Commodity Specifications for the UNFC-2009: Application of the Framework Classification Using the PRMS

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Outline

• Why do we bother to classify resources?
• What is the UNFC?
• How do we use with the SPE-PRMS?
• What are the future applications?
Stakeholders

- External Influencers
- Internal Stakeholders
  - Internal preparers
  - Governance and Assurance
  - Internal users
- External user
Resource progression

Access  Appraise  Select  Define  Execute  Operate

Development Pending  Justified for Development  Approved for Development  On Production  Production

Discovery Criteria
Commercial Criteria
Volumetric Uncertainty

Key
- Exploration
- Non-Commercial
- Commercial
- Potentially Commercial

Exploration Prospect
Resource progression – adding value

- Access
- Appraise
- Select
- Define
- Execute
- Operate

**Key**

- Exploration
- Commercial
- Non-Commercial
- Potentially Commercial

**Diagram**

- Exploration Prospect
- Development Unclarified
- Development on Hold
- Development Pending
- Justified for Development
- Approved for Development
- On Production
- Production

**Criteria**

- Discovery Criteria
- Commercial Criteria
- Volumetric Uncertainty
Outline

• Why do we bother to classify resources?
• What is the UNFC?
• How do we use with the SPE-PRMS?
• What are the future applications?
● 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 do we need the UNFC?

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
Proved reserves must be...

- Geologically well defined (with high confidence)
- Technically feasible to extract
- Economic to extract (commercially feasible)
### UNFC – How it works

#### Category Definition

<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 – 2D representation

<table>
<thead>
<tr>
<th>Extracted</th>
<th>Sales Production</th>
<th>Non-sales Production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class</td>
<td>Categories</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>Future recovery by commercial development projects or mining operations</td>
<td>Commercial Projects</td>
<td>1</td>
</tr>
<tr>
<td>Potential future recovery by contingent development projects or mining operations</td>
<td>Potentially Commercial Projects</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Non-Commercial Projects</td>
<td>3</td>
</tr>
<tr>
<td>Additional quantities in place associated with known deposits</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Potential future recovery by successful exploration activities</td>
<td>Exploration Projects</td>
<td>3</td>
</tr>
<tr>
<td>Additional quantities in place associated with potential deposits</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Each class is uniquely defined by its code.
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
UNFC Classes defined by categories and sub-categories

<table>
<thead>
<tr>
<th>Class</th>
<th>Sub-class</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Extracted</strong></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td><strong>Sales Production</strong></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Non-sales Production</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total commodity initially in place</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Known Deposit</strong></td>
<td>Commercial Projects</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Approved for Development</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Justified for Development</td>
<td>1</td>
</tr>
<tr>
<td><strong>Potentially Commercial Projects</strong></td>
<td>Development Pending</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Development On Hold</td>
<td>2</td>
</tr>
<tr>
<td><strong>Non-Commercial Projects</strong></td>
<td>Development Unclarified</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Development Not Viable</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Additional quantities in place</strong></td>
<td></td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Potential Deposit</strong></td>
<td>Exploration Projects</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>[No sub-classes defined]</td>
<td></td>
</tr>
<tr>
<td><strong>Additional quantities in place</strong></td>
<td></td>
<td>3.3</td>
</tr>
</tbody>
</table>
Outline

• Why do we bother to classify resources?
• What is the UNFC?
• How do we use with the SPE-PRMS?
• What are the future applications?
Alignment to other systems

UNFC-2009

- Total commodity initially in place
  - Sales Production
    - Non-sales Production
      - Class
        - 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

CRIRSCO

- Extracted
  - Class
  - Mineral Reserves
    - Not reported
  - Mineral Resources
    - Not reported
  - Exploration Results
    - Not reported
UNFC Alignment

Classification Framework and Category Definitions

Generic Specifications

- Bridging Document
- Bridging Document
- Bridging Document

- Petroleum Specifications PRMS
- Solid Mineral Specifications CRIRSCO
- Other Aligned Systems
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”).
Outline

• Why do we bother to classify resources?
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Applications under development

- Renewable energy
  - Bio-fuels
  - Wind
  - Solar
- Uranium classification with the IAEA
- Carbon Storage evaluation
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
Conclusion

● **UNFC-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