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Generic specifications for the United Nations Framework

Classification for Fossil Energy and Mineral Reserves and Resources 2009

Draft Bridging Document for “Classification for Resources/Reserves of Solid Fuels and Mineral Commodities” (GB/T 17766-1999) and “United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009”

DRAFT FOR DISCUSSION

I. Foreword

1. This bridging document for “Classification for Resources/Reserves of Solid Fuels and Mineral Commodities” (GB/T 17766-1999) (hereinafter referred to as “CCMR-1999”) and “United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009” (hereinafter referred to as “UNFC-2009”) details the correspondence between CCMR-1999 and UNFC-2009.
2. CCMR-1999 is independent of UNFC-2009. This bridging document does not affect the independent application of CCMR-1999.
3. The application of CCMR-1999 does not affect any component of UNFC-2009

II. Overview of CCMR-1999

4. CCMR-1999 is a national standard promulgated in 1999, and applies to the preparation, design, deployment, reserves (resources) calculation and report writing for each stage of Exploration and development of Solid Fuels and Mineral Commodities. It is not only applicable to the evaluation of Solid Fuels and Mineral Commodities/Reserves, registration, statistics, scheduling, planning, formulation of policies on Solid Fuels and Mineral Commodities, and the development of mineral exploration codes, rules and guides, but can also be serve as the basis for evaluation and calculation of mineral Resources/Reserves for the purpose of mineral rights transfers and financing for mineral exploration and development.
5. CCMR-1999 divides mineral resources into two classes: Identified Mineral Resources and Undiscovered Resources. Identified Mineral Resources are further divided into three sub-classes: Sources, Basic Reserves and Reserves. It details the mineral resources via a three-dimensional numerical coding scheme in which quantities are classified based on the three fundamental criteria: Degree of Economic Viability (E), stage of Feasibility Assessment (F)

and Degrees of Geological Assurance (G). Combinations of these criteria form a three-dimensional system. Figure 1 shows the entire classification and codification of CCMR-1999.

Figure 1
Classification of CCMR-1999

Degrees of Geological Assurance Classification Category Degrees of Economic Viability	Identified Mineral Resources			Undiscovered Mineral Resources
	Measured	Indicated	Inferred	Pre-Prospected
Economic	Proved Reserves (111)			
	Basic Reserves (111b)			
	Probable Reserves (121)	Probable Reserves (122)		
	Basic Reserves (121b)	Basic Reserves (122b)		
Marginal Economic	Basic Reserves (2M11)			
	Basic Reserves (2M21)			
Sub-Marginal Economic	Resources (2S11)			
	Resources (2S21)			
Intrinsic Economic	Resources (331)	Resources (332)	Resources (333)	Resources (334)?

Notes: Codes used in Table (111 – 334)
 The 1st digit refers to economic viability: 1=Economic; 2M=Marginal Economic; 2S=Sub-Marginal Economic; 3=Intrinsic Economic; ?=Economic-Interest Undefined.
 The 2nd digit refers to stage of Feasibility Assessment: 1=Feasibility Study; 2=Pre-Feasibility Study; 3=Scoping Study.
 The 3rd digit refers to Degrees of Geological Assurance: 1=Measured; 2=Indicated; 3=Inferred; 4=Pre-Prospected. b= Reserves without deducting any design or mining losses.

III. Overview of UNFC-2009

6. UNFC-2009 was developed by experts organized by the United Nations Economic Commission for Europe (UNECE) and was published with the approval of the UNECE. UNFC-2009 applies to international energy and mineral research, government resource management as well as the industrial process planning and efficient capital allocation of enterprises.

7. UNFC-2009 is a generic principle-based system in which quantities are classified based on the three fundamental criteria: economic and social viability (E), field project status and feasibility (F), and geological knowledge (G), using a three-dimensional numerical independent coding scheme. Combinations of these criteria form a three-dimensional system. Each criterion (axis) is divided into various categories. For instance, the F axis is divided into three categories: F1, F2 and F3, and each category is further divided into a few sub-categories

(for example, F1 is further divided into F1.1, F1.2 and F1.3). The specific classification is shown in Figure 2.

Figure 2

UNFC-2009 Classes and Sub-classes defined by Sub-categories

UNFC Classes defined by Categories and Sub-categories							
Total commodity initially in place	Extracted	Sales Production					
		Non-sales Production					
	Class	Sub-class	Categories				
			E	F	G		
Known Deposit		On Production	1	1.1	1,2,3		
		Approved for Development	1	1.2	1,2,3		
		Justified for Development	1	1.3	1,2,3		
		Potentially Commercial Projects	Development Pending	2	2.1	1,2,3	
			Development On Hold	2	2.2	1,2,3	
		Non-Commercial Projects	Development Unclarified	3.2	2.2	1,2,3	
			Development Not Viable	3.3	2.3	1,2,3	
		Additional Quantities in place		3.3	4	1,2,3	
		Potential Deposits	Exploration Projects	No sub-classes defined	3.2	3	4
			Additional quantities in place		3.3	4	4

IV. Axis correspondence and code correspondence

1. Correspondence of G axis

8. In CCMR-1999, the G axis represents the degrees of geological assurance, representing the accuracy of exploration results, and is divided into four classes: 1. Measured; 2. Indicated; 3. Inferred; 4. Pre-prospected.

9. In UNFC-2009, the G axis represents geological knowledge and is divided into four categories.

10. The categories of the two G axes essentially correspond to each other, as shown in the gray area in Figure 3.

Figure 3
Axis correspondence of CCMR-1999 and UNFC-2009

CCMR-1999		UNFC-2009		
		Category	Sub-Category	
Economic Viability	1	E1	E1.1	Economic and Social Viability
	2M		E1.2	
	3	E2		
	2S		X	
	X	E3	E3.1	
	3		E3.2	
	X		E3.3	
Stage of Feasibility Study	1	F1		Field Project Status and Feasibility
	2			
	3	F2		
		F3		
	X	F4		
Degrees of Geological Assurance	1	G1		Geological Knowledge
	2	G2		
	3	G3		
	4	G4		

2. Correspondence of F axis

11. In CCMR-1999, the F axis represents the stage of feasibility assessment and is divided into three categories: 1. Feasibility study, 2. Pre-Feasibility study and 3. Scoping study. No sub-classes are defined.

12. In UNFC-2009, the F axis represents the field project status and feasibility and is divided into four categories: F1, F2, F3 and F4, in which F1 and F2 can be divided into sub-categories. The correspondence of the F axis is shown in the blue area in Figure 3.

13. CCMR-1999 emphasizes the detail level in the evaluation, but UNFC-2009 emphasizes the status of the project, and therefore their classes and categories do not correspond one to one.

14. The conclusions of the feasibility study and pre-feasibility study are determined. Their statuses are positive and correspond to F1 in UNFC-2009.

15. Scoping study can be applied to all stages of exploration activities, and the degree of assurance of its conclusions varies greatly. The conclusions of the scoping study in the prospecting stage have a relatively low degree of assurance. The conclusions of the scoping study during general and detailed exploration are relatively positive and have a high degree of assurance. The scoping study corresponds to F2 and F3 in UNFC-2009.

16. F4 of UNFC-2009 is not defined in CCMR-1999.

3. Correspondence of E axis

17. In CCMR-1999, the E axis represents the evaluation of the economic rationality at that time, and is divided into 4 categories: 1 Economic, 2M Marginal Economic, 2S Sub-Marginal Economic and 3 Intrinsic Economic. No sub-classes are defined.

18. In UNFC-2009, the E axis represents economic and social viability and is divided into E1, E2 and E3 categories, in which E1 and E3 can be divided into sub-categories. Its correspondence is shown in the brown area in Figure 3.

19. In CCMR-1999, “Economic” is representative of the fact that the pre-feasibility or feasibility study shows that exploitation is economically reasonable under the market condition at that time, or it is possible to develop with assistance from government subsidies and other forms of assistance. It corresponds to E1.1 sub-category in UNFC-2009;

20. “Marginal Economic” represents the fact that the pre-feasibility or feasibility study shows that exploitation was uneconomic but close to the breakeven point and can become economic only if conditions improve or future government support is received. It corresponds to E1.2 in UNFC-2009.

21. “Sub-Marginal Economic” represents the fact that the pre-feasibility or feasibility study shows that exploitation was uneconomical or technologically unfeasible at that time and that mineral resources can be economically exploited only upon substantial price increase and technological advancements. It is not defined in E axis of UNFC-2009.

22. “Intrinsic Economic” is the result of evaluating investment opportunities through the scoping study. Its degree of economic viability varies widely, ranging from being difficult to determine during the prospecting stage to being economic during the general and detailed exploration stages. It corresponds to E2 and E3.2 in UNFC-2009.

23. “Economic-Interest Undefined” only corresponds to pre-prospected resources and belongs to undiscovered resources. It is impossible to determine its degree of economic viability. It corresponds to E3.2 in UNFC-2009.

24. E3.1 and E3.3 in UNFC-2009 represent clear negative states. They are not defined in CCMR-1999.

4. Correspondence of coding combinations

25. Because the E axis and the F axis do not correspond, and their coding combinations similarly do not correspond, they can only correspond from classes, as shown in Figure 4 and Figure 5.

26. “Basic Reserves” and “Reserves” in CCMR-1999 correspond to the “Commercial Projects” class in UNFC-2009.

27. Resources beginning with 2S represent that the pre-feasibility study or feasibility study shows that exploitation was uneconomical or technologically unfeasible at that time and are not defined in the classes of UNFC-2009.

Figure 4
Correspondence of coding combinations in CCMR-1999 and UNFC-2009EF

	F1	F2.1	F2.2	F2.3	F3	F4
E1.1	1					
E1.2	1					
E2		4	5			
E3.1						
E3.2			6		8	
E3.3				7		11

Figure 5
Correspondence of CCMR-1999 and UNFC-2009

CCMR-1999						UNFC-2009			
CLASS	Measured	Indicated	Inferred	Pre-Prospected		CLASS	E	F	G
Economic	(111)				1	commercial projects	E1.1	F1	G1
	(111b)				1				G1,G2
	(121)	(122)			1				G1,G2
	(121b)	(122b)			1				G1,G2
Marginal Economic	(2M11)				1		E1.2		G1,G2
	(2M21)	(2M22)			1				
Sub-Marginal Economic	(2S11)					Not defined in UNFC-2009			
	(2S21)	(2S22)							
Intrinsic Economic	(331)	(332)	(333)		4	Potentially commercial projects	E2	F2.1	G1,G2,G3
					5			F2.2	
Not defined in CCMR-1999					6	Non-commercial projects	E3.2	F2.2	G1,G2,G3
					7		E3.3	F2.3	
Economic-Interest Undefined				(334)?	8	Exploration projects	E3.2	F3	G4
Not defined in CCMR-1999					11	Additional quantities in place	E3.3	F4	G1,G2,G3,G4

28. “Intrinsic Economic Resources” obtained in general exploration and detailed exploration stages in CCMR-1999 can correspond to “Potentially Commercial Projects” class in UNFC-2009. “Intrinsic Economic Resources” (333) obtained in the prospecting stage cannot directly correspond to “Potentially Commercial Projects” in UNFC-2009.

29. “Non-commercial projects” and “Additional quantities in place” in UNFC-2009 are not defined in CCMR-1999.

IV. Calculation and management characteristics of solid fuel and mineral resources/reserves in China

30. The Chinese national standard "Classification for Resources/Reserves of Solid Fuels and Mineral Commodities", together with all related technique specifications and procedures for exploration, constitute a complete standard system for mineral resources in China. It can ensure the orderly, high-quality exploration of mineral resources in China.

31. In terms of the calculation and management of solid fuel and mineral resources/reserves, China possesses unique characteristics in the production and application of industrial indicators. General industrial indicators are the summary of the industry's accumulated experience in the long-term exploration, technical economic demonstration and mining activities and contain a wealth of content regarding technical and economic evaluation. They are generally used in pre-prospecting and prospecting stages. The proven industrial indicators of the mineral deposits are the technical and economic evaluation results formed through normative procedures upon comprehensive consideration of geological, mining, metallurgy, comprehensive utilization, economy, environmental protection, laws and regulations, society and government and other factors by technical personnel of different professions. The demonstration process of industrial indicators is essentially a schematic feasibility study. In exploration and development activities prior to the general exploration stage, resources calculated with the proven industrial indicators are sufficient to show that such mineral resources are potentially viable for commercial development even if only the scoping study has been performed.
