CO_2 storage potential of the Visegrád group countries (Poland, Slovakia, Czech Republic, Hungary)

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The countries of Visegrád Group (V4) are close both geographically and in terms of their historical and political developments.

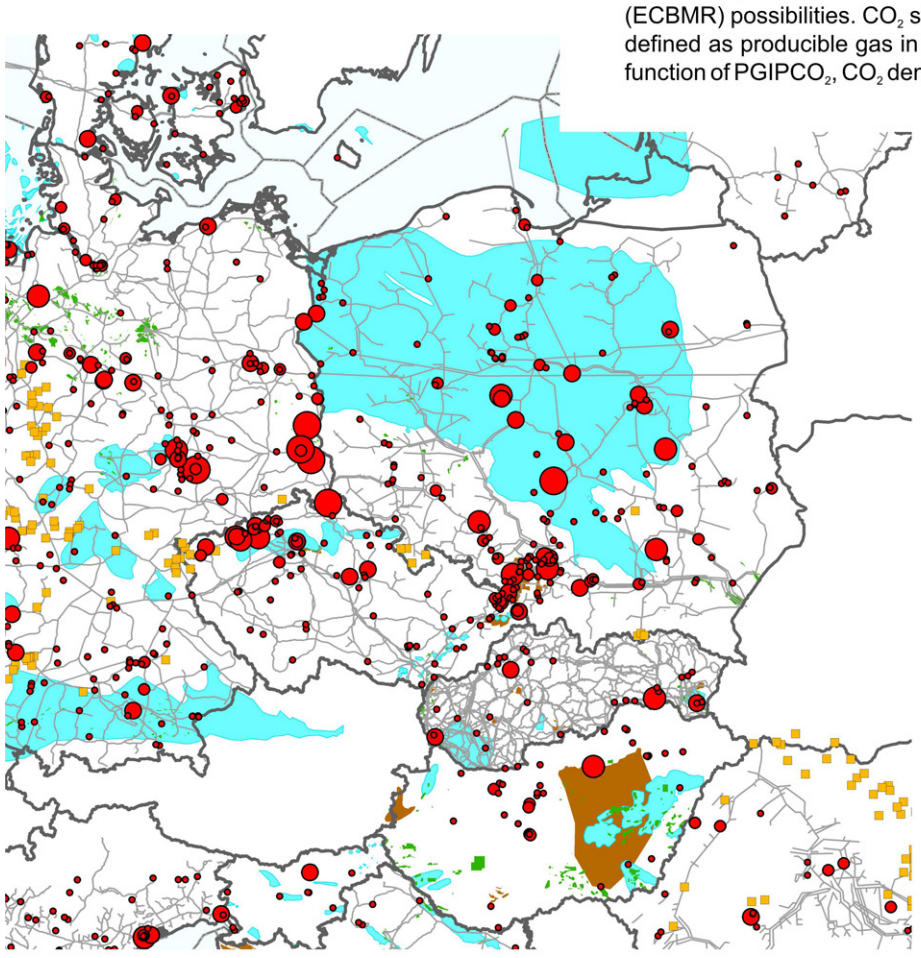
The history of geological evolution V4 territory stretches back to time of Hercynian and mainly Alpine orogenic stages that agglutinated initially more or less independent areas firmly to each other.
Geological evolution doesn't respect state boundaries ergo traditionally good collaboration of geologists gives a good chance to understand building and evolution of underground. Good political relations give a chance to store CO_2 in deep close-boundary geological structures, what could cause a doubling of monitoring and consequently enhancement of storage-site safeness.

Compared to 1990, the GHG emissions decreased in V4 countries. However, the increasing industrial growth and changing energy market urge to evaluate different options of reducing CO_2 emissions, including the assessment of the potential geological storages.

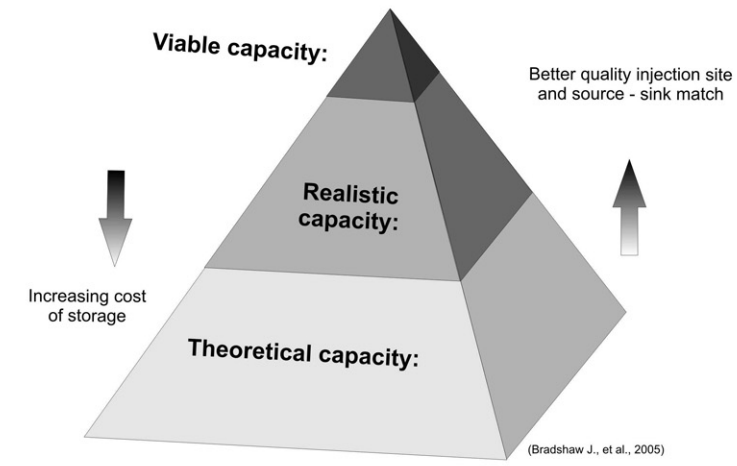
An assessment of storage possibilities and capacities of individual V4 countries were studied within the framework of EU GEOCAPACITY (www.geocapacity.eu/) and CO2NET EAST (http://co2neteast.energnet.com) projects supported by European Commission Sixth Framework Programme (FP6). The main objective was to assess the European capacity for geological storage of CO_2 in deep saline aquifers, oil and gas structures and coal beds.

Capacity estimation was performed according to methodology proposed in the EU GeoCapacity Project.

- Estimation of CO_2 storage volume within deep brine aquifers and for tectonicaly restricted structures the attention was aimed at vertically closed structures with suitable depth, sufficient sealing and significant pore volume capacity.
- Possibilities of CO_2 storage within depleted/depleting hydrocarbon fields were analysed from the viewpoint of proven Ultimate Reserves (UR), depth range and production history. CO_2 replacement of oil and gas, respectively, has been calculated separately, due to differences of their formation volume factor specification.
- For the purposes of CO_2 storage, the unmined pit coal measures are interesting, especially due to the enhanced coal-bed methane recovery (ECBMR) possibilities. CO_2 storage capacity in coal seams denotes the quantity of CO_2 that could replace CBM. For this purpose, the CBM is defined as producible gas in place accessible for CO_2-ECBMR ($PGIPCO_2$), which differs from conventional PGIP, The storage capacity is a function of $PGIPCO_2$, CO_2 density at standard condition and exchange ratio of CO_2 to methane.



Vissegrád Group map of CO_2 emissions, infrastructure and storage capacity in Slovakia (GeoCapacity)

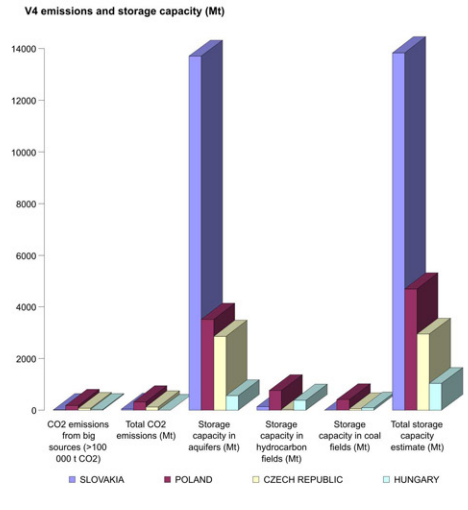


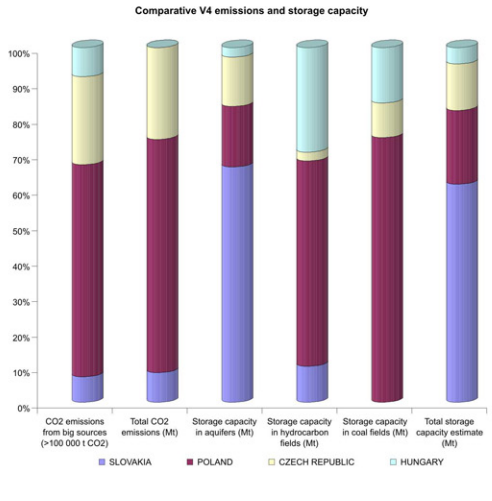
Viable capacity: PRACTICAL: Applies economic barriers to realistic capacity, detailed source sink matcher, becomes annual sustainable rate - economics supply and reservoir performance

Realistic capacity: EFFECTIVE: Applies technical cut off limits, technically viable estimate, more pragmatic, actual site/basin data

Theoretical capacity: Includes large volumes of "unecnomic" opportunities. Sometimes unrealistic/inappropriate/unreliable cut offs applied - 1% traps

	SLOVAKIA	POLAND	CZECH REPUBLIC	HUNGARY
CO_2 emissions from big sources (>100 000 t CO_2)	22,77	188,12	78	26
Total CO_2 emissions (Mt)	41,3	325,38	128	-
Storage capacity in aquifers (Mt)	13 708	3 522,20	2 863	561
Storage capacity in hydrocarbon fields (Mt)	134	764,3	33	389
Storage capacity in coal fields (Mt)	0	414,6	54	87
Total storage capacity estimate (Mt)	**13 842**	**4 701,10**	**2 950**	**1 037**
Pyramid class	*Theoretical*	*Effective*	*Effective*	*Effective*





References:
Bradshaw J, Bachu S, Bonijoly D, Burruss R, Christensen NP, Mathiassen, OM. Discussion paper on CO_2 storage capacity estimation (Phase 1) ; A taskforce for review and development of standards with regards to storage capacity measurement; CSLF-T-2005-9 15, August 2005,16p. http://www.cslforum.org/documents/Taskforce_Storage_Capacity_Estimation_Version_2.pdf