



Australian Government
Geoscience Australia



UNFC – A tool for national reporting

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Introductory remarks

Countries with significant mining sectors should regularly evaluate their national mineral resource stocks

- **Inform policies and decisions by providing information on what is likely to be available for mining**

Most governments have difficulty conducting mineral resource assessments for all known mineral deposits due to:

- **Staffing/expertise limitations and lack of access to sensitive data on economic viability of deposits**
- **National reporting needs to be based on individual deposits wherever possible**
- **Individual deposit information is provided from company reports**
 - **Companies do not use the UNFC**

National resource reporting in Australia

GA has conducted annual national scale assessments for major and selected minor mineral commodities since 1975.

- To ***assist long-term government policies*** by providing information on *what is likely to be available for mining*.
- All GA “Resources” (including sub-economic resources) must have **“reasonable prospects for economic extraction”** in the foreseeable future (~25years).
- The **Economic Demonstrated Resources (EDR)** in the Australian national resource system is the key resource category applied in policy development, in particular for land-use issues.
- Annual national mineral resource inventory is published online:
<http://www.ga.gov.au/minerals/mineral-resources/aimr/table-1.html>

From company reports to national inventory

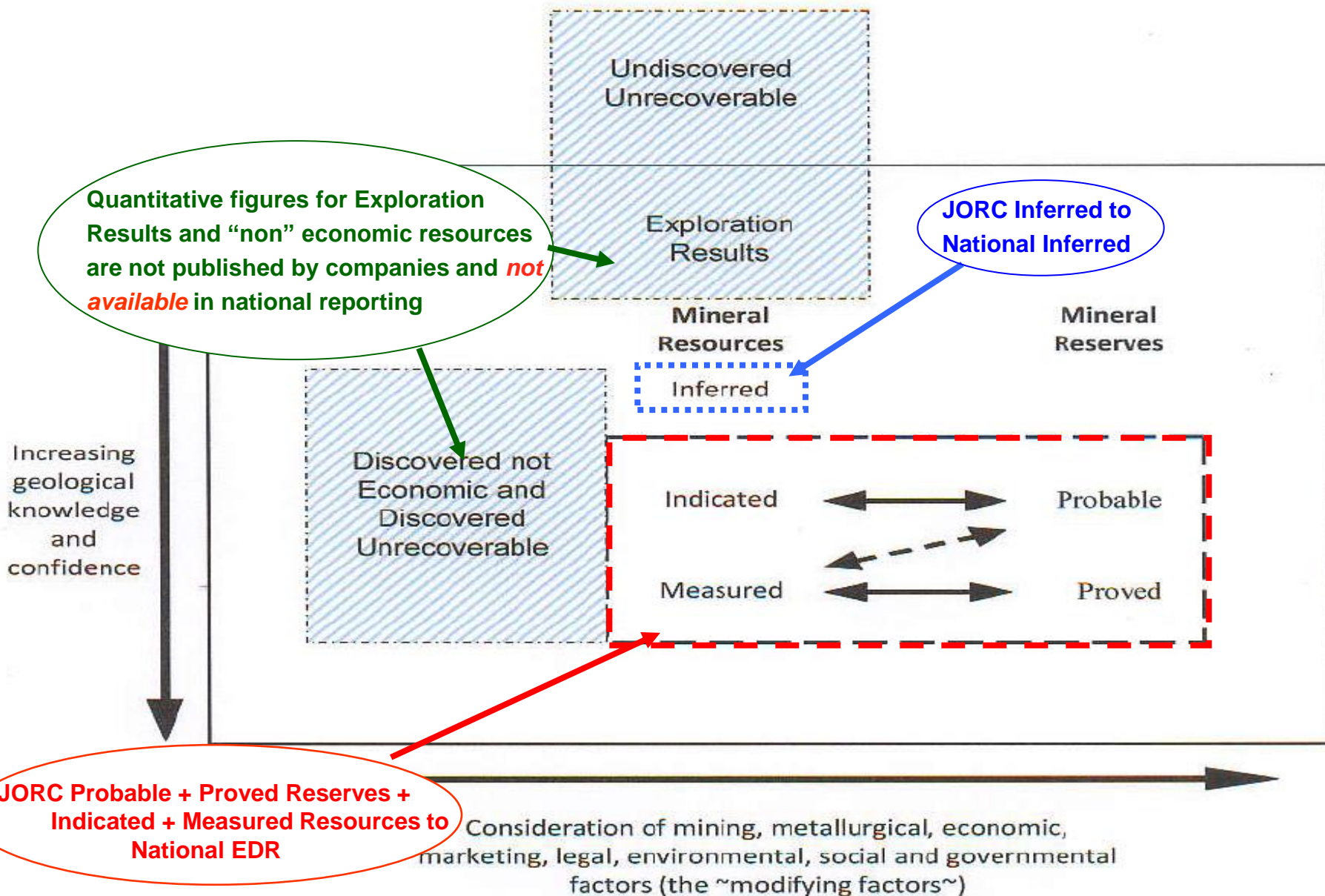
- National mineral resources inventory is based on company reports made available on the Australian Securities Exchange (ASX).
- Companies listed on the ASX are required to report publicly on Ore Reserves and Mineral Resources under their control, using the Joint Ore Reserves Committee (JORC) Code (<http://www.jorc.org/>).
- JORC **Resources** must have “**reasonable prospects for economic extraction**” in the foreseeable future (*as is the case for national resources*).
- JORC **Reserves** provide commercial (**relatively short term**) view of what is to be mined.
- JORC categories are compiled to the national system.

From company reports to national inventory

Resource information from company reports is used to compile the national inventory:

- EDR comprise current JORC Code Mineral Reserves and Measured & Indicated Mineral Resources.
- Sub-economic Resources are largely from historic company reports but are still the most recent estimates, and also includes proportions of resources from current company reports which are JORC Code compliant but have been assessed by GA as sub-economic.
- JORC Code Inferred Resources map directly to the national Inferred Resources category and by definition, the information is not sufficient to determine its economic status.

JORC Code to national system



National classification system

Decreasing degree of geological assurance →

		IDENTIFIED RESOURCES	
		DEMONSTRATED	INFERRED
ECONOMIC		CURRENT JORC RESERVES PROVED PROBABLE	
		CURRENT JORC RESOURCES MEASURED INDICATED <small>UNLESS ASSESSED BY GA AS SUBECONOMIC</small>	JORC INFERRED RESOURCES (INCLUDES HISTORIC RESOURCE)
SUBECONOMIC	PARAMARGINAL	JORC MEASURED AND INDICATED RESOURCES ASSESSED BY GEOSCIENCE AUSTRALIA TO BE SUBECONOMIC (INCLUDES HISTORIC RESOURCES)	
	SUBMARGINAL		

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Economic Demonstrated Resources (EDR)

EDR = Key indicator

By definition EDR provides a reasonable and objective indication of what is likely to be available for mining in the long term (25 years)

- **For the national context adding JORC Reserves and Resources is not considered a problem**
 - **Both “inherently economic”**
 - **EDR “anticipates” movement of Resources to Reserves**

In addition to EDR, Geoscience Australia also reports national JORC Reserves and Inferred Resources in separate

What is reported in the national inventory?

Commodity	Units	Australia						World		
		JORC Reserves (a) (% of Accessible EDR)	Demonstrated Resources		Inferred Resources (c)	Accessible EDR (d)	Mine Production 2012 (e)	Economic Resources 2012 (f)	Mine production 2012 (g)	
			Economic (EDR) (b)	Subeconomic						
			Para-marginal	Sub-marginal						
Antimony	kt Sb	55 (51%)	107	9	0	203	107	3.9	1800	180
Bauxite	Mt	2145 (34%)	6281	144	1429	1474	6281	76.3	28 000	263
Black coal										
in situ	Mt		77 589	1613	5341	89 194				
recoverable	Mt	20 662 (38%)	61 082	1134	3984	64 184	54 200	489 (h)	665 000 (i)	6637 (j)(k)
Brown coal										
in situ	Mt		49 035	37 465	16 873	123 240				
recoverable	Mt	n.a. (l)	44 164	33 402	15 185	102 502	34 095	66.73 (m)	195 000 (i)	1041 (k)
Cobalt	kt Co	519 (51%)	1021	294	37	1209	1021	5.88 (n)	7273	110.48
Copper	Mt Cu	25.2 (28%)	91.1	1.4	0.4	43.9	91.1	0.91	690	16.6
Chromium	kt Cr	0	0	0	0	3657	0	127.7 (o)	>460 000	24 000 (p)
Diamond	Mc	146.1 (55%)	268.0	0	0	42.7	268.0	8.6	600 (q)	150
Fluorine	Mt F	0	0	0.5	0	0.4	0	0	117 (r)	3.34 (r)
Gold	t Au	4119 (42%)	9909	372	122	4571	9879	251	54 300	2660
Iron										
iron ore	Mt	15 305 (34%)	44 650	566	1365	73 570	44 650	520	175 650	2959
iron (contained Fe)	Mt Fe	7931 (38%)	20 638	224	473	33 827	20 638	n.a.	83 688	n.a.

Mapping to a universal template

It is useful to map the various classification and reporting systems for mineral and energy resources to a common base to:

- **Reveal similarities/differences between the systems**
- **Enable valid comparisons between countries' inventories and better estimates of total world stocks**

The UNFC-2009 is a universal template:

- **Broader coverage than CRIRSCO Template**
- **Includes non-commercial and undiscovered**

Many countries already have mandated commercial reporting systems:

- **These countries will not adopt the UNFC**
- **Other countries may choose to use the UNFC**

Broad-scale correlation of Australia's national resource system with UNFC-2009

The CRIRSCO template *is the international system* for public reporting of mineral reserves and resources in individual deposits.

- CRIRSCO Template = JORC Code.
- Virtually all of Australia's national resource inventory is derived from JORC compliant resources from company reports.
- Hence, any correlation between the Australian national resource system and the UNFC-2009 must comply with the CRIRSCO bridging document in Annex III of the Specifications Document.

Correlation of CRIRSCO Template with the UNFC-2009

CRIRSCO Template		UNFC-2009 "minimum" Categories			UNFC-2009 Class
Mineral Reserve	Proved	E1	F1	G1	Commercial Projects
	Probable			G2	
Mineral Resource	Measured	E2	F2	G1	Potentially Commercial Projects
	Indicated			G2	
	Inferred			G3	
Exploration Results		E3	F3	G4	Exploration Projects

EDR

Broad-scale correlation of Australia's national resource system with UNFC-2009

With reference to the CRIRSCO bridging document, a broad-scale correlation of Australia's national resource system with UNFC-2009 is as follows:

- The **JORC Reserves** component of EDR correlates with the UNFC's class of **Commercial Projects** as defined by mineral resource categories **111 & 112**.
- The **JORC Resources** component correlates with **Potentially Commercial Projects** as defined by categories **221 & 222**.
- **Inferred Resources** are identified by the UNFC geological criterion G3 and are defined by **223**.

Broad-scale correlation of Australia's national resource system with UNFC-2009

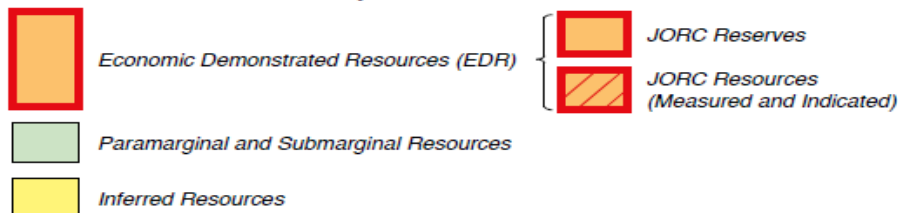
- Australia's national **Sub-economic Resources** correlate with the UNFC's **Development Unclassified** sub-class of Non-commercial Projects (categories 3.2; 2.2; 1,2).
- Since by definition, all of Australia's national resources have to have a 'reasonable expectation' to be economic in the foreseeable future, there are no resources within UNFC's **Development Not Viable** sub-class since this sub-class mandates that it has no reasonable expectation for viability in the foreseeable future.
- Under the national mineral resource system there are no resources assessed within the UNFC's **Potential Deposit** class.

Broad-scale correlation of Australia's national resource system with UNFC-2009

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	Commercial projects	On production	1	1.1	1	2		
		Approved for development	1	1.2	1	2		
		Justified for development	1	1.3	1	2		
	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 deposit	Exploration projects	(No sub-classes defined)	3.2	3				4
	Additional quantities in place		3.3	4				4

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Australia's National Resource System



Detailed correlation of Australia's national mineral resources with UNFC-2009 sub-classes

- Detailed correlation is not possible from Australia's national system as the national scale resource categories enclose several UNFC sub-classes.
 - It is not possible to 'unscramble the egg' for greater granularity.
- It requires returning to the original JORC compliant company resource reports and apply the CRIRSCO bridging document for correlation with UNFC-2009 sub-classes.
- A more detailed correlation would be possible if the correlation was carried out by the relevant owners of the deposits using in-house information.

Granularity of national reporting

Australia's EDR may be sub-divided to distinguish what is likely to be available in short, intermediate and longer time frames

- Economic Resources (“EDR 1”) = JORC Proven and Probable Ore Reserves = **UNFC Commercial projects**
- Potential Medium Term Economic Resources (“EDR 2”) = JORC Measured and Indicated Mineral Resources in existing mines and undeveloped deposits which have had a positive feasibility study/development has been announced = **UNFC Potentially commercial projects – development pending**
- Potential Long Term Economic Resources (“EDR 3”) = JORC Measured and Indicated Mineral Resources in deposits where their grade and tonnage characteristics are similar to deposits being mined elsewhere, but not subjected to a feasibility study/current consideration of mining = **UNFC Potentially commercial projects – development on hold**

Total EDR = EDR1 + EDR2 + EDR3

Detailed correlation of Australia's national resource system with UNFC-2009

National perspectives

Short term

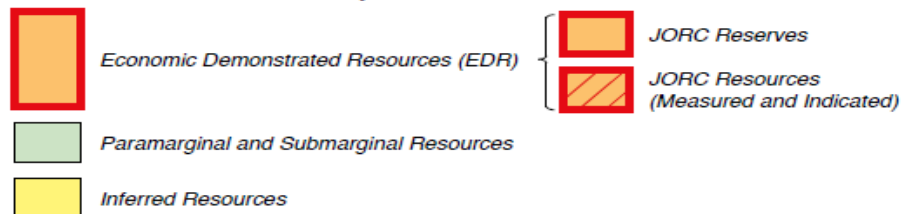
Intermediate term

Long term

		UNFC Classes defined by categories and sub-categories							
		Extracted	Sales production				Non-sales production		
			Class	Sub-class	Categories				
				E	F	G			
Total commodity initially in place	Known deposit	Commercial projects	On production	1	1.1	1	2		
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Australia's National Resource System



UNFC and national reporting of mineral resources

Development of the UNFC has focussed on reporting at the scale of individual deposits/projects

National reporting should be based on data from individual deposits

- Only inherently economic/commercial resources should be included

The national total for a commodity in a particular category (eg EDR) should be derived by:

- Summing the tonnages of that commodity in all deposits for which resources have been estimated
- Aggregating commercial reporting categories into broader national categories (eg. Reserves + Resources = EDR)

Summary

- **While national (Australian) mineral resource classification systems can be readily correlated with UNFC-2009, this can only be done on a broad-scale which lumps several UNFC-2009 sub-classes**
- **In order to take advantage of UNFC-2009 granularity, one needs to track back to the original source of resource data**
 - **JORC compliant resource data must use the CRIRSCO bridging document to transfer resources to UNFC-2009**
- **The full extent of the granularity in UNFC-2009 can only be utilised by the owners/operators of the relevant mineral deposits using in-house data.**

Summary

Global inventories not well known

Comparisons of inventories of different countries can be unreliable

It is up to each country to decide what categories it reports & which resources classification it will use

- **National inventories should map its reporting categories to UNFC to facilitate meaningful comparisons and estimation of global inventories**

For major mining nations it is most informative to report categories which provide short, medium and long term views on what is likely to be available for mining



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Thank you for your attention

Questions

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