Study on Underground Gas Storage in Europe and Central Asia

Working Party on Gas
Geneva,
January 22, 2013
G.-H. Joffre (Storengy) et al.

United Nations Economic Commission for Europe Committee on Sustainable Energy
Study on Underground Gas Storage in Europe and Central Asia

Summary:
- Introduction
- Structure of the UGS Study
- Progress
- Results
- Conclusions
Study on Underground Gas Storage in Europe and Central Asia

Introduction:

- The Study on UGS in Europe and Central Asia is an update of a first Study carried out in 90’s;
- The Study aimed at benchmarking all aspects of underground gas storage in Europe and Central Asia;
- The task force, created in 2008, welcomed Members from Gas companies, National Authorities (Mining Authorities, Regulators,...) or International Bodies (IGU, GSE, IEA,...);
- As a principle, an efficient use was made of already available data (IGU, GSE, IEA...) and a co-operation contract was signed with IGU for exchanging data.
### Study on Underground Gas Storage in Europe and Central Asia

**Introduction : Status of the UGS market**

<table>
<thead>
<tr>
<th>Main drivers</th>
<th>Trends</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRISIS</td>
<td>All players affected</td>
</tr>
<tr>
<td>RENEWABLE ENERGIES</td>
<td>Shut down of gas power plants</td>
</tr>
<tr>
<td>GAS DEMAND</td>
<td>No growth</td>
</tr>
<tr>
<td>LNG (US SHALE GAS)</td>
<td>Gas available at low cost / Competitor for flexibility</td>
</tr>
<tr>
<td>SECURITY OF SUPPLY (climatic risk)</td>
<td>No willing for bearing this responsibility / risk</td>
</tr>
<tr>
<td>OPTIMISATION AND BALANCE OF TRANSMISSION NETWORKS</td>
<td>Use other flexibility tools</td>
</tr>
<tr>
<td>SPREAD (winter vs summer prices)</td>
<td>Strong decrease (5-6 €/MWh vs 15 a few years ago)</td>
</tr>
</tbody>
</table>

[Diagram showing demand, storage, and injection points]

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Study on Underground Gas Storage in Europe and Central Asia

Structure of the Study (1):

- Chapter 1: New and emerging technologies:
  - to identify innovations in UGS business that may lead to a better cost efficiency,
  - to list the technologies that have been put in place or that are planned to be put in place to improve efficiency of the facility, in terms of quality of service, responsiveness to Client or cost.

- Heads: Mr A. Iskhakov (Gazprom) and Mr C. Gomez-Montalvo (Geostock)
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Structure of the Study (2):

- Chapter 2: Current UGS status: set up an updated database for all existing UGS plants in each country,

- Heads: Mr M. Sandu (Romgaz), and Mr B. Ernecic (PSP) with support of Mr J. Wallbrecht (IGU) and Mr A. Iskhakov (Gazprom)
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Structure of the Study (3) :

- Chapter 3: Market structure and legal framework: describe the legislation and guidelines for UGS market organization (incl. TPA rules) and UGS services,

- Heads: G.-H. Joffre (Storengy) with support of Mr J. Wallbrecht (IGU), Ms A. Brandenburger & A. Ramm (RWE Gasspeicher)
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Structure of the Study (4):

- Chapter 4: UGS projects: set up a data base for planned projects in each country including criteria for selecting projects,

- Heads: Mr M. Sandu (Romgaz) with support of Mr J. Wallbrecht (IGU), Ms A. Brandenburger (RWE Gasspeicher)
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Structure of the Study (5):

- Chapter 5: Legal framework for development and operation: provide with all useful information (legislation and procedures) necessary for granting consents and authorizations to SSO,

- Heads: Mr T. Korosi (Hungarian Energy Office), Mr W. Rokosz (PGNiG) and Mr G.-H. Joffre (Storengy) with support of Ms A. Brandenburger (RWE Gasspeicher) and Mr M. Laczko (E.On Földgaz Storage),
## Study on Underground Gas Storage in Europe and Central Asia

### Progress

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<th></th>
<th>2008</th>
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<td>95%</td>
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<td>10%</td>
<td>95%</td>
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<td><strong>ANSWERS TO QUESTIONNAIRE</strong></td>
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<td>0%</td>
<td>0%</td>
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<td>20 -30 % (60% of WGV)</td>
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<td>0%</td>
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<td>90%</td>
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</table>
Study on Underground Gas Storage in Europe and Central Asia

Results of the Study

• The questionnaire was completed by 20% of NRAs and 30% of companies, but representing main gas industries and main Working gas volumes (60%).

• A document of 120 pages including 112 figures was drawn up.

• All workable information was restored from the questionnaire, analysed and presented in a way to be exploited by all gas industry stakeholders.

• In the next slides, some figures have been selected to show the amount and the diversity of information collected and analysed.
Results of Chapter 1

New and emerging technologies

Questionnaire completed by Storage companies
Results of Chapter 1: New and emerging technologies

- Monitoring of safe UGS exploitation
  - Applying of production methods to CAPEX and OPEX optimization

- Partial replacement of cushion gas by non-hydrocarbon gases
- Optimization of operative condition based on the geological & reservoir model
Results of Chapter 2

Existing Storage facilities

Questionnaire completed by Storage companies
Results of Chapter 2: Existing Storage Facilities

Working capacities by UGS type (Bcm)

- Aquifer: 28,912.0
- Abandoned mine: 60.0
- Gas Field: 7,866.6
- Rock Cavern: 2,436.0
- Oil Field: 73,441.0
- Salt Cavern: 15

UGS distribution by type

- Abandoned mine: 21
- Aquifer: 1
- Gas Field: 16
- Oil Field: 1
- Rock Cavern: 53
- Salt Cavern: 4

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Results of Chapter 3

Organization of the market

Part A : Questionnaire completed by National Regulation Authorities
Results of Chapter 3 A: Market Organization

Which legal requirements on Capacity Allocation Management are in place?

![Graph showing distribution of capacity allocation methods]

- **Existing capacities**
  - Others
  - Auction
  - Pro rata
  - Customer portfolio
  - Open season/open subscription
- **Expansion of capacities**
  - First committed first served
  - First come first served
- **New capacities**

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Results of Chapter 3 A: Market Organization

Which legal requirements for Congestion Management are in place?

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Results of Chapter 3 A: Market Organization

*If no legal requirements on CMP, which CMP put in place by SSO?*

![Graph showing existing capacities, expansion of capacities, and new capacities with different allocation methods: use it or sell it, use it or lose it, offer at least on interruptible basis, secondary market, pro rata, customer portfolio, market based, first committed first served, first come first served.]

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What are your main work items regarding storage market arrangements in the next years?

- Define new rules (nTPA, capacity allocation...)
- Encourage development of capacities
- Implementation EU regulation, GGPSSO,...
- Develop the secondary market
- Develop trading platforms
- Other (transparency, competition)
Result of Chapter 3

Organization of the market

Part B : Questionnaire completed by SSOs
Results of Chapter 3 B: Market Organization

Ownership structure

- 100% Private
- Shared State/Private
- 100% State

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Results of Chapter 3 B: Market Organization

**TPA (Third Party Access) to gas storage**

- **Negotiated**
- **Regulated**
- **Hybrid**

TPA ➔ Indicates the applicable access regime:

- Blue: Negotiated
- Red: Regulated
- Green: Hybrid
- White: Not Applicable

Note: several answers possible, if access rule applied differs, depending on the storage facility/group of storage facilities or part of storage used for.

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Results of Chapter 3 B: Market Organization

How is your storage service offered?

- Physically separated
- Physically grouped
- Virtual

Note: several answers possible, if access rule applied differs, depending on the storage facility/group of storage facilities or part of storage used for.

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Results of Chapter 3 B: Market Organization

*What kind of services do you offer*  
*For Aquifers*

- Bundled firm
- Bundled interruptible
- Unbundled firm
- Unbundled interruptible
- Parking
- Lease
- Title transfer
- Virtual

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What kind of services do you offer
For Depleted fields (oil & gas)
Results of Chapter 3 B: Market Organization

What kind of services do you offer
For salt caverns

- Bundled firm
- Bundled interruptible
- Unbundled firm
- Unbundled interruptible
- Parking
- Lease
- Title transfer
- Virtual

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Results of Chapter 3 B: Market Organization

What kind of services have been demanded?

- Bundled firm
- Bundled interruptible
- Unbundled firm
- Unbundled interruptible
- Parking
- Lease
- Title transfer
- Virtual

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Results of Chapter 3 B: Market Organization

What kind of contract durations do you offer?

![Bar chart showing contract durations and services offered.](chart.png)

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What kind of contract durations have been demanded?
What are the characteristics of your offered service, for porous storage for firm service, no transport fees incl., and incl. withdrawal curve?
What are the characteristics of your offered service, for porous storage for firm service, no transport fees incl., and incl. withdrawal curve?
What are the characteristics of your offered service, for porous storage for firm service, no transport fees incl., and incl. withdrawal curve?
What are the characteristics of your offered service, for porous storage, for non-firm service, no transport fees incl., and incl. withdrawal curve?
What are the characteristics of your offered service, for salt caverns, for firm service, no transport fees incl., and incl. withdrawal curve?
Results of Chapter 3 B: Market Organization

*Essential physical restrictions of your storage service offered*

- **salt caverns/bundled service/firm**
  - Other
  - refill requirements
  - maintenance duration
  - nb of storage cycles per year
  - required min or max flows
  - obligation to employ working gas
  - rest period

- **salt caverns/bundled service/interruptible**

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Results of Chapter 3 B: Market Organization

**Essential physical restrictions of your storage service offered**

- Refill requirements
- Maintenance duration
- Nb of storage cycles per year
- Required min or max flows
- Obligation to employ working gas
- Rest period

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Results of Chapter 3 B: Market Organization

Essential physical restrictions of your storage service offered

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Results of Chapter 3 B: Market Organization

Essential physical restrictions of your storage service offered

AQUIFER OR DEPLETED F/UNbundled service/FIRM

AQUIFER OR DEPLETED F/UNbundled service/INTERRUPTIBLE

Other
refill requirements
maintenance duration
nb of storage cycles per year
required min or max flows
obligation to employ working gas
rest period

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Results of Chapter 3 B: Market Organization

Capacity allocation mechanism applied for existing capacities?

![Bar chart showing capacity allocation mechanisms applied for existing capacities.](chart)

- **Existing capacities**
  - pro rata
  - customer portfolio
  - open season
  - other (auctions)
  - first come first served
  - first committed first served

- **Expansion of capacities**
  - pro rata
  - customer portfolio
  - open season
  - other (auctions)
  - first come first served
  - first committed first served

- **New capacities**
  - pro rata
  - customer portfolio
  - open season
  - other (auctions)
  - first come first served
  - first committed first served

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In case of congestion, what kind of principles are applied?
In case of congestion, what kind of principles are applied?

- **Use it or sell it**
- **Use it or lose it**
- **Offer at least on interruptible basis**
- **Secondary market**
- **Pro rata**
- **Follow customer portfolio**
- **Market based**
- **First committed first served**
- **First come first served**
In case of congestion, what kind of principles are applied?

- Use or sell it
- Use it or lose it
- Offer at least on interruptible basis
- Secondary market
- Pro rata
- Follow customer portfolio
- Market based
- First committed first served
- First come first served

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Results of Chapter 4

Existing storage facilities

Questionnaire completed by Storage companies
Results of Chapter 4: UGS projects

Expected total capacity (Mcm)

Aquifer ■ LNG Peak Shaving □ Offshore Reservoir □ Reservoirs □ Salt cavity

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Results of Chapter 5

Legal requirements

Part A :
Questionnaire completed by National Mining Authorities
Results of Chapter 5:

Is the storage-related legislation specific to storage or included in the mining and/or other legislation?

- 56% specific to storage
- 44% included in the mining legislation
Results of Chapter 5:

Who is the owner of the underground oil and gas reserves/mineral resources?

- State: 57%
- Local Government: 14%
- Landowners: 29%

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Results of Chapter 5

Is cushion gas considered as capex or as opex?

- 86% capex
- 14% opex
Results of Chapter 5

Legal requirements
Part B:
Questionnaire completed by SSOs

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Results of Chapter 5

Are you satisfied about the Number of authorities involved?

- Very Satisfied: 12%
- Satisfied: 50%
- Dissatisfied: 38%

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Results of Chapter 5

Are you satisfied about the Transparency of regulation?

62% Very Satisfied
38% Satisfied

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Are you satisfied about the Applicability of regulation?

38% Very Satisfied
62% Satisfied

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Results of Chapter 5

Are you satisfied about the Real length of authorization procedure

75% Very Satisfied
25% Satisfied

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Conclusion:

• The Study progress was satisfactory in 2012, however,
• Company representatives were less and less available for co-operative works: 3 Heads of Chapters (4, 6 & 7) resigned;
• The relatively low level of interest of gas companies for contributing actively to the completion of the questionnaire and to participate in the UGS Study --> Lack of data for Chapters 6 & 7;
• The delay is due to choices made in 2010 (no support of external service for data management and drafting) and from the lack of IT extraction/data management tool) → analysis of data was a huge work for experts
Conclusion and future:

1. To finalise formatting and harmonizing the final draft (end of January 2013)

2. To send the Study to WPG members for approval (mid February 2013)

3. To publish the Study by the end of February

4. To prepare the Study update (2016)
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Thanks for your attention
On which basis TPA to storage capacities is provided?
Are capacities in existing storage or expansion of existing storage fully or partially exempted from TPA?
Results of Chapter 3 A: Market Organization

Are capacities in new facilities fully or partially exempted from TPA?

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Results of Chapter 3 A: Market Organization

Are there PSO (Public Service Obligation) in place?

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Are there PSO (Public Service Obligation) in place? If yes, indicate to which Party these obligations are assigned to?
Results of Chapter 3 A: Market Organization

Are there legal obligation to provide Strategic Stocks?

Strategic Stocks

- YES
- NO

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If there are legal obligations for Strategic Stocks, indicate which Party is responsible for implementing the mandatory stock level?
Results of Chapter 3 A: Market Organization

Are there any kind of price regulation in place?

Price regulation

YES

NO

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Results of Chapter 3 B: Market Organization

For which reason your capacities are exempted from TPA?

- By art. 22 Gas Directive 2003/55/EC (New Major Infrastructure)
- TSO functions
- "de minimis" rule
- Production purpose
- Other

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Results of Chapter 3 A: Market Organization

Where is the delivery point of storage services?

Note: several answers possible, if access rule applied differs, depending on the storage facility/group of storage facilities or part of storage used for.
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**Progress: Answers to questionnaire:**

<table>
<thead>
<tr>
<th>Chapter</th>
<th>1</th>
<th>2</th>
<th>3A</th>
<th>3B</th>
<th>3C</th>
<th>4</th>
<th>5A</th>
<th>5B</th>
<th>6</th>
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<tr>
<td>% of working gas volume (TSSO)</td>
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<tr>
<td>(representing 112 bcm vs 200 bcm Working Gas Volume)</td>
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<td>TOTAL NRAs</td>
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</table>

- **TOTAL SSOs:** 83
- **% of working gas volume (TSSO):** 60%
  - Representing 112 bcm vs 200 bcm Working Gas Volume
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Structure of the Study (13):

- Chapter 6: Tariffs of UGS: provide with information (if available and taking into account confidentiality issues) about construction costs and operation costs,

- Heads: Mr G. Martinus (Gas Terra) with support of Mr W. Rokosz (PGNiG)

- Chapter deleted
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Structure of the Study (15):

- Chapter 7: Outlook and main expected trends of UGS markets: describe the gas market (supply and demand) evolution and define the UGS needs subject to this evolution.

- Heads: Mr. G. Martinus (Gas Terra) with support of Mr. J. Wallbrecht (IGU), Ms. A. Brandenburger (RWE Gasspeicher)

- Chapter deleted