



STRATEGY CCUS

A viable solution for a sustainable future

Strategic planning of Regions And Territories in Europe for low-carbon energy and industry through CCUS

Coordination and Support Action (CSA)

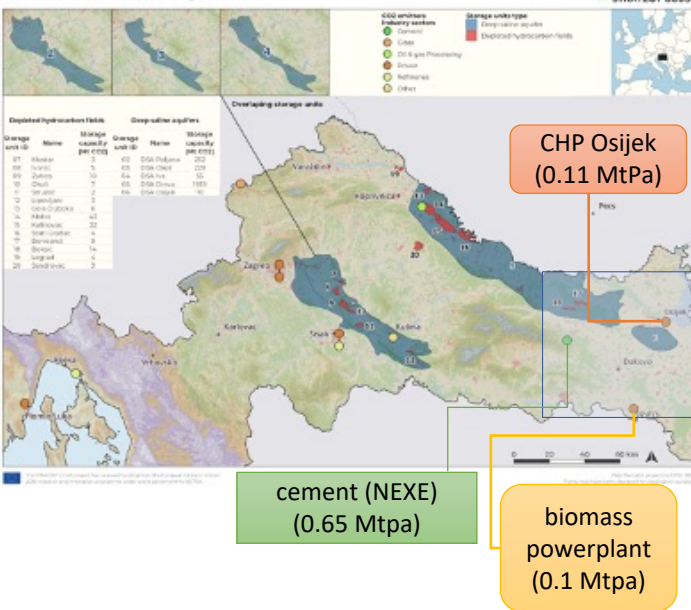
Budget: 3 M€

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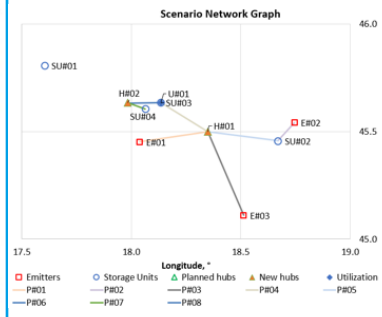


14 perspective DHF (144 Mt), five perspective DSA (>2500 Mt)
In Eastern cluster, Našicecement (NEXE) is intensively considering CO₂ capture in their feasibility studies, and also the new natural gas Power Plant project with CO₂ capture, around 0.4 Mtpa, in that region is planned; it might become the first region in Croatia ready for implementing the full chain of CCS

Northern Croatia | Storage units



Northern Croatia - main (long-term) scenario (eastern cluster) Capture & Transport



emitters in the scenario

Unit ID	E#01	E#02	E#03
Facility name	Našicecement d.	TE-TO OSIEK	Viridas Biomass
Industry sector	Cement	Power	Power
Start Year	2025	2025	2030
End Year	2050	2050	2050
CO2 Capture rate (%)	90%	70%	80%
CO2 captured (Mt/y)	0.58	0.08	0.08
Total CO2 emitted if not captured (Mt)	15.1	2.0	1.8

Transport mode	Pipelines							
	From	E#01	E#02	E#03	H#01	SU#02	SU#03	H#02
To	H#01	SU#02	H#01	SU#03	HR01	HR02	SU#04	
Distance	27	12	49	30	26	15	8	
CAPEX	7.5 M€	1.8 M€	8.8 M€	8.6 M€	4.8 M€	4.9 M€	1.3 M€	
OPEX	4.5 M€	0.5 M€	4.3 M€	8.1 M€	1.2 M€	4.3 M€	0.2 M€	
€/tonCO2	0.48	0.13	6.79	0.59	5.17	0.34	0.13	
M€/km	0.44	0.19	0.27	0.56	0.23	0.61	0.19	

Scenario analysis was performed by using the tool developed within the WP5

Northern Croatia main (long-term) scenario (eastern cluster) Utilization & Storage

CO2 utilisation	UH01
Industry	Hydrocarbon production
Product	EOR
Quantities	0.326 Mt cumulative oil production
Total CO2 used	1.137 Mt
EU ETS credit savings	1879.9 M€

2025-2030
(phase I)

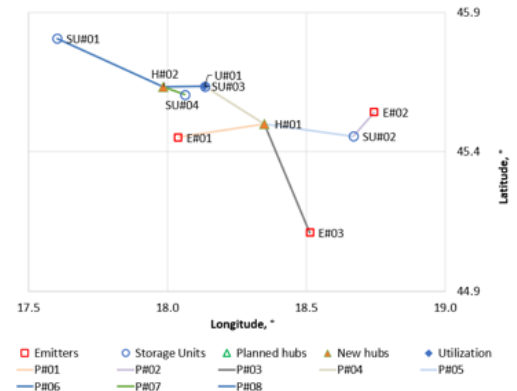
2036-2040
(phase II)

Storage	SU#04	SU#03	SU#02
Localisation	Northern Croatia, Bokšić & Onshore	Northern Croatia, Beničanci & Onshore	Deep Saline Aquifer
Start date of storage	2025	2041	2036
End date of storage	2035	2050	2050
Total CO2 stored	11.25 Mt	2.27 Mt	15.11 Mt
Cost of Storage	23.3 €/tonCO2 avoided	116.7 €/tonCO2 avoided	18.6 €/tonCO2 avoided

One of depleted HCF's is oil field considered for CO₂-EOR decades ago, making oil company INA ready for CO₂ injection, which is further encouraged by success of CO₂-EOR projects in Žutica and Ivanić. However, CO₂-EOR is not encouraged in any document in Croatia as it boosts oil production, and oil field operators, who are practically the only with practical know-how for CO₂ injection, are currently actively considering the CO₂ storage.

Alternative scenario

The difference regarding the main scenario: because DSA Osijek storage capacity is sufficient only for storage up to 2050, an additional CO₂ storage site is considered (DSA Drava, activated in 2036).



Conclusion

- utilization through CO₂-EOR was modeled with the main objective being CO₂ storage (it is not a feasible strategy for increasing oil recovery), which results in early return of investment and cost-effective CCUS cluster
- use of mature hydrocarbon reservoirs for storage makes CCS available as early as from 2025.
- scenario analyses have to be tuned according to discussions and information gathered at RSC and Regional Event meetings

