



## GETICA CCS Romanian Demo Project

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# Why CCS in Romania?

## Inter alia

### Because

- ✓ To reach 2020 EU targets of making CCS commercial we need to **promote both onshore and offshore projects**
- ✓ **Romania** has preliminary identified around **23 Gt onshore CO2 storage geocapacities** (17Gt in saline aquifers and 4Gt in depleted oil & gas reservoirs)
- ✓ **Romania** has more than **150 years** of history in the **oil and gas** industry, and currently operating natural gas reservoirs
- ✓ **Maintaining operational** the **PPs** running on fossil fuels (41% indigene coal and 12% hydrocarbons) and the **mining sites exploitations** has a **positive economic & social impact** for Romania
- ✓ It will **contribute** by the power of example to the **CCS deployment** in the **South-East European region**

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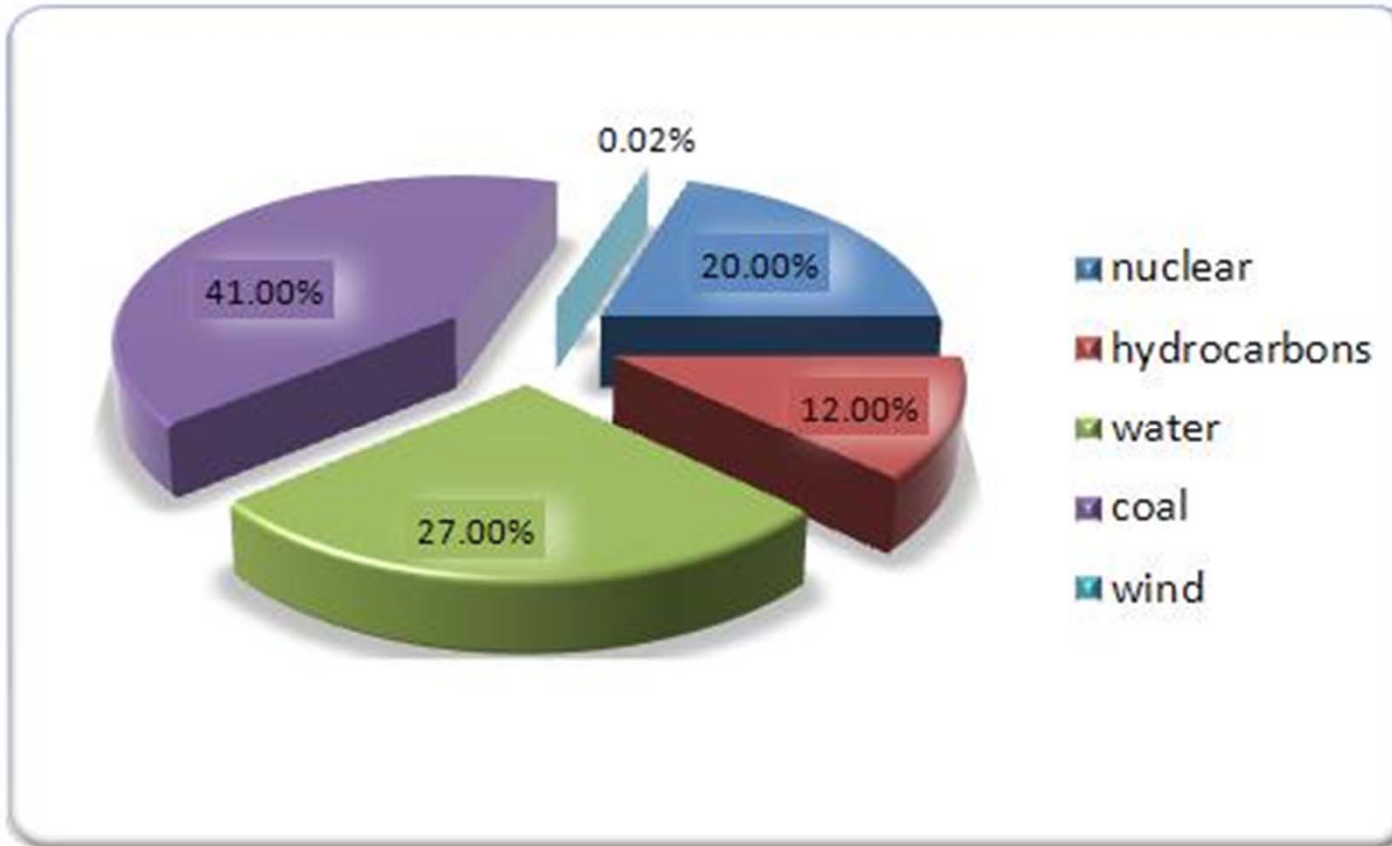
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# Electricity Generation by Primary Energy



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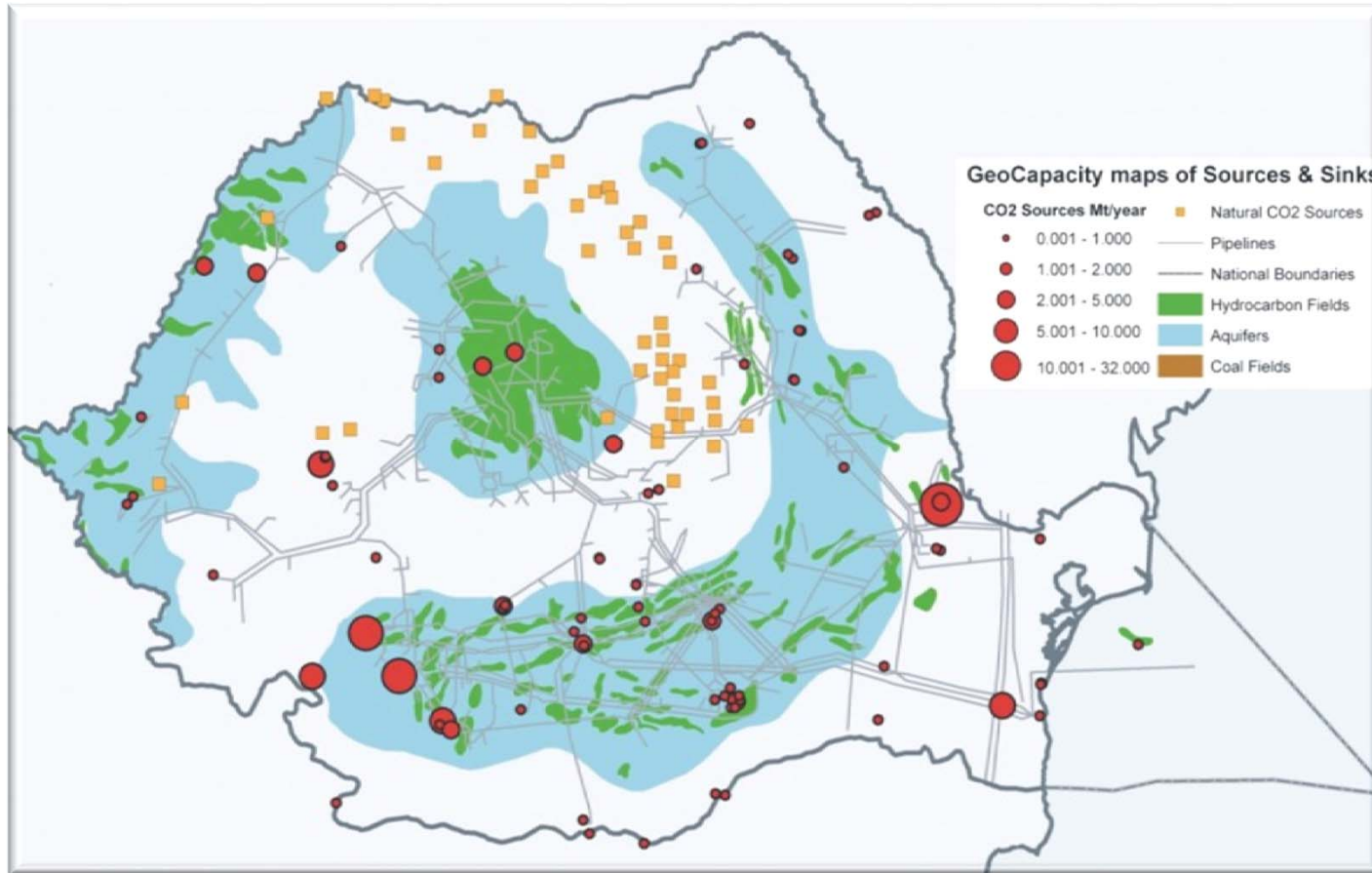
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# CO<sub>2</sub> Emissions and Storage Capacity in Romania



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# Knowledge Sharing Activities 2001-2010

2001	GeoEcoMar affiliation to ENeRG
2006	GeoEcoMar affiliation to CO <sub>2</sub> Net
2007	<ul style="list-style-type: none"> <li>▪ "CO2 Club" Association was founded</li> <li>▪ GeoEcoMar representation in ZEP - GG</li> </ul>
2008	<ul style="list-style-type: none"> <li>▪ ISPE representation in ZEP - AC</li> <li>▪ First International Workshop "Promoting CCS in Romania" – Bucharest</li> </ul>
2009	<ul style="list-style-type: none"> <li>▪ CIEM - International Conference on Energy and Environment "CCS Round Table" – Bucharest</li> <li>▪ FENCO ERA NET – CCS impact on communication</li> </ul>
2010	<ul style="list-style-type: none"> <li>▪ Second International Workshop "Promoting CCS in Romania" – Bucharest</li> <li>▪ FOREN – Regional Energy Forum "CCS International Workshop" – Neptun</li> <li>▪ GeoEcoMar participating in CGS Europe / FP7</li> <li>▪ Romanian CCS Demo Project accepted as observer in CCS - EU Project Network</li> <li>▪ First Knowledge Sharing Event on "CCS National R&amp;D Program" – Târgu Jiu</li> <li>▪ Official announcement of Romania candidacy to NER300 competition</li> </ul>

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# Knowledge Sharing Activities in 2011

	Events	Other activities
January	ZEP Governmental Communicators Meeting	
February	Coal Gen Europe 15-17 February, Prague, Czech Republic	
	ZEP Governmental Communicators Call-in conference	
March		“Science in appropriate words” - Radio Romania Cultural interviews dr. Constantin S. SAVA, GeoEcoMar March 09
	Climate change – impact and solutions, brief presentation at Turceni High School 1 day, March 11, Turceni, Gorj county	
		Radio Romania Cultural, Science editorial, “Science at home” interviews dr. Constantin S. SAVA, GeoEcoMar March 15, 45 minutes
	CCS Projects in Europe – dialog with the diplomatic environment in Romania 1 day Business Meeting, 29 March, 35-40 part. Bucharest	Starting to develop the on-line <b>GETICA CCS and Knowledge Sharing Platform</b>

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# Knowledge Sharing Activities in 2011

	Events	Other activities
April	European Sustainable Energy Week	Animation movie GETICA CCS
	<b>GETICA CCS - Open Door Event</b> 1 day knowledge sharing event, 14 April, 80-100part in Turceni TPP, Gorj county	
	<b>CCS Regulatory Toolkit in Romania</b> Kick-off meeting, 20 April, 20part, Bucharest	
May	<b>CCS – horizon 2020</b> 1 day Round Table, 12 May, 60 part, Bucharest <b>SAVE THE DATE!</b>	<b>Social Survey</b> in Oltenia region – call for proposal
June	<b>GETICA CCS - CO2 Transport &amp; Storage</b> Transgaz & Romgaz, 9 June, CO2 Transport & Storage event, 70-80part, Medias <b>SAVE THE DATE!</b>	Launchin the GETICA CCS web site and Knowledge Sharing on-line Platform
September	<b>CLUB CO2 "Promoting CCS in Romania"</b> Third International Conference, 1 day event, 60-70part., Craiova, Dolj county	
October	<b>Romanian CCS roadmap</b> 1 day Final National Conference, 100part, Bucharest	
November	<b>International Congress on Energy &amp; Environment</b> 1 day CCS Round Table, 4 November, 50part, Bucharest <b>SAVE THE DATE!</b>	

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# Romanian Governmental Actions

<p><b>July, 2009</b></p>	<p>Action Plan to prepare Romania for the “Energy-Climate Change” EU legislative package implementation (co-initiated by METBE, MEF, MPF, MERYS and signed by the Prime Minister)</p>
<p><b>February, 2010</b></p>	<p>Action Plan for implementing a Demo Project regarding the Carbon Capture and Storage in Romania (initiated by METBE and signed by the Prime Minister)</p>
<p><b>April, 2010</b></p>	<p>METBE launched the call for proposals to industries for the national ranking</p>
<p><b>May, 2010</b></p>	<p>The Romanian CCS Demo Project was selected from the energy industry</p>
<p><b>August, 2010</b></p>	<ul style="list-style-type: none"> <li>▪ METBE contracted the National CCS R&amp;D Program</li> <li>▪ METBE established the CCS Demo Project Inter-Ministerial Steering Committee through the Order no. 1508</li> </ul>
<p><b>2011</b></p>	<ul style="list-style-type: none"> <li>▪ Transposing the EU Directive related to CCS</li> <li>▪ Founding the future CCS Project Company as the Romanian CCS Demo Project Sponsor</li> <li>▪ GETICA CCS Demo Project financing</li> <li>▪ Submitting the GETICA CCS project proposal to the EIB within NER 300 competition</li> </ul>

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# EC/31/2009 CCS Directive transposition

- ✓ In Romania the CE/31/2009 CCS Directive is promoted under the Ministry of Environment and Forestry and Ministry of Economy, Trade and the Business Environment co-initiative
- ✓ It was decided to be transposed first through a Governmental Emergency Ordinance
- ✓ The Competent Authority will be the existing National Agency for Mineral Resources - NAMR

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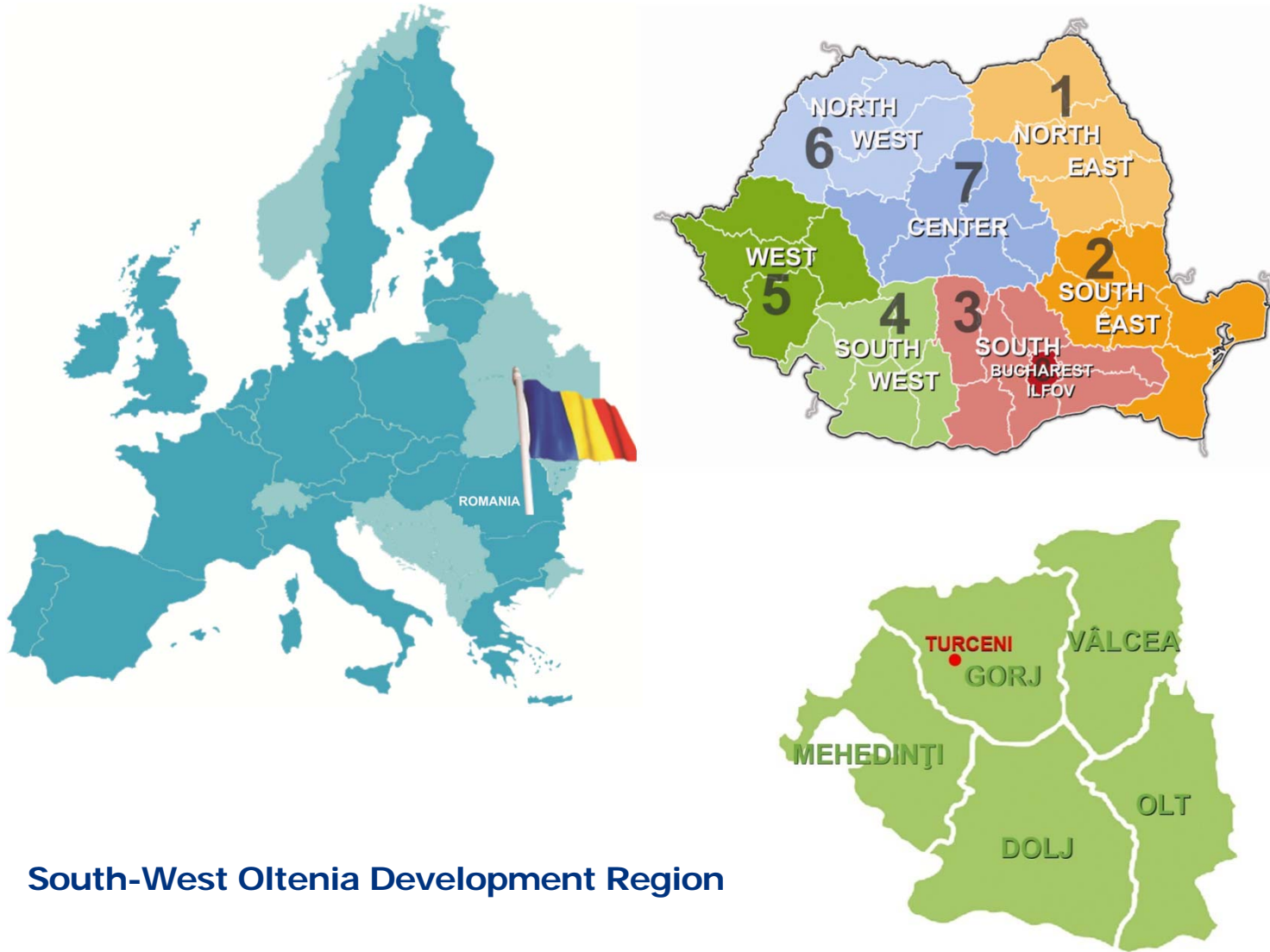
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# Project Location



South-West Oltenia Development Region



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# GETICA CCS Demo Project – in brief

GETICA CCS is a Governmental Demo Project, officially sustained by the Prime Minister and coordinated by the Ministry of Economy, Trade and the Business Environment – METBE and supported by Global CCS Institute.

<b>Location</b>	<ul style="list-style-type: none"> <li>▪ Oltenia region – the most energy intensive</li> <li>▪ Turceni PP – Unit no.6 (330MW)</li> </ul>
<b>Full Chain</b>	<ul style="list-style-type: none"> <li>▪ CO<sub>2</sub> Capture Plant &amp; Compression (1.5Mtpa)</li> <li>▪ CO<sub>2</sub> Transport – onshore pipeline</li> <li>▪ CO<sub>2</sub> Storage – onshore deep saline aquifers</li> </ul>
<b>Sponsor</b>	<p>GETICA CCS Project Company (PC), including:</p> <ul style="list-style-type: none"> <li>▪ TURCENI Energy Complex – future CO<sub>2</sub> Capture Plant operator and PC Leader</li> <li>▪ TRANSGAZ, National Company for Natural Gas Transport – future CO<sub>2</sub> Transport Infrastructure operator and PC Member</li> <li>▪ ROMGAZ, National Company for Natural Gas Exploitation – future CO<sub>2</sub> Storage Facility operator and PC Member</li> </ul>
<b>Current Status</b>	<ul style="list-style-type: none"> <li>▪ Feasibility Study completed</li> <li>▪ The demo project proposal for NER300 competition was submitted to the EIB</li> </ul>



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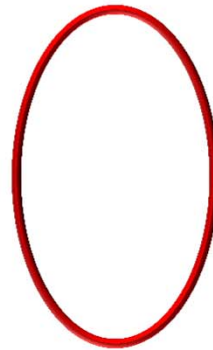
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# Turceni PP Layout



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# Turceni PP – Unit no. 6 (330MW)

- undergoing **retrofitting process** – deadline 2013
- **FGD** system – deadline 2012
- **ash and slag “dense slurry”** system – deadline 2012

## Main technical features after retrofitting

### Steam Turbine + Electric generator

Rated gross power	330MW
Maximum long term available gross power	310MW
Annual average gross power	280MW

### Steam Boiler

Steam flow	1035t/h
Steam parameters (pressure / temperature)	192 / 540 bar / °C
Efficiency	88%

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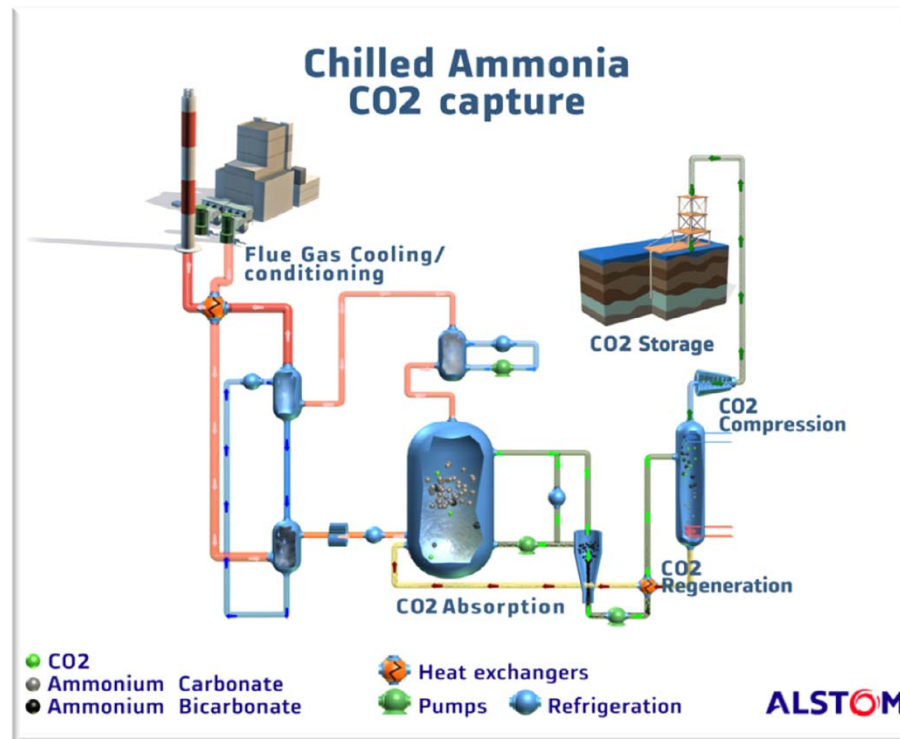


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# CO<sub>2</sub> Capture

- post-combustion system
- 85% minimum efficiency
- chilled ammonia process
- future operator: Turceni Energy Complex



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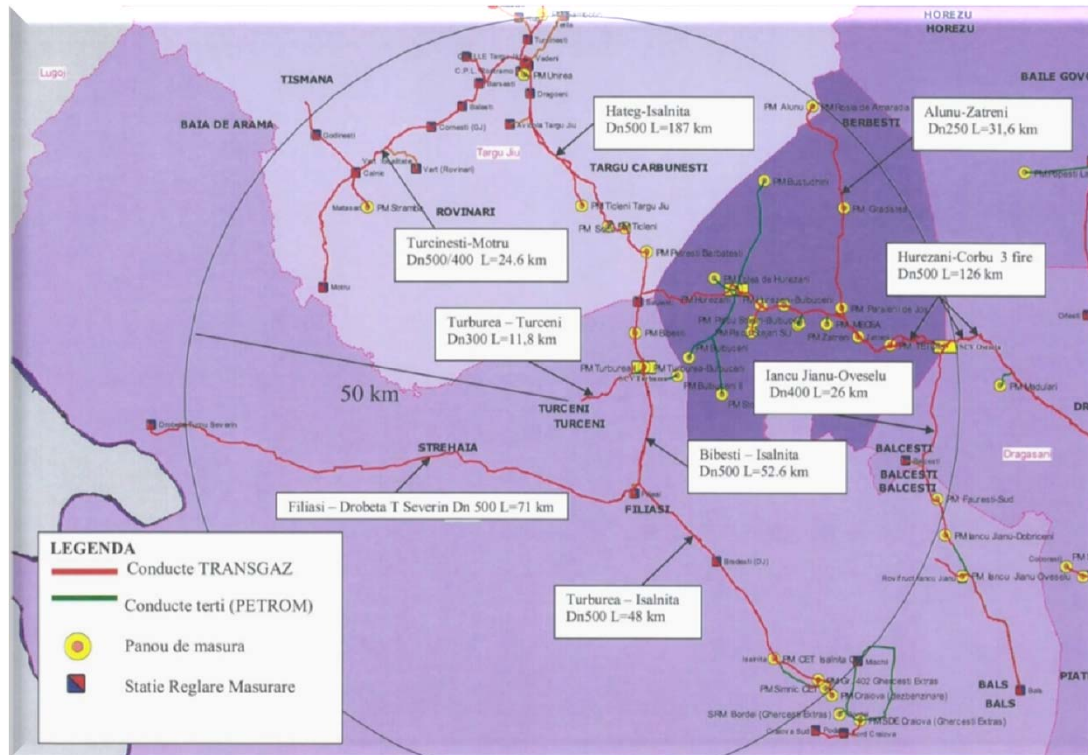


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# CO<sub>2</sub> Transport

- onshore pipeline of 40km length
- future potential development: Rovinari PP (1300MWe), Craiova II CHPP (300MWe), Işalniţa CHPP (600MWe), Petro-chemical and Metallurgical industries
- future operator: **Transgaz** - National Company for Natural Gas Transportation



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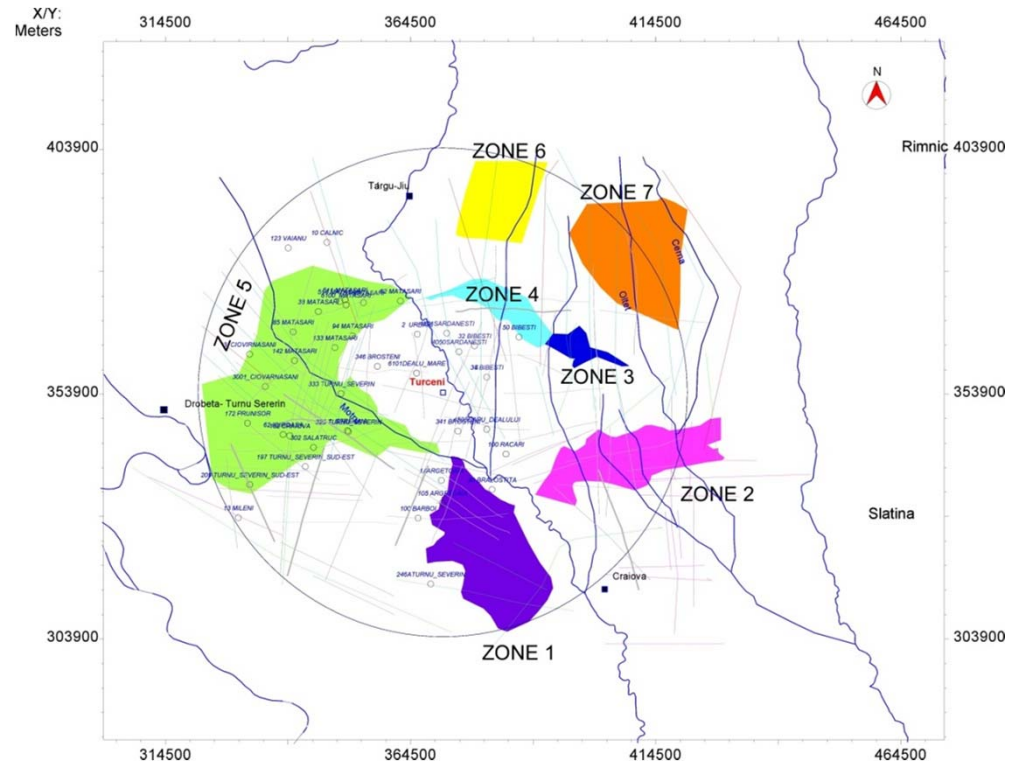


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# CO<sub>2</sub> Storage

- area of investigations within a radius of 50km around Turceni PP
- 2 potential CO<sub>2</sub> storage sites in onshore deep saline aquifers
- multi-user hub development potential
- future operator: **Romgaz** - National Company for Natural Gas Exploitation



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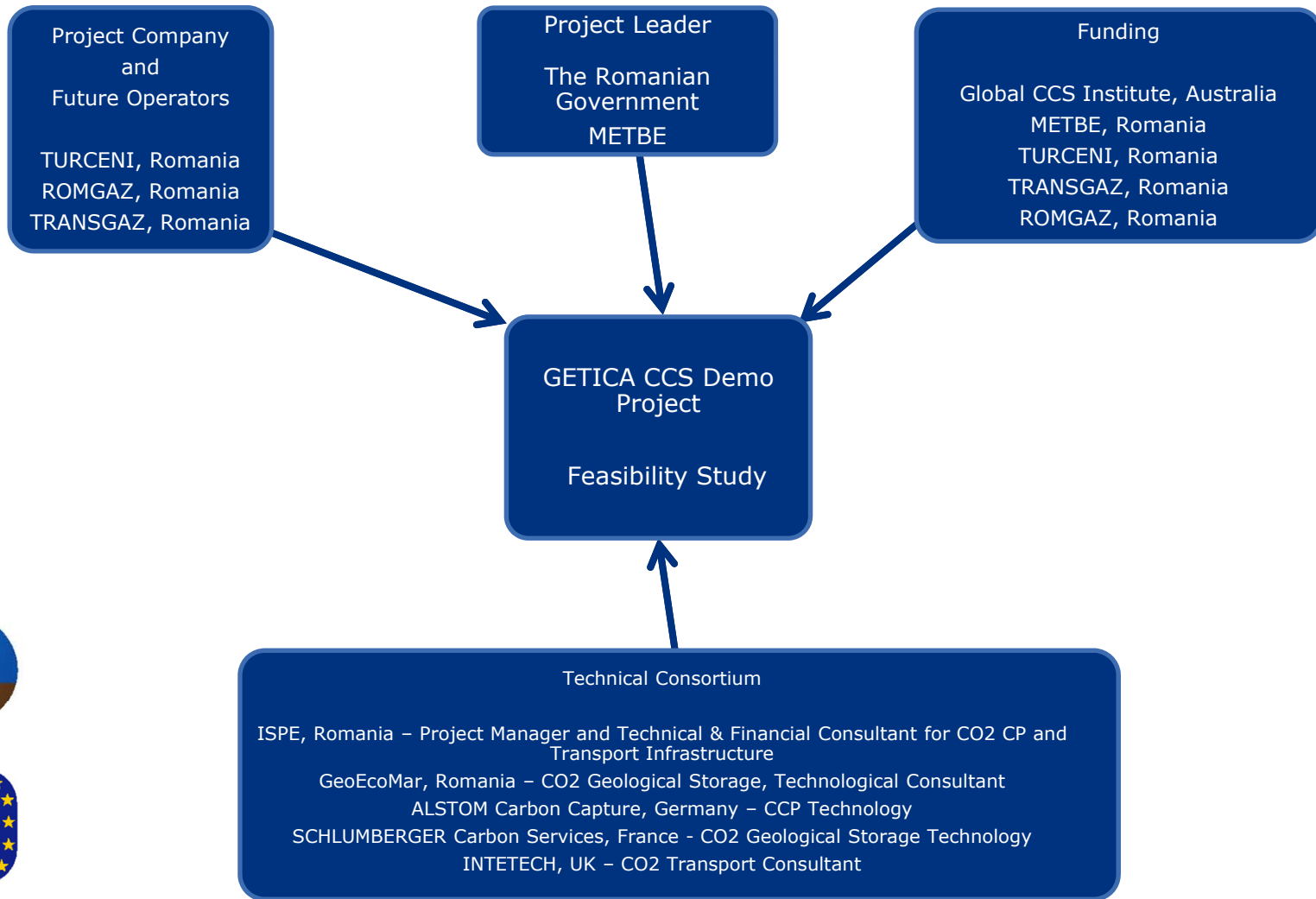


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# GETICA CCS - Key Players



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# Prospected Financing Sources

- ✓ NER 300 Program
- ✓ Norwegian Financial Mechanism
- ✓ EEA Financial Mechanism
- ✓ EU Structural Funds (2013 ÷ 2020)
- ✓ EU-ETS auctioning
- ✓ EIB (Risk – Sharing Financing Facility)
- ✓ USA Government Support
- ✓ Operators (Turceni , Transgaz, Romgaz)
- ✓ National Public Sources (feed-in-tariff)
- ✓ Other sources (commercial loans)

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Thank You for your attention !

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