G Axis Review Working Group Progress Report

Expert Group on Resource Classification

Eighth session

Geneva, 26 – 28 April 2017

UNECE

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G Axis Review WG - Terms of Reference

- **Mandate:**
  - The EGRC 6th Session determined that there was a need to review the G axis name, category definitions and supporting explanations to better reflect the needs of the renewables sector without compromising their applicability to solid minerals and petroleum (paras 38 - 40).
- **Terms of Reference:**
  - To form a G Axis Review Working Group consisting of expertise from the Renewable Energy sector, the current sectors covered by the classification (Oil & Gas, and Minerals), and generic expertise in the interpretation and application of the UNFC-2009 framework.
  - To review the current G axis category definitions and supporting explanations, including the relevant sections in the proposed Renewable Energy Specification.
  - To propose suitable modifications, if required, that would better reflect the needs of the proposed Renewables Energy specifications without compromising their applicability to solid minerals and petroleum.
  - To propose suitable G axis name change(s), if required.
- **Interactions:**
  - Renewable Taskforce
  - Geothermal and Bioenergy WG

Name	*Affiliation / Expertise*
James Primrose (Chair)	Private sector, bioenergy, oil & gas
Paul Bankes	Private sector, mining
Vitor Correia	Professional association, geology
Gioia Falcone	Academia, geothermal
Isabel Fernandez	Professional association, geology
Michael Neumann	Professional association, geology
Jim Ross	Private sector, oil & gas

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Recap of Previous (2015/16) Key Findings and Recommendations

Findings:

1. G Axis applicable to Renewable Energy Projects.
   - Confirms conclusion of Renewable Taskforce
   - Informed by further work on the Geothermal and Bioenergy Specifications.
2. Clearer guidance required on the application of uncertainty/levels of confidence.
   - Guidance contained in the bridged documents for fossil energy and solid minerals.
   - Clearer guidance on G1-2-3 & G4.1.-2- .3 required however in Renewable Energy Specification.
3. Ambiguity/confusion can be caused by the shortened name "geological knowledge".
   - Sole focus on geological and/or sub-surface risks.
   - Potentially not unique to Renewable Energy Projects.
   - Expert Group has recommended that the full name "Geological knowledge and potential recoverability" be used when possible.
4. UNFC terminology not immediately transferable to non sub-surface resource projects.
   - A secondary issue, that is dealt with in the Renewable Energy Specification.
   - However a reminder that in the longer term as UNFC coverage widens a potential need to adopt more generic terminology.

Recommendations:

- Revision to the Draft Renewable Energy Specification.
  - Improved guidance on the treatment of uncertainty under the G Axis.
  - Explicit reference to the established approaches for determining estimates for G1, G2 and G3.
    - Incremental Approach
    - Scenario Approach
    - Probabilistic Approach

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2016/17 Work Program

1. **Consideration of an alternative name for the G Axis**
   - Internet-based survey of the membership of the Expert Group on Resource Classification.

2. **Recommendation for text providing explanation of the purpose of the G axis.**

3. **Recommendations for text changes to the G-axis category definitions and supporting explanations**

- Recommendations tabled for consideration as part of any future update of the UNFC-2009 document.

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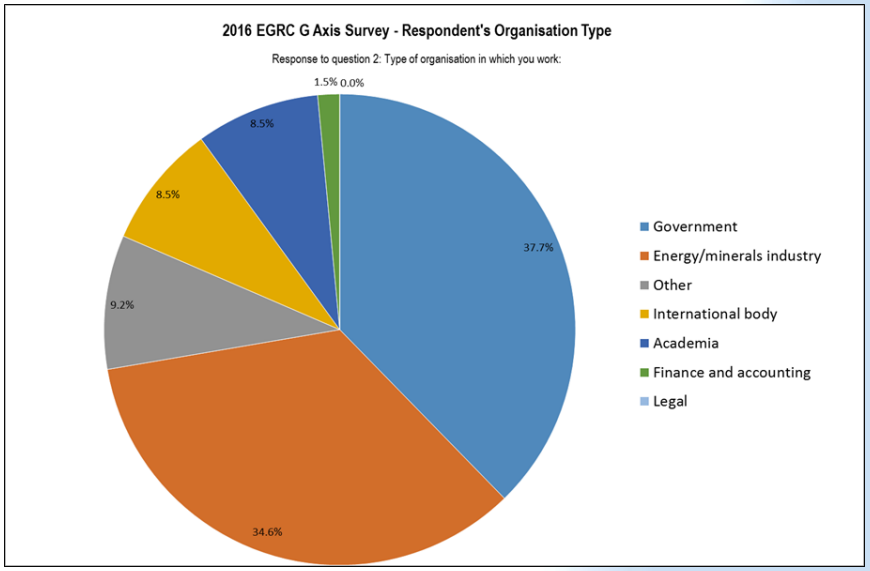
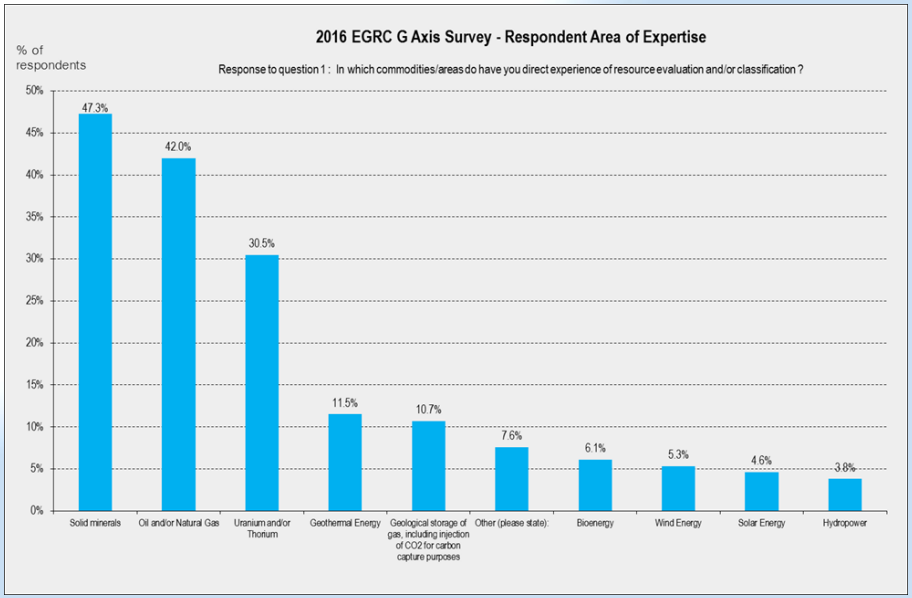
Alternative Name For the G Axis

- EGRC Membership Survey
  - 72 Responses.
  - 142 suggestions for alternative names from 92% of the respondents.
  - 6% did not support a change to the current name for the G axis.
  - Complete list of suggestions and comments in the report.
- No one single name that is:
  1. Concise, and…
  2. Effectively defines the G axis.
- Responses suggest a lack of unanimity across the EGRC in the definition and role of the G axis.
- Recommendation:
  - Rename the G Axis as the "G Axis".
  - Plus provide a comprehensive explanation of the G Axis in the UNFC-2009 text .
  - Potential implications for E and F axis naming convention / approaches.





Recommendation for text providing explanation of the purpose of the G axis

- Proposed UNFC-2009 Text

  *"The G axis is used in conjunction with the E and F axes to classify the estimated quantities of a commodity that are associated with a specific **Commodity Source** in a specific geographic location. Classification is based on the level of knowledge and/or confidence in specific criteria which, for solid minerals, petroleum and geothermal energy, correspond to geological knowledge and potential recoverability. For other commodities, where geology may not be relevant, the criteria will include uncertainty in both the availability of the **Commodity Source** and in the subsequent extraction or conversion into a saleable product. Details of relevant criteria are addressed in Bridging Documents (where available) and in commodity-specific specifications. Commonly, there will be more than one G Axis category applicable to that specific **Commodity Source**, and to estimated recoverable quantities associated with that **Commodity Source**, reflecting the distinction between quantities that can be estimated at different levels of confidence based on consideration of the relevant criteria. Estimates of recoverable quantities of the commodity reflect the application of an extraction and/or conversion Project or Projects to that **Commodity Source**, or to potential storage in the case of Projects designed for such purposes."*

- Proposed Definition of Commodity Source

  A Commodity Source is the initial form in which a commodity of potential economic interest is found, or from which such a commodity may be derived. In the case of solid minerals, the Commodity Source would generally be termed a mineral deposit, whereas for oil and gas it would be an accumulation or reservoir. For renewable energy sources, it is the primary energy (e.g. the earth's thermal energy, energy from the sun, wind, biomass, river flow, tides, waves) available for extraction of (and conversion into) energy products, such as electricity, heat and biofuels.

Recommendations for text changes to the G-axis category definitions and supporting explanations

- Emphasis on:
  1. Avoid terminology that might limit the future scope of UNFC-2009.
  2. Integration with specifications for renewable energy resources and injection projects.

Category	*Current Definition*	*Proposed Generic Definition*
G1	Quantities associated with a known deposit that can be estimated with a high level of confidence.	Quantities associated with, or recoverable from, a known Commodity Source that can be estimated with a high level of confidence.
G2	Quantities associated with a known deposit that can be estimated with a moderate level of confidence.	Quantities associated with, or recoverable from, a known Commodity Source that can be estimated with a moderate level of confidence.
G3	Quantities associated with a known deposit that can be estimated with a low level of confidence.	Quantities associated with, or recoverable from, a known Commodity Source that can be estimated with a low level of confidence.
G4	Estimated quantities associated with a potential deposit, based primarily on indirect evidence.	Estimated quantities associated with, or recoverable from, a potential Commodity Source, based primarily on indirect evidence.

Category	*Current Supporting Explanation*	*Proposed Supporting Explanation*
G1 G2 G3	For in situ (in-place) quantities, and for recoverable estimates of fossil energy and mineral resources that are extracted as solids, quantities are typically categorized discretely, where each discrete estimate reflects the level of geological knowledge and confidence associated with a specific part of the deposit. The estimates are categorized as G1, G2 and/or G3 as appropriate. For recoverable estimates of fossil energy and mineral resources that are extracted as fluids, their mobile nature generally precludes assigning recoverable quantities to discrete parts of an accumulation. Recoverable quantities should be evaluated on the basis of the impact of the development scheme on the accumulation as a whole and are usually categorized on the basis of three scenarios or outcomes that are equivalent to G1, G1+G2 and G1+G2+G3.	Quantities may be categorized discretely as G1, G2 and/or G3 (along with the appropriate E and F categories), based on the level of confidence in the estimates (high, moderate and low confidence, respectively), as is typically the case for solid minerals, for example. Alternatively, quantities may be categorized as a range of uncertainty as reflected by either (i) three specific deterministic scenarios (low, best and high cases) or (ii) a probabilistic analysis from which three outcomes (P_{90}, P_{50} and P_{10})[1] are selected. In both of these methodologies (the "scenario" and "probabilistic" approaches), the quantities are then classified on the G Axis as G1, G1+G2 and G1+G2+G3 respectively. In all cases, potentially recoverable quantities are those associated with a defined Project[2].
G4	Quantities that are estimated during the exploration phase are subject to a substantial range of uncertainty as well as a major risk that no development project or mining operation may subsequently be implemented to extract the estimated quantities. Where a single estimate is provided, it should be the expected outcome but, where possible, a full range of uncertainty in the size of the potential deposit should be documented (e.g. in the form of a probability distribution). In addition, it is recommended that the chance (probability) that the potential deposit will become a deposit of any commercial significance is also documented.	A potential Commodity Source is one where the existence of quantities of a commodity of potential economic interest is based primarily on indirect evidence and has not yet been confirmed. Further data acquisition and evaluation would be required for confirmation. Where a single estimate is provided, it should be the expected outcome. Further subdivision, comparable to the G1/G2/G3 categories, is optional and is addressed through the use of sub-categories (G4.1, G4.2 and G4.3) as set out in Specification P of UNFC-2009[3]. In addition, it is recommended that the chance (probability) that the potential Commodity Source will eventually lead to a commercial Project is assessed and documented.

Final Conclusions and Future Work Scope

1. G Axis WG Recommendations to be tabled for consideration as part of any future revision to the UNFC 2009.

2. The G Axis WG has completed its original brief as per the Terms of Reference.

3. Guidance is sought on the future requirement for the G Axis WG.
   - WG could continue as an Ad Hoc "centre of expertise" on G Axis related issues to advise the continued development of renewable energy commodity specific specifications and any future UNFC 2009 review process.
   - Equally, WG could stand down and expertise rolled into TAG and/or future taskforce/working group involved in the future revision of the UNFC-2009.

4. The experience with the survey, suggests that such approaches (properly constructed), could be a valuable means of increasing engagement.

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