



# ***UNFC APPLIED TO COAL and MINERAL COMMODITIES***

**Mücella Ersoy**  
**(Turkish Coal Enterprises)**

**Workshop on Energy Statistics in ESCWA Member  
Countries**

**Regional Seminar on Energy Reserves/Resources  
Classification in ESCWA/OPEC Member Countries**

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# ***INTRODUCTION-***

## ***Why UNFC?***

- more than 150 reserve/ resource classifications are in use worldwide with differing terms and definitions
- even in the same country more than one classification systems are in use



- **Difficulty in correlations of these classifications**

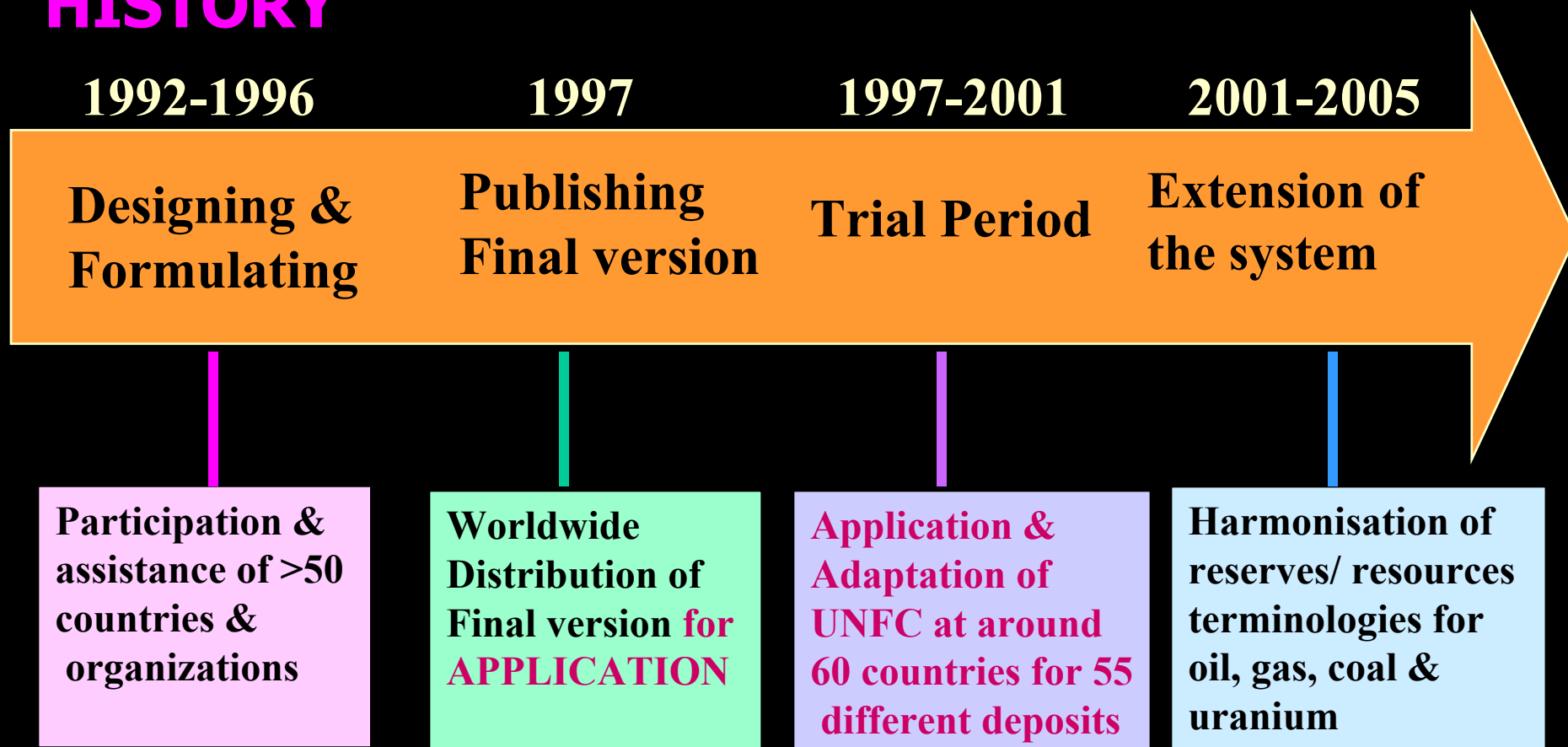
# ***INTRODUCTION-*** ***Objective of UNFC***

***UNFC designed as an umbrella system which is internationally applicable and acceptable to***

- harmonise existing different terminology and definitions by using numerical codification system
- result improvements in the international comparability of mineral statistics
- facilitate international trade and cooperation
- provide efficient link between market economy countries and countries in transition

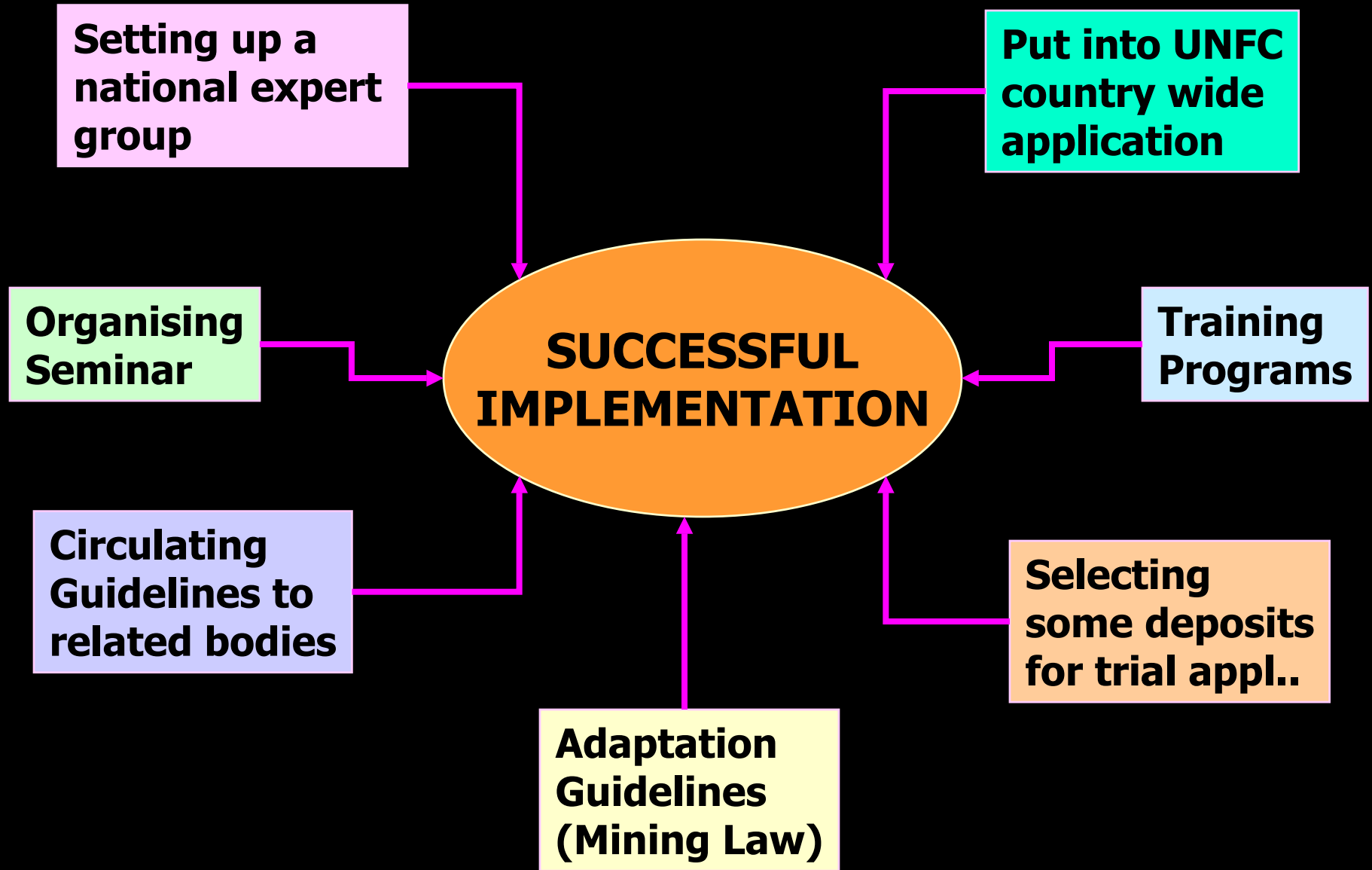
# Status of the Implementation of UNFC

## HISTORY



+ Further application of UNFC

# Ways of Successful UNFC Implementation



# Status of the Implementation of UNFC

## - PREVIOUS ORGANIZED SEMINARS

1998

**ESCAP/ECE (Bangkok)**

(Cambodia, China, Indonesia, Japan,  
Malaysia, Philippines, Thailand, Vietnam)

1999

**Indonesia**

**Brazil (for Latin America)**

2000

**Bulgaria**

**India Ocean Rim Countries**

2001

**Philippines (ESCAP)**

2002

**Turkey**

2003

**Russian Federation  
& CIS Countries**

# Status of the Implementation of UNFC

- **RESULTS of SEMINARS**

- **Organising regional or national seminars help national experts**



**to put the UNFC into practice more easily**

- by introducing the UNFC principles,
- by highlighting handicaps during the implementation.




**in particular to develop country's national systems based on the UNFC principles.**

# Status of the Implementation of UNFC

- Adaptation of country's national systems to UNFC and implementation were conducted by mainly;
  - individual mining companies from industry
  - government organisations such as:
    - Ministries of Natural Resources
    - National Geological Surveys
  - Technical Universities, Institutes, Bureaus on mining and geology

# Status of the Implementation of UNFC

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 Growing number of countries are implementing UNFC as a national system.

- a number of countries included UNFC principles to their Mining Law or developed national standards.

- **Such as:**
  - Bulgaria
  - Romania
  - Slovakia
  - Ukraine
  - China,
  - Cambodia
  - India
  - Indonesia
  - Iran
  - Malaysia
  - Philippines
  - Thailand

 Some countries **continue updating their national systems** on the basis of UNFC

 Other countries are considering to apply it

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# Status of the Implementation of UNFC on Coal Deposits by the regions

## 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



**More efforts are needed to  
advance with the application of  
UNFC in Africa & Latin America**

# Status of the Implementation of UNFC on Coal Deposits- EUROPE

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
<b>Austria<sup>1</sup></b>	Graz-Köflacher Eisenbahn-Und Bergbau Gesell Shaft M.B.H	-	-	<b>Köflach coal deposit</b>	<b>UNFC considered to be excellent tool for assessment their coal dep.</b>
<b>Bulgaria<sup>2</sup></b>	Ministry of Environmental Protection and Water	<b>fully adapted</b>	-	<b>Bobol Dol Coal Mine</b>	<b>applied a model training program, reassessment is in progress</b>
<b>Estonia<sup>1</sup></b>	Geological Survey of Estonia, Ministry of Environment	<b>UNFC principles and definition are well accepted</b>	-	<b>peat/ oilshale</b>	Application is in progress
<b>Germany<sup>2</sup></b>	BGR, Rheinbraun AG, Montan Consulting	<b>Compatible with UNFC</b>	-	<b>Rhenish Lignite Mine, Consulting for 2 coal dep.s (Iran,Philippines)</b>	<b>fully supports UNFC</b>

**1: by 2001  
2: 2003**

# Status of the Implementation of UNFC on Coal Deposits- EUROPE

(Continue 1)

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
Greece <sup>1</sup>	Centre for Solid Fuels Technology and Applications	<b>UNFC suitable for adapting,</b> (specific suggestions provided)	-	<b>Greek lignite deposits</b>	<b>UNFC suitable for adapting</b>
Hungary <sup>2</sup>	Hungarian Geological Survey	<b>Easily incorporated into UNFC</b>	under examination	<b>Hungarian coal deposits</b>	<b>New class.syst. Fully compatible with UNFC</b>
Lithuania <sup>1</sup>	Geological Survey of Lithuania	<b>Adopted, but improved and adjusted traditional terms were maintained</b>	<b>entered into force (2000)</b>	<b>Lithuania's solid mineral commodities are in re-evaluation</b>	<b>The new classif. System Compatible with UNFC.</b>

1: by 2001

2:by 2003

# Status of the Implementation of UNFC on Coal Deposits- EUROPE

(Continue 2)

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
Poland <sup>2</sup>	Min.of Env. Protection Nat. Resources & Forestry, Univ. Of Min.&Metal., State Geo.Insti.	National terms and definitions <b>adapted</b> to UNFC in Polish	-	Upper Silesian & Lublin Coal Basins, Jas Mos Coal Mine and Belchatow Lignite Mine	UNFC successfully applied to coal resources
Romania <sup>2</sup>	National Agency for Mineral Resources	<b>adapted</b> including national terms & definitions	by law (1998)	will be implemented to coal deposits	in progress
Russia <sup>1</sup>	Ministry of Natural Resources, State Committee for Mineral Reserves/ Resources	recently new system will <b>fully compatible with UNFC</b>	-	13 deposits were selected for application	in progress
Slovakia <sup>1</sup>	Ministry of Environment	<b>Adapted</b>	by law	Beladice Coal Deposit	fully supports UNFC, reclassifying of all deposits continue

1: by 2001  
2: by 2003

# Status of the Implementation of UNFC on Coal Deposits- EUROPE

(Continue 3)

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
<b>Slovenia<sup>2</sup></b>	Velenje Lignite Mine, Geological Survey, Dept. of Mining Eng& Geotechnology	<b>Adapted</b>	Adoption of special regulations based on UNFC pending	<b>Velenje Lignite Mine</b>	Special resource class is provided covering specific situation of the mining area
<b>Spain<sup>1</sup></b>	Institute of Geology and Mining Technology	-	-	<b>West Balestra Coal Mine</b>	in progress
<b>Turkey<sup>2</sup></b>	Turkish Coal Enterprises, General Directorate for Mineral Research and Exploitation	in progress	-	<b>Turkish lignite deposits</b>	adaptation, reassessment of lignite deposits based on UNFC in progress
<b>Ukraine<sup>2</sup></b>	State Committee of Reserves/ Resources	<u>fully adapted</u> (Guidelines were prepared for oil, gas, uranium & drinking water)	by law (1997)	<b>Currently all reserves/ resources are being evaluated</b>	Guidelines for classifying coal and building materials are being prepared

1: by 2001  
2: by 2003

# Status of the Implementation of UNFC on Coal Deposits- ASIA-PASIFIC

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
<b>Armenia<sup>1</sup></b>	State Commission of Mineral Resources	Minor amendments to UNFC suggested	-	<b>Armenian coal deposits</b>	in progress
<b>China<sup>1</sup></b>	Ministry of Land and Resources	<b>Adapted and replaced the former class.</b> (including adoption of terms & definitions)	<b>As national standard (1999)</b>	<b>All solid fuels &amp; minerals</b>	<b>extensive training prog. performed</b> (reclassified 20000 mineral properties related to 45 minerals by involving 200000 mining entities)
<b>Combodia<sup>1</sup></b>	Department of Geology and Mines	-	<b>As national standard</b>	<b>all solid fuels &amp; minerals</b>	<b>in progress</b>
<b>India<sup>2</sup></b>	Indean Bureau of Mines, Federation of Indian Mineral Industry, Ministry of Mines, Ministry of Coal	adapted	<b>Approved (tech.ly, administrative ly &amp; politically)- (1999)</b>	<b>all solid fuels &amp; minerals, application to coal deposits at preliminary stage</b>	<b>extensive training prog. in progress, noncoal solid minerals are in advanced stage.</b>

**1: by 2001**  
**2: by 2003**

# Status of the Implementation of UNFC on Coal Deposits- ASIA-PASIFIC

(Continue 1)

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
Indonesia <sup>1</sup>	Directorate General of Geology & Mineral Resources, Dept. of Mines & Energy	<b>adapted</b>	<b>as a national standard (1998)</b>	national minerals and solid fuels inventory campaign	<b>UNFC is seen as a very effective tool, application in progress</b>
Iran <sup>1</sup>	Geological Survey of Iran (GSI)	<b>adapted</b> (Procedure of practical appl. of UNFC has been confirmed by GSI experts)	<b>by law</b>	<b>Iranian Coal Deposits</b>	GSI has appointed an expert group to coordinate all exploration activities
Kazakhstan <sup>1</sup>	State Commission of Mineral Resources	<b>new class. In preparation on the basis of UNFC</b>	-	<b>Karapi Coal Deposit</b>	in progress

# Status of the Implementation of UNFC on Coal Deposits- ASIA-PASIFIC

(Continue2)

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
Malaysia <sup>1</sup>	Geological Survey Department	adapted	as national standard	Merit Pila coal deposit	No problems encountered in applying UNFC
Philippines <sup>1</sup>	Department of Energy & Mines & Geoscience Bureau	adapted	by law	reassessment of coal deposits	in progress
Thailand <sup>1</sup>	Department of Mineral Resources Geological Survey Division	Adapted (UNFC was modified to a Thai version)	by law (1998)	coal deposits	a working group was set up to compile field data

1: by 2001

# Status of the Implementation of UNFC on Coal Deposits- AMERICA

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
<b>Brazil<sup>1</sup></b>	Rio Grande do Sul State Government, Federal Univ. of Rio Grande do Sul	-	<b>UNFC applicable to Brazilian Mining Law</b>	<b>Coal deposits of Rio Grande Sul</b>	<b>Examples demonstrated that national data can be easily incorporated into UNFC</b>
<b>USA<sup>1</sup></b>	United States of Geological Survey (USGS)	<b>UNFC &amp; US National sys. completely compatible &amp; philosophically same</b>	-	<b>Wyodak Anderson coal zone &amp; Hilight Quadrangle that are in Powder River Basin</b>	USGS is in progress of completing "National Resources Assessment" the purpose of which is to identify the coal that will be needed during first half of 21st century. <b>Resources identified in that study can be classified by using UNFC.</b>

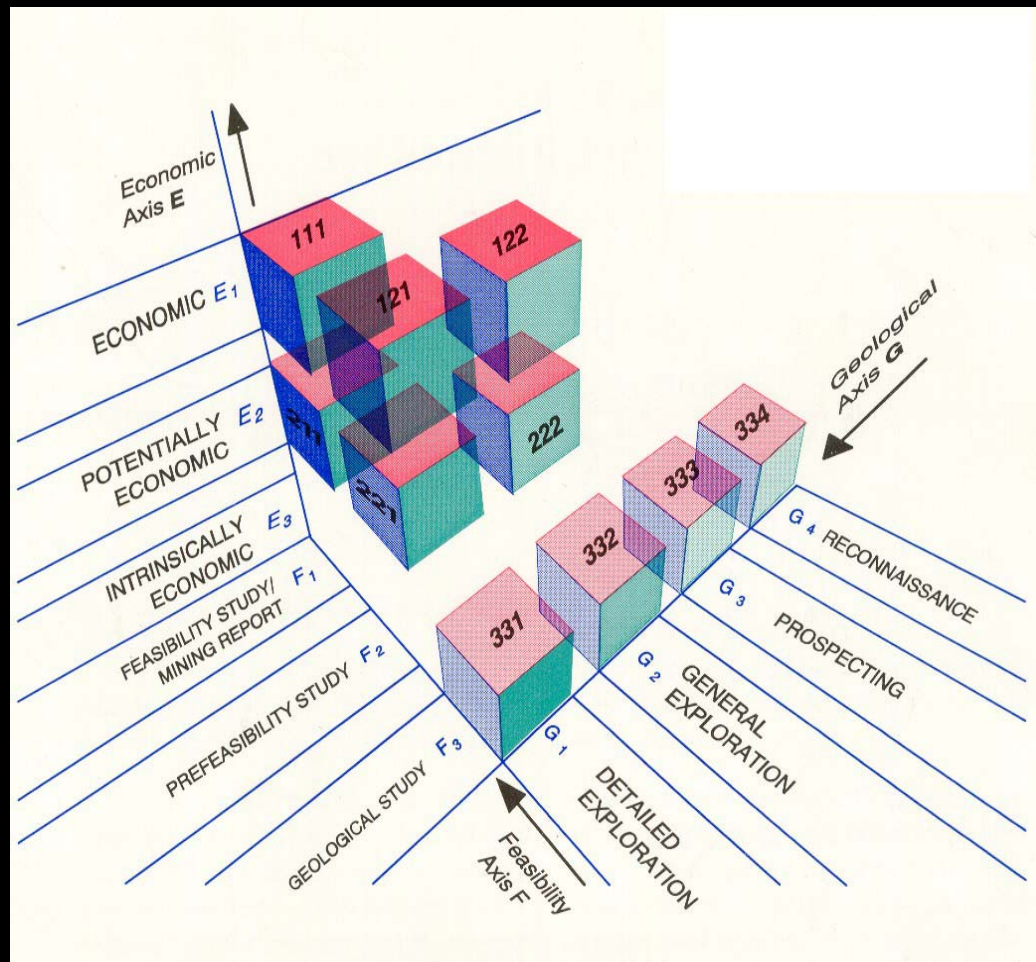
1: by 2001

# Status of the Implementation of UNFC on Coal Deposits- AFRICA

Country	Organisation	Adoption Nat.Class. to UNFC	Legal Status	Application to coal	Results
Zimbabwe <sup>1</sup>	Geological Survey Department	-	-	Trial application initiated in the frame of country- wide resource inventory	A short course was performed at the University of Harare

1: by 2001

# Examples for the adaptation & the implementation of UNFC



- In UNFC 36 classifications are available in total. 8 of them are used often.
- UNFC is not rigid system. During adaptation National system to UNFC, it is possible to prevent issues in the National System that is useful to remain.

# Relationship of UNFC and Polish Classification for Coal Resources/Reserves

UN Framework Classification	Polish System	Detail Exploration	General Exploration	Prospecting	Reconnaissance
		Rozpoznanie szczegolowe A+B	Rozpoznanie wstepne C1*	Poszukiwania C2, D1	Penetracja D2, E(D3)
Feasibility Study and/or Mining Report	Plan Ruchu Zakladu Gorniczego Operat Ewidency Zasobow	1a. Proved mineral reserves (operational) (111) 1b. Proved Mineral reserves in place (industrial) A+B (111) 2. Feasaibility Mineral Resources (nonindustrial) A+B (211)	usually		
Prefeasibility Study	Project zagospodarowania zloza	1. Probable Mineral Reserves in place (probable industrial reserves) A+B (121) 2. Prefeasibility Mineral Resources (probable nonindustrial resorces) A+B (221)			
Geolojical Study, Opportunity Study	Dokumentacja geologiczna zloza	(1-2). Measured Mineral Resources** A+B (331)	(1-2). Indicated Mineral Resources** C1 (332)	(1-2). Inferred Mineral Resources C2, D1 (333)	1-2. Reconnaissance Mineral resources D2, E(D3) (334)

\* Partly category C2 if fullfill the general exploration requirements

\*\* Supposed ecenomic (bilansowe) and supposed subeconomic (potentially economic- pozabilansowe)

Source: M.Niec, M.Piwocki, S.Przenioslo, University of Mining & Metalurgy, Polish Geological Survey

# Examples for the implementation of UNFC - Poland black coal resources/reserves of Upper Silesian Coal Basin

(million tons)

UN Framework Classification	Polish System	Detail Exploration	General Exploration	Prospecting	Reconnaissance
		Rozpoznanie szczegolowe A+B	Rozpoznanie wstepne C1*	Poszukiwania C2, D1	Penetracja D2, E(D3)
Feasibility Study and/or Mining Report	Plan Ruchu Zakladu Gorniczego Operat Ewidency Zasobow	(111) 1335			
		(211) 656			
Prefeasibility Study	Project zagospodarowania zloza	(121) 151	(122) 2851	(123) 2515	
		(221) 222	(222) 8805	(223) 9099	
Geological Study, Opportunity Study	Dokumentacja geologiczna zloza	Measured coal resources (331) 1448* 1341**	Indicated coal resources (332) 6760* 5299**	Inferred coal resources (333) 23189* 17880**	Reconnaissance coal resources (334) 74333

\* Total geologic (supposed economic and potentially economic)

\*\* Supposed economic only (bilansowe)

Source: M.Niec, M.Piwocki, S.Przenioslo, University of Mining & Metalurgy, Polish Geological Survey

# Framework Classification for World Energy Resources Survey

## Greece: Lignite Deposits

August 1999

		Definitions	Code	10 <sup>6</sup> t	10 <sup>6</sup> toe
<b>Total Resource</b>	<b>Reserve</b>	Economically extractable quantity, appropriately assessed	111	} 4035	} 561
			121		
			122		
	<b>Remaining/ Additional Resources</b>	Potentially economically extractable quantity, appropriately assessed, which is currently not economic but may possibly be so in future	211	} 2173	} 302
			221		
			222		
		Intrinsically economic in-situ quantity with future economic prospect pending appropriate assessment	331	} 3758	} 753
			332		
			333		
			334		

Source: N.Koukouzas, Centre for Solid Fuels Technology and Applications (CSFTA), Athens

# Framework Classification for World Energy Resources Survey

## Hungary: Coal Deposits

01.01.2000

		Definitions	Code	10 <sup>6</sup> t	10 <sup>6</sup> toe
<b>Total Resource</b>	<b>Reserve</b>	Economically extractable quantity, appropriately assessed	111	1826.7	
			121		
			122		
	<b>Remaining/ Additional Resources</b>	Potentially economically extractable quantity, appropriately assessed, which is currently not economic but may possibly be so in future	211	5449.8	
			221		
			222		
	Intrinsically economic in-situ quantity with future economic prospect pending appropriate assessment	331	13687.4		
		332			
		333			
		334			

Source: B.Fodor, Hungarian Geological Survey, Budapest

# Framework Classification for World Energy Resources Survey

## Slovenia:Lignite Mine Velenje

February 2001

		Definitions	Code	10 <sup>6</sup> t	10 <sup>6</sup> toe	
Total Resource	Reserve	Economically extractable quantity, appropriately assessed	111	230		
			121	0		
			122	0		
	Remaining/ Additional Resources	Potentially economically extractable quantity, appropriately assessed, which is currently not economic but may possibly be so in future		211	120	
				221	0	
				222	0	
		Abandoned for exploitation for land use planning reasons	311	74		
		Intrinsically economic in-situ quantity with future economic prospect pending appropriate assessment		331	170	
				332	0	
				333	0	
			334	0		

Source: I.Veber, Lignite Mine Velenje

# Framework Classification for World Energy Resources Survey

## Turkey: Lignite Deposits (preliminary results)

June 2002

		Definitions	Code	10 <sup>6</sup> t	10 <sup>6</sup> toe
<b>Total Resource</b>	<b>Reserve</b>	Economically extractable quantity, appropriately assessed	111	} 5784	891
			121		
			122		
	<b>Remaining/ Additional Resources</b>	Potentially economically extractable quantity, appropriately assessed, which is currently not economic but may possibly be so in future	211	} 377	72
			221		
222					
Intrinsically economic in-situ quantity with future economic prospect pending appropriate assessment		331	} 334	64	
	332 333 334				
	<b>Unevaluated Remaining Resources</b>	2.... , 3....	} 1776	336	

Source: M.Ersoy, Turkish Coal Enterprises, Ankara

# General Handicaps Faced

- **Problems relating with;**
- dividing the stages of geological investigation into four steps (*as reconnaissance, prospecting, general exploration, detail exploration*)
- not fitting country's Mining Laws with UNFC (*re-evaluation and revision process are needed*)
- difficulty in evaluating "economic viability" because of lack of clear economic criteria for countries in transition
- terminology chaos particularly for "reserve" and "resource"
- classifying in-situ, base reserve, extractable reserves/resources (*usage of letters is recommended*)

# ***CONCLUSION and RECOMMODATIONS***

- **Main findings are that:**
  - UNFC is easy to apply
  - national terms can be maintained while using UNFC
  - Flexible in application; usable at company/ institutional, national and international level
  - codification of UNFC
    - solves the previously existing semantic problems
    - simplify comparison of the different coal & mineral commodities
    - provide short, unambiguous identification of reserves/resources classes which facilitate computer processing of data as well as exchange of information

# ***CONCLUSION and RECOMMODATIONS***

- **In order to get fast and reliable results**
  - ➔ **setting up a national expert group** representing all related bodies,
  - ➔ **organising seminar** to introduce UNFC principles, to discuss in depth Guidelines
  - ➔ **Circulating guidelines to related bodies**
  - ➔ **adapting guidelines** including terms and definitions considering the related part's suggestions and the Mining Law
  - ➔ **selecting some deposits for implementation**
  - ➔ **providing extensive training program country-wide**
  - ➔ **put into UNFC for country wide implementation**