

The United Nations Framework Classification for Fossil Energy and Mineral Resources UNFC

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**Ad Hoc Group of Experts on Harmonization of Energy Reserves
and Resources Terminology**

9-11 November 2005



Outline

- The history of UNFC
- The structure of the classification
- Some definitions
- Comparison to other classifications

History of UNFC

- First version of the UN Framework Classification for Solid Fuels and Mineral Commodities was initiated in 1992.
- Substantial work on the system by a UN Task Force in the period 1992-1997.
- UN Economic and Social Council (ECOSOC) recommended all UN Members to use the system in 1997. Now used successfully or tested in more than 60 countries.
- UNECE Committee on Sustainable Energy creates in 2001 an Ad Hoc Group of Experts to extend the principles of the Framework Classification to other energy resources (oil, natural gas and uranium).

History of UNFC (cont.)

- The Ad Hoc Group worked intensively with design of the system and harmonization with other systems during 2002-2004.
- **UN Framework Classification for Fossil Energy and Mineral Resources** is established
- ECOSOC recommended the use of the system world-wide in July 2004.
- UNECE Committee on Sustainable Energy requests that the Ad Hoc Group should continue its work
 - Cooperate with relevant institutions
 - Promote the practical implementation
 - Issue guidelines

What is UNFC?

- A universally applicable instrument for classification, based on market criteria, of the reserves and resources of energy and mineral commodities
- An international scheme that aims at incorporating all national systems for reserves/resources and make them comparable and compatible – enhancing international communication
- A flexible system for application at global, national, industrial or institutional level
- A framework to harmonize existing terminologies and definitions worldwide



Why one common global code for energy and mineral resources?

- Global markets need global standards
- Efficient markets need strong standards
- The capital market became global after 1980
- Global commodity markets are consolidating
 - The oil market is global. The gas market will soon be.

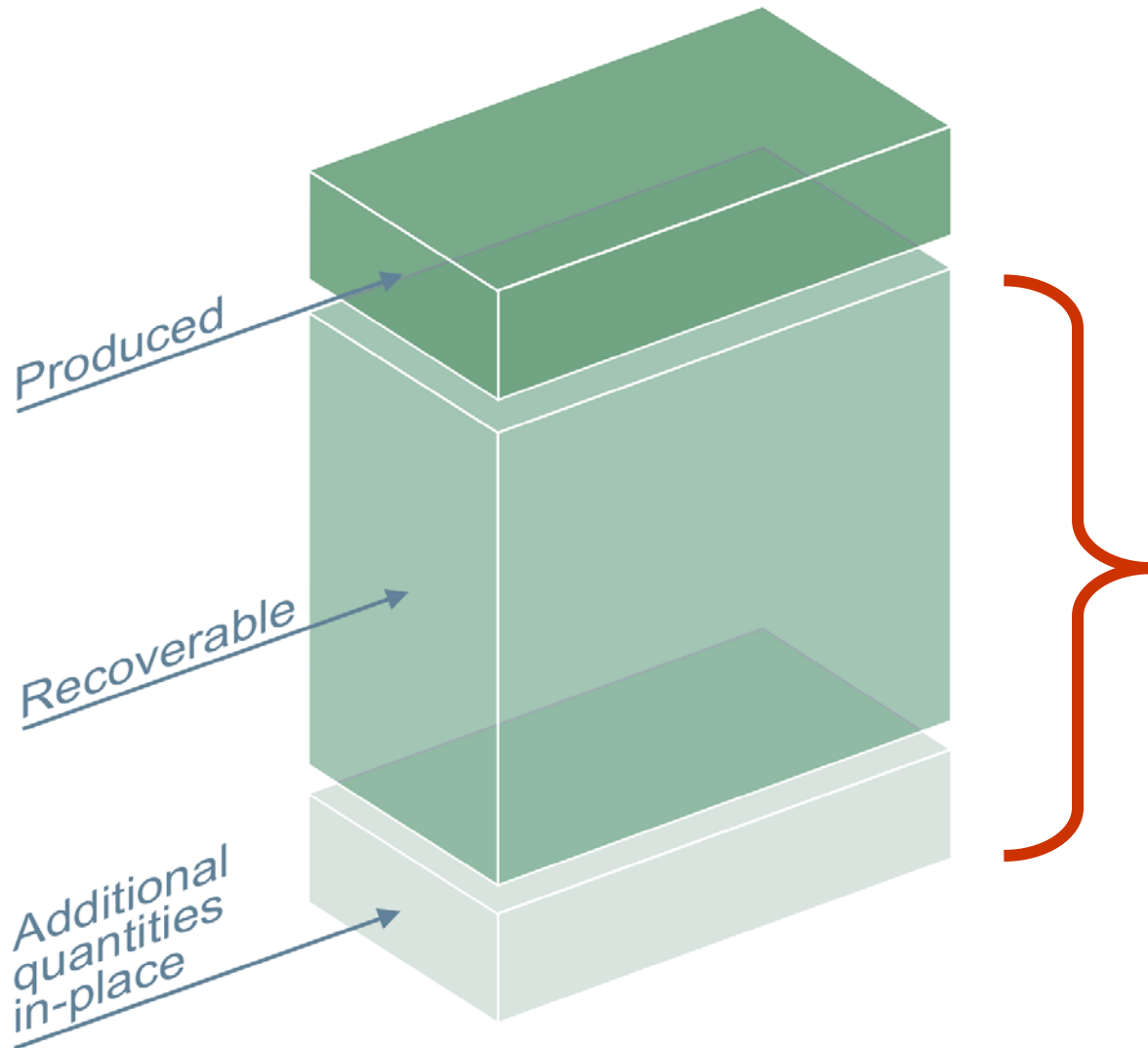
Why UNFC?

- Enhance international communication
- Support business processes and improve efficiency of resource management
- Facilitate international financial reporting
- Enhance the security of energy suppliers and the associated financial resources
- Assist countries with transition economies in reassessing their resources, and so make them more attractive to foreign investors



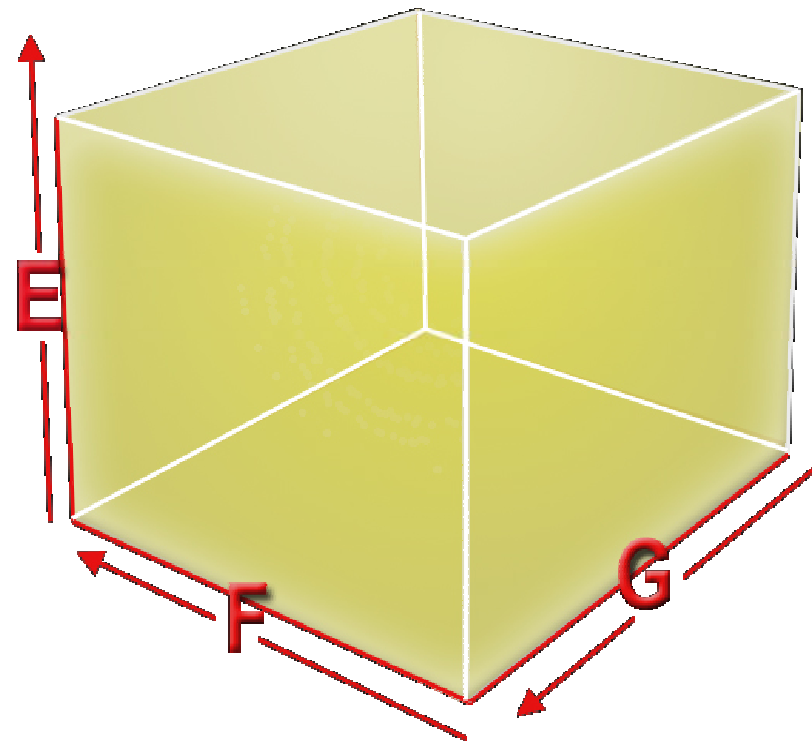
The UNFC Classification

Total initial resources



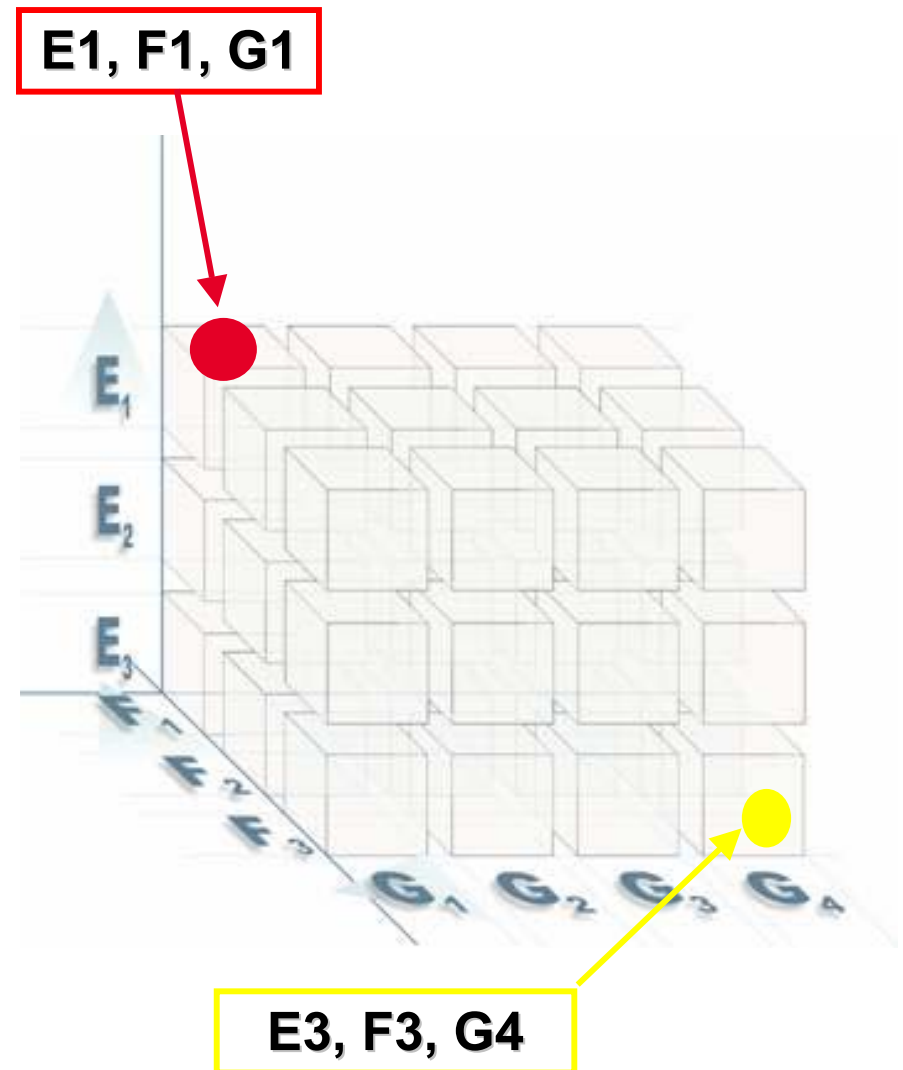
Total remaining resources are categorized by three criteria

- E** Economic and commercial viability
- F** Field project status and feasibility
- G** Geological knowledge



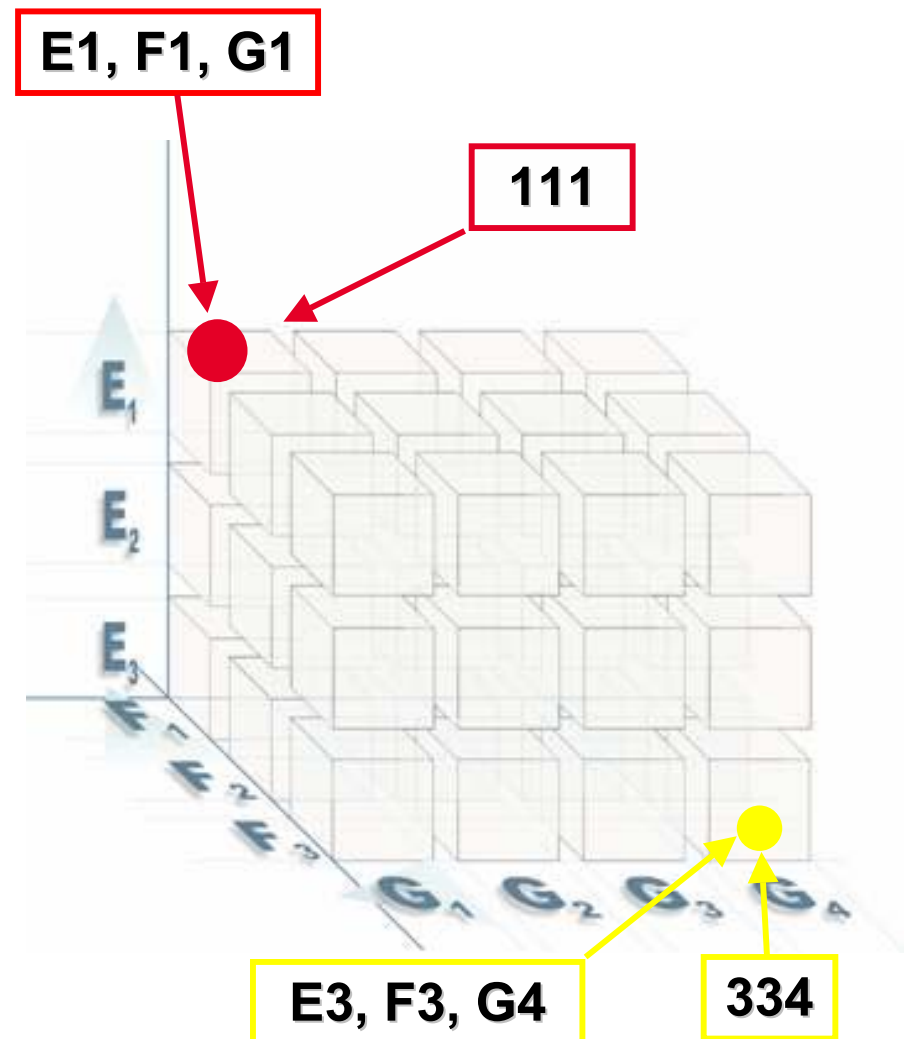
Categories

- The criteria (E, F, G) are divided into categories (1, 2, 3, 4).
- Resource volumes are classified by an E, an F and a G category



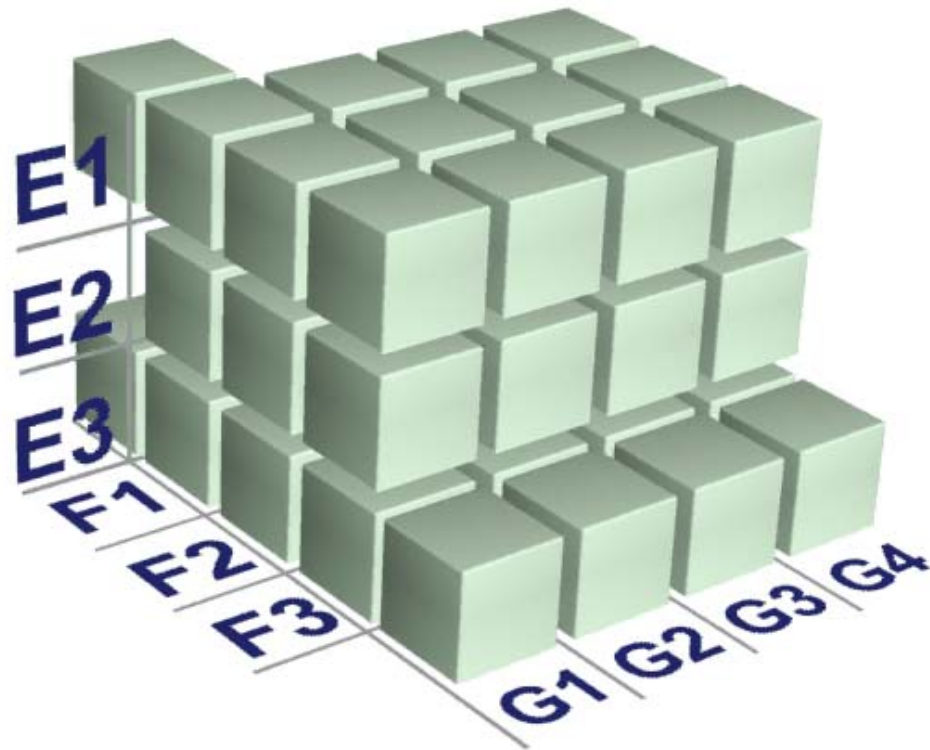
Codification

- The categories are quoted in fixed order: **EFG**
- The category letters are removed, but the numbers are retained.
- The resources are identified by a number code (111), (334), etc.
- Facilitates communication independent of alphabet



UNFC for petroleum

- UNFC basic structure
 - 42 theoretical possibilities
 - ..but these are not all relevant!
- Adjusted for petroleum

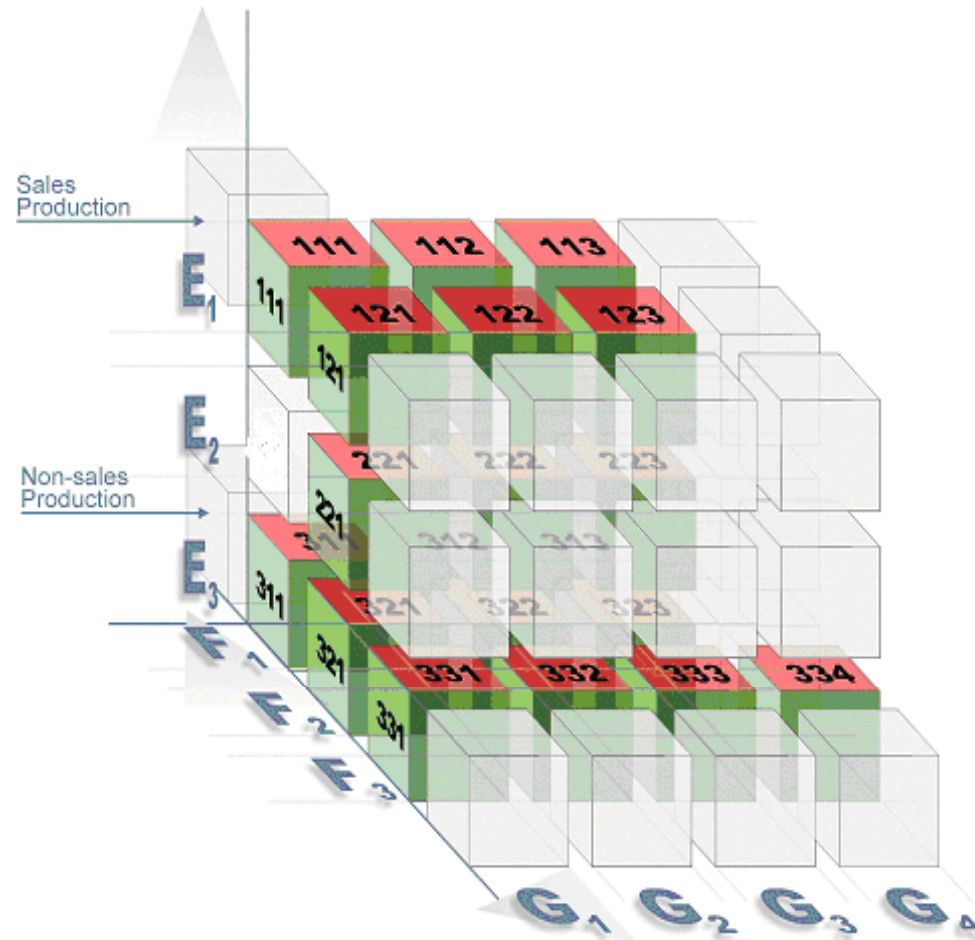


UNFC for petroleum

- **E₁ Economic**
- **E₂ Potentially economic**
- **E₃ Intrinsically economic**

- **F₁ Justified**
- **F₂ Contingent**
- **F₃ Undefined**

- **G₁ Reasonably assured**
- **G₂ Estimated**
- **G₃ Inferred**
- **G₄ Potential**



Some definitions

E1 - Economic

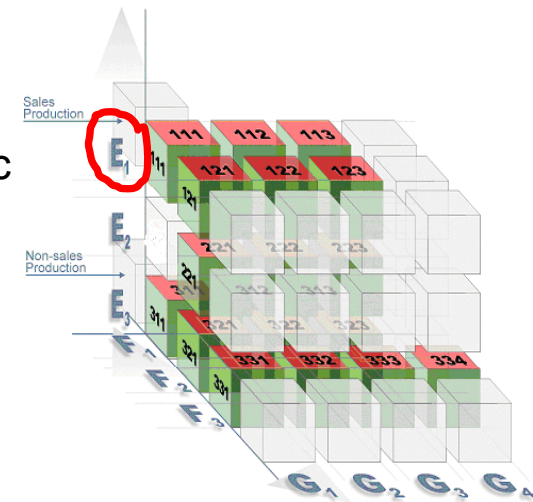
Production is justified under the technological, economic, environmental and other relevant commercial conditions, realistically assumed or specified

E1.1 - Normal Economic

Production is justified under normal economic conditions. Assumptions regarding future economic conditions may be constrained by regulation

E1.2 - Exceptional Economic

Exceptional economic quantities are at present not economic to produce under normal economic conditions. Their production is made possible through government subsidies and/or other considerations.



E2 – Potentially Economic

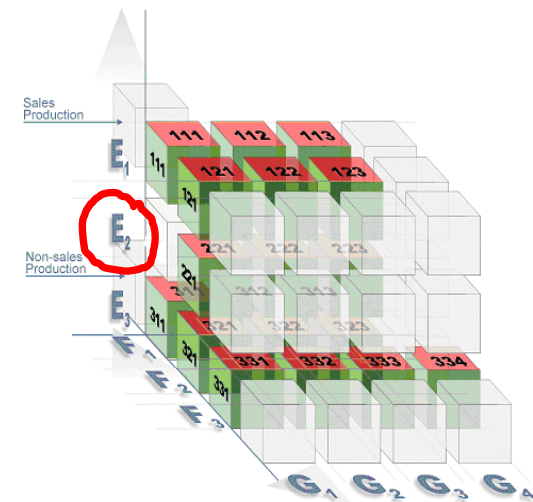
Production is not justified under the technological, economic, environmental and other relevant commercial conditions, realistically assumed at the time of the estimation, but which

E2.1 - Marginal Economic

Marginal economic quantities are quantities that at the time of determination are not economic, but border on being so. They may become economic in the foreseeable future as a result of changes in technological, economic, environmental and/or other relevant commercial conditions

E2.2 - Sub-Marginal Economic

Sub-marginal economic quantities are quantities that would require a substantially higher commodity price or a major cost-reducing advance in technology to render them economic.



E3 – Intrinsically Economic

Quantities that are of **economic viability** or are of **unrecoverable**)

E3.1 - Non-sales

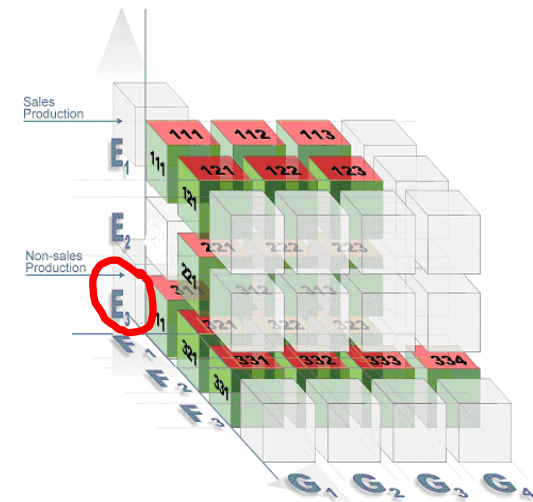
Quantities that will be produced but not sold

E3.2 - Undetermined

Economic viability undetermined

E3.2 - Unrecoverable

Additional quantities remaining in-place, i.e. the quantities initially in-place less the produced and remaining recoverable quantities.



F1 – Justified Development and/or Production Project

Development and/or production plans have demonstrated production of the reported quantities to be justified

F1.1 - Project in Production

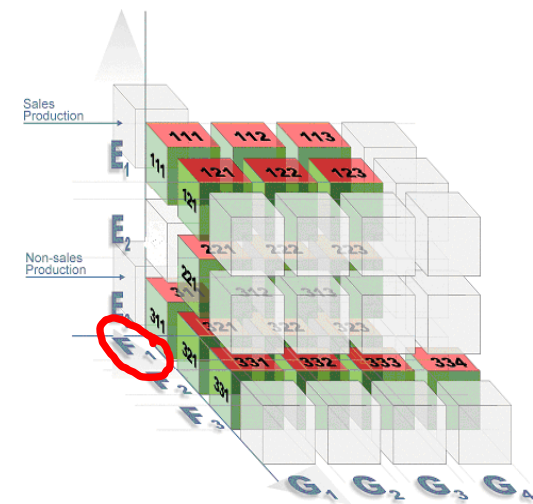
The development project is completed and the facilities are producing

F1.2 - Committed Development Project

Firm commitments have been made for the expenditures and activities needed to bring a discovered accumulation to the production stage

F1.3 - Uncommitted Development Project

Development plans have demonstrated production of the reported quantities to be justified, but commitments to carry out the development works have not yet been made



F2 – Contingent Development Project

Development and production of recoverable quantities has not been justified, due to conditions that may or may not be fulfilled

F2.1 - Under Investigation

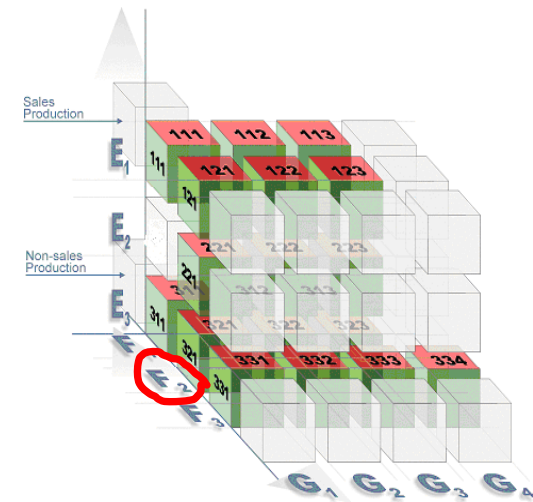
Activities are ongoing to justify development and production in the foreseeable future

F2.2 - Unclarified or On hold

Activities to justify development and production are unclarified or temporarily suspended

F2.3 - Not Viable

Investigations have indicated that development and production will not be technically justified



F3 – Project Undefined

Project evaluation is incomplete or lacks sufficient definition to establish feasibility. This includes projects aiming to identify the presence of petroleum accumulation(s) or projects to improve recovery.



G1 – Reasonably Assured Geological Conditions

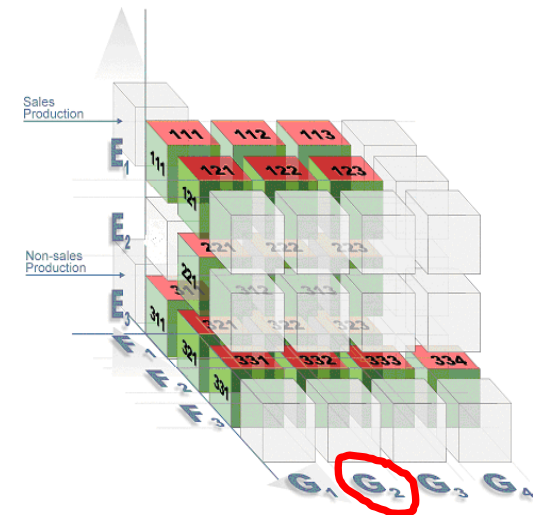
Quantities that are estimated to be recoverable from a known (drilled) accumulation, or part of a known accumulation, where sufficient technical data are available to establish the geological and reservoir production performance characteristics with

Quantities in this category that are associated with a development project (i.e. F1) may be subdivided to reflect their development and producing status.



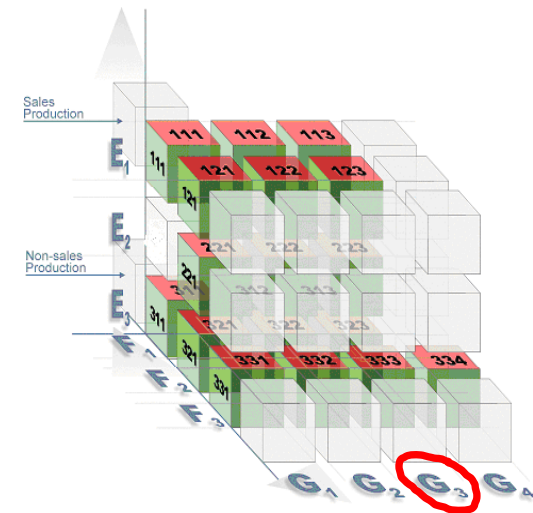
G2 – Estimated Geological Conditions

Quantities that are estimated to be recoverable from a known (drilled) accumulation, or part of a known accumulation, where sufficient technical data are available to establish the geological and reservoir production performance characteristics with



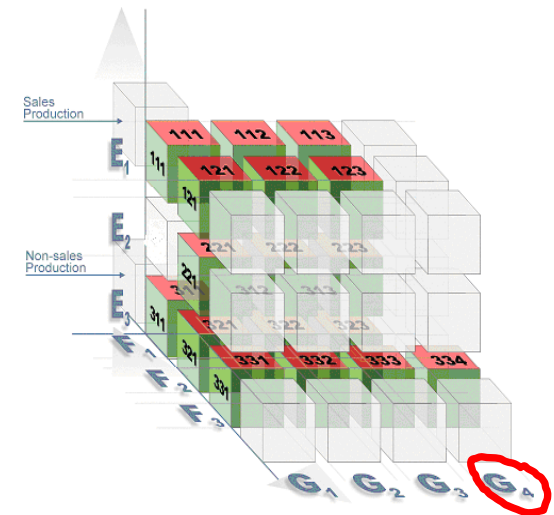
G3 – Inferred Geological Conditions

Quantities that are estimated to be recoverable from a known (drilled) accumulation, or part of a known accumulation, where sufficient technical data are available to establish the geological and reservoir production performance characteristics with **known reservoir**



G4 – Potential Geological Conditions

Quantities that are estimated to be recoverable from an accumulation, on the basis of inferred geological and reservoir production performance characteristics.



Quantification

Probability distribution

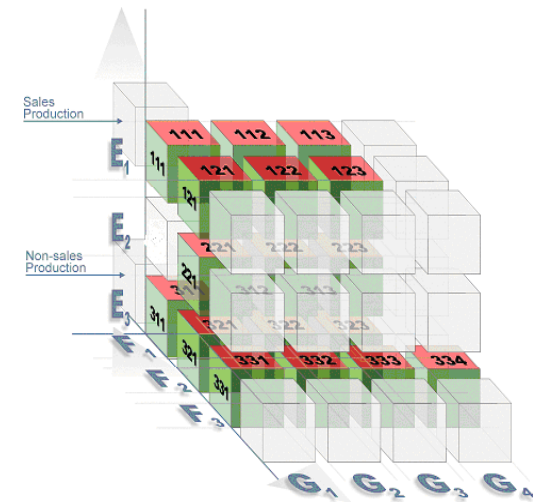
- Low (P90)
- Best (mean, most probable, or median (P50))
- High (P10)

Discrete estimates

- the low, best and high estimates shall reflect the same principles and approximately the same probabilities, as would be associated with estimates derived from a probability distribution

Proved, probable and possible petroleum reserves

- UNFC recommend to use **low**, **best** and **high** estimate instead of proved, probable and possible.
- Geological knowledge; category G1 equals proved, G2 probable and G3 possible reserves.
- **Committed reserves** are restricted to F1.1 and F1.2
- **Proved reserves** are subset of Committed Reserves.



Proved reserves

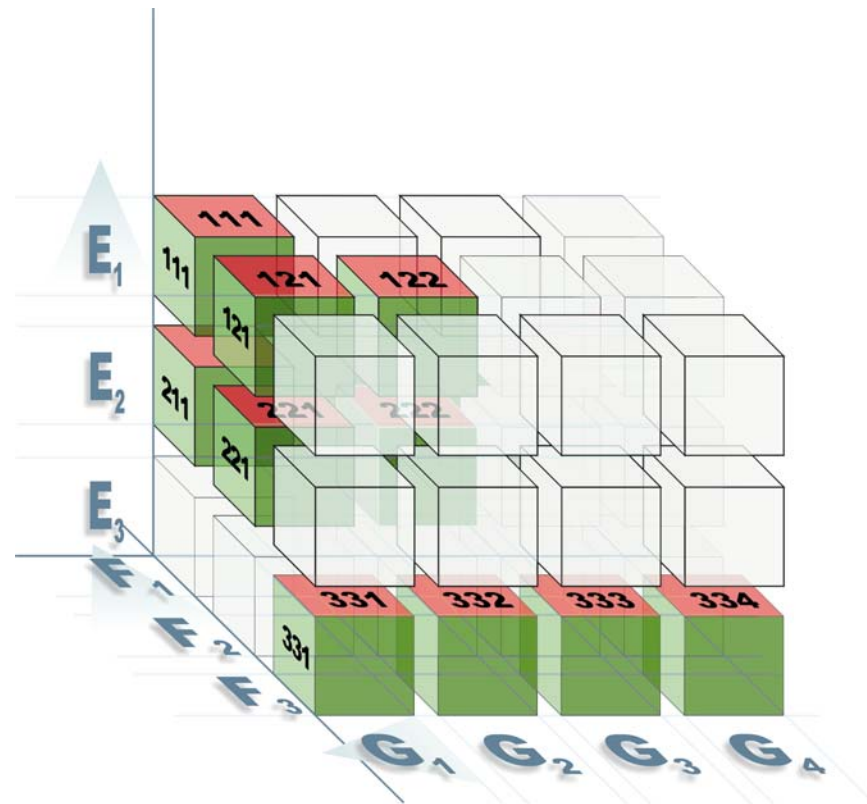
- Proved reserves are a specifically defined subset of Committed Reserves.
- Proved reserves are those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known accumulations and under current economic conditions, operating methods, and government regulations.
- Proved reserves can be categorized as developed or undeveloped.

UNFC for coal, uranium and other solid minerals

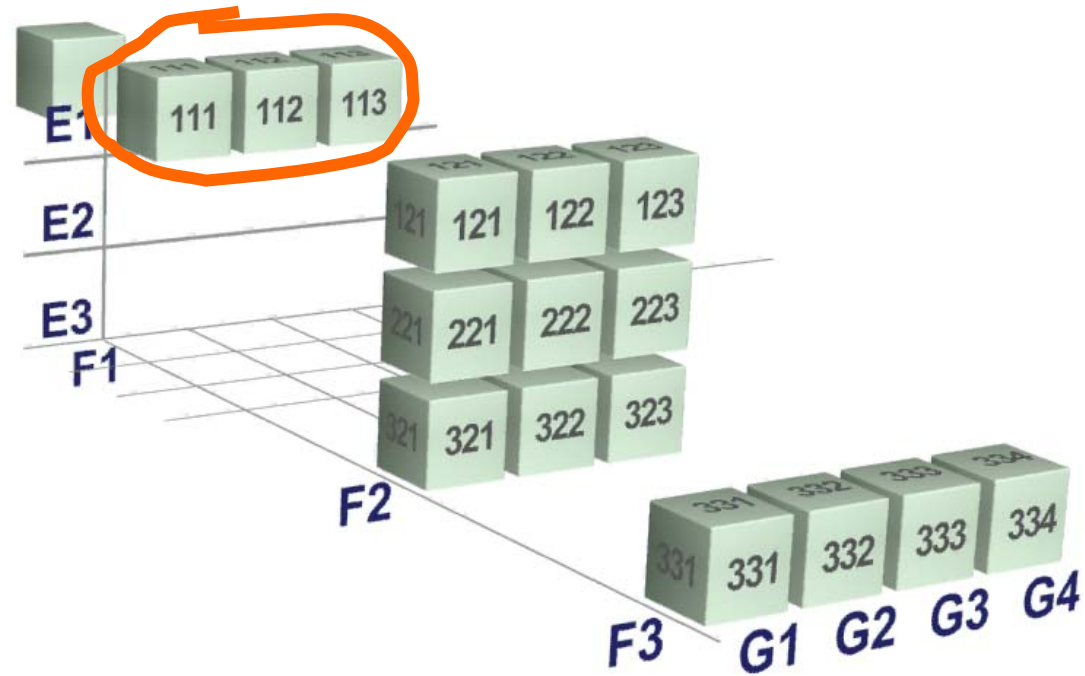
- **E₁ Economic**
- **E₂ Potentially economic**
- **E₃ Intrinsically economic**

- **F₁ Mining report/Feasibility**
- **F₂ Pre-feasibility**
- **F₃ Geological Study**

- **G₁ Detailed Exploration**
- **G₂ General Exploration**
- **G₃ Prospecting**
- **G₄ Reconnaissance**

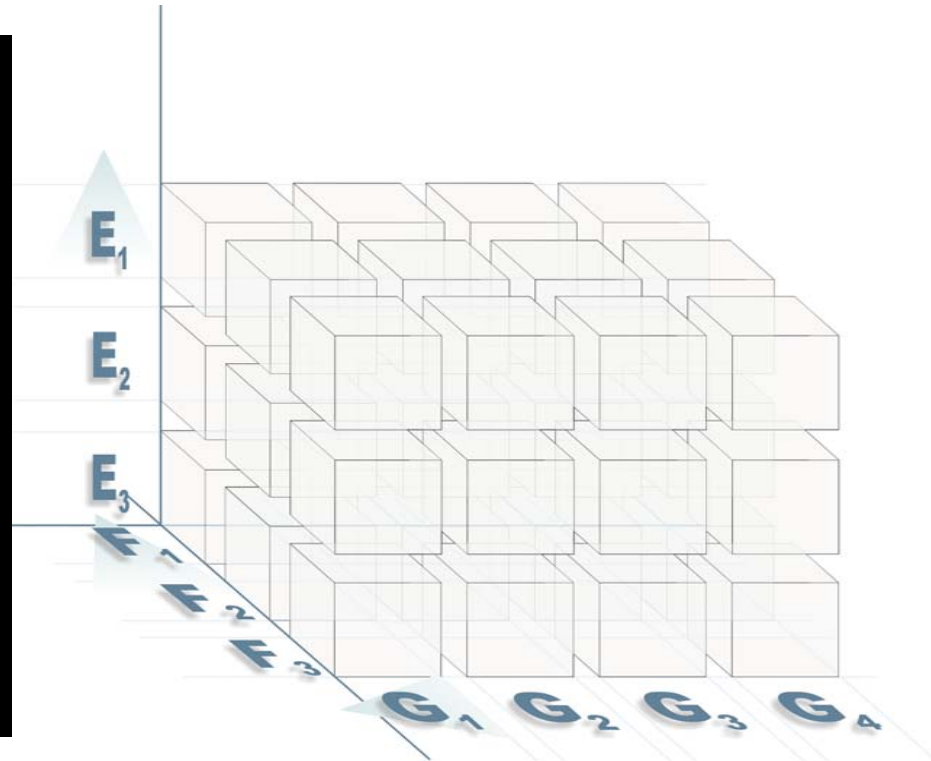
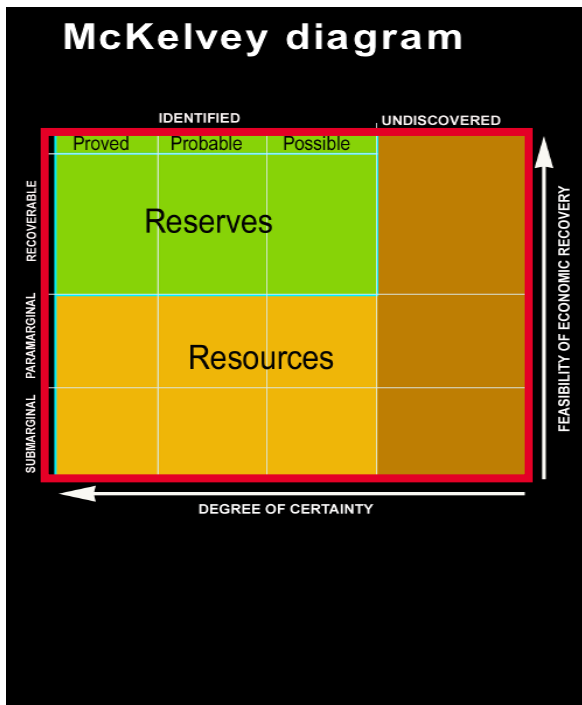


Proved, probable and possible reserves vs committed and uncommitted reserves



Comparison to other classifications

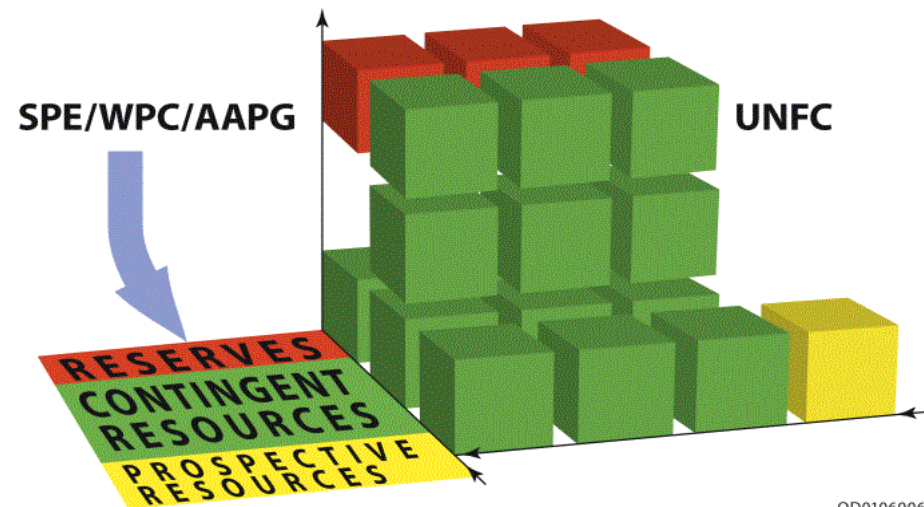
UNFC and the McKelvey diagram



UNFC and the SPE/WPC/AAPG

SPE/WPC/AAPG
Resource classification system
(showing possible Project Status Categories)

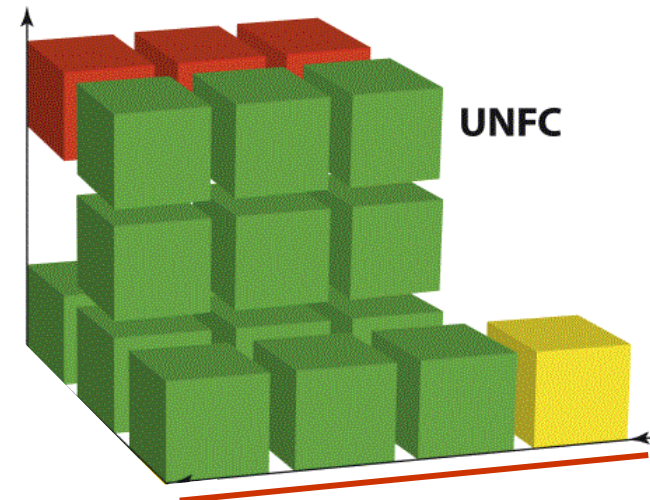
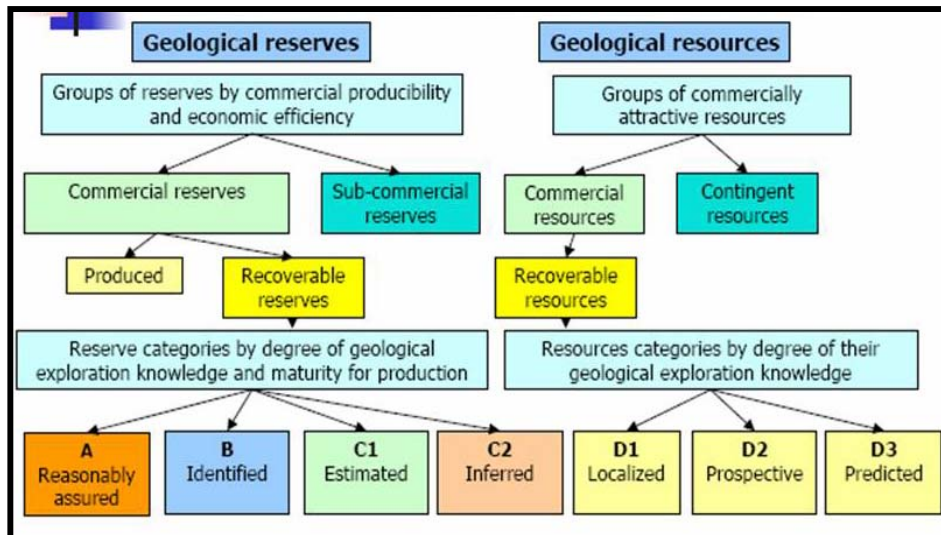
		Production			Project Status		
Total petroleum - Initially - In-place	Discovered petroleum - Initially - In-place Commercial	Reserves	Proved	Proved plus Probable	Proved plus Probable plus Possible	On production	Lower risk
			Proved plus Probable	Proved plus Probable plus Possible	Under development		
Planned for development							
Total petroleum - Initially - In-place	Discovered petroleum - Sub-commercial	Contingent resources	Low estimate	Best estimate	High estimate	Development pending	Project maturity ↑
			Development on hold				
			Development not viable				
		Unrecoverable					
Undiscovered petroleum - Initially - In-place	Initially - In-place	Prospective resources	Low estimate	Best estimate	High estimate	Prospect	Higher risk
			Lead				
			Play				
		Unrecoverable					
		← Range of uncertainty →					



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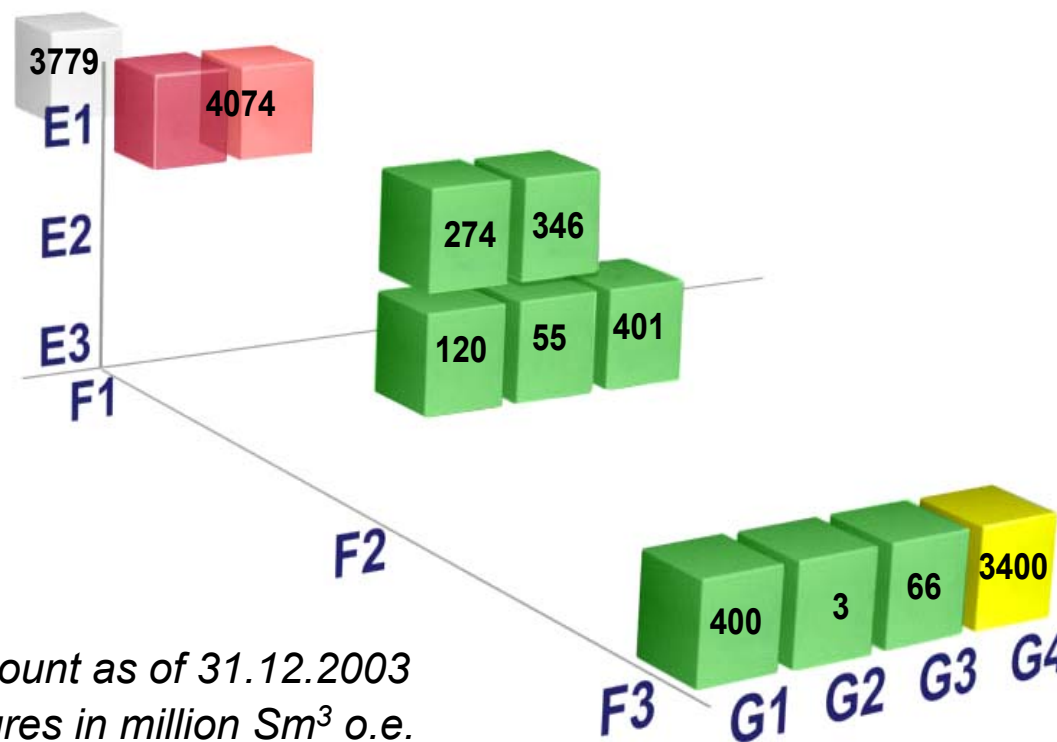
UNFC and the Russian Federation Classification Scheme

Russian Federation Classification Scheme



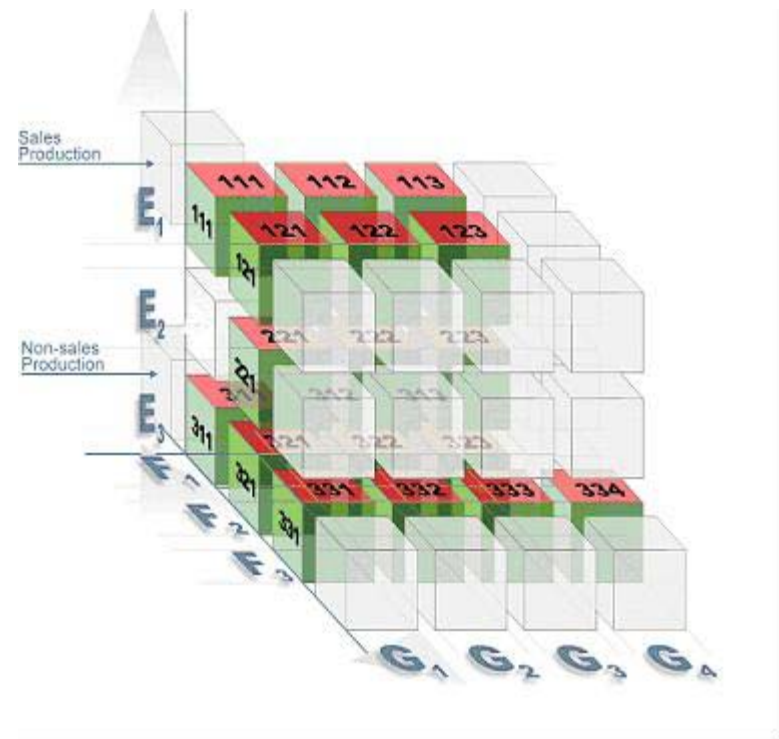
Norway's resource account presented in the UNFC classification

		NPD		UNFC
Class	Type	Category	Mill Sm ³ o.e.	
Reserves	Fields	0	3779	
		1	2837	
		2A	36	
		2F	387	
		3A	412	
		3F	402	
		Sum	4074	111-2
Contingent resources	Fields	4A	274	121
		4F	49	122
		5A	120	221
		5F	55	222
		7F	3	332
		7A	400	331
		Sum	1665	
	Discoveries	4F	297	122
		5F	401	223
		7F	66	333
Prospective resources	8 & 9		3400	334



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Conclusions

- The UNFC for Solid Fuels and Mineral Commodities is extended to include energy resources, making it a **UN Framework Classification for Fossil Energy and Mineral Resources**
- A strong code for improving the managing of extractive industries worldwide
- Continued work in the Ad Hoc group of Experts on harmonization with other systems, case studies, advise on application and cooperation with important stakeholders
- Development of specifications and guidelines for the UNFC for Petroleum in close cooperation with SPE OGRC

<http://www.unece.org/ie/se/reserves.html>

 **UNECE** United Nations Economic Commission for Europe

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Industrial Restructuring, Energy and Enterprise Development Division

Energy Reserves and Resources

including

- (i) United Nations Framework Classification for Reserves/Resources (UNFC); and
- (ii) Ad Hoc Group of Experts on the Supply of Fossil Fuels



United Nations Framework Classification for Energy and Mineral Resources
The United Nations Framework Classification (UNFC) for Energy and Mineral Resources is a universally applicable scheme for classifying/evaluating energy and mineral reserves resources. [▶ \[Download Final Version\]](#)



Activities & Information

- ▶ [Ad Hoc Group of Experts on Classification of Energy Reserves and Resources](#) (formerly Ad Hoc Group of Experts on the Harmonization of Energy Reserves/Resources Terminology)
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Thank you for your attention

Proved reserves

