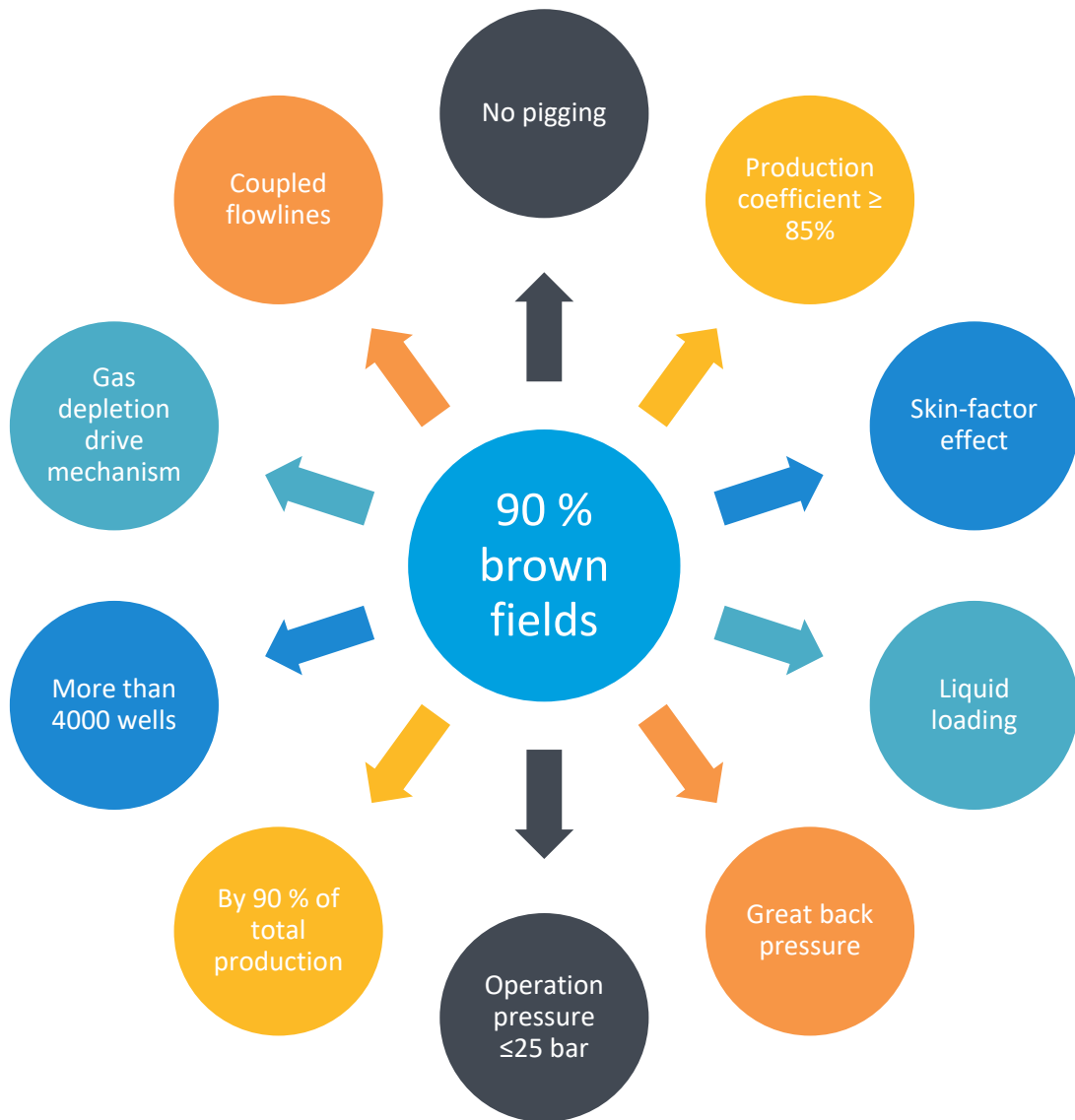




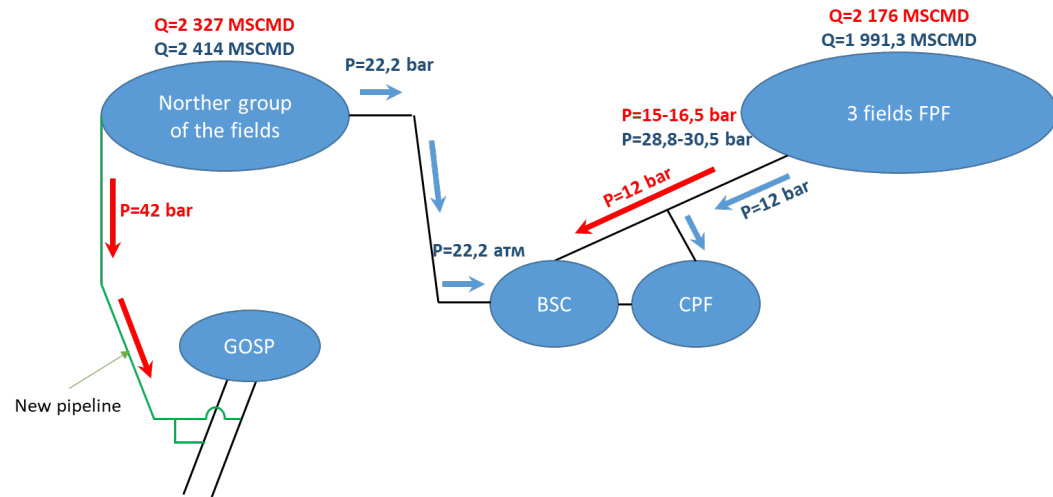
## **UGV: Production Optimization by PipeSim @Schlumberger**

**Mykhailo Bratak**  
**Midstream Department**  
**September, Monaco**

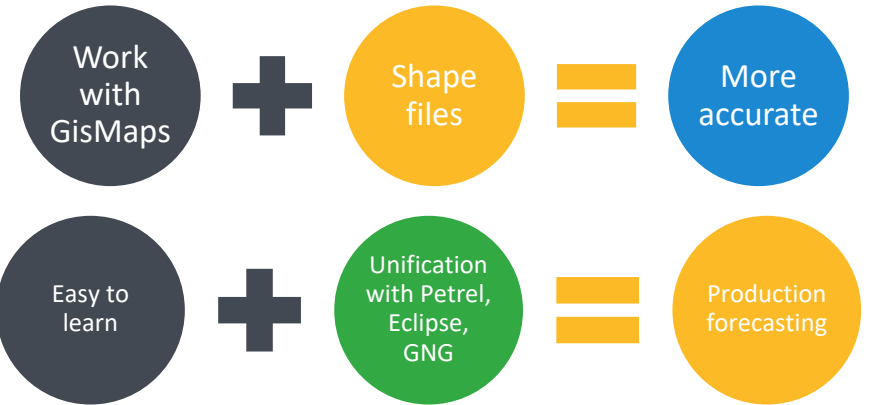
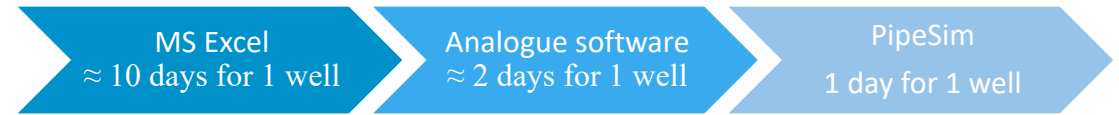
# UGV: "mature fields" VS "green field"



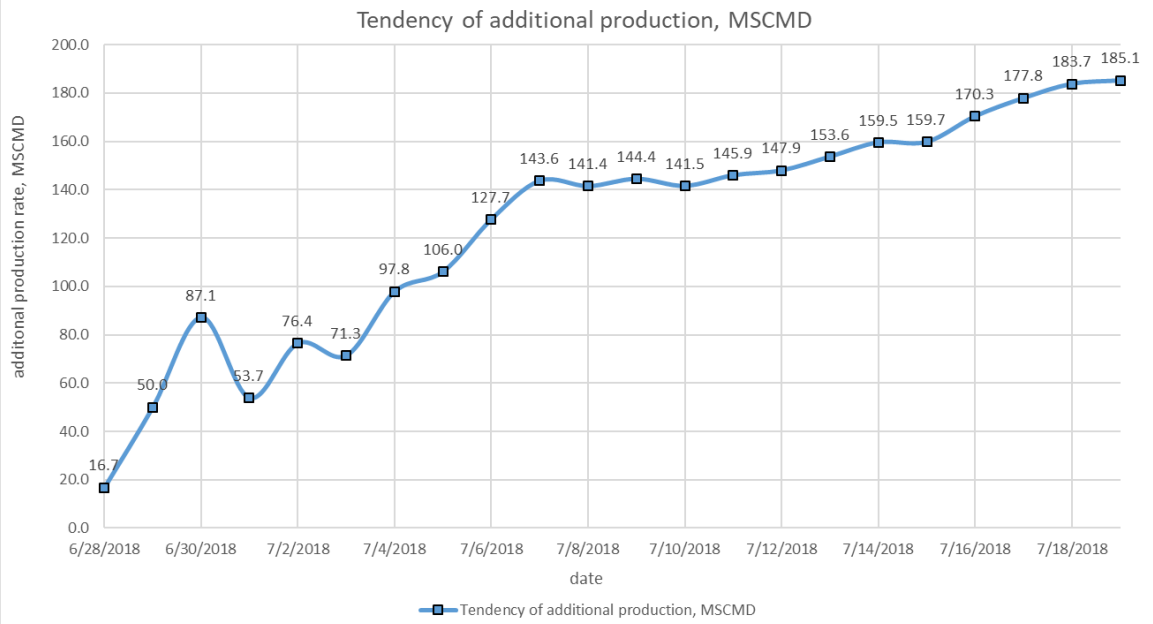
# PipeSim – UGV production optimization pilot project (2018)



PipeSim screening criteria to choose:



PipeSim Pilot Project results:



**Modelling accuracy: 3,5 %**  
**185 MSCMD – actual ΔQ**  
**191 MSCMD – model ΔQ**

**Proper candidates to pressure decreasing**

**Overage ΔQ in 2018 – 2019 + 10 %**

# Brown fields: Production and Gathering system.

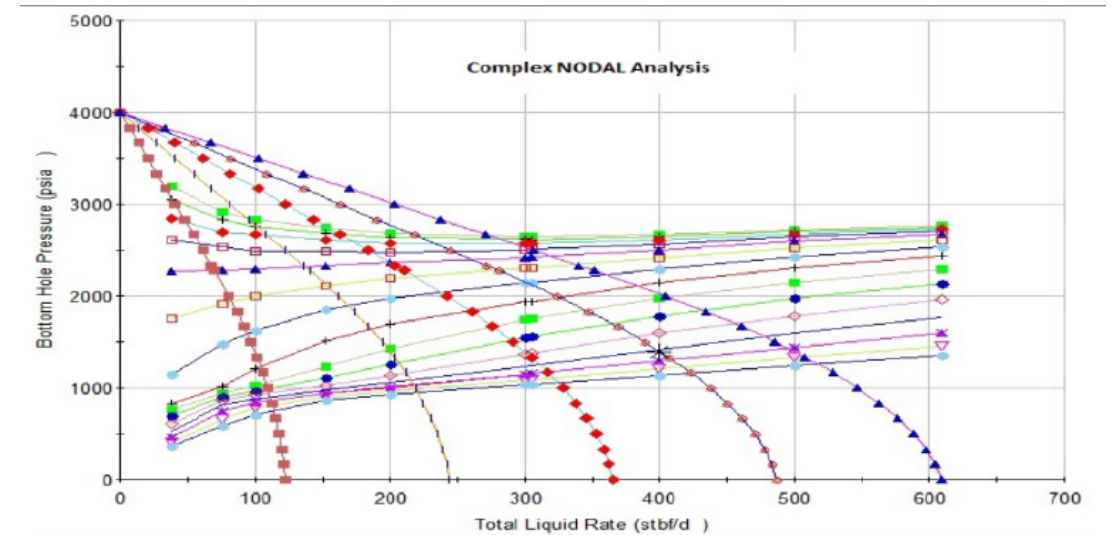
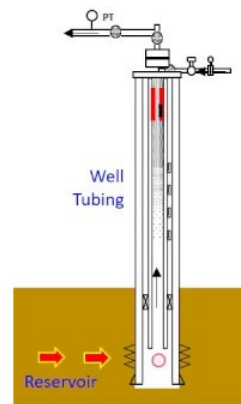
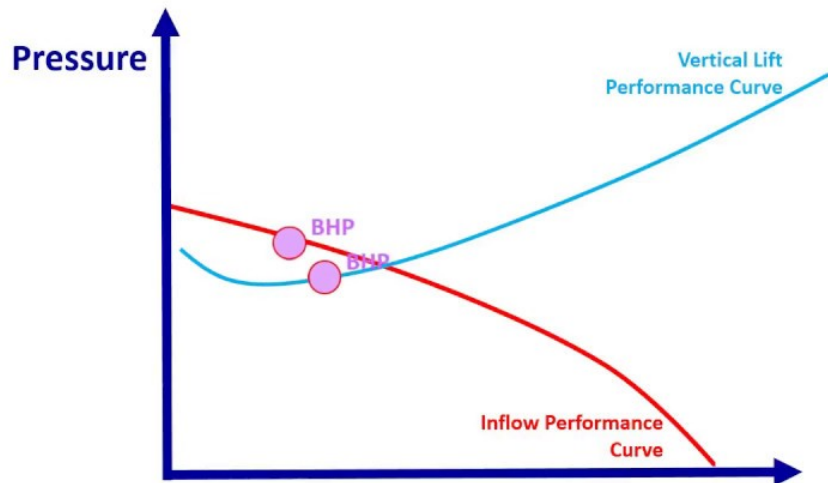
## Bottleneckings vs debottlenecking

**Nodal analysis: find bottlenecking (to estimate the impact on production)**

- Local resistance in CPF and FPF;
- Backpressure in trunk-lines, brunch-lines and flow-lines;
- Liquid loading on the wellbore;
- Hydrates, paraffin and salts.

**Sensitivity analysis: debottlenecking (to model how the wells will react on):**

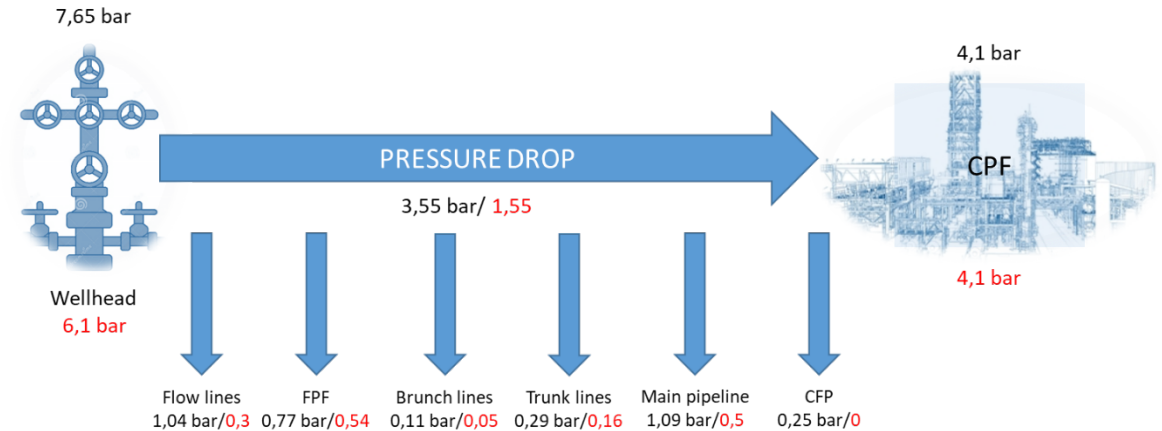
- Pigging of trunk lines and flow-lines;
- Choosing optimal liquid unloading method;
- Flow-lines decoupling;
- Booster installation;
- Tubing changing.



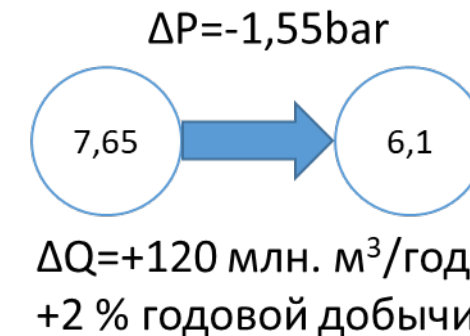
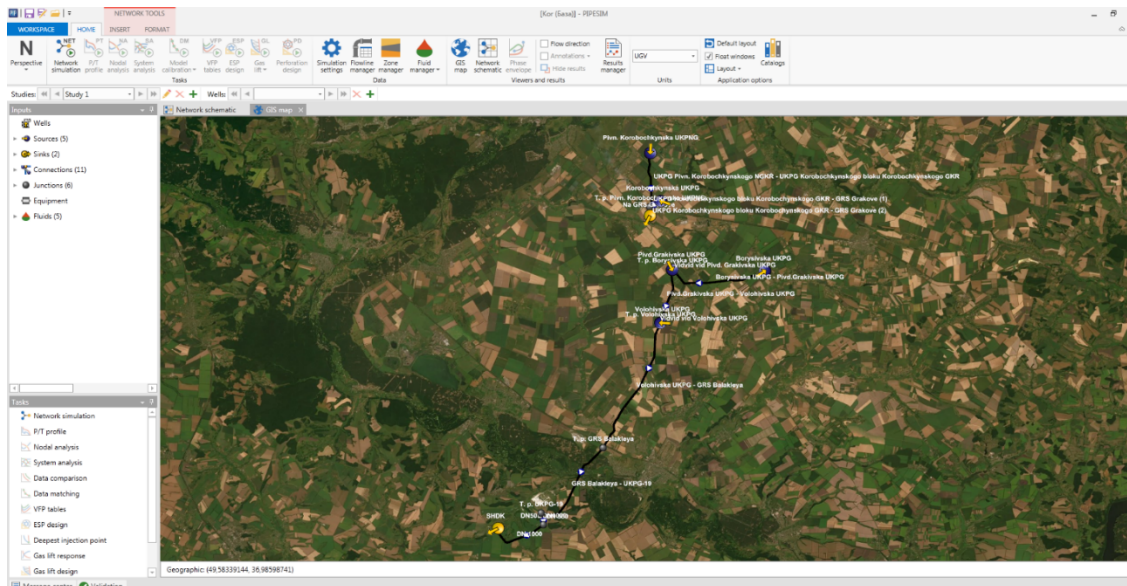
# Actual pressure drop in gathering system: optimal vs backpressure

## Backpressure:

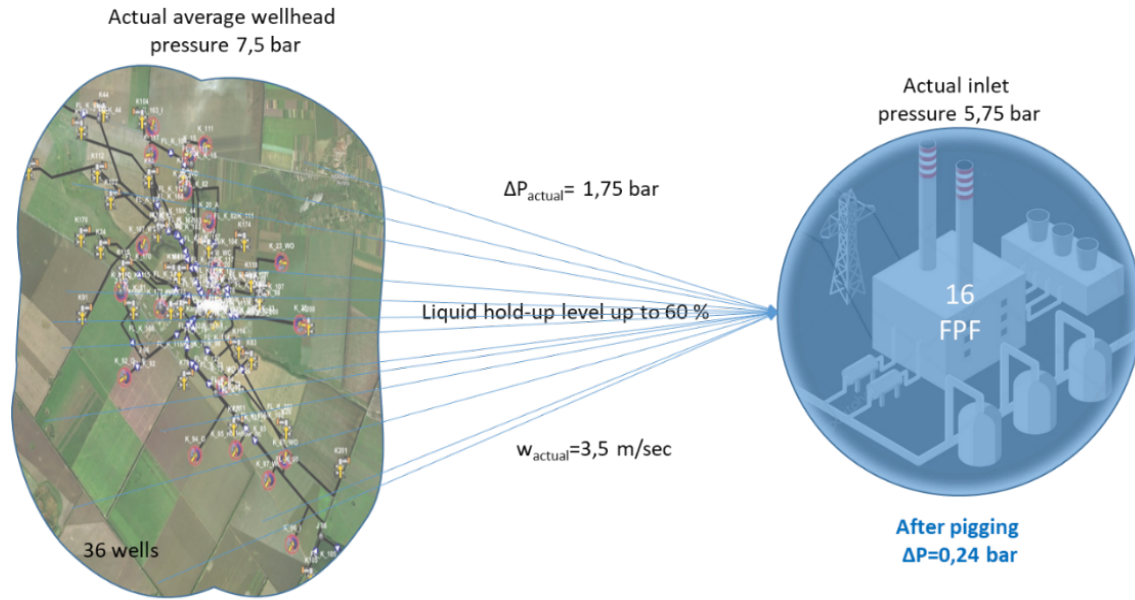
- Liquid slugs inside the flow-lines;
- Chocking at the FPF;
- Local resistance in the outdated valves;
- Liquid loading in the lowest spots of the pipelines;
- Excessive pressure drop in the orifice plates



- actual;  
- debottlenecking.



# Flowlines' pigging

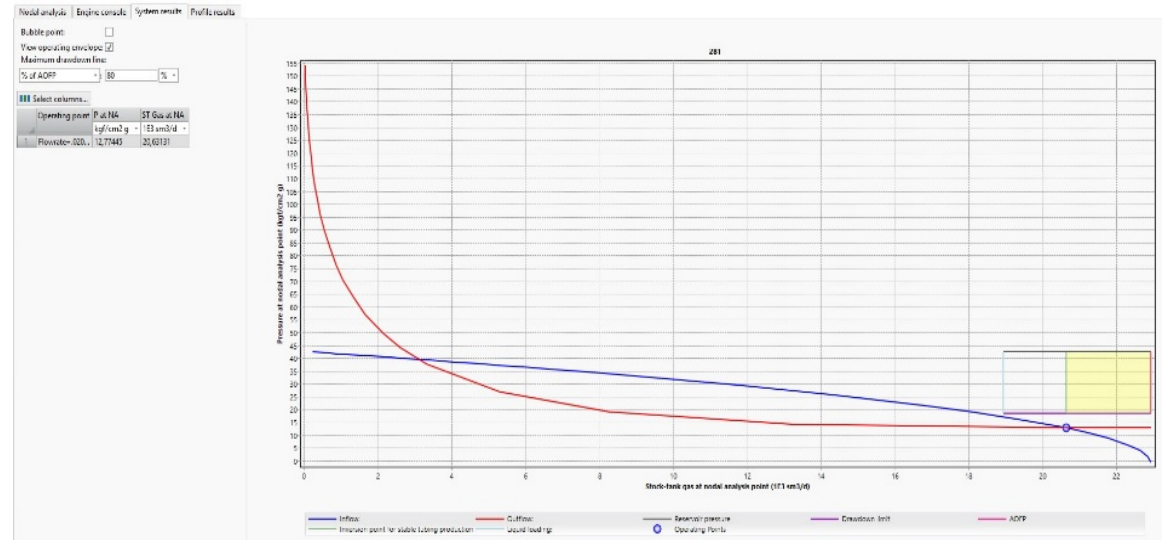
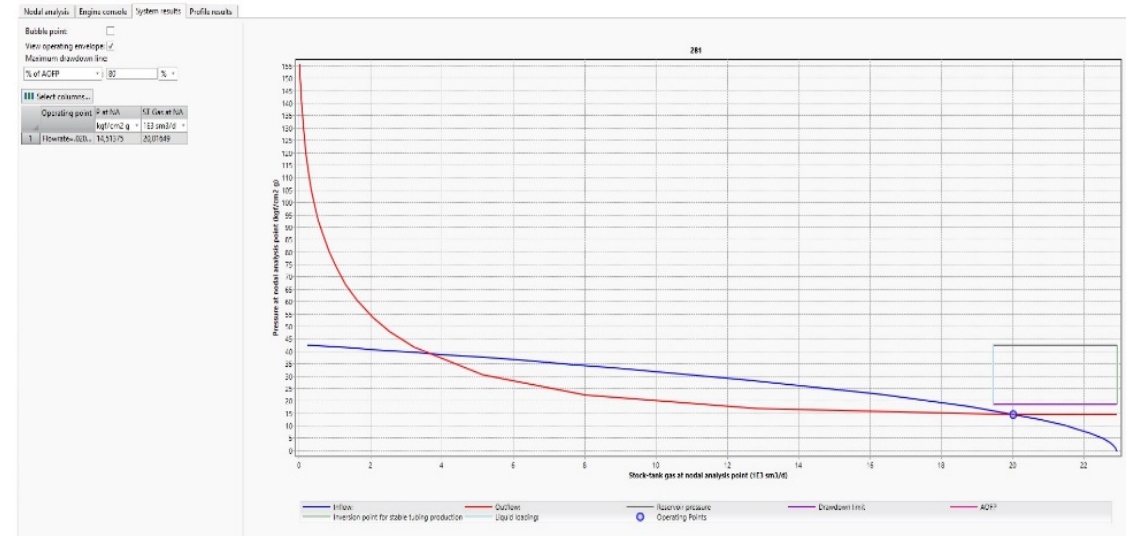


Forecasting  
 $P_{\text{wh}} = 5,9$  bar

Actual production

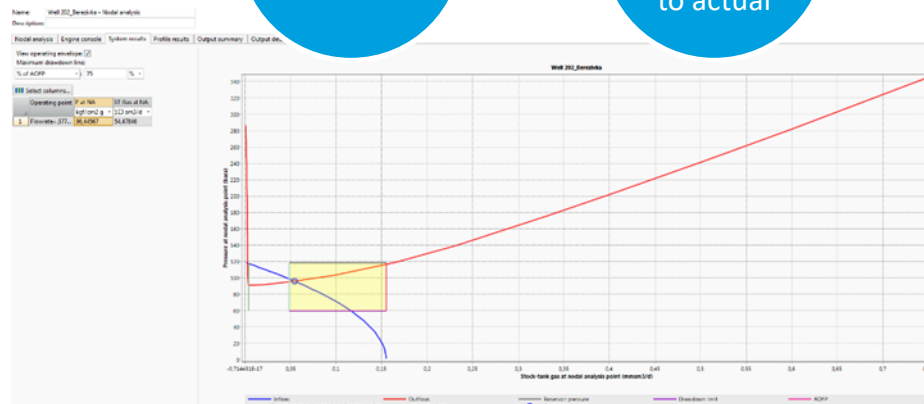
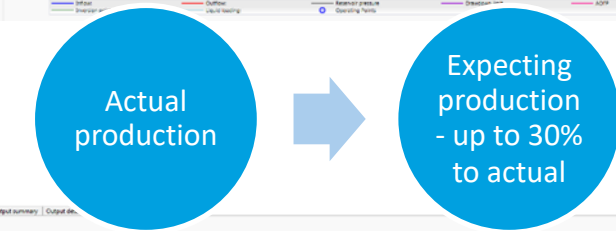
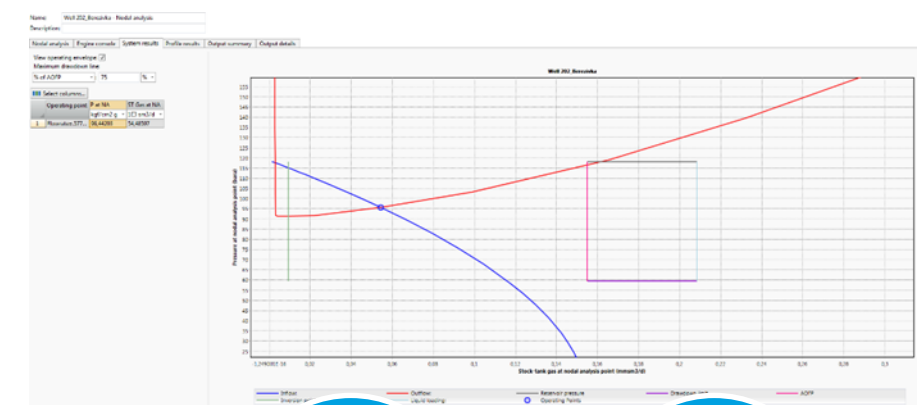
Pigging

Expecting production  
+7% to actual



# Liquid unloading

Well#	GWR, %	GWR, scm/MMscm	Bottom hole pressure, bar	Liquid hydrostatic pressure, bar	Liquid volume, scm	Flowrate, MSCMD	Expected additional production, MSCMD	Expected additional production, MSCMY
202	actual	26,90	96,442	41,020	0,6229	54,486	15,127	5,521
	75	20,18	95,725	40,133	0,6016	55,960		
	50	13,45	95,030	39,276	0,5824	57,378		
	25	6,73	94,400	38,491	0,5684	58,655		
	0	0	88,812	30,813	0,3726	69,613		



## Liquid unloading

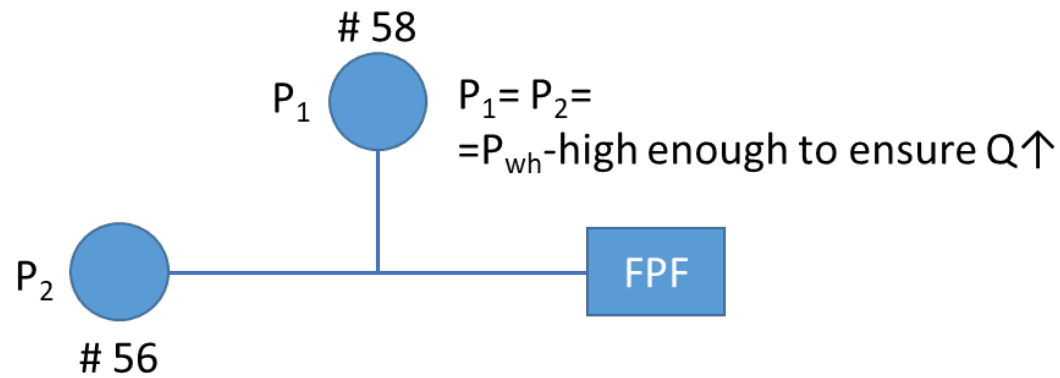
- continuous

- periodic

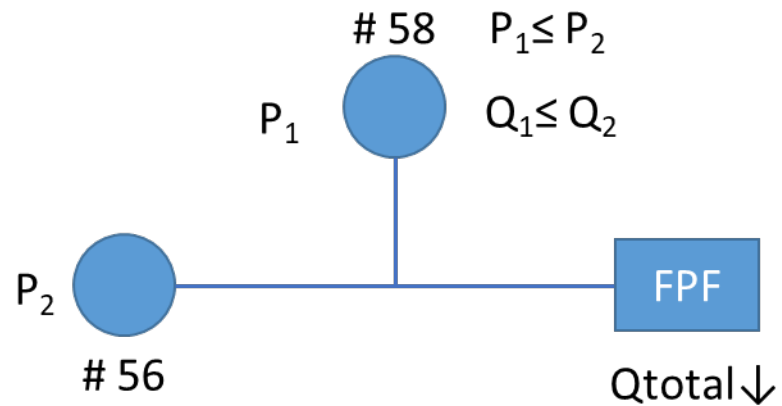
- ESP
- Plunger lift
- Tubing change
- Gas-lift continuous
- Foaming through capillary tube
- Gas-lift periodic
- Vents (WH pressure decreasing)
- Coiled tubing
- Foaming (solid based)

# Flow-lines decoupling

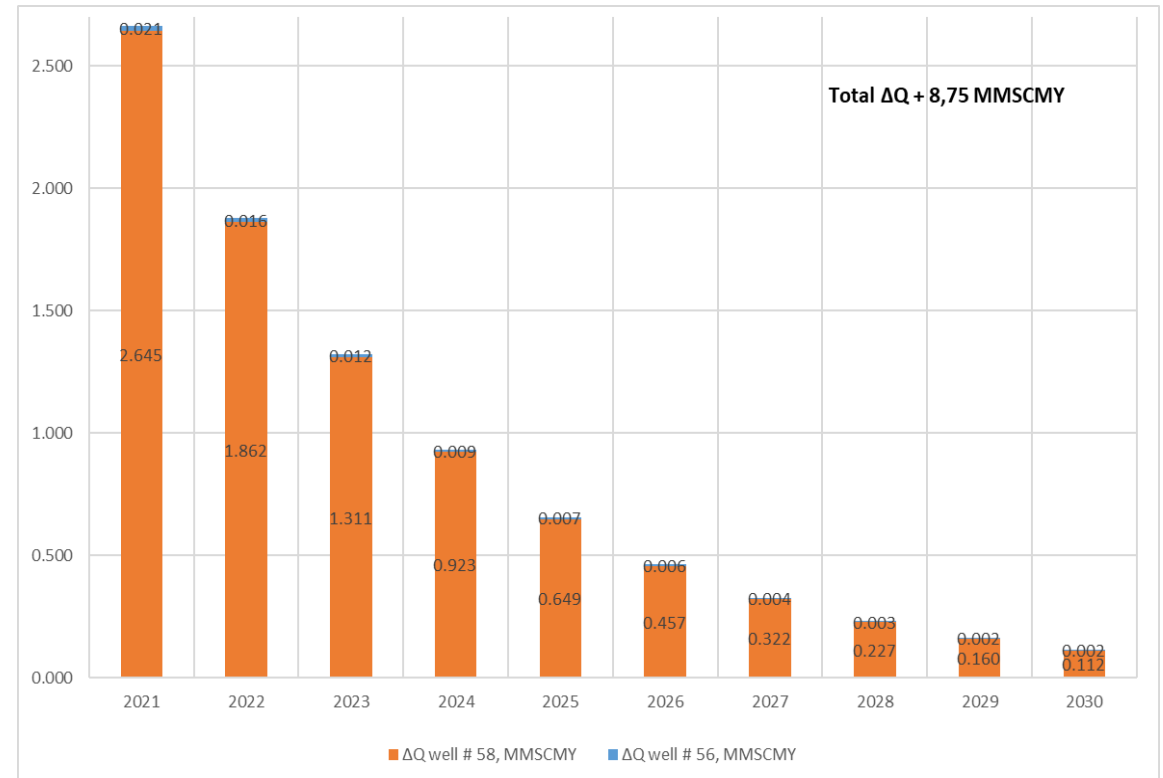
Early stage – green field



Brown field

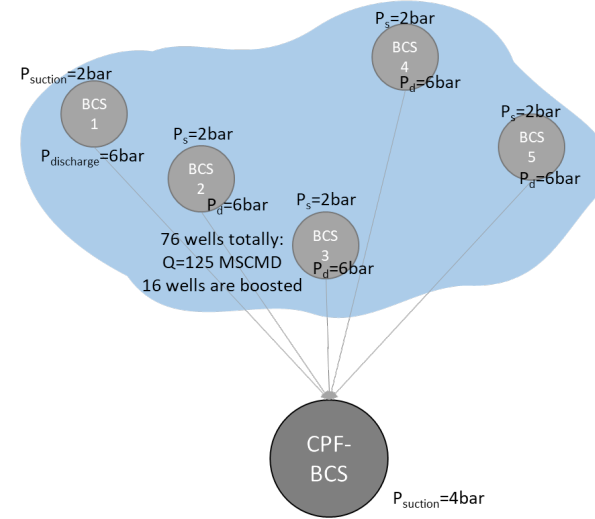
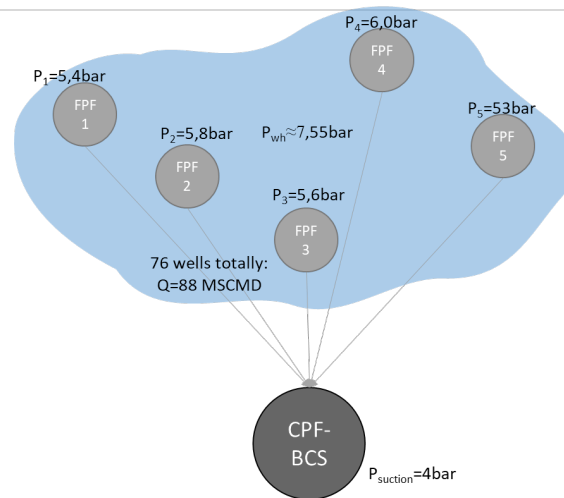
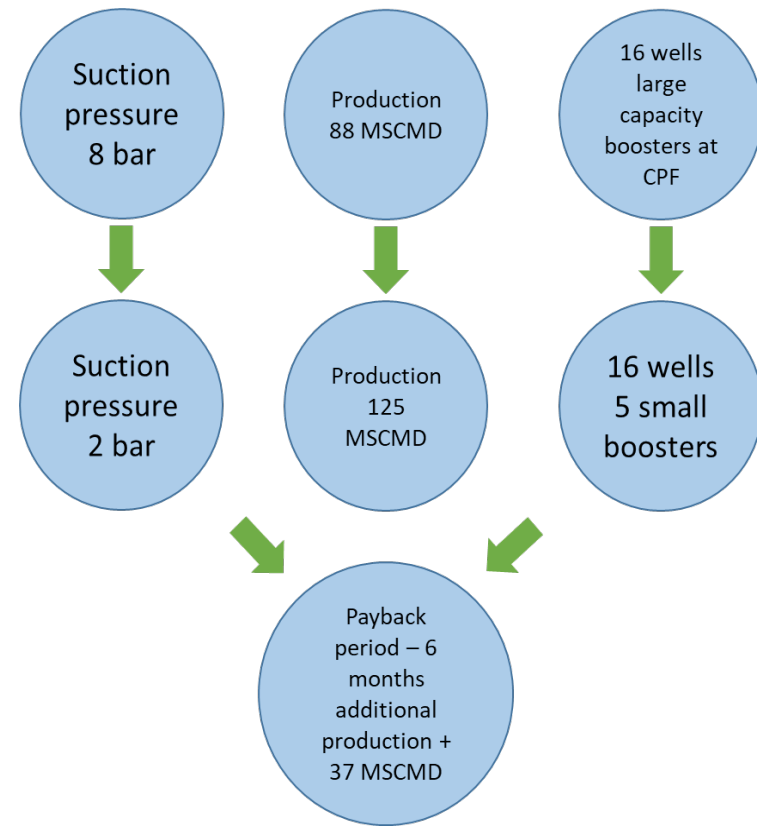
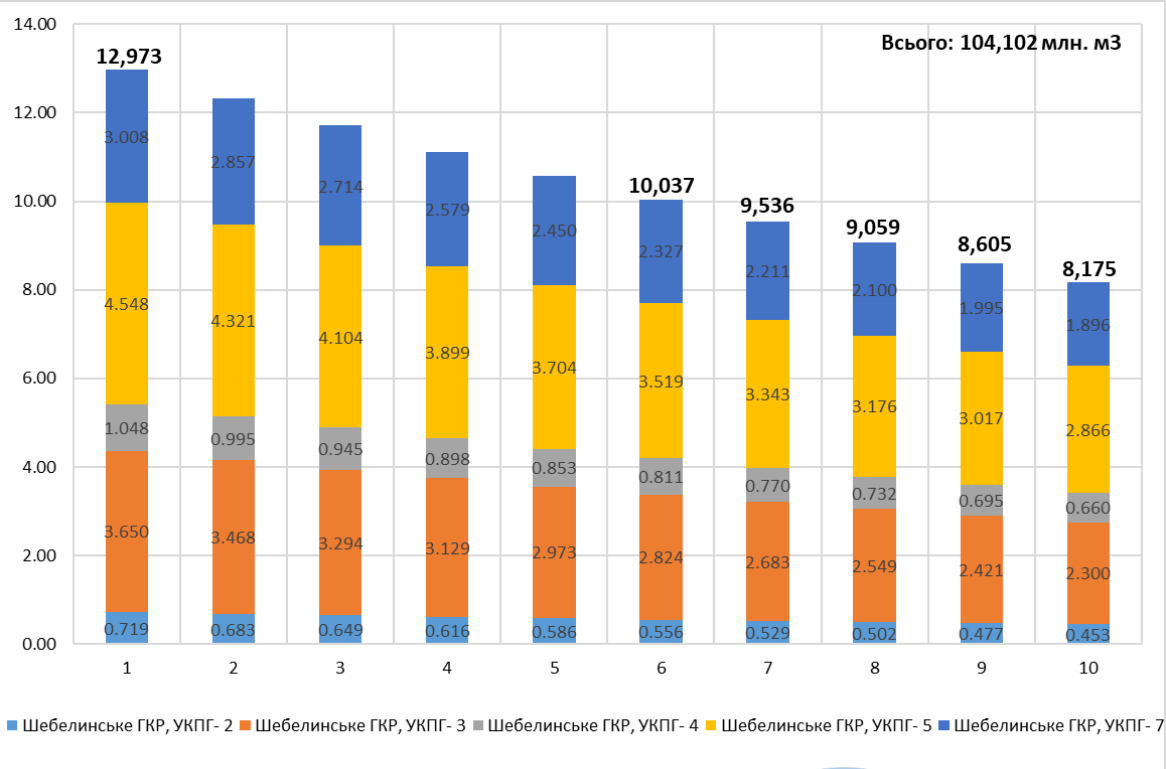


Well #	Before decoupling (1)		After decoupling (2)		$\Delta$ 2-1	
	P, bar	Q, MSCMD	P, bar	Q, MSCMD	P, bar	Q, MSCMD
56	27,96	3,909	18,02	4,014	-9,94	0,105
58	54,88	43,456	41,87*	58,847	-13,01	15,391

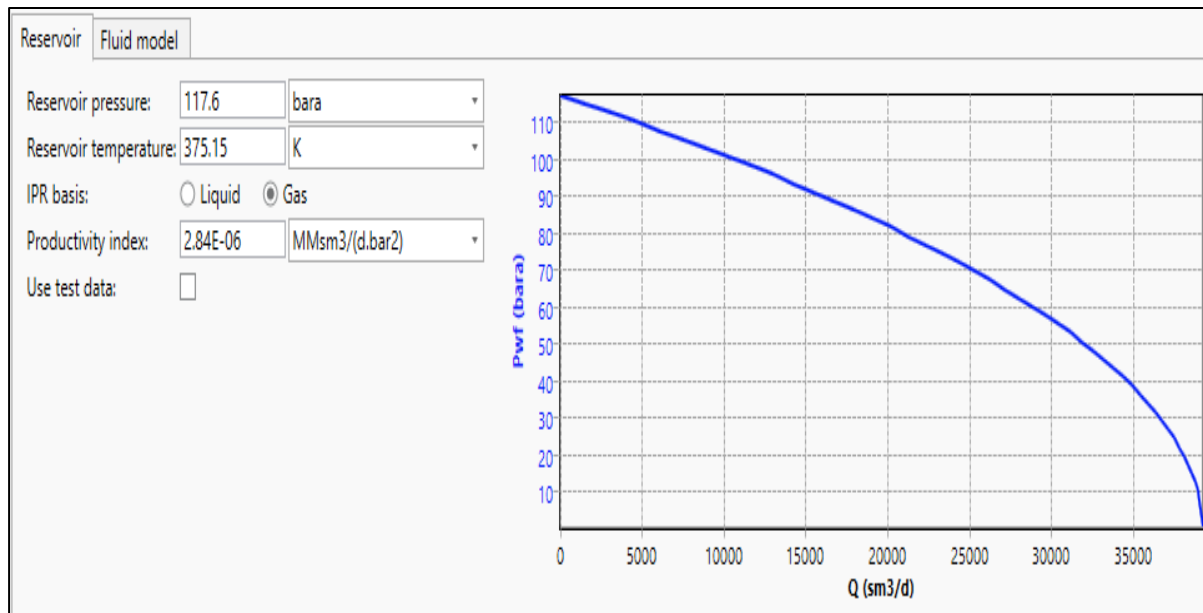




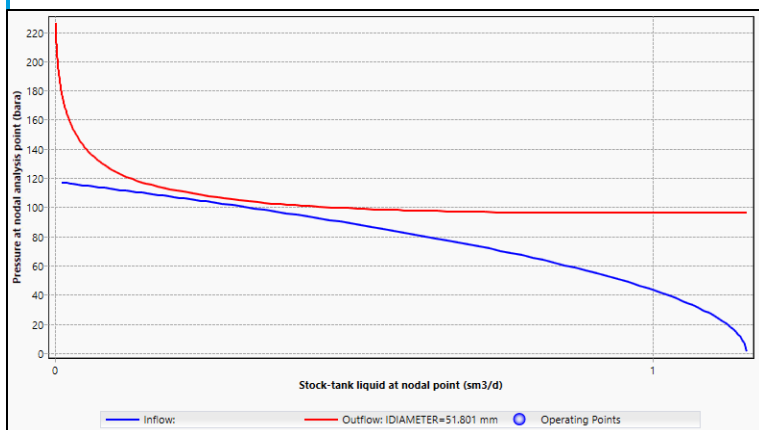
# Boosters



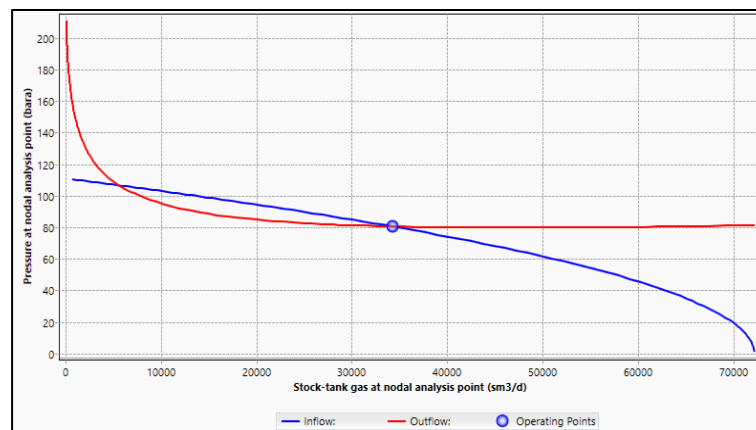
# Tubing change



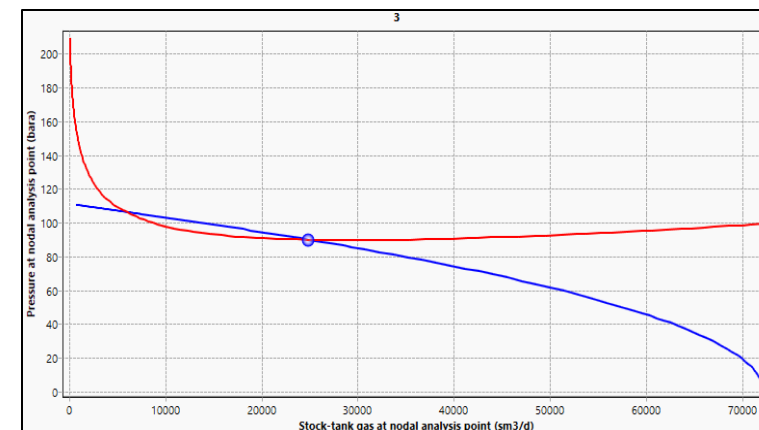
Elevation	Pressure	Liquid holdup	LLVR	LL Gas rate
m	bara	%		sm <sup>3</sup> /d
0	57.23788	9.159553	3.498092298...	36075.2
-304.8	61.50796	9.203346	3.511312386...	36211.54
-609.6	65.82296	9.234685	3.518311026...	36283.71
-914.4	70.17511	9.255215	3.519900702...	36300.11
-1219.2	74.55756	9.266299	3.516767795...	36267.8
-1524	78.96425	9.270302	3.510303260...	36201.13
-1828.8	83.39107	9.272298	3.503677616...	36132.8
-2133.6	87.83385	9.267713	3.493742024...	36030.34
-2438.4	92.28826	9.2573	3.480889713...	35897.79
-2743.2	96.75116	9.244544	3.466927521...	35753.8
-3024.012	100.881	9.283444	3.480375648...	35892.49
-3024.012	100.881	21.30044	13.97902792...	144163.2
-3025.506	100.9153	21.30188	13.98120620...	144185.7
-3025.506	100.9153	21.30225	13.98177177...	144191.5
-3028.493	100.9839	21.30562	13.98687619...	144244.2
-3028.493	100.9839			
-3028.493	117.597			



Текущее состояние



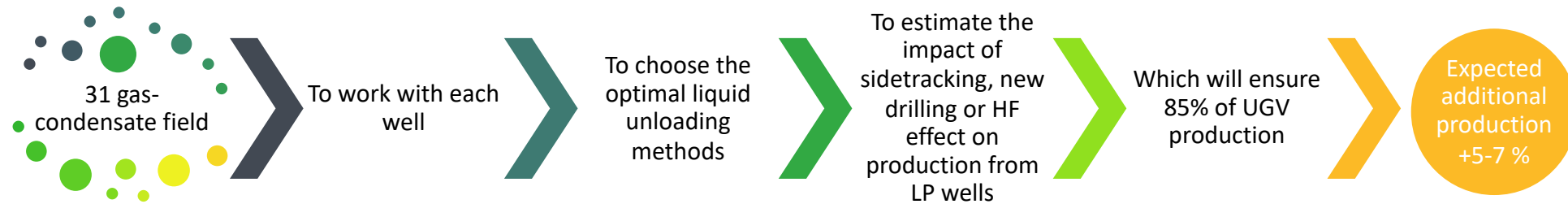
МДКС



Замена НКТ

# What's next?

## Further cooperation in production optimization



## Further cooperation in «green field» development



Дякуємо за увагу!



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