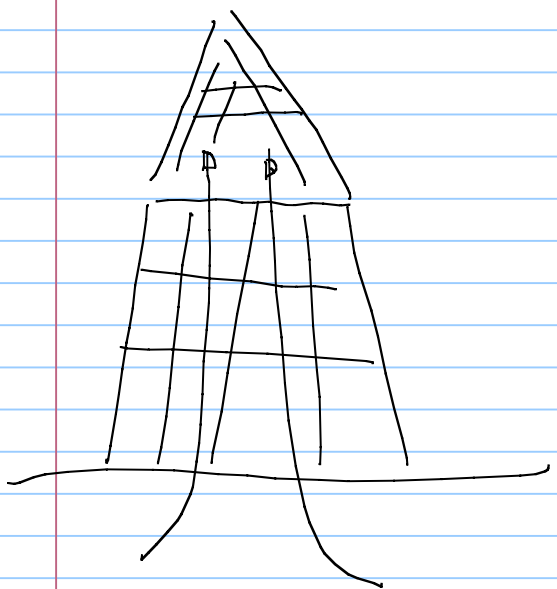


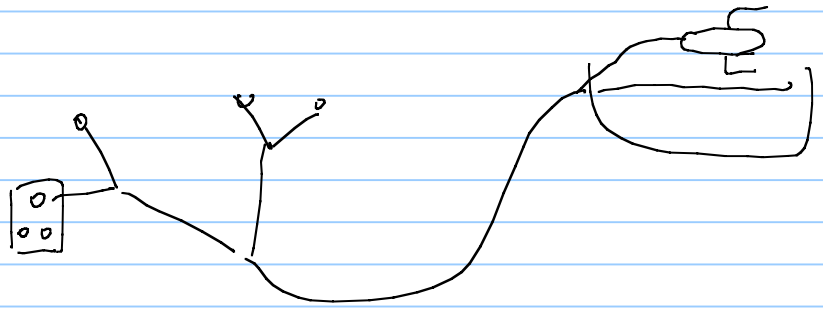
Longer build-up

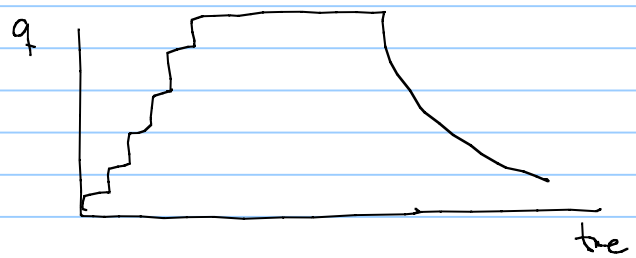
build-up phase

- gain more information about reservoir
- finance development with initial wells

- start production asap ← shorten build-up, pre-drilled wells
- making decisions with big uncertainty







Alternatively, there can be onshore fields whose development resembles those in the offshore environment. One such field in the (aptly named) Empty Quarter of the Yemen was so remote that, by the time an oil production pipeline had been laid, all the appraisal and development wells had been drilled permitting only a static view of the reservoirs.