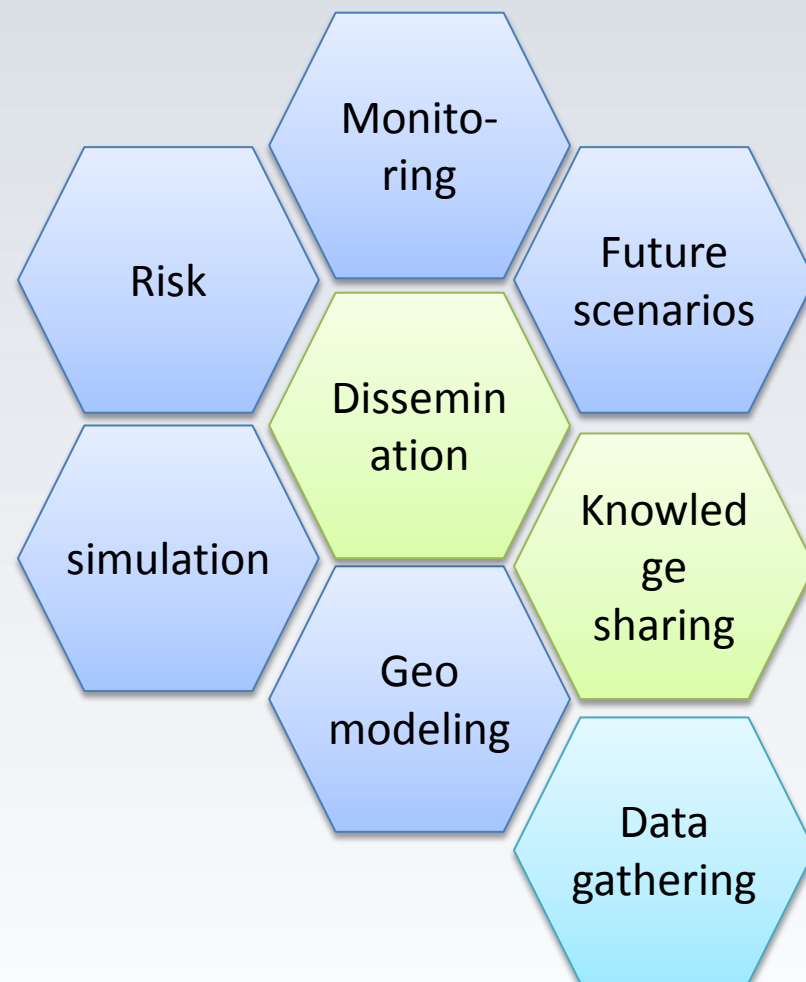
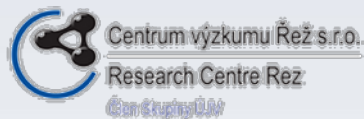


Preparation for a pilot project of a CO₂ geological storage in Czech Republic

Roman Berenblyum on behalf of Activity 3 team
October 2016

Project and the team

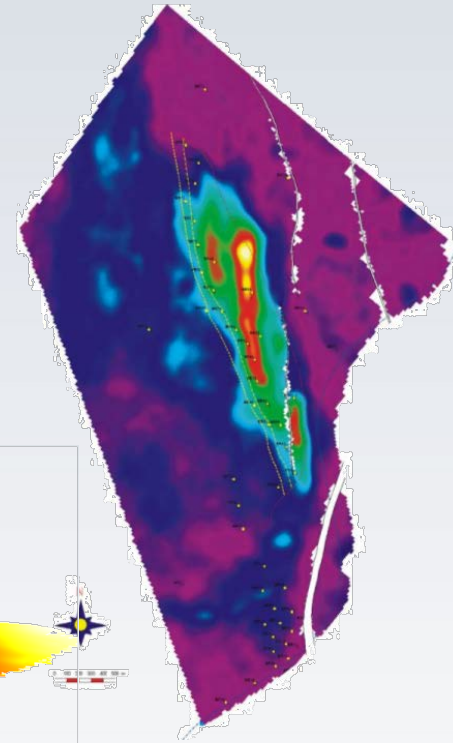
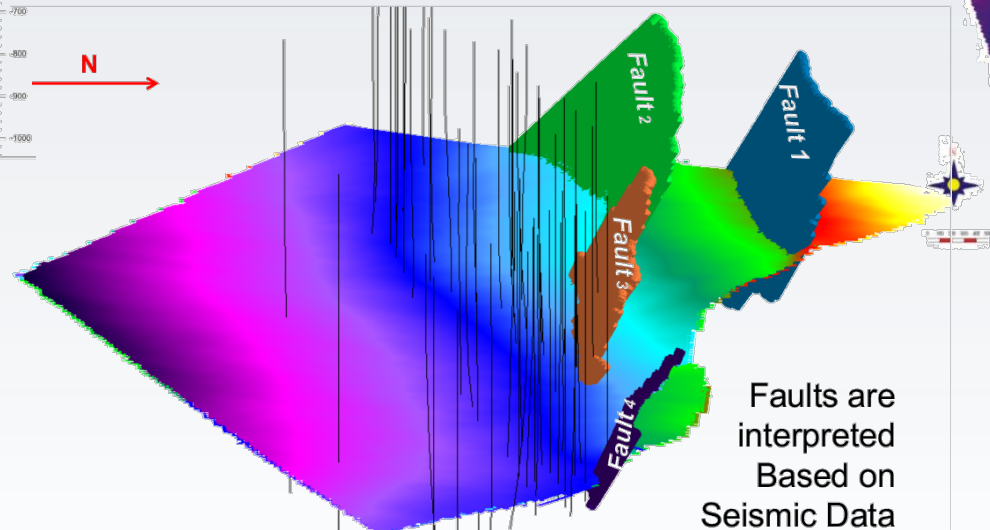
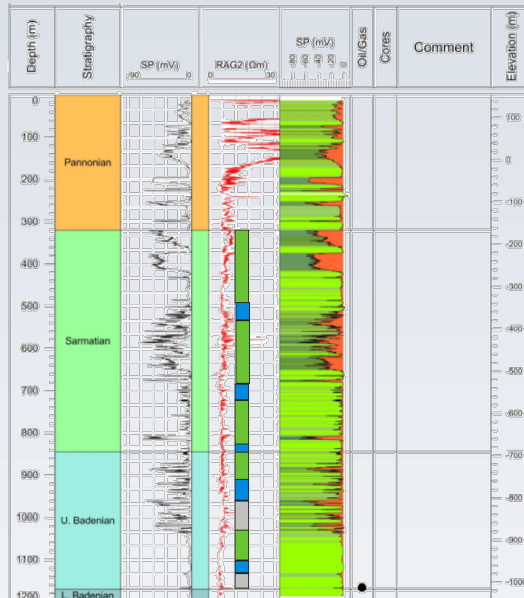


100 researchers and technicians from 7 institutions

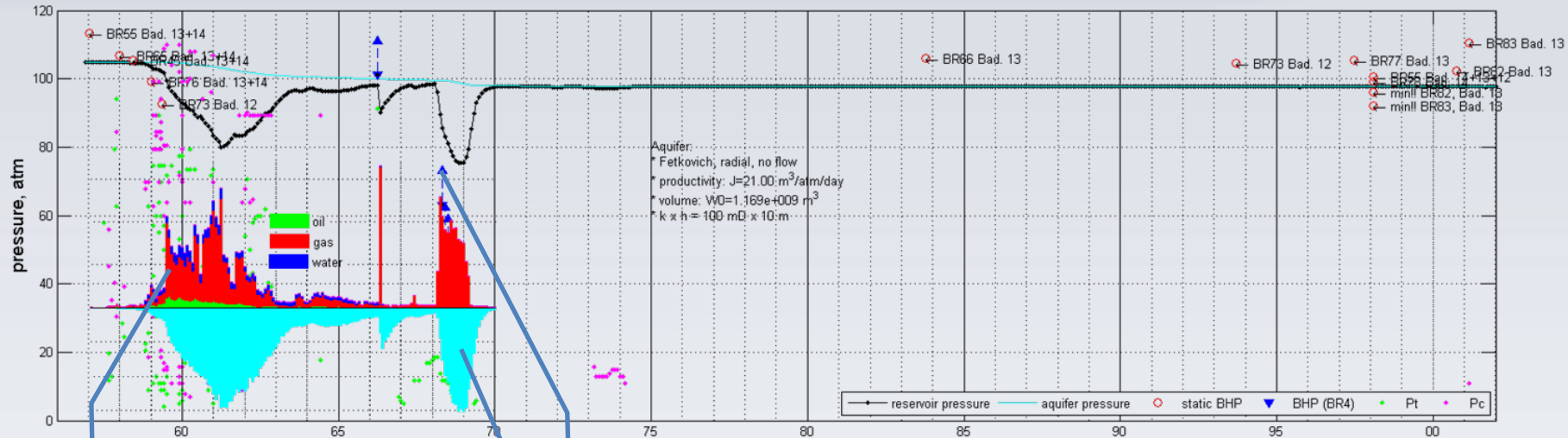
- Field under production in 60's and 70's
 - Scarce and often uncertain data...
 - Yet its still more than what we might know about “common” aquifer
 - Small field, yet representative of Vienna basin
 - Recent re-abandonement
 - Recent re-view of restarting production
 - Old abandoned fields are likely storage candidates

Starting point: G&G

Re-interpretation of existing data – new 3D seismics – new geological model



Mass balance study



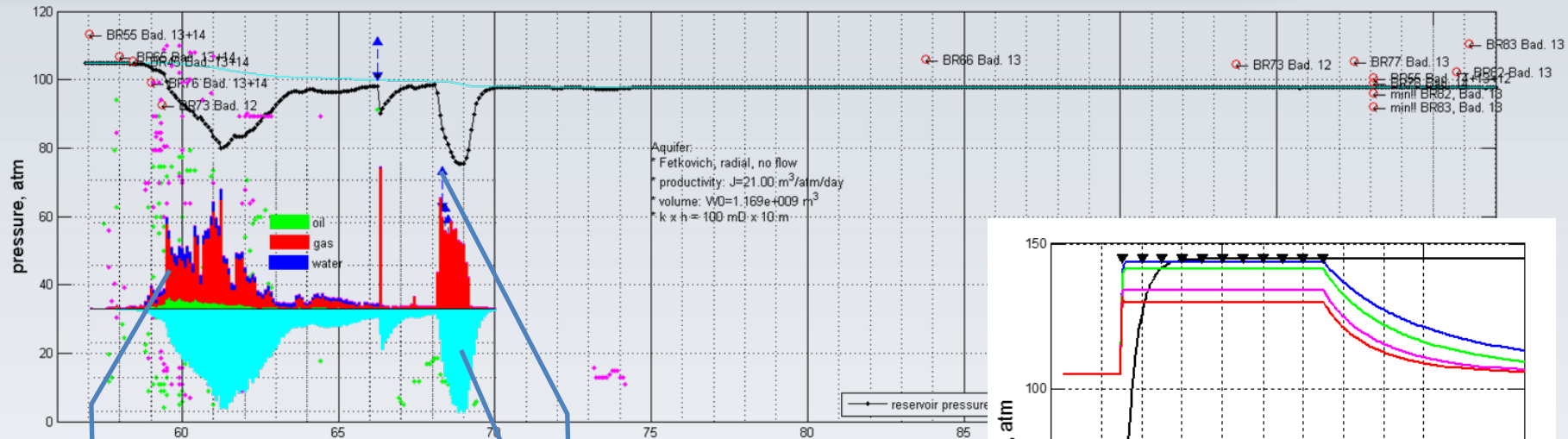
Actual
production
data

Utilizing all
available
pressure data

Matching aquifer
behavior using
the same model
as in full field
runs

- Screening uncertainty in reservoir properties
- Injection prediction capability
- Fast screening of various risk scenarios

Mass balance study

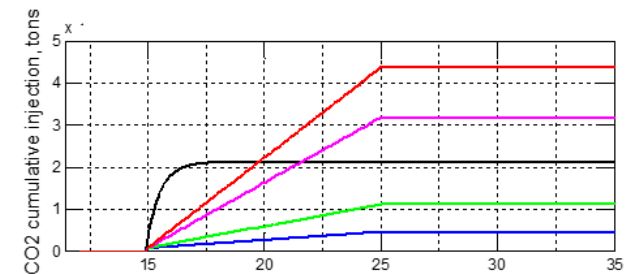
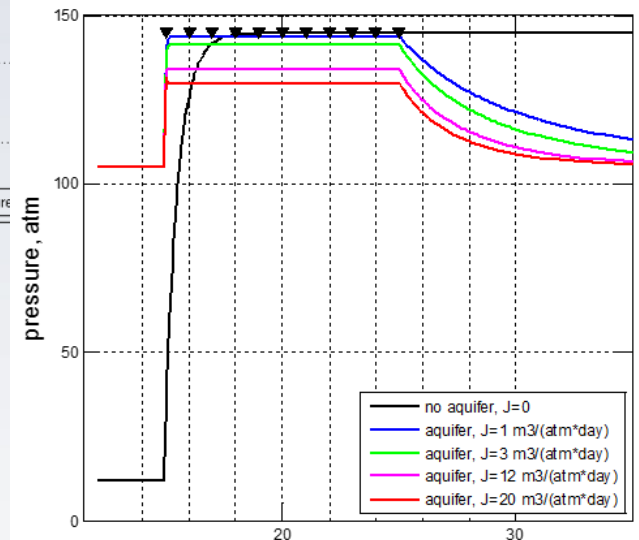


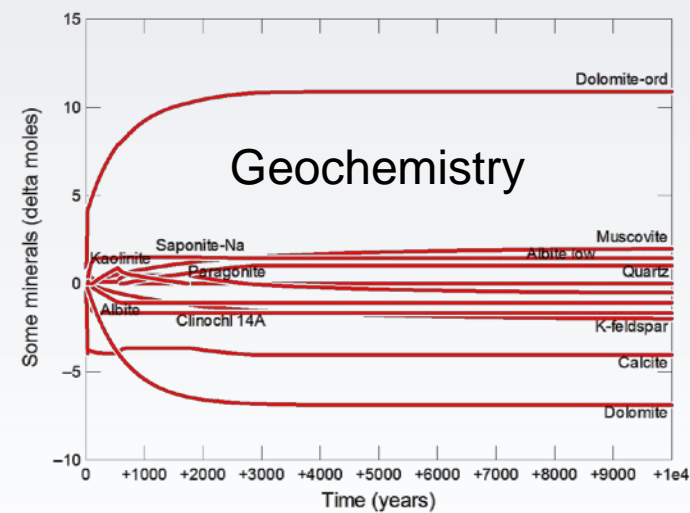
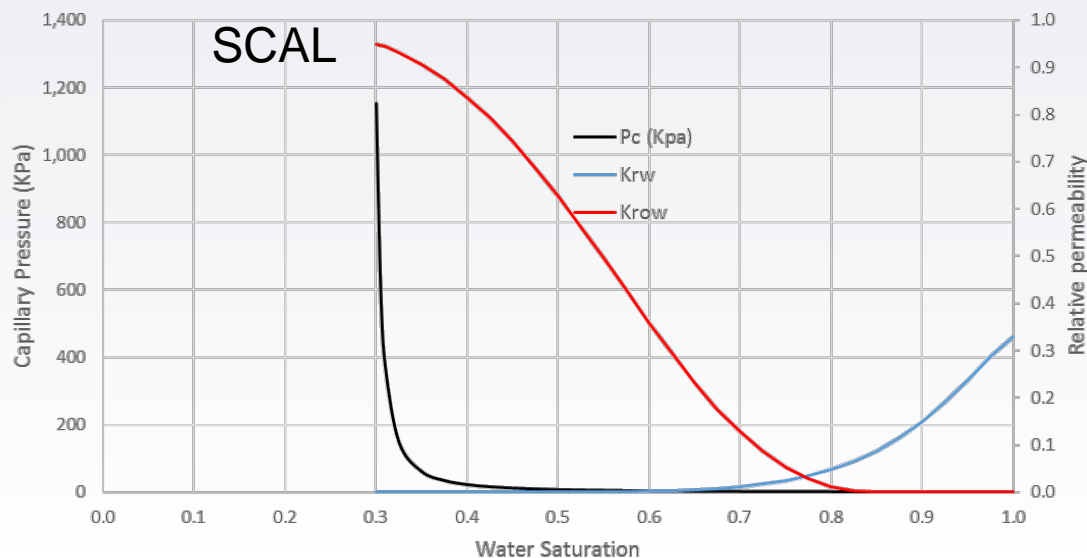
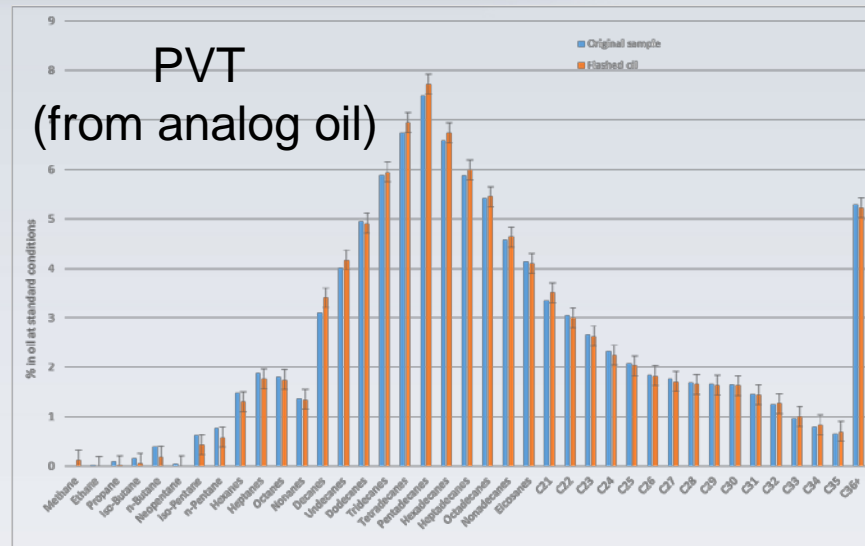
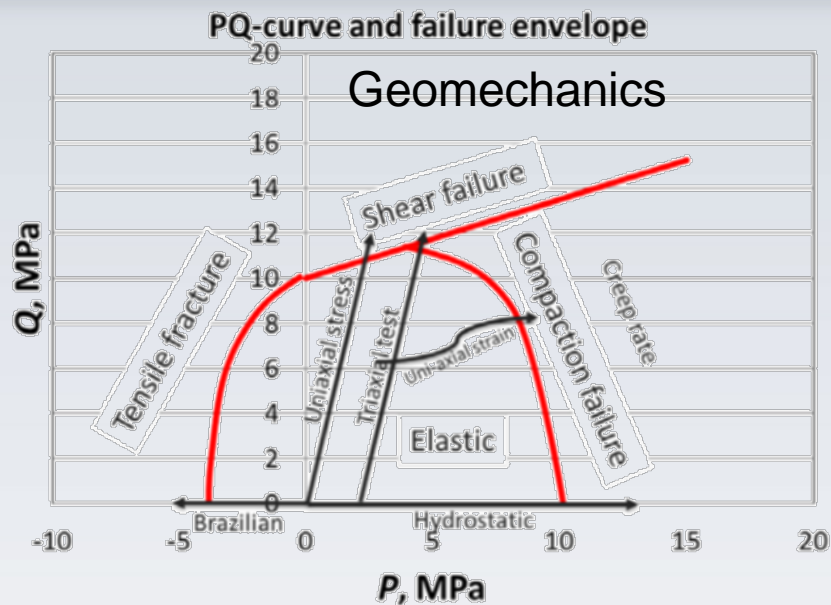
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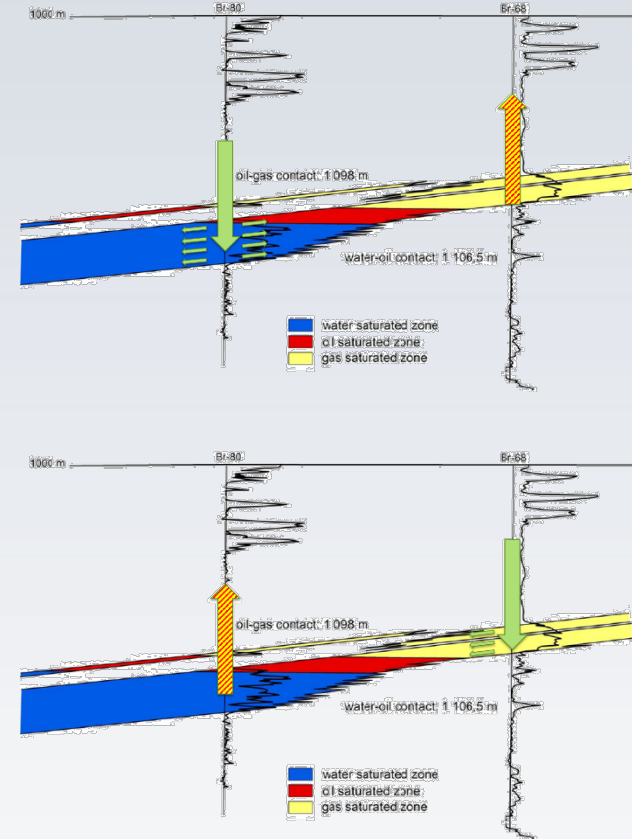
Scenarios

Evaluation of a pilot – up to 70 000 ton during 6-7 years. One vertical well

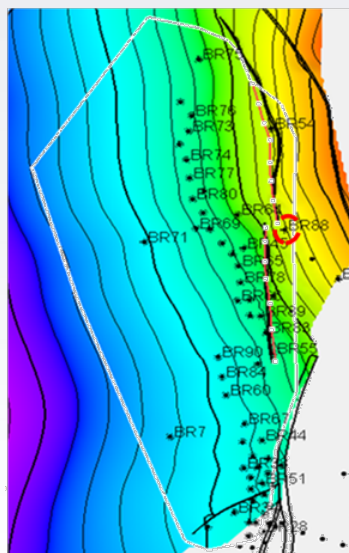
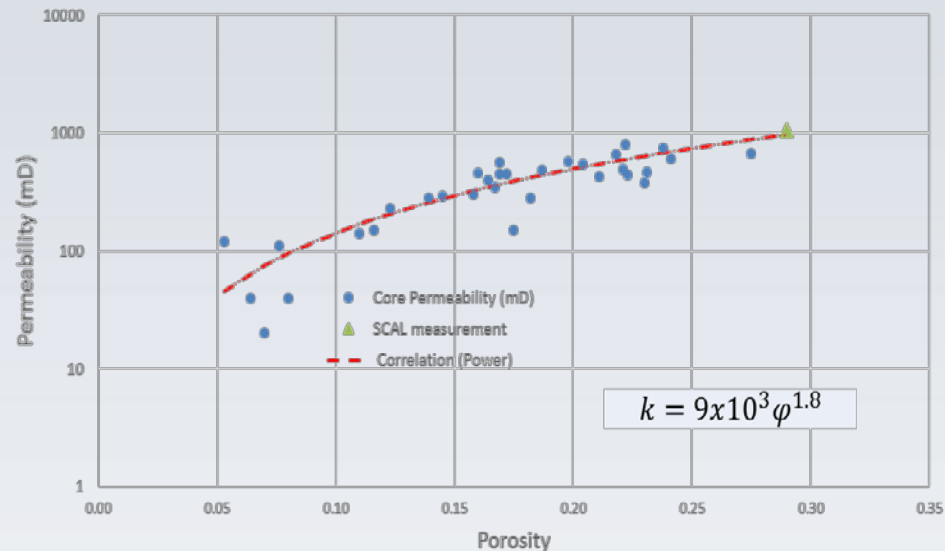
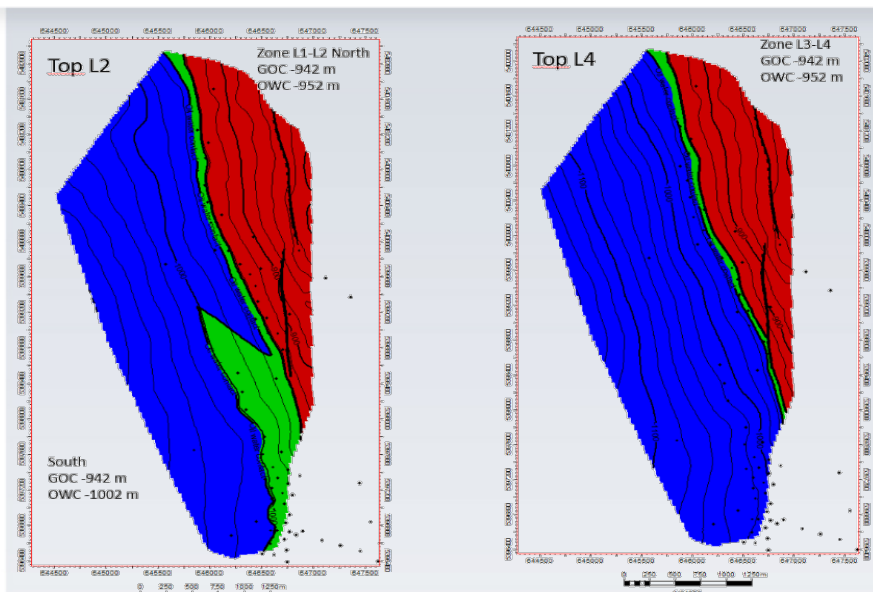
Storage – injection through two new horizontal wells

~~Pressure relief~~ – active aquifer and risk of reaching the spill points

EOR – carbon neutral oil production?



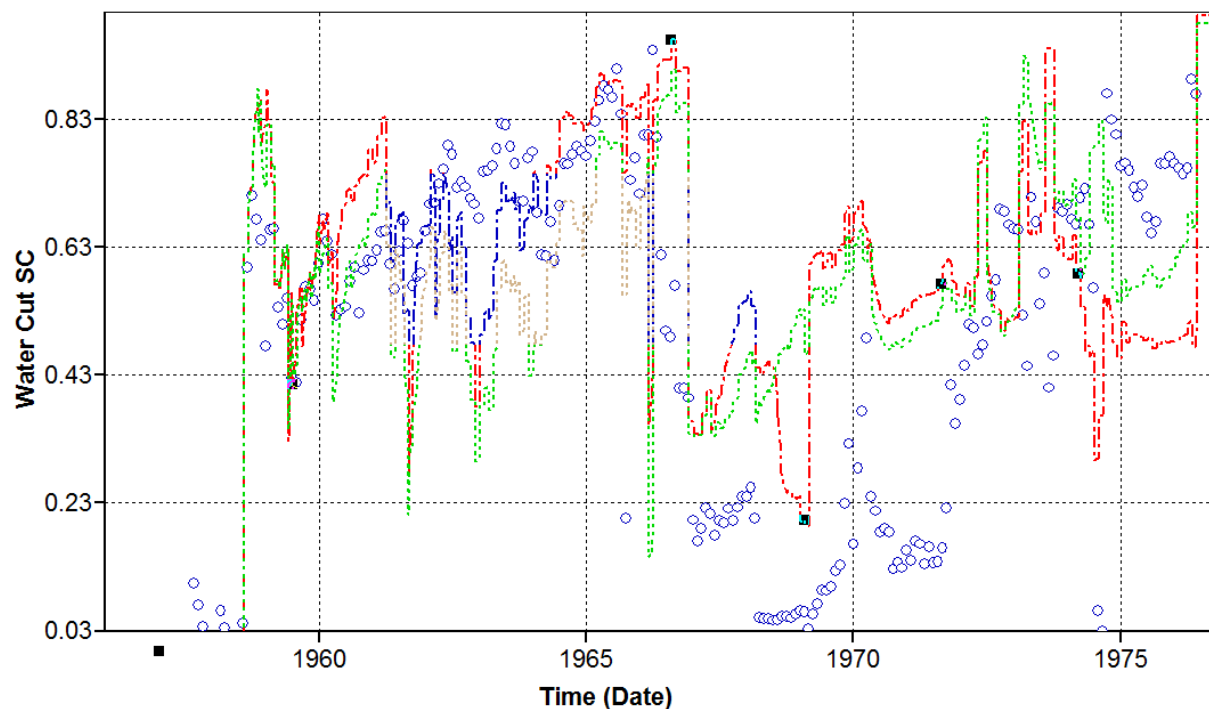
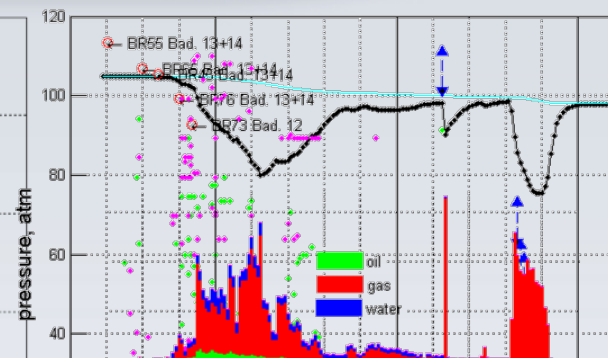
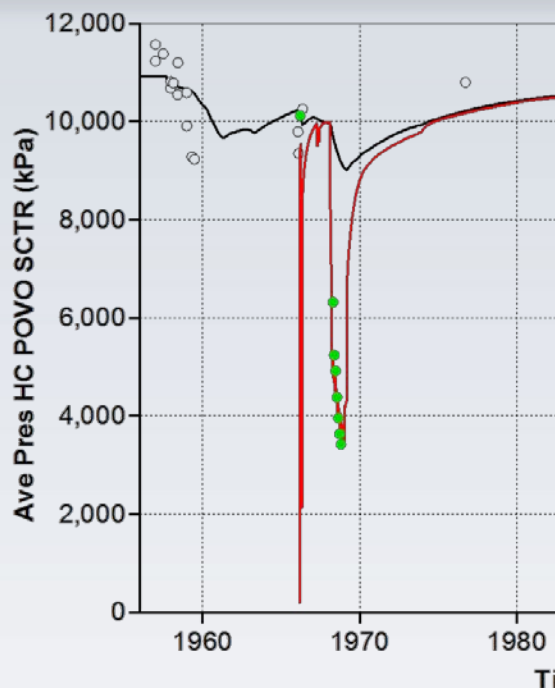
Initialisation



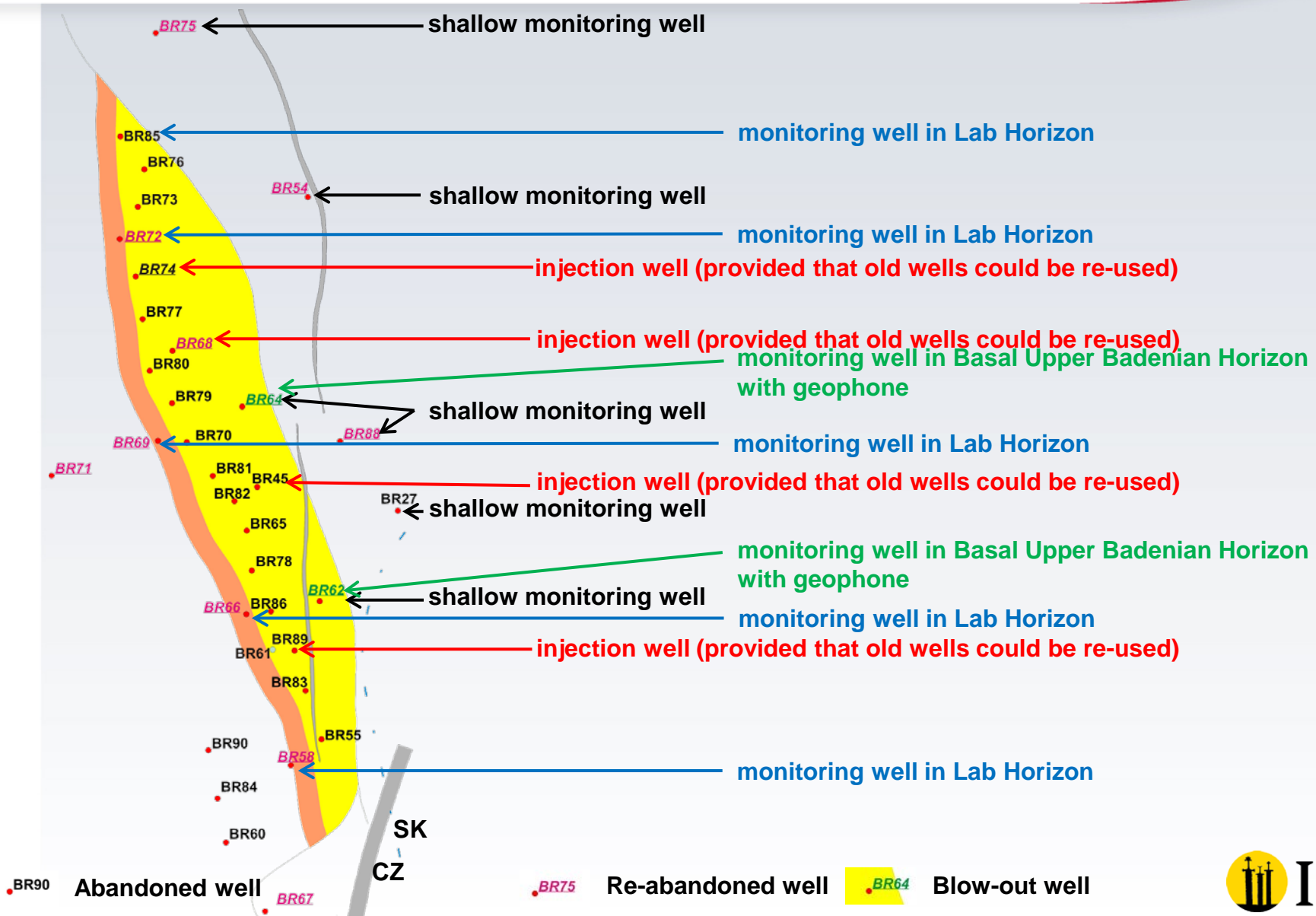
Zone	Oil zones		Gas cap		Oil segment split (STOOIP)	
	HCPV	STOOIP	HCPV	GOIP*	North (All)	South (L1&L2)
L1	58.0	53	250.0	26.7	53.0	N/A
L2	309.0	284.0	372.0	39.8	84.0	200.0
L3	67.0	61.2	302.0	32.2	61.2	N/A
L4	70.0	64.2	172.0	18.3	64.2	N/A
Total	504.0	462.4	1096.0	117.0	262.4	200.0

* Gas-in-place is noted in M m³ – other volumes are in K m³

History match

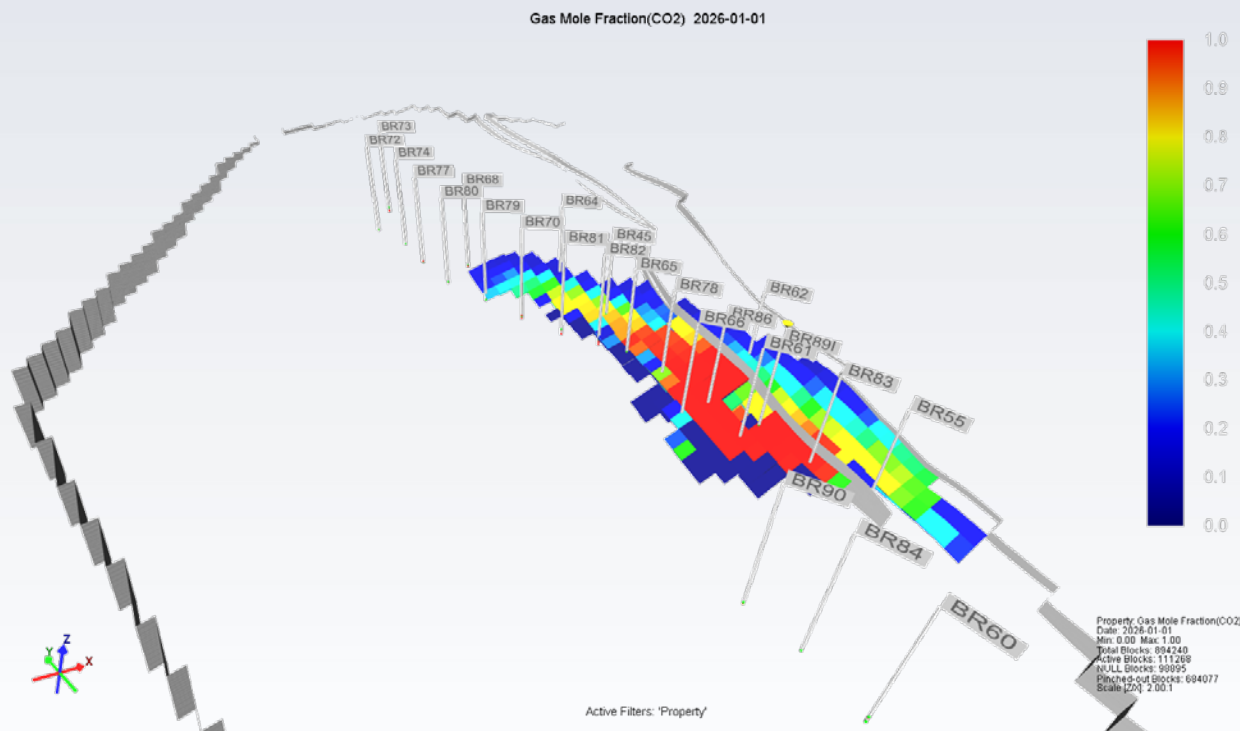


Wells suggestions



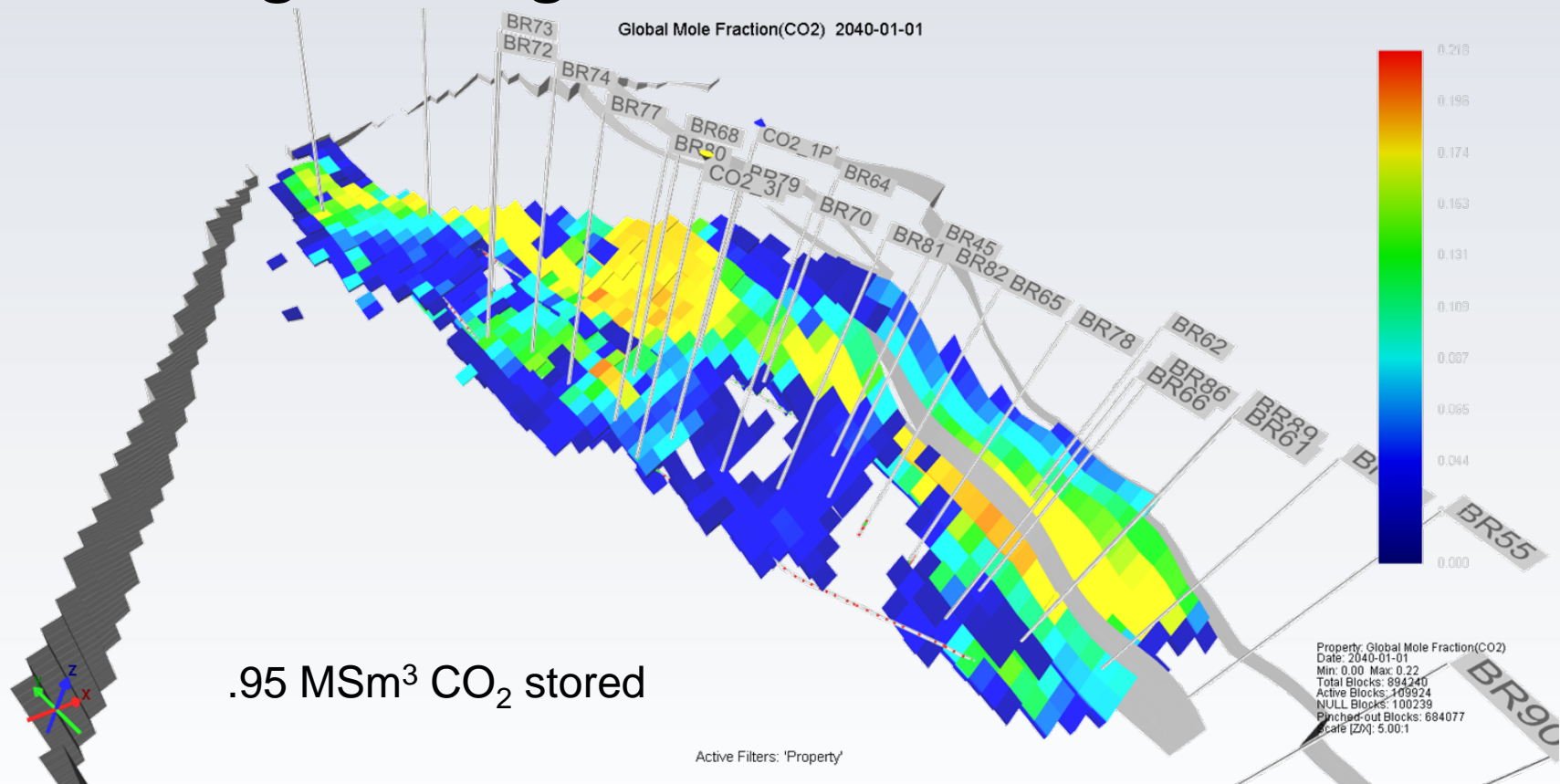
Pilot case

- 2020-2026, 70 000 tons: 17 600 sm³/day
- No injection issues expected, pressure increase is small and local



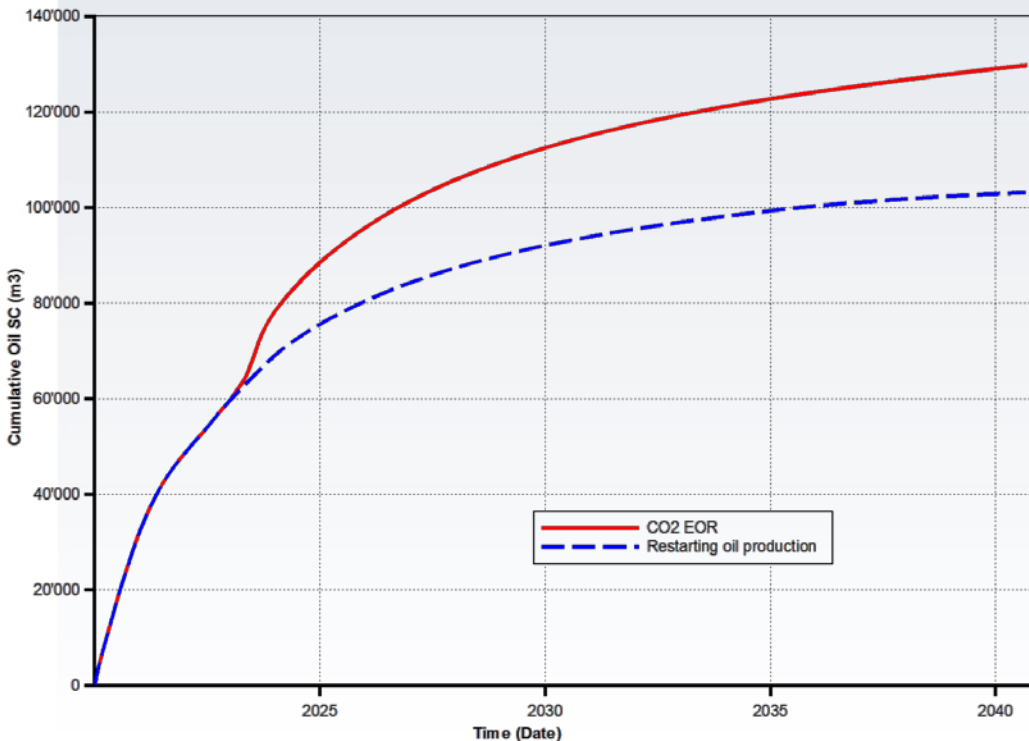
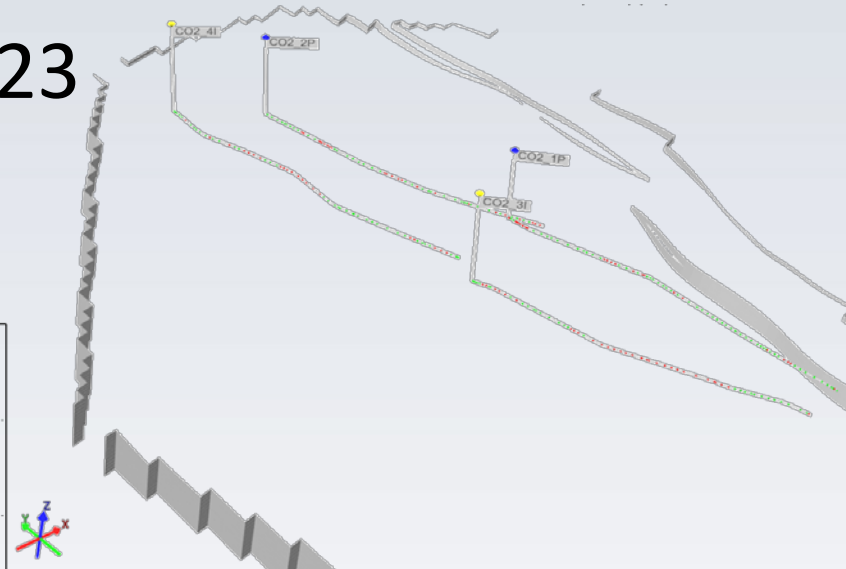
Storage case

- Pilot in 2020-2026 followed by full scale storage through two horizontal wells



CO₂ EOR

- No pilot. Oil production restarts in 2020
- CO₂ injection starts in 2023



Additional oil recovery – 26550 sm³
Total stored CO₂ – 63 000 tons

If burned as fuel 26550 sm³ of oil
generate 72 000 tons CO₂

Almost carbon neutral EOR without
storage!!!

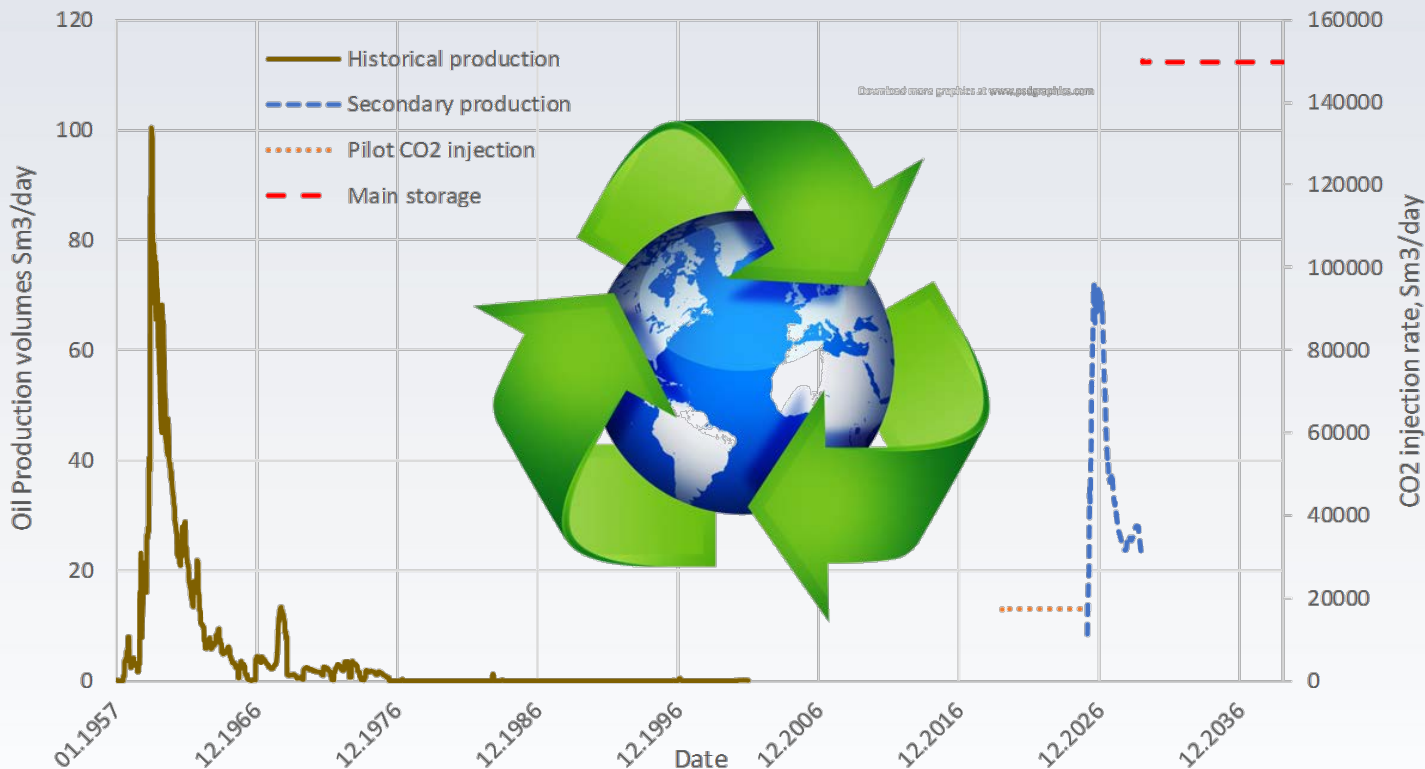
Combined case

- Pilot 2020-2026; EOR 2026-2029
- Storage 2030 – 2040

Total oil recovery (1965-2030):
181 kSm³

If used entirely to fuel cars it would produce around 495 ktonns CO₂

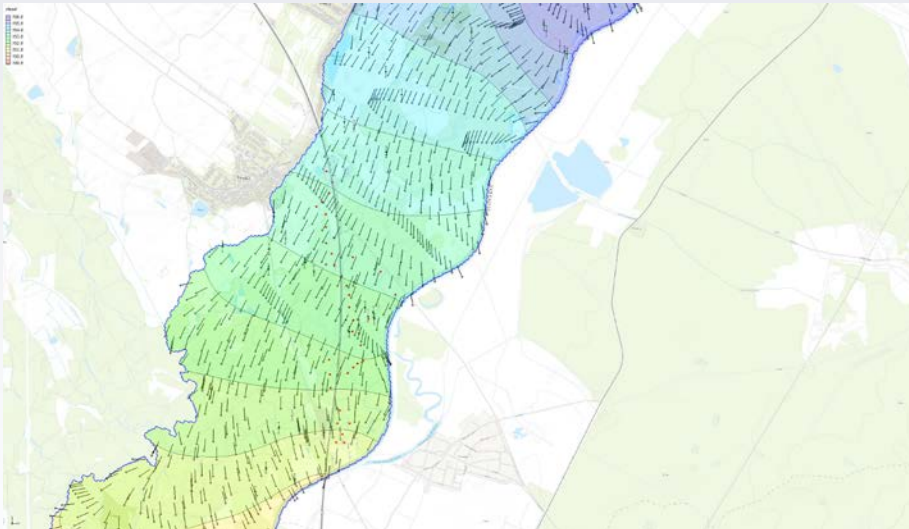
Total stored volume 523 ktonns CO₂ (more storage volume available)



Leakage paths?

Generally risk are identified as low!

- Old wells, faults, cap rock integrity failures?
 - Reservoir simulation model to evaluate risks and rates
 - Chemical models to evaluate CO₂ reactivity and elements on its path (rock? Cement? Salts in water?)
 - Detailed surface model to analyze migration of pollutants.



Next stage: risk

Prevention: pro-active

Mitigation: re-active

