

Application of UNFC to Minerals

Mücella ERSOY, Turkish Coal Enterprises
EXPERT GROUP ON RESOURCE CLASSIFICATION

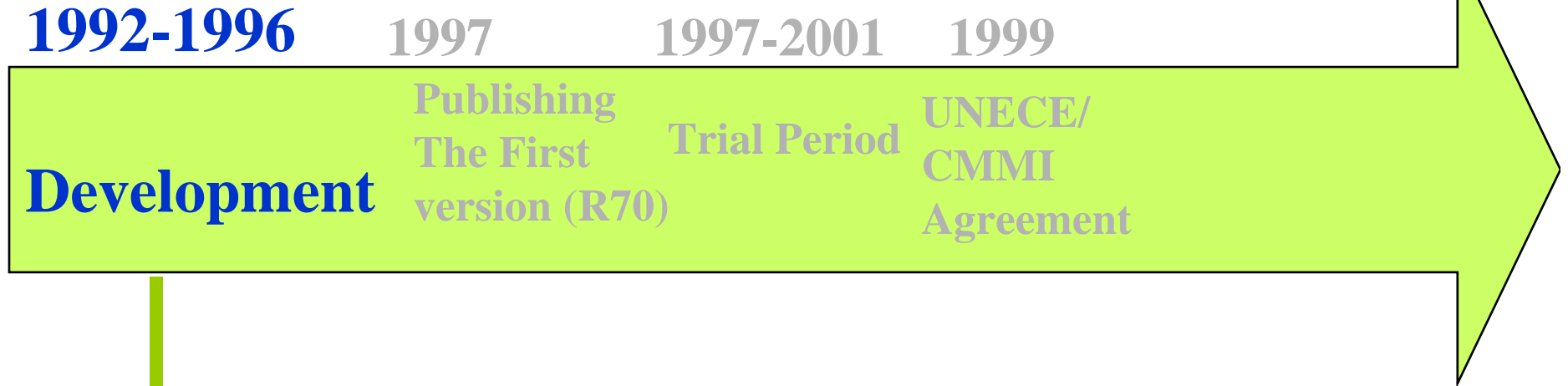
International Workshop on UNFC(2009)- Theory and Practice

21-22 June 2010, Warsaw, Poland

CONTENT

- Development and Application of First Version UNFC(1997) –Solid Fuels and Mineral Commodities
- Development and Application of UNFC(2004)- Coal, Uranium and Other Minerals
- Mapping of UNFC to other Systems for Minerals - CRIRSCO Template
- UNFC(2009) for Fossil Energy and Mineral Reserves and Resources

UNFC(1992-1997)- First Version (R70) (Solid Fuels and Mineral Commodities)



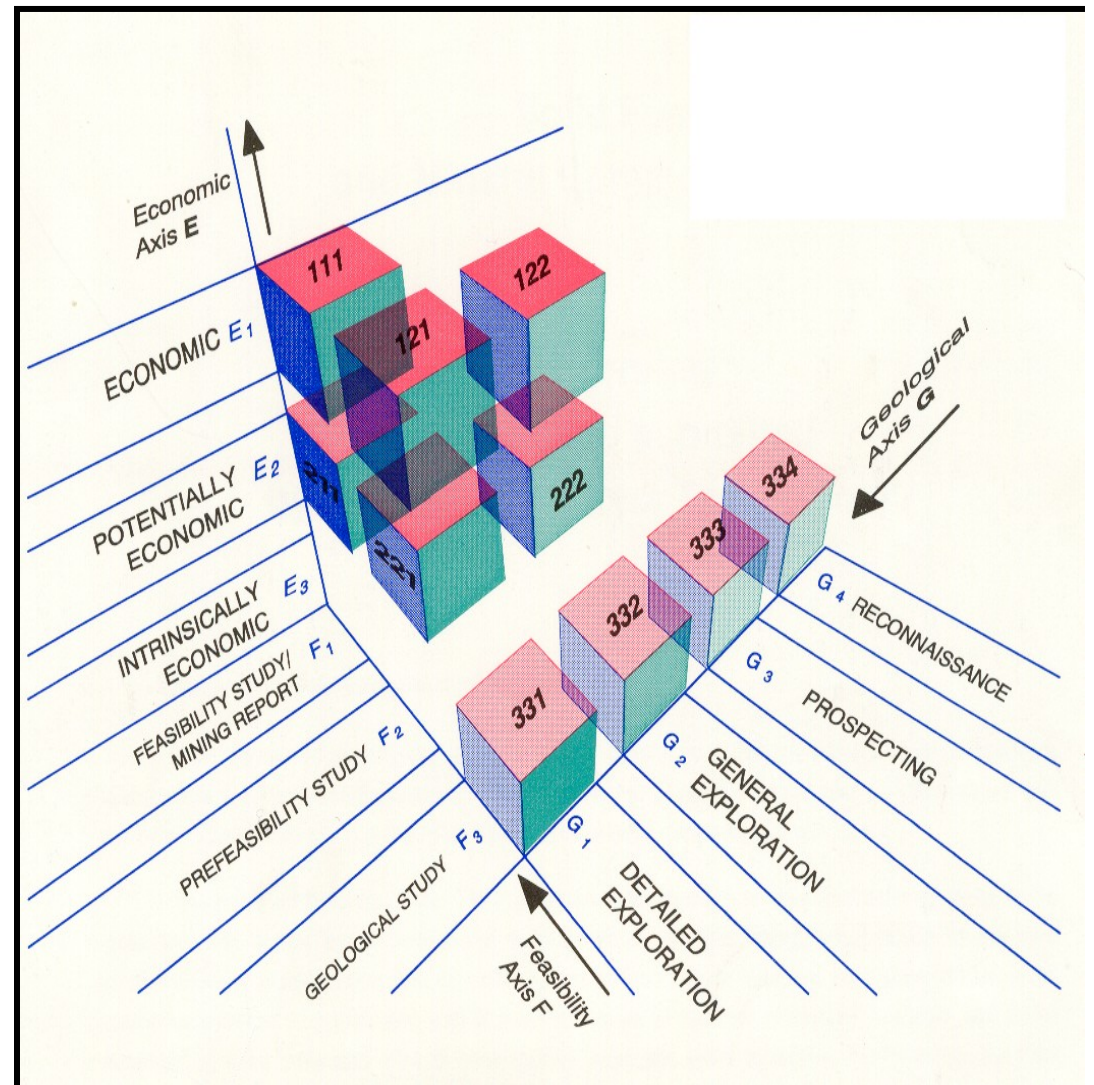
- UNECE Working Party on Coal initiated the first version in 1992
- Consultations were held with >50 countries & organisations

UNFC(1992-1996)- First Version (R70) (Solid Fuels and Mineral Commodities)

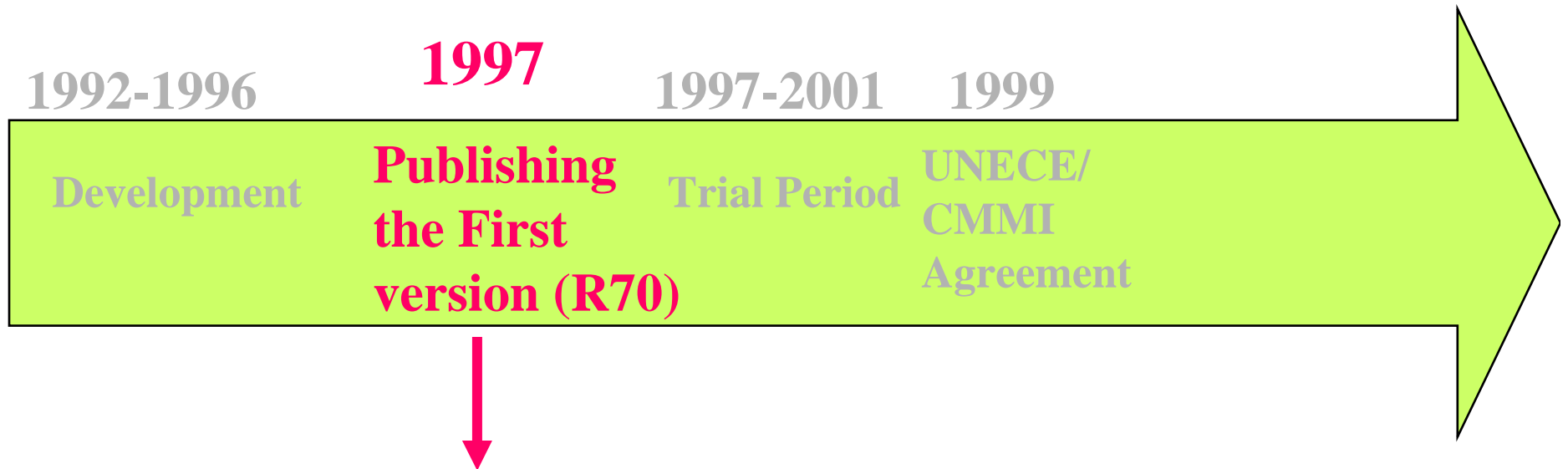
Classification Criteria

- **E**: Economic Viability
- **F**: Feasibility Assessment
- **G**: Geological Assessment

36 possible classes were available in total
- 8 of them were used often

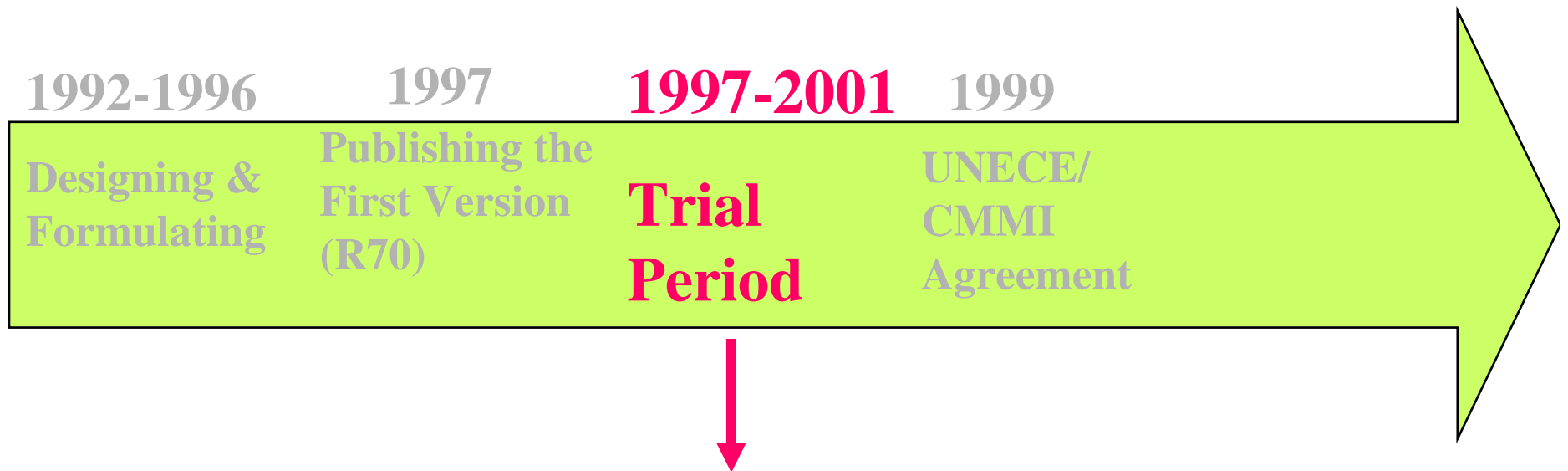


UNFC(1997)- First Version (R70) (Solid Fuels and Mineral Commodities)



- UN International Framework Classification for Reserves/Resources- Solid Fuels and Mineral Commodities was adopted by UN ECOSOC in 1997 and recommended for worldwide application (ECOSOC Decision 226/1997).

TRIAL PERIOD: Application of UNFC (1997)



- applied in >50 countries worldwide, a number of them introduced the UNFC for Solid Fuels and Mineral Commodities as a national system, & others adapted their national systems to the UNFC principles

TRIAL PERIOD: Application of UNFC (1997) for coal deposits

Europe

Austria, Bulgaria, Estonia, Germany, Greece, Hungary, Lithuania, Poland, Romania, Russia, Slovenia, Slovakia, Spain, Turkey, Ukraine

Asia-Pacific

Armenia, China, Cambodia, India, Iran, Indonesia, Kazakhstan, Malaysia, Philippines, Thailand

America

Brazil, USA

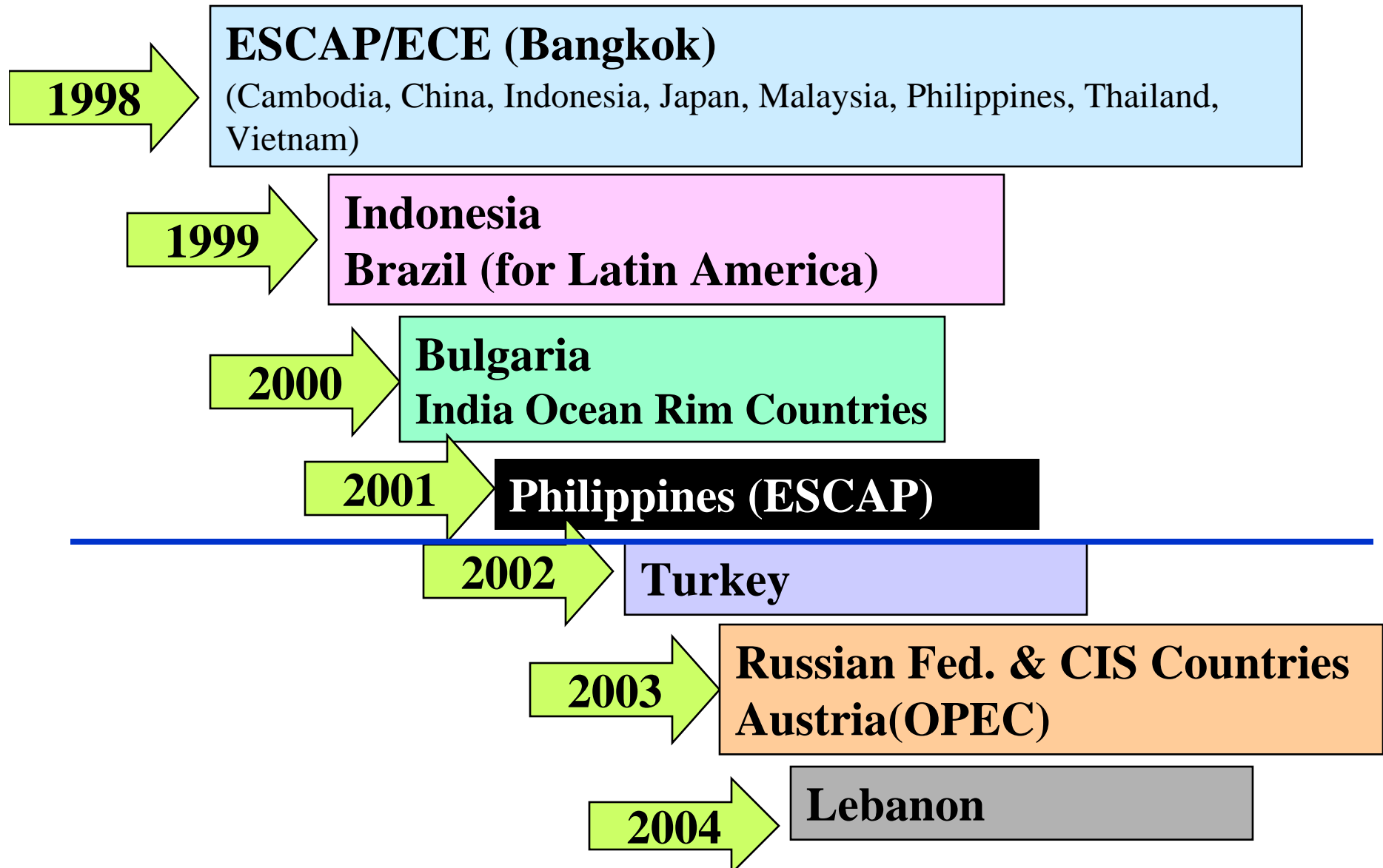
Africa

Zimbabwe



■ tested & applied in >50 countries worldwide, a number of them introduced the UNFC for Solid Fuels and Mineral commodities as a national system, & others adapted their national systems to the UNFC principles

The UNFC(1997) for Solid Fuels and Mineral Commodities- **TRIAL PERIOD- Organized Seminars**

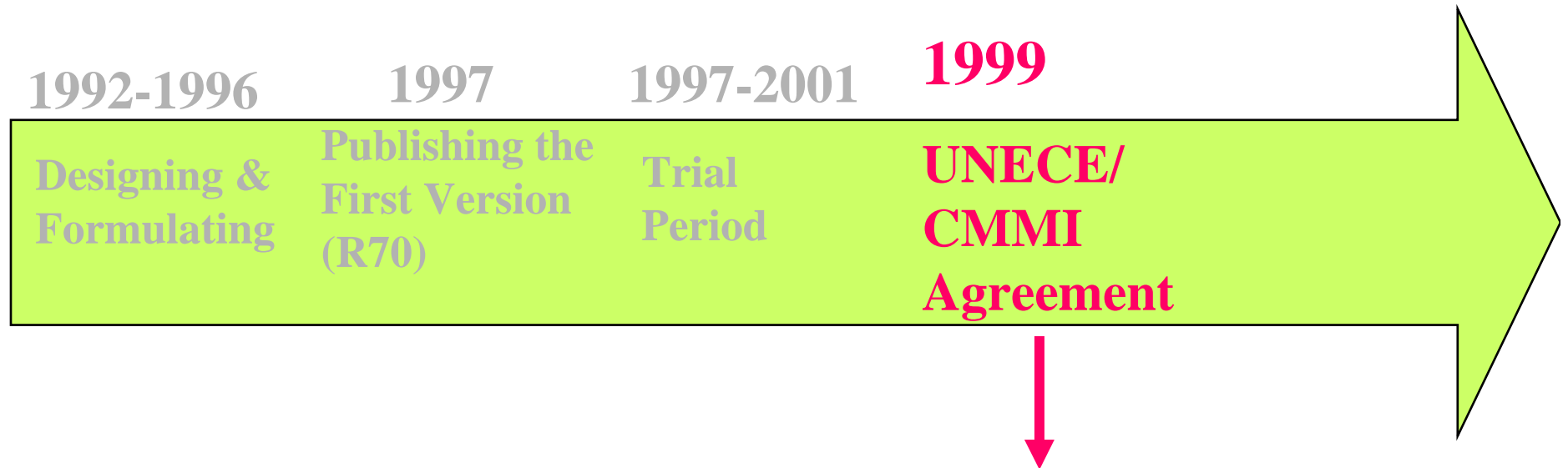


UNFC(1997) for Solid Fuels and Mineral Commodities

TRIAL PERIOD- Case Studies

- **Brazil**
- **Bulgaria**
- **Canada**
- **China**
- **Finland**
- **Germany**
- **Greece**
- **Hungary**
- **India**
- **Indonesia**
- **Malaysia**
- **Poland**
- **Portugal**
- **Romania**
- **Russia**
- **Slovakia**
- **Slovenia**
- **Turkey**
- **Ukraine**
- **USA**
- **Yugoslavia (Former)**

UNFC for Solid Fuels and Mineral Commodities Joint UN/CMMI Definitions



- In 1998, the UNECE Task Force and CMMI Expert Group reached an agreement to integrate their respective definitions into a single, universally applicable set of definitions. The joint UN CMMI definitions for reserves/resources were completed in November 1999 (Document ENERGY/2000/11)

The UNFC for Solid Fuels and Mineral Commodities Joint UN/CMMI Definitions (Geneva Accord, 1999)

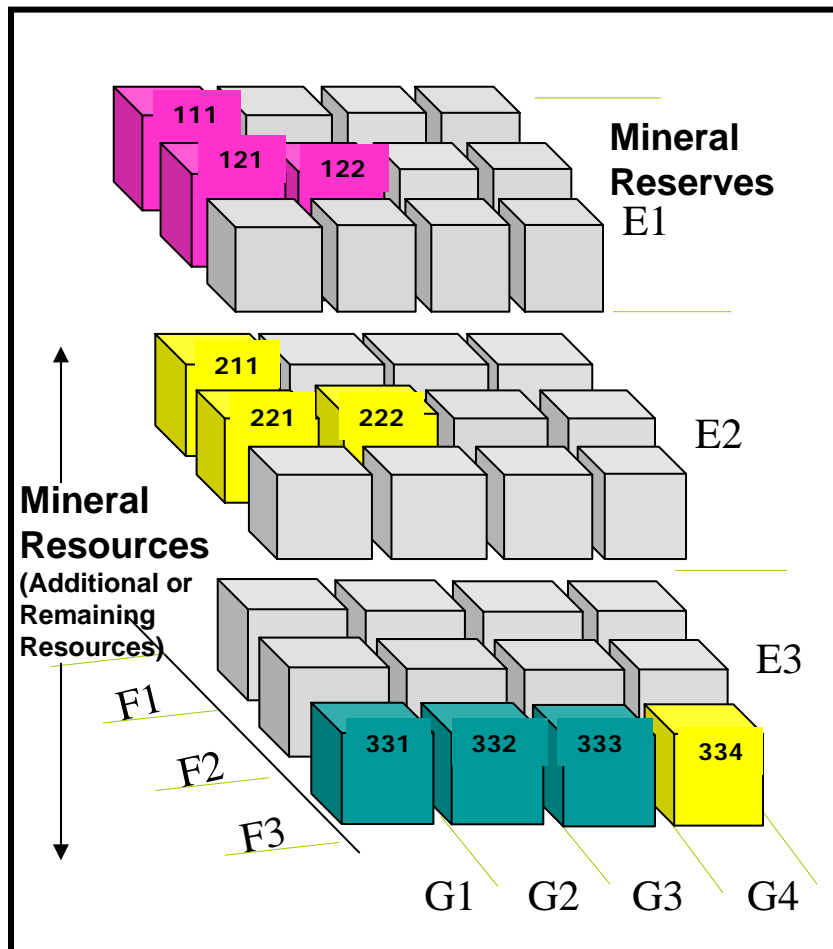
CODE	CMMI CATEGORY	UN CATEGORY
111	Proved Mineral Reserve	Proved Mineral Reserve
121 and 122	Probable Mineral Reserve	Probable Mineral Reserve
211	Measured Mineral Resource	Feasibility Mineral Resource
211 and 222	Indicated Mineral Resource	Prefeasibility Mineral Resource
331	Measured Mineral Resource	Measured Mineral Resource
332	Indicated Mineral Resource	Indicated Mineral Resource
333	Inferred Mineral Resource	Inferred Mineral Resource
334	Not Available	Reconnaissance Mineral Resource

Source: ENERGY/2000/11

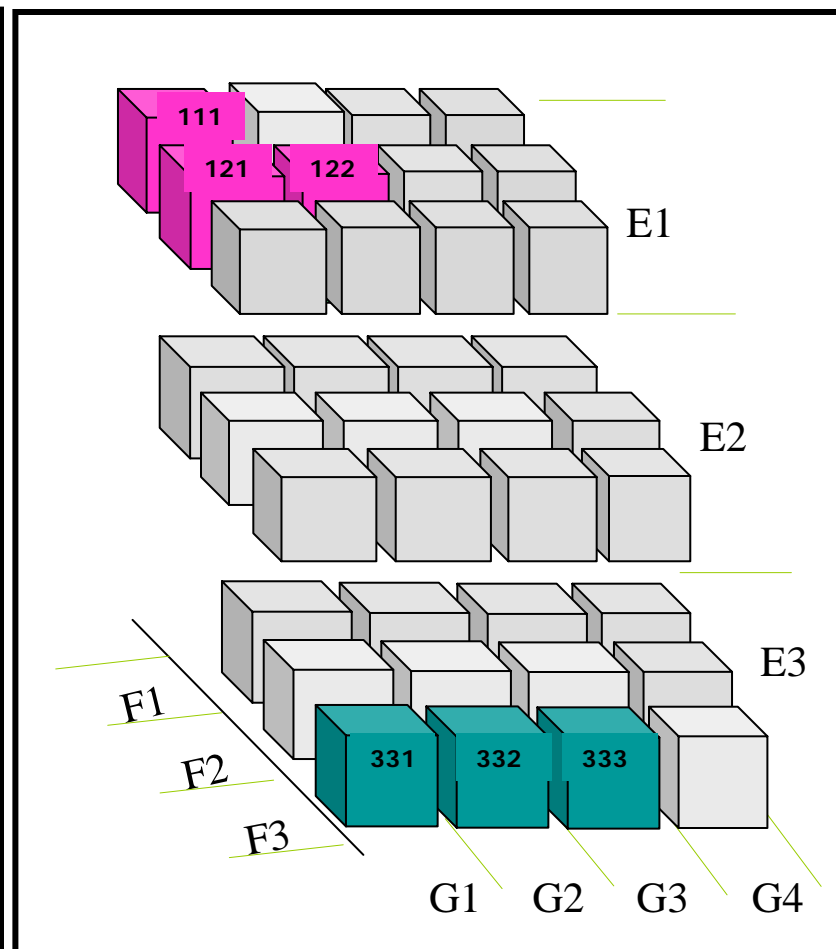
The UNFC for Solid Fuels and Mineral Commodities

Joint UN/CMMI Definitions (Geneva Accord)

UNFC (1997) for Solid Minerals



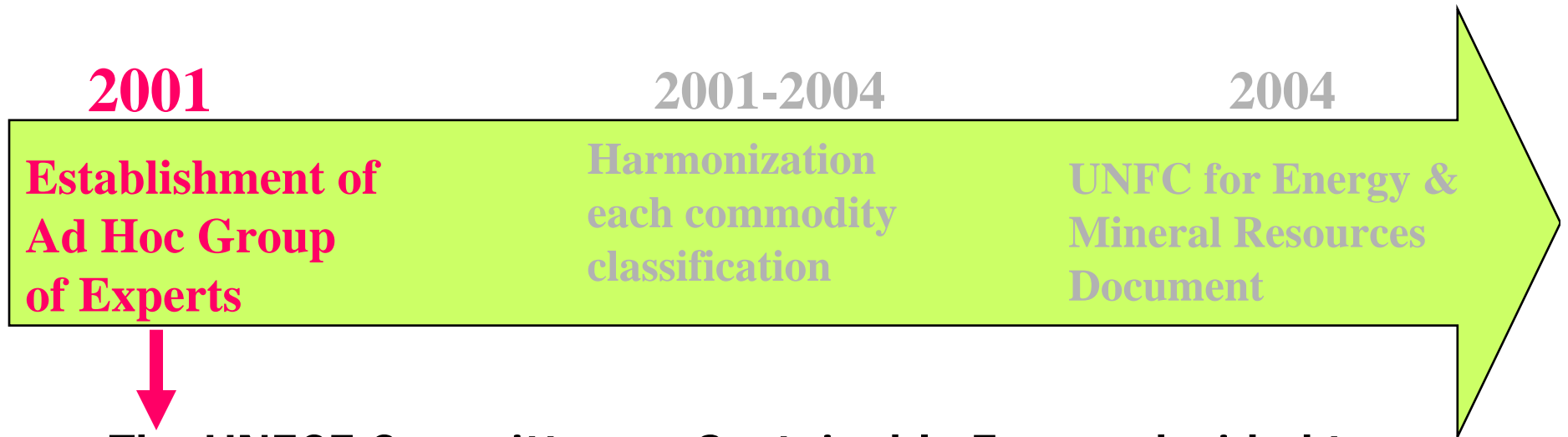
CMMI



 additional classes in UNFC (1997)

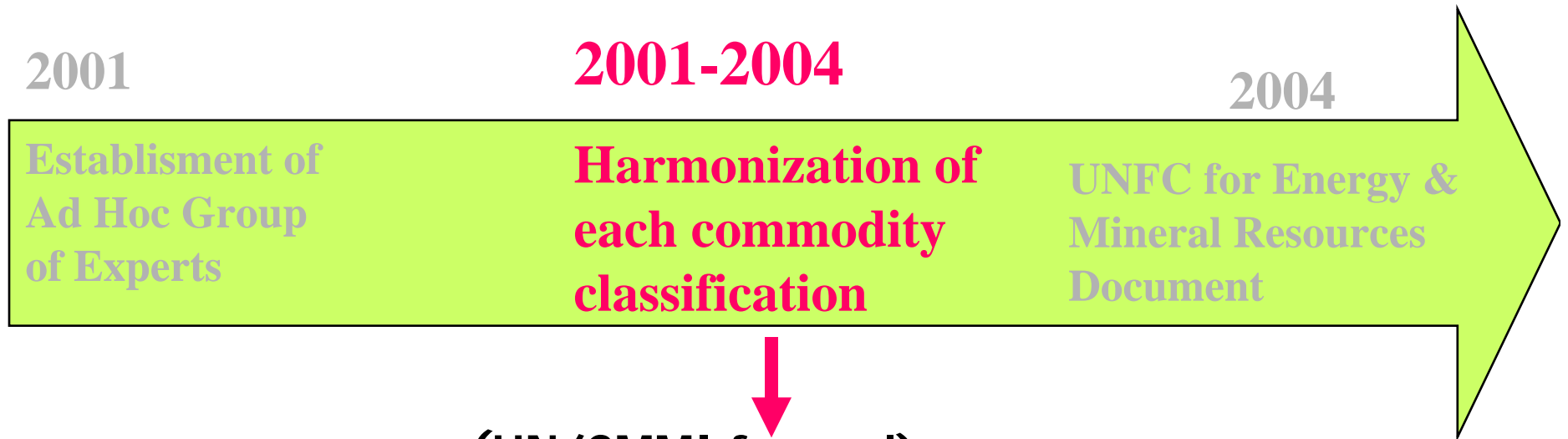
Extension of the System:

UNFC for Energy & Mineral Resources



- The UNECE Committee on Sustainable Energy decided to create an Intergovernmental Ad Hoc Group of Experts on the Harmonization of Energy Reserves/Resources Terminology (ECE/ENERGY/47,para.13) to extend the principles of UNFC for Solid Fuels and Mineral Commodities to other energy resources(oil, natural gas and uranium)
- The Ad Hoc Group of Experts was split into three groups: coal and minerals, petroleum and uranium.

Extension of the System: ***UNFC for Energy & Mineral Resources***

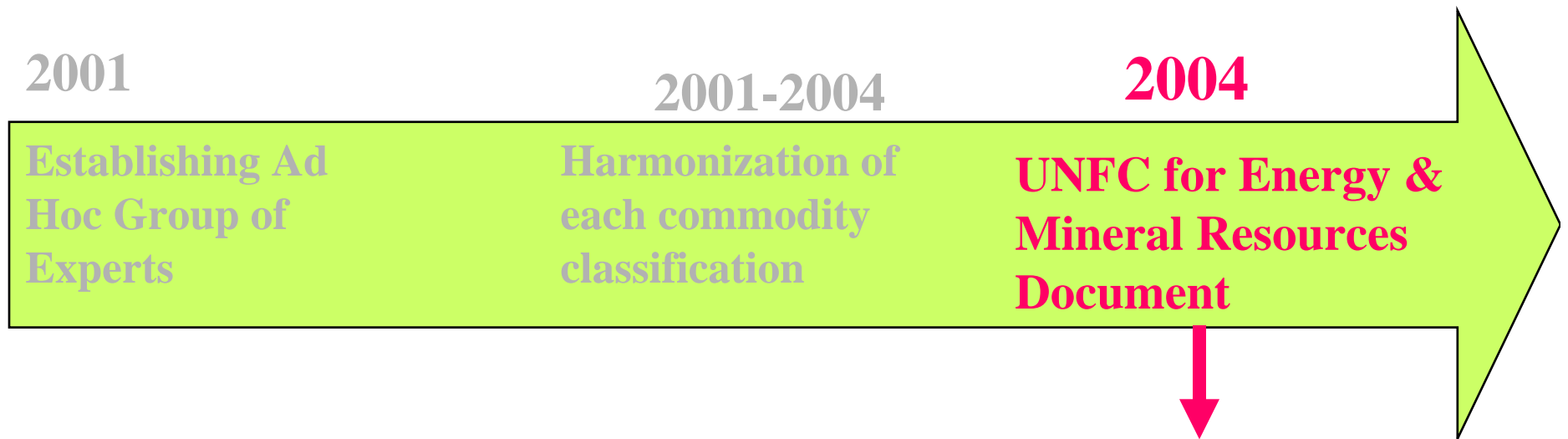


- (UN/CMMI for coal)
- SPE/WPC/AAPG for petroleum
- IAEA/NEA for uranium

In addition to the above organizations several national classification systems played an important role in the harmonization process, including revised national classification system of Russian Fed., including also that of the Australian Joint Ore Reserves Committee (the JORC Code).

Extension of the System:

UNFC for Energy & Mineral Resources



- UN ECOSOC recommended an amendment to the 1997 UNFC incorporating petroleum (oil and gas) and uranium resources. This extended its application fully to fossil energy and mineral resources (UN ECOSOC Resolution 233/2004)

UNFC(2004) Applied to Coal, Uranium & Other Minerals

- *a comparison with the UNFC 1997(R70)*



- **(NO BIG CHANGES HAVE BEEN MADE for SOLID MINERALS** in the Second Version UNFC (2004). All category & axes names, figures kept same as the UNFC (1997) version. Because:
 - After UN/CMMI agreement(1999), joint definitions for mineral reserve and resource classes were frozen. (**Joint UN/CMMI definitions for mineral reserve and resource classes (agreed upon in 1999) were replaced with the definitions in the R.70 Document-1997**)
 - UNFC(1997) for solid fuels and minerals was in application worldwide in some 50 countries since 1997

UNFC (2004) Applied to Coal, Uranium & Other Minerals

- *A Comparison with the UNFC Applied to Petroleum*

	2004 Coal, Uranium & Other Solid Minerals	2004 Petroleum
Categories and Sub-Categories	Label	Label
E1	Economic	Economic
E1.1	Normal Economic	Normal Economic
E1.2	Exceptional Economic	Exceptional Economic
E2	Potentially Economic	Potentially Economic
E2.1	Marginal Economic	Marginal Economic
E2.2	Sub-marginal Economic	Sub-marginal Economic
E3	Intrinsically Economic	Intrinsically Economic
E3.1	Not used	Non-sales
E3.2	Not used	Undetermined
E3.3	Not used	Unrecoverable
F1	Mining Report &/or Feasibility Study	Justified Development &/or Production Project
F1.1	Mining Report	Project in Production
F1.2	Not used	Committed Development Project
F1.3	Feasibility Study	Uncommitted Development Project
F2	Pre-feasibility Study	Contingent Development Project
F2.1	Not used	Under Investigation
F2.2	Not used	Unclear or On Hold
F2.3	Not used	Not Viable
F3	Geological Study	Project Undefined
G1	Detailed Exploration	Reasonably Assured Geological Conditions
G2	General Exploration	Estimated Geological Conditions
G3	Prospecting	Inferred Geological Conditions
G4	Reconnaissance Study	Potential Geological Conditions

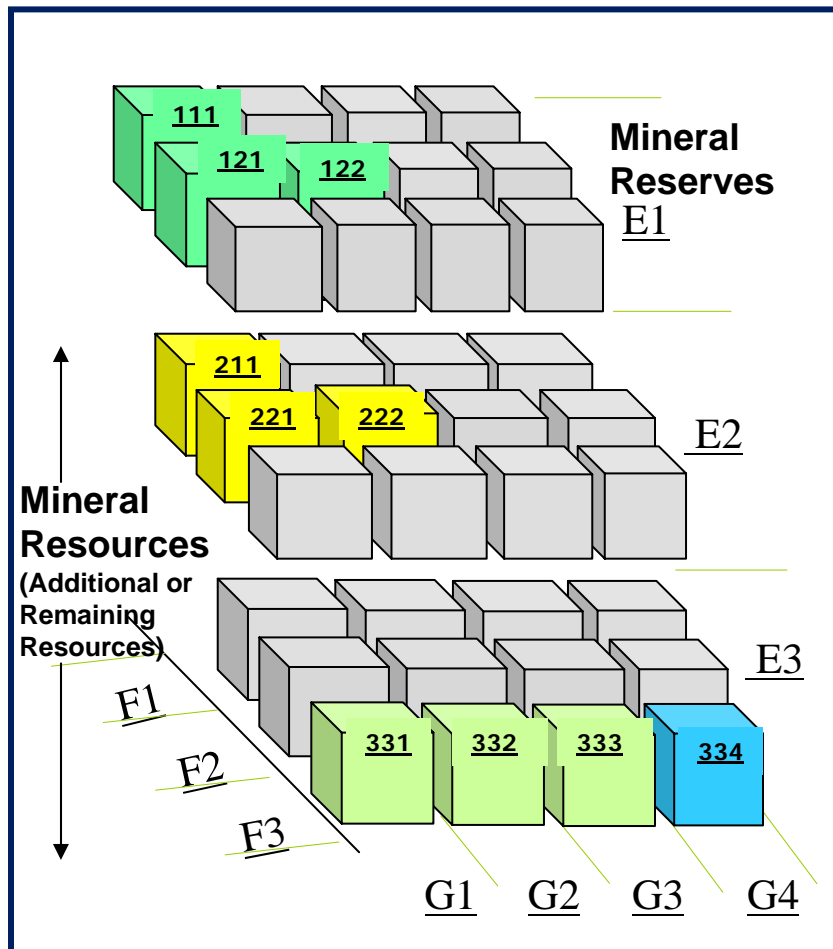
Mapping Task Force



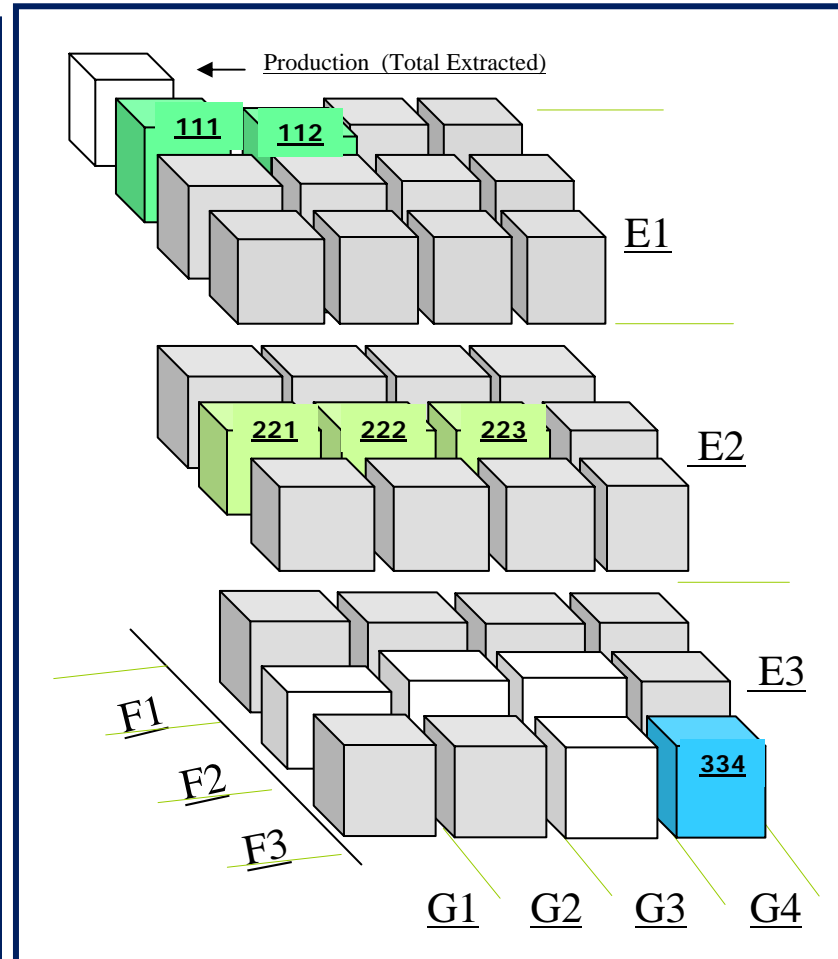
- invited to consider the changes to the UNFC for (solid) minerals and for petroleum to align these on a project status based framework.
- To include recommended changes to the three underlying classifications for further consideration
- to exploit flexibility inherent in the current systems in the form of specifications and guidelines that may affect practice within the current systems.

UNFC(2004) for Solid Minerals- CRIRSCO Template (before Mapping)

UNFC (2004) for Solid Minerals



CRIRSCO Template



High Level Mapping of UNFC to CRIRSCO Template

Fundamental Characterization	Solid Mineral Classes	UNFC E axis	UNFC F axis	UNFC G axis		
				Proved	Probable	NA
DISCOVERED AND MINEABLE	MINERAL RESERVES	1	1	1	2	
				Measured	Indicated	Inferred
DISCOVERED AND NOT COMMERCIALY RECOVERABLE	MINERAL RESOURCES	2.1	2	1	2	3
	Discovered Not Economic	2.2	2	1	2	3
	Unrecoverable	3	4	1	2	3
				Zone of Mineralization		
UNDISCOVERED	Exploration Results	3	3	4		
	Unrecoverable	3	4			

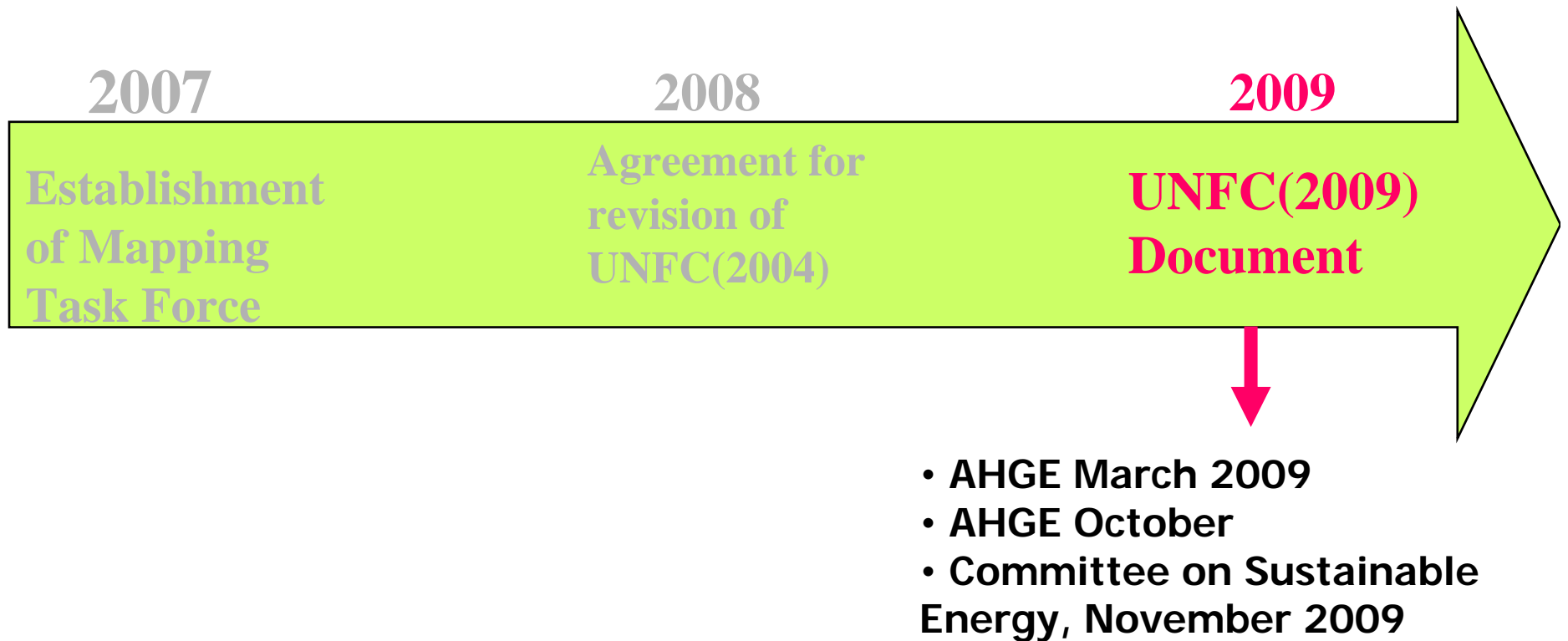
*Not part of the Template but may be used for internal project management

Source: MTF Report

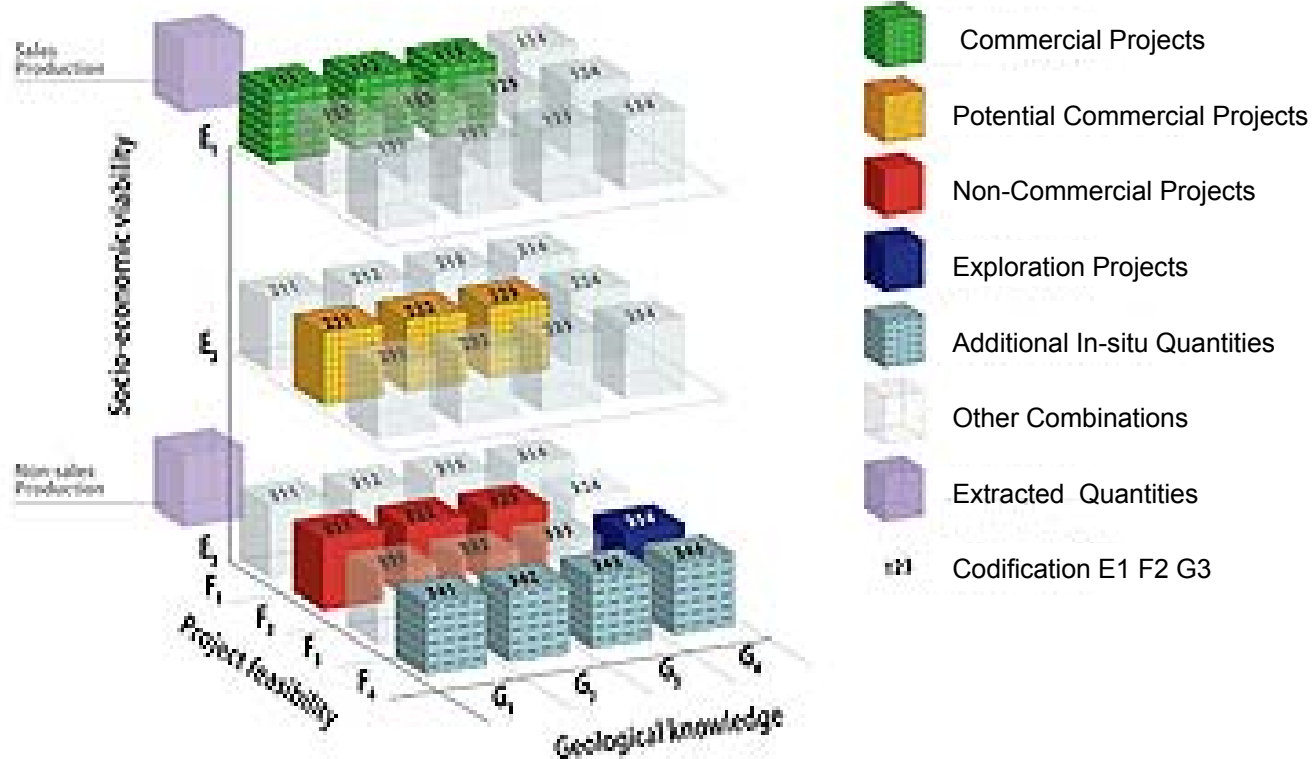
Mapping Task Force Recommendations

- Remove category and sub-category labels, and agree on one harmonized (generic) set definitions of categories and sub-categories
- Recommendation that the UNFC document is revised and simplified to reflect proposed changes and mapping modules

UNFC(2009) Document



UNFC- 2009- 3 Dimensional



Economic & Commercial Viability

E1: Confirmed to be economic
 E2: Expected to become economic
 E3: Not expected to become economic

Field Project Status & Feasibility

F1: Feasibility confirmed
 F2: Feasibility under evaluation
 F3: Feasibility not known
 F4: No project identified

Geological Knowledge

G1: High confidence
 G2: Moderate confidence
 G3: Low confidence
 G4: Potential accumulation

UNFC- 2009- Alignment with CRIRSCO

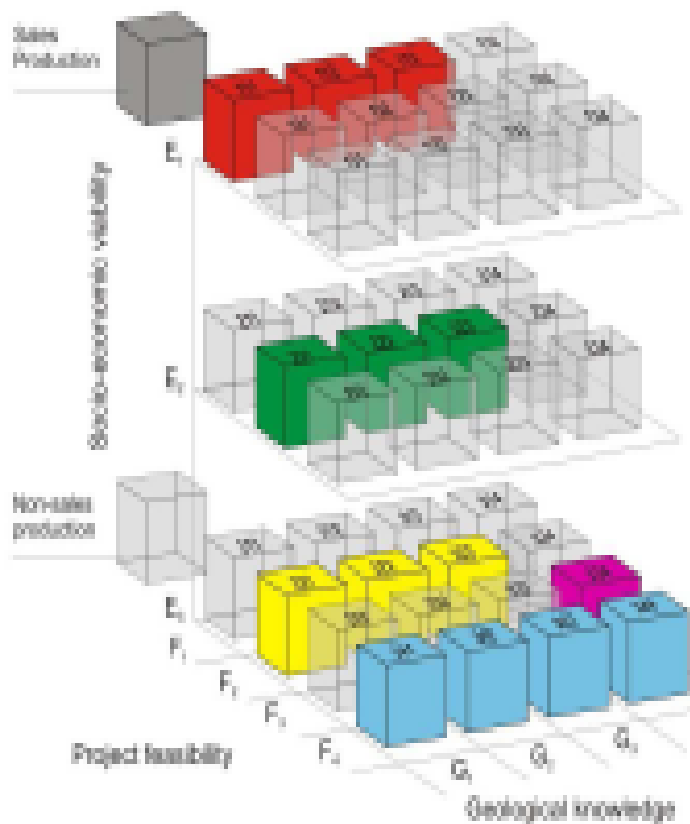
UNFC- 2009- 2 Dimensional

	Extracted	Sales Production				CRIRSCO Template				
		Non-Sales Production								
	Class	Categories			MINERAL RESERVES					
		E	F	G					Proved (111)	Probable (112)
Total commodity initially in place	Future recovery by commercial development projects or mining operations	Commercial Projects	1	1	1,2,3	MINERAL RESOURCES				
	Potential future recovery by contingent development projects or mining operations	Potential Commercial Projects	2	2	1,2,3	Measured (221)	Indicated (222)	Inferred (223)		
		Non-Commercial Projects	3	2	1,2,3					
	Additional quantities in place associated with known deposits		3	4	1,2,3					
	Potential future recovery by successful exploration activities	Exploration Projects	3	3	4	Exploration Project (334)				
	Additional quantities in place associated with known deposits		3	4	4					

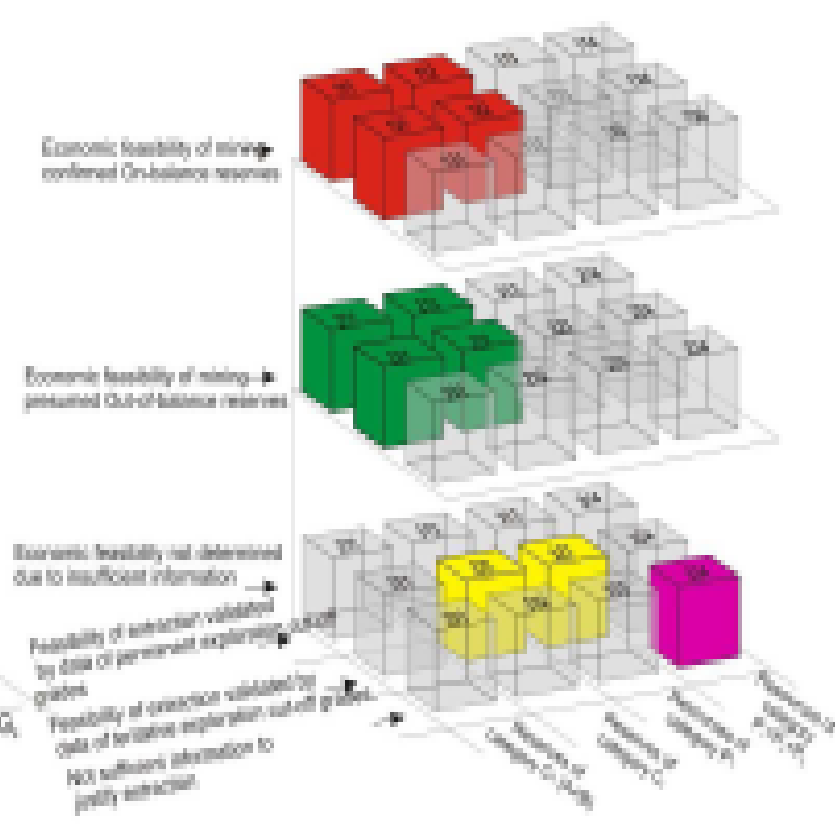
Source: Ferdi Camisani, 2009

UNFC- 2009- Alignment with Russian Classification

UNFC-2009 categories and examples of classes



Scheme of integrating Russian mineral reserves/resources into UNFC-2009 classification system



Source: Yuri Podturkin, GKZ
EGRCMeeting, 29 April 2010

Alignment with Other Systems

- Alignment with other systems is underway

THANK YOU

Expert Group on
Resource Classification