UNFC–2009 –
An Introduction to the United Nations Framework Classification

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India
29-30 October 2013
UNFC – 2009

- What is it?
- How it works
- Alignment
- Future
UNFC – 2009

• United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources

• Generic, principles-based system
  • Applicable to both solid minerals and fluids

• Based on three criteria
  Economic and social viability
  Field project status and feasibility
  Geological knowledge
Why is the UNFC needed?

• Need for common global language for energy and mineral resource estimates
  – What are “proved reserves”? 
  – What are “resources”?

• Increasing overlap between mining and oil & gas industries
  – Major issue with respect to “unconventional” resources 
  – Which system applies to mined petroleum solids?

• Increasing need to be able to compare renewable energy resources with non-renewable resources
UNFC – 2009

- What is it?
- How it works
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- Future
Proved reserves must be ...
UNFC – Three criteria

- Economic and social viability (E axis)
- Field project status and feasibility (F axis)
- Geological knowledge (G axis)
UNFC-2009 – How it works

E axis categories

F axis categories

G axis categories
UNFC – Categories

E axis categories
UNFC – E axis

• Degree of favourability of social and economic conditions in establishing the commercial viability of the project

• Includes consideration of market prices and relevant legal, regulatory, environmental and contractual conditions

• E1, E2 and E3 categories

• E1 is “best”
### E axis category definitions

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Extraction and sale has been confirmed to be economically viable.</td>
</tr>
<tr>
<td>E2</td>
<td>Extraction and sale is expected to become economically viable in the foreseeable future.</td>
</tr>
<tr>
<td>E3</td>
<td>Extraction and sale is not expected to become economically viable in the foreseeable future or evaluation is at too early a stage to determine economic viability.</td>
</tr>
</tbody>
</table>
UNFC – How it works

• The category definitions are the building blocks of the system

• These are combined (E, F, G) in the form of classes

• Class 111 means that the reported quantities have satisfied the definitions for:
  – E1, F1 and G1

• There are no constraints on combinations, but not all will be meaningful
UNFC – How it works

### Proved Reserves

Proved Reserves are those quantities of petroleum, which by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under defined economic conditions, operating methods, and government regulations.

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Extraction and sale has been confirmed to be economically viable.</td>
</tr>
<tr>
<td>F1</td>
<td>Feasibility of extraction by a defined development project or mining operation has been confirmed.</td>
</tr>
<tr>
<td>G1</td>
<td>Quantities associated with a known deposit that can be estimated with a high level of confidence.</td>
</tr>
</tbody>
</table>

**UNFC Class: 111**
UNFC – How it works

• Some users prefer the 3D representation of UNFC

• Other users prefer a 2D representation

• Consensus meant we needed both!

• They are simply different visualisations of the same system

• Classes may be a single code (e.g. 111) or groups of codes (e.g. 111, 112 and 113)
UNFC – Examples of classes

- Commercial projects
- Potentially commercial projects
- Non-commercial projects
- Exploration projects
- Additional quantities in place
- Other combinations
- Extracted quantities
- Codification (E1;F2;G3)
## UNFC – 2D representation

<table>
<thead>
<tr>
<th>Total commodity initially in place</th>
<th>Extracted</th>
<th>Sales Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future recovery by commercial development projects or mining operations</td>
<td>Commercial Projects</td>
<td></td>
</tr>
<tr>
<td>Potential future recovery by contingent development projects or mining operations</td>
<td>Potentially Commercial Projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Commercial Projects</td>
<td></td>
</tr>
<tr>
<td>Total commodity initially in place associated with known deposits</td>
<td>Exploration Projects</td>
<td></td>
</tr>
<tr>
<td>Potential future recovery by successful exploration activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional quantities in place associated with potential deposits</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each class is uniquely defined by its code
UNFC – 2009

• What is it?

• How it works

• Alignment

• Future
Alignment of systems (schematic)

UNFC-2009
- Sales Production
  - Non-sales Production
    - Commercial Projects
    - Potentially Commercial Projects
    - Non-Commercial Projects
      - Additional quantities in place
      - Exploration Projects
        - Additional quantities in place

PRMS
- Production
  - Class
    - Reserves
    - Contingent Resources
      - Unrecoverable
    - Prospective Resources
      - Unrecoverable

CRIRSCCO
- Extracted
  - Class
    - Mineral Reserves
    - Mineral Resources
      - Not reported
    - Exploration Results
      - Not reported
UNFC – Sub-categories

- The system allows further granularity through sub-categories

- These are optional

- They facilitate mapping with the project maturity sub-classes of PRMS

- These sub-classes also align with some mining companies’ reporting practices and with the IAEA classification of production centres
## F axis sub-category definitions

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Feasibility of extraction by a defined development project or mining operation has been confirmed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1.1</td>
<td>Extraction is currently taking place.</td>
</tr>
<tr>
<td>F1.2</td>
<td>Capital funds have been committed and implementation of the development project or mining operation is underway.</td>
</tr>
<tr>
<td>F1.3</td>
<td>Sufficiently detailed studies have been completed to demonstrate the feasibility of extraction by implementing a defined development project or mining operation.</td>
</tr>
</tbody>
</table>
UNFC – Using all sub-categories

<table>
<thead>
<tr>
<th>UNFC Classes defined by categories and sub-categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Extracted</strong></td>
</tr>
<tr>
<td>Sales Production</td>
</tr>
<tr>
<td>Non-sales Production</td>
</tr>
<tr>
<td><strong>Class</strong></td>
</tr>
<tr>
<td><strong>Sub-class</strong></td>
</tr>
<tr>
<td><strong>Categories</strong></td>
</tr>
<tr>
<td><strong>E</strong></td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Commercial Projects</td>
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<td></td>
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<td></td>
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<tr>
<td>Potentially Commercial Projects</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Non-Commercial Projects</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Additional quantities in place</td>
</tr>
<tr>
<td>Potential Deposit</td>
</tr>
<tr>
<td>Additional quantities in place</td>
</tr>
</tbody>
</table>
How can we use alignment?

• Quantities can be estimated using current well-established commodity-specific systems

• Reporting under these systems can continue unchanged

• But the same quantities can also be reported under UNFC using the numerical codes

• The reporting is then independent of commodity type, extraction methodology and ambiguous terminology (e.g. “reserves”)
UNFC – 2009

- What is it?
- How it works
- Alignment
- Future
Applications under development

- **Renewable energy**
  - Bio-fuels
  - Wind
  - Solar
- **Uranium classification with the IAEA**
- **Carbon Storage evaluation**
Renewable Energy and the UNFC

Renewable energy is on a significant growth trend.

The same issues impacting mineral and petroleum projects are relevant for renewable energy.

There is a real need for a consistent framework for comparing renewable projects with conventional energy forms.

UNFC could meet these needs with minimal modification, providing a tool for communication around issues of sustainable energy.

Real stakeholder commitment.

Shares of World Primary Energy

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil</th>
<th>Coal</th>
<th>Gas</th>
<th>Hydro</th>
<th>Nuclear</th>
<th>Renew.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
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<tr>
<td>2010</td>
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<tr>
<td>2030</td>
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</tbody>
</table>

*Includes biofuels
Conclusion

- INFC-2009 is a generic, principles-based system
  - Applicable to both solid minerals and fluids
  - Uses a numerical coding system

- Based on three criteria
  - Economic and social viability
  - Field project status and feasibility
  - Geological knowledge

- Direct linkage to PRMS and the CRIRSCO Template
  - Quantities can be estimated using these systems and reported using the UNFC numerical codes

- Key goal is to provide a tool to facilitate global communications
  - Other systems can be linked to it (e.g. IAEA “red book” system)
  - Potential to use system for renewable energy and CCS projects
What are specifications?

Definitions

Specifications

Guidelines

Classification Framework

Application Rules

Optional Guidance
What are specifications?

• Specifications set out the basic rules that are considered necessary to ensure an appropriate level of consistency in application

• They provide additional instructions on how the definitions must be applied in specific circumstances

• 4 themes identified
  – Environmental and social considerations
  – National resources reporting
  – Disclosure
  – Commodity specifications
Environmental and social considerations

• Highlights the fact that the E-axis category definitions explicitly include consideration of such issues

• Emphasises the need for a “social licence to operate” both before and during extractive activities
National resource reporting

- Government level reporting usually at aggregated level
- Not necessarily the same as corporate estimates
- Aggregation methodology to be disclosed
Disclosure

• UNFC-2009 is a voluntary system

• Unless mandated or restricted by government or other regulatory body, disclosure of resource quantities is at the discretion of the reporter

• However, certain generic specifications requiring disclosure of information relevant to the reported estimates are mandatory
Commodity specifications & alignment

• Alignment of UNFC-2009 with the CRIRSCO Template and PRMS

• Agreements with CRIRSCO/SPE to provide commodity-specific specifications

• Other systems can be used, provided they are “aligned”
Commodity specifications & alignment

• Bridging Documents subject to evaluation and endorsement to ensure alignment

• Quantities can be estimated in “aligned system” or directly, provided all specifications are honoured

• Need for generic specifications in order to provide a common basis for reporting at UNFC level
UNFC Classification Framework and Category Definitions

Generic Specifications

Bridging Document

Petroleum Specifications

PRMS

Bridging Document

Solid Mineral Specifications

CRIRSCO

Bridging Document

Other Aligned Systems

Sustainable Mining and the UNFC, India, 29-30 October 2013
Generic specifications

• In these generic specifications, the following words have specific meanings:
  – “Shall” is used where a provision is mandatory;
  – “Should” is used where a provision is preferred; and,
  – “May” is used where alternatives are equally acceptable.

• Mandatory generic specifications set a minimum standard for reporting

• Commodity-specific specifications for the same issue may be adopted provided they fully meet the requirements
Mandatory disclosure issues

- UNFC numerical codes
- Bridging document
- Effective date
- Commodity or product type
- Basis for estimate
- Reference point
Summary of development process

- UNFC-2009 simplification with generic definitions only
- Survey of stakeholder requirements for specifications
- Development of specifications
  - Public comment period
- EGRC Recommendation of specifications document
  - Generic specifications
  - Bridging documents with CRIRSCO Template and PRMS
In summary ...

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http://www.unece.org/energy/se/reserves.html