



# DAY 02: **SESSION 04**

## Asset Account for Mineral and Energy Resources: Physical Terms

Regional Training Workshop on the System of Environmental-Economic Accounting

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## Unit Outline

- how does SEEA define and record mineral and energy resources (or assets)?
- what are asset accounts?
- what are the differences between balance sheets and assets accounts?
- what are the differences between economic and environmental assets?



## Acronyms

<b>EDR</b>	<b>=</b>	<b>Economic Demonstrated Resource</b>
<b>PNFC</b>	<b>=</b>	<b>Public Non-Financial Corporation</b>
<b>SEEA-CF</b>	<b>=</b>	<b>SEEA Central Framework</b>
<b>SNA</b>	<b>=</b>	<b>System of National Accounts</b>
<b>2008 SNA</b>	<b>=</b>	<b>SNA Manual (2008 Edition)</b>
<b>UNFC-2009</b>	<b>=</b>	<b>UN Framework Classification for Fossil Energy and Mineral Reserves 2009</b>



## Asset Account for Mineral and Energy Resources

This session is based on Section 5.5 *Asset accounts for mineral and energy resources* in Chapter 05 of the System of Environmental-Economic Accounting 2012 — Central Framework (pp.148-159).



## What Are Mineral and Energy Resources in SNA?

### SNA defines mineral and energy resources as consisting of:

... reserves located on or below the earth's surface that are economically exploitable, given current technology and relative prices. Ownership rights to the mineral and energy resources are usually separable from those to the land itself. [They include] known reserves of coal, oil, gas or other fuels and metallic ores, and non-metallic minerals, etc. . . . (SNA, 2008, *para.10.179*).



## What Are Mineral and Energy Resources in SEEA-CF?

A country may have deposits or reserves of mineral and energy resources but they are not necessarily economically exploitable according to SNA and SEEA criteria.



## What Are Mineral and Energy Resources in SEEA-CF?

SEEA-CF records some mineral and energy resources as economic assets:

- an "asset life" of one year or more
- ownership rights enforceable by institutional units
- institutional units are entitled to claim the benefits associated with the use of the asset in question
- have an economic value

Estimates of extraction should include estimates of illegal extraction, either by residents or non-residents, as these amounts reduce the availability of the resource (SEEA-CF, 2012, *para. 5.189*).





# Asset Account for Mineral and Energy Resources: Physical Terms



## GROUP ACTIVITY 02







## Valuation of Mineral and Energy Resources

Which mineral and energy asset classification should be used?

- UN Framework Classification for Fossil Energy and Mineral Reserves 2009 (UNFC-2009)

### UNFC-2009 categories

**Class A** Commercially recoverable resources

**Class B** Potentially commercially recoverable resources

**Class C** Non-commercial and other known deposits



## Valuation of Mineral and Energy Resources

Many countries have their own classification system like Australia because there is no internationally agreed detailed classification for mineral and energy resources suitable for statistical purposes.



## Valuation of Mineral and Energy Resources

The ABS uses the McKelvey Box in which resources are classified and quantified according to the McKelvey resource classification system:

- economic demonstrated resources
- sub-economic demonstrated resources
- inferred resources



## Valuation of Mineral and Energy Resources

Australia has 27 identified mineral and energy resources.  
Data are published annually by Geoscience Australia:

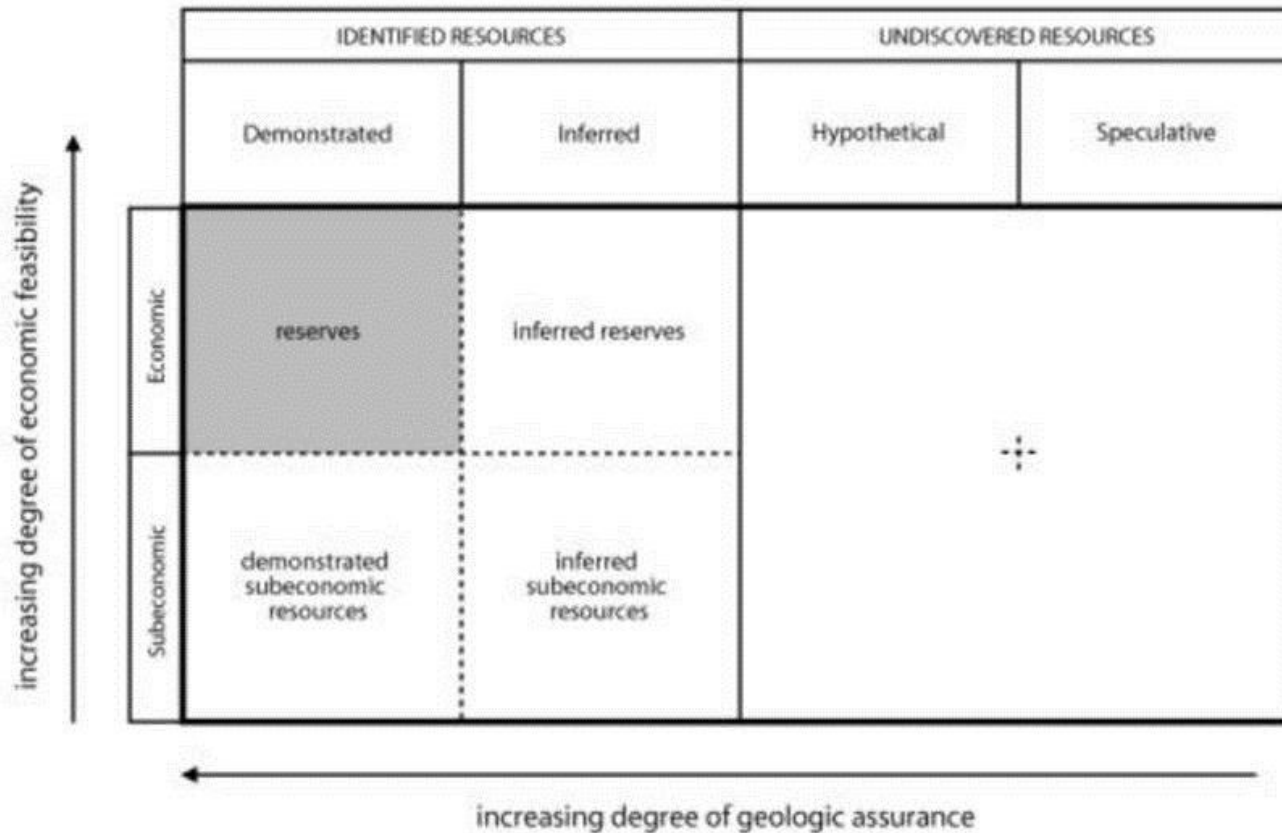
- *Australia's Identified Mineral Resources (AIMR)*
- *Oil and Gas Resources of Australia (OGRA)*

ABS publishes detailed data for each of the 27 resources,  
including physical and monetary values:

- each one has been demonstrated to be economically exploitable

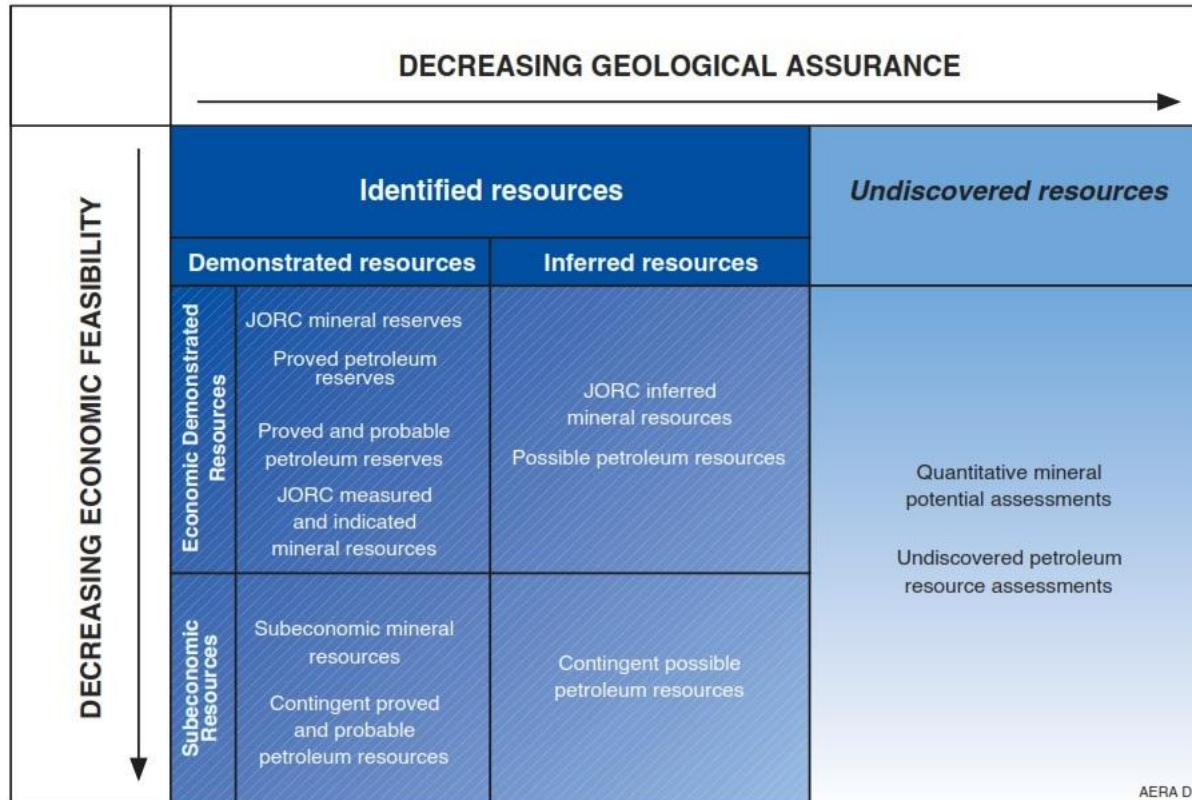


## Standard McKelvey Box





## Australia's Classification Scheme



**SOURCE:** Figure C.1 in Appendix C Resource Classification, *Australian Energy Resource Assessment*. Canberra: Department of Industry, Geoscience Australia, and Bureau of Resources and Energy Economics, 2014.





## Valuation of Mineral and Energy Resources

In physical terms, the scope of mineral and energy resources (or assets) measured in the Central Framework may be greater than the scope of mineral and energy resources measured in monetary terms following the SNA definition of economic assets.

This is because there is no requirement in physical terms that mineral and energy resources (or assets) must deliver economic benefits to an economic owner.



## Valuation of Mineral and Energy Resources

The economic exploitation of a mineral or energy resource is an important consideration given the capital intensity of the mining industry:

*sunk capital* = fixed capital and exploration costs

Large amounts of fixed capital is required to extract mineral and energy resources, relative to other factors of production.





## Valuation of Mineral and Energy Resources

The ASNA treatment of mineral and energy resources reflects the treatment adopted by Geoscience Australia for identifying Australia's resources:

- *economically demonstrated resources* (or EDRs) equate to proven plus probable resources

**EDRs are based on the McKelvey Box:**

- have a high probability of existence are economically feasible to extract, given current technology and relative prices
- equate to the volume available for production



## Valuation of Mineral and Energy Resources

**BPS Indonesia publishes national physical and monetary accounts for commercial and potential reserves:**

- **commercial reserves consist of probable and proven reserves with an economic value**
- **potential reserves consist of inferred, indicated and measured reserves**

**BPS Indonesia does not publish sectoral accounts.**



## Valuation of Mineral and Energy Resources

Asset lives for mines and oilfields are derived indirectly using EDRs from Geoscience Australia:

- average annual production for each commodity is divided into its EDR to derive the asset life for each commodity
- mine lives for some commodities, namely black coal, iron ore and uranium, have extremely long asset lives



## Valuation of Mineral and Energy Resources

The physical asset account for mineral and energy resources records:

- the volume of mineral and energy resources at the beginning and end of an accounting period
- the change in this stock over the accounting period

The following table provides a basic structure for a physical asset account for mineral and energy resources:

# Asset Account for Mineral and Energy Resources: Physical Terms

Table 5.8 Physical asset account for mineral and energy resources

	Type of mineral and energy resource				
	(Class A: Commercially recoverable resources)				
	Oil resources (thousands of barrels)	Natural gas resources (cubic metres)	Coal and peat resources (thousands of tonnes)	Non-metallic minerals (tonnes)	Metallic minerals (thousands of tonnes)
Opening stock of mineral and energy resources	800	1 200	600	150	60
<b>Additions to stock</b>					
Discoveries					20
Upward reappraisals		200		40	
Reclassifications					
<i>Total additions to stock</i>		200		40	20
<b>Reductions in stock</b>					
Extractions	40	50	60	10	4
Catastrophic losses					
Downward reappraisals			60		
Reclassifications					
<i>Total reductions in stock</i>	40	50	120	10	4
Closing stock of mineral and energy resources	760	1 350	480	180	76

SOURCE: Table 5.8 in UN (2014) *System of Environmental-Economic Accounting 2012 - Central Framework*, p.165.



## Additions and Reductions to Stock

The stock of resources will change due to:

- ***discoveries***: should be recorded by class of resource
- ***reappraisals***: may be upwards or downwards based on changes in geologic information, technology, resource price or a combination of these factors
- ***extraction***: should reflect the quantity of the resource physically removed from the deposit, and include estimates of illegal extraction



## Additions and Reductions to Stock

The stock of resources will also change due to:

- ***catastrophic losses***: deposits can be recovered and the issue is one of economic viability of extraction rather than actual loss of the resource itself  
e.g. flooding and collapse of mines
- ***reclassification***: may occur if access rights to a deposit are changed as a result of government decisions, but all other changes in the quantity of known deposits should be treated as reappraisals

Note that these resources are not renewable like timber.





## Key Concepts

**SNA and SEEA measure the same assets. SNA uses balance sheets and SEEA uses asset accounts:**

- **balance sheets measure the value of stocks of assets and liabilities at the beginning and end of the accounting period**
- **all changes between the opening and closing balance sheet are recorded in the various accumulation accounts**