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**Draft Specifications for Application of
UNFC-2009 to Injection Projects**
([ECE/ENERGY/GE.3/2016/7](#))

Presentation to UNFC Workshop, Geneva, 26 April 2016



UNITED NATIONS
ECONOMIC COMMISSION
FOR EUROPE

UNECE

Task Force Members

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- Benjamin Court, Global CCS Institute
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Background and Mandate

- Mandate from 2013

The Task Force has been asked to investigate how, for example, oil and gas companies classify and evaluate the maturity of their gas injection projects today, and propose a draft bridging document for application of UNFC-2009 to injection projects, in particular to the storage of carbon dioxide.

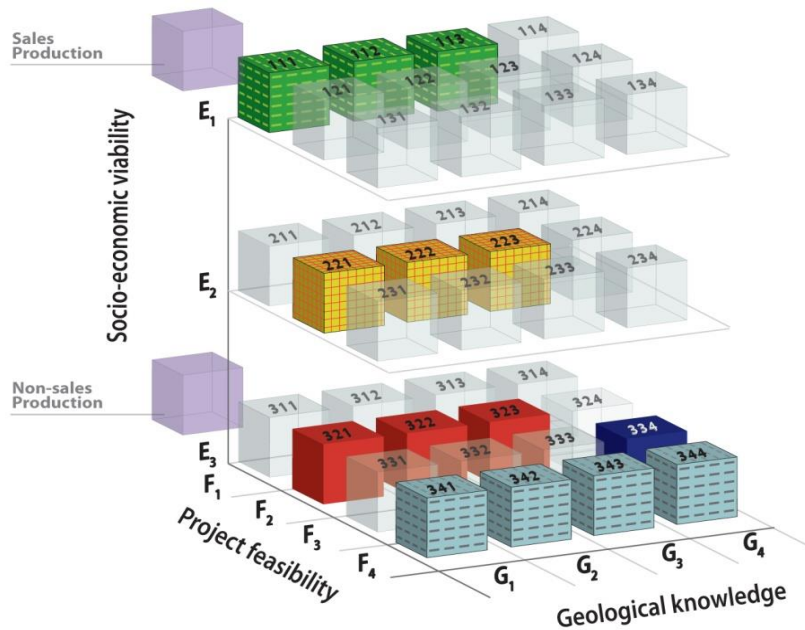
- EGRC recommendation from the 5th session

The Expert Group recommended that the Task Force on UNFC and Recipient Reservoirs prepare draft specifications for the use of UNFC-2009 to classify injection projects, in particular for the storage of carbon dioxide, and submit them to the sixth session.

- Submission to the EGRC 6th session and Public Commenting

At the EGRC 6th session, the Task Force presented its proposed DRAFT Specifications for Application of the UNFC to Injection Projects for the Purpose of Geological Storage. These specifications have since been subject to a public comment period and updated based on comments received.

Injection Project Activities - the Simple Picture



We need to:

- Understand the geology and dynamic behaviour of the recipient reservoir
- Design a technical concept and evaluate the project feasibility
- Calculate the costs and evaluate the economic and social viability of the project
- Make decisions

These are all activities that we know from oil and gas extraction projects and that are well defined in the UNFC2009

Task Force on Application of UNFC-2009 to Injection Projects

Revised Draft Document Submitted to the 7th Session

Economic Commission for Europe
Committee on Sustainable Energy
Expert Group on Resource Classification
Seventh session
Geneva, 26–29 April 2016
Item 14 of the provisional agenda
Use of the United Nations Framework Classification for
Fossil Energy and Mineral Reserves and Resources 2009
for classifying injection projects

**Draft Specifications for the Application of the United Nations
Classification for Fossil Energy and Mineral Reserves and
Resources 2009 (UNFC-2009) to Injection Projects for the
Purpose of Geological Storage**

Draft document prepared by the Task Force on Application of UNFC-
2009 to Injection Projects and revised after Public Comment period

Summary

This document provides the revised draft Specifications for the Application of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 (UNFC-2009) incorporating Specifications for its Application (as set out in ECE Energy Series No. 42, ECE/ENERGY/94), to Injection Projects for the purpose of Geological Storage. The document was prepared by the Task Force on Application of UNFC-2009 to Injection Projects of the ECE Expert Group on Resource Classification and revised following the public comment period held from 8 July to 15 September 2015. The main focus of the document is on classifying Injection Projects related to the geological storage of carbon dioxide. The same principles of project maturity should however also be applicable to other injection projects where a fluid is injected into a subsurface geological formation for storage. The draft Specifications are submitted to the Expert Group for review at its seventh session. The Expert Group is invited to consider recommending that the Specifications be submitted to the Committee on Sustainable Energy for endorsement.

*DRAFT Specifications for the application of the
United Nations Framework Classification for
Fossil Energy and Mineral Reserves and
Resources 2009 (UNFC-2009) to Injection
Projects for the Purpose of Geological Storage*

[LINK to document on UNFC web page](#)

Task Force on Application of UNFC-2009 to Injection Projects

Public Hearing Summary Report

EGRC-7/2016/INF.2
6 April 2016

Economic Commission for Europe

Committee on Sustainable Energy

Expert Group on Resource Classification

Seventh session

Geneva, 26–29 April 2016

Item 14 of the provisional agenda

Use of the United Nations Framework Classification for
Fossil Energy and Mineral Reserves and Resources 2009
for classifying injection projects

**Summary report of changes made to the draft Specifications
for the Application of the United Nations Classification for
Fossil Energy and Mineral Reserves and Resources 2009
(UNFC-2009) to Injection Projects for the Purpose of
Geological Storage based on comments received during the
Public Hearing**

**Report prepared by the Task Force on UNFC-2009 and Injection
Projects for the Purpose of Geological Storage**

Introduction

1. At the sixth session of the Expert Group on Resource Classification (EGRC) in Geneva in 2015, the Task Force on UNFC-2009 and Injection Projects for the Purpose of Geological Storage presented its *DRAFT Specifications for the Application of the United Nations Classification for Fossil Energy and Mineral Reserves and Resources 2009 (UNFC-2009) to Injection Projects for the Purpose of Geological Storage*.
2. The document has since been subject to a Public Hearing period that was held from 8 July to 15 September 2015. Certain changes have been made to the draft document based on the received comments. This document summarizes the received comments, and how the Task Force has chosen to respond to these.
3. Comments that were an appreciation of the work done, and which did not require any further actions or explanations, are not included in this report.

*Summary Report of changes made based on
comments received during the Public Hearing.*

*THANK YOU to all who contributed with
comments!*

[LINK to document on UNFC web page](#)



Important Definitions and Clarifications

Injection Projects for the Purpose of Geological Storage:

- Geological Storage refers mainly to permanent containment of CO₂ in deep subsurface geological formations
- Same principles can be applied also to other projects through which a fluid is stored in a geological formation (such as hydrogen storage, natural gas storage)

What are we classifying?

- The resource is the available reservoir in which a certain quantity of a given fluid can be stored
- It is not the injected and stored fluid, although this can be a resource in itself
- In the Revised DRAFT document the resource is now referred to as ***Geological Storage***

Task Force on Application of UNFC-2009 to Injection Projects

UNFC-2009 Main Classes and Categories

UNFC as Applied to Extractive Industries						UNFC as Proposed Applied to Injection Projects							
Total Commodity Initially in Place	Extracted	Sales Production				Class	Injected and Stored Quantities			Class	Lost Quantities		
		Non-sales Production					Categories				Categories		
						E	F	G		E	F	G	
		Future recovery by commercial development projects or mining operations	Commercial Projects	1	1	1, 2, 3	Future storage by commercial injection projects	Commercial Injection Projects	1	1	1, 2, 3		
		Potential future recovery by contingent development projects or mining operations	Potentially Commercial Projects	2	2	1, 2, 3	Potential future storage in known reservoirs by injection projects	Potentially Commercial Injection Projects	2	2	1, 2, 3		
	Non-Commercial Projects		3	2	1, 2, 3	Non-Commercial Injection Projects		3	2	1, 2, 3			
	Additional quantities in place associated with known deposits		3	4	1, 2, 3	Storage Not Feasible		3	4	1, 2, 3			
	Potential future recovery by successful exploration activities	Exploration Projects	3	3	4	Potential future storage in undiscovered reservoirs by injection projects	Screening Projects	3	3	4			
	Additional quantities in place associated with potential projects		3	4	4	Storage Not Feasible		3	4	4			

UNFC-2009 Main Classes and Categories

UNFC as Proposed Applied to Injection Projects					
Total Geological Storage	Injected and Stored Quantities				
	Lost Quantities				
		Class	Categories		
			E	F	G
	Future storage by commercial injection projects	Commercial Injection Projects	1	1	1, 2, 3
	Potential future storage in known reservoirs by injection projects	Potentially Commercial Injection Projects	2	2	1, 2, 3
		Non-Commercial Injection Projects	3	2	1, 2, 3
	Storage Not Feasible		3	4	1, 2, 3
	Potential future storage in undiscovered reservoirs by injection projects	Screening Projects	3	3	4
	Storage Not Feasible		3	4	4



Task Force on Application of UNFC-2009 to Injection Projects

Comparing UNFC-2009 with other Proposed Classifications

Extraction Projects							Injection Projects																																											
UNFC-2009 defined by Classes, Sub-classes and Categories							PRMS			Techno-economic Resource-reserve Pyramid			CO2CRC Classification (2008)	Classification System proposed by Gorecki et al, SPE126421 (2009)			DOE/NETL Geologic Storage Framework (Adapted PRMS)			CSRCC Frailey & Finley (2009)			Global CCS Institute																											
Class	Sub-class	Categories			Reserves	Approved for Development Justified for Development	Matched Capacity	Operational capacity	Development of Injection Site	Operational Storage Capacity	Theoretical Storage Resource*	Characterized Storage Resource	Effective Storage Resource	Practical Storage Capacity	Commercial	Storage Capacity	Current Injection	Approved Injection Project	Planned Injection Project	Site Characterization/Project Pending	Site Characterization/Development on hold	Site Characterization/Development Not Viable	Commercial	Capacity	Active Injector	Under Development	Planned for Development	Development Pending	Development on Hold	Development Not Viable	Project Status	Project Stage																		
		E	F	G																													CSLF	CCOP	NPD	Unrecoverable	Prospect	Lead	Play	Unrecoverable	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2					
Commercial projects	On Production	1	1.1	1,2,3	On Production	Matched Capacity	Operational capacity	Development of Injection Site	Operational Storage Capacity	Theoretical Storage Resource*	Characterized Storage Resource	Effective Storage Resource	Practical Storage Capacity	Commercial	Storage Capacity	Current Injection	Approved Injection Project	Planned Injection Project	Site Characterization/Project Pending	Site Characterization/Development on hold	Site Characterization/Development Not Viable	Sub-Commercial	Capacity	Active Injector	Under Development	Planned for Development	Development Pending	Development on Hold	Development Not Viable	Active	Operate																			
	Approved for Development	1	1.2	1,2,3	Approved for Development Justified for Development	Matched Capacity	Operational capacity	Development of Injection Site	Operational Storage Capacity							Characterized Storage Resource	Effective Storage Resource	Practical Storage Capacity	Commercial	Storage Capacity	Current Injection			Approved Injection Project	Planned Injection Project	Site Characterization/Project Pending	Site Characterization/Development on hold	Site Characterization/Development Not Viable	Sub-Commercial	Capacity	Active Injector	Under Development	Planned for Development	Development Pending	Development on Hold	Development Not Viable	Active	Execute												
	Justified for Development	1	1.3	1,2,3	Justified for Development																Practical Capacity			Contingent Capacity	Suitable for Long Term Storage	Contingent Storage Capacity	Uncharacterized Storage Resource	Geologic Storage			Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Site Characterization (Initial)	Site Selection		Site Screening (Sub-Regional)	Uninjectable CO2	Uninjectable CO2	Sub-Commercial	Contingent Resource	Development Pending	Development on Hold	Development Not Viable	Planned	Evaluate			
Potentially commercial projects	Development Pending	2	2.1	1,2,3	Development Pending	Practical Capacity	Contingent Capacity	Suitable for Long Term Storage	Contingent Storage Capacity							Uncharacterized Storage Resource	Geologic Storage	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2									Uninjectable CO2	Site Characterization (Initial)				Site Selection	Site Screening (Sub-Regional)	Uninjectable CO2	Uninjectable CO2	Sub-Commercial					Contingent Resource	Development Pending	Development on Hold			Development Not Viable	Planned	Evaluate
	Development on Hold	2	2.2	1,2,3	Development on Hold																								Practical Capacity	Contingent Capacity				Suitable for Long Term Storage	Contingent Storage Capacity									Uncharacterized Storage Resource	Geologic Storage			Uninjectable CO2		
	Development Unclarified	3.2	2.2	1,2,3	Development Unclarified or On Hold																Practical Capacity			Contingent Capacity	Suitable for Long Term Storage	Contingent Storage Capacity	Uncharacterized Storage Resource	Geologic Storage			Uninjectable CO2	Uninjectable CO2	Uninjectable CO2						Uninjectable CO2	Site Characterization (Initial)	Site Selection	Site Screening (Sub-Regional)				Uninjectable CO2	Uninjectable CO2			
Non-commercial projects	Development Not Viable	3.3	2.3	1,2,3	Development Not Viable	Practical Capacity	Contingent Capacity	Suitable for Long Term Storage	Contingent Storage Capacity							Uncharacterized Storage Resource	Geologic Storage	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2									Uninjectable CO2	Site Characterization (Initial)				Site Selection	Site Screening (Sub-Regional)	Uninjectable CO2	Uninjectable CO2	Sub-Commercial	Contingent Resource	Development Pending	Development on Hold	Development Not Viable	Planned	Evaluate						
	Additional Quantities in Place	3.3	4	1,2,3	Unrecoverable																Practical Capacity			Contingent Capacity	Suitable for Long Term Storage	Contingent Storage Capacity	Uncharacterized Storage Resource	Geologic Storage	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Site Characterization (Initial)	Site Selection	Site Screening (Sub-Regional)					Uninjectable CO2	Uninjectable CO2	Sub-Commercial			Contingent Resource	Development Pending	Development on Hold	Development Not Viable	Planned	Evaluate
	Additional Quantities in Place	3.3	4	1,2,3	Unrecoverable	Practical Capacity	Contingent Capacity	Suitable for Long Term Storage	Contingent Storage Capacity							Uncharacterized Storage Resource	Geologic Storage	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2												Uninjectable CO2	Site Characterization (Initial)	Site Selection	Site Screening (Sub-Regional)	Uninjectable CO2	Uninjectable CO2	Sub-Commercial	Contingent Resource				Development Pending	Development on Hold		Development Not Viable	Planned	Evaluate		
Exploration Projects	(No sub-classes defined)	3.2	3	4	Prospective resources																Effective Capacity			Prospective Capacity	Exploration	Prospective Storage Capacity	Theoretical Storage Resource*	Uncharacterized Storage Resource	Geologic Storage	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Site Characterization (Initial)	Site Selection	Site Screening (Sub-Regional)					Uninjectable CO2	Uninjectable CO2	Sub-Commercial	Prospective Resource	Prospect	Lead	Play			Identify	
	Additional Quantities in Place	3.3	4	4	Unrecoverable	Theoretical Capacity	Total Pore Volume	Theoretical Volume	Prospective Storage Capacity							Theoretical Storage Resource*	Uncharacterized Storage Resource	Geologic Storage	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2			Site Characterization (Initial)	Site Selection	Site Screening (Sub-Regional)						Uninjectable CO2	Uninjectable CO2	Sub-Commercial	Prospective Resource	Prospect	Lead	Play	Identify											
	Additional Quantities in Place	3.3	4	4	Unrecoverable	Theoretical Capacity	Total Pore Volume	Theoretical Volume	Prospective Storage Capacity												Theoretical Storage Resource*			Uncharacterized Storage Resource	Geologic Storage	Uninjectable CO2	Uninjectable CO2	Uninjectable CO2	Site Characterization (Initial)	Site Selection	Site Screening (Sub-Regional)					Uninjectable CO2	Uninjectable CO2	Sub-Commercial		Prospective Resource	Prospect	Lead	Play	Identify						

- **Techno-Economic Resource-Reserve Pyramid**
 - *CSLF*
 - *CCOP*
 - *NPD*
- **The CO2CRC classification**
- **Classification proposed by Gorecki et al (2009)**
- **The Geologic Storage Framework (US DOE/NETL)**
- **CSRCC (Frailey & Finley, ISGS)**
- **The Global CCS Institute's project overview**

[LINK to document on UNFC web page](#)



Task Force on Application of UNFC-2009 to Injection Projects

The *DRAFT Specifications for the application of UNFC-2009 to Injection Projects for the Purpose of Geological Storage* will be presented to the EGRC on Thursday 28 April at 11:50.

Thank you for your attention!