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Resource Estimations for Conventional Deep Geothermal Projects

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Summary

Significant capital has been raised on the Toronto Stock Exchange (TSX) by publicly traded companies seeking financing for renewable energy projects. In 2002, the TSX adopted the National Instrument 43-101 for mineral and mining development to help ensure that misleading, erroneous or fraudulent information relating to mineral properties is not published and promoted to investors on the stock exchanges overseen by the Canadian Securities Authority. This National Instrument came about in response to the "Bre-X" scandal that culminated in 1997. In 2003, a parallel Instrument to the NI43-101 was adopted for estimation of Oil and Gas reserves NI51-101. Creation of these instruments involved a broad spectrum of specialists, government agencies, professional organizations and companies working in the sectors. In the geothermal realm, Australia was first to propose a code (Williams et al. 2010). This code was adopted by the International Geothermal Association (IGA) who endorsed it. From there it was proposed to the TSX as non-compulsory, voluntary code for companies reporting on the TSX. The goals were the same as the NI43-101 and NI51-100 – to provide "a basis for transparency, consistency and confidence in public reporting of geothermal information" (CanGEA 2010).

Peer-reviewed science is the basis for a reporting standard, and much has been learned in the ten years since the geothermal codes were released. For example, the NI51-101 has undergone more than a dozen changes since its introduction almost 20 years ago, and the geothermal reporting codes been developing as well. In 2014 the IGA entered into an agreement to work with the United Nations Economic Commission for Europe (UNECE) who were developing a framework classification for geothermal energy (Figure 1). The comparison between fossil energy, mineral reserves, and geothermal energy was published in 2016 (UNECE 2016).

Along with the evolving science base for resource classification and estimation, important cultural and social values have entered the arena and are changing the landscape. The UNECE has continued to push ahead on updating and refining the resource framework. In 2019 they released an updated framework called 'United Nations Framework for Classification for Resources' (UNFC) (UNECE 2019). The importance of this update is its full alignment with the UN's sustainable resource management goals, referred to as '2030 Agenda for Sustainable Management'. In doing so, there is a heavy emphasis on the environmental-socio-economic viability as well as the technical feasibility of projects. This growing trend is parallel with significantly increasing interest in geothermal projects in Canada and across the globe (Hickson et al. 2020a).

The three-dimensional matrix devised by the UNFC, called 'Categories and Examples of Classes' to represent the multiplicity of values incorporated into the framework have never been applied to a geothermal project in Canada (UNECE 2019).

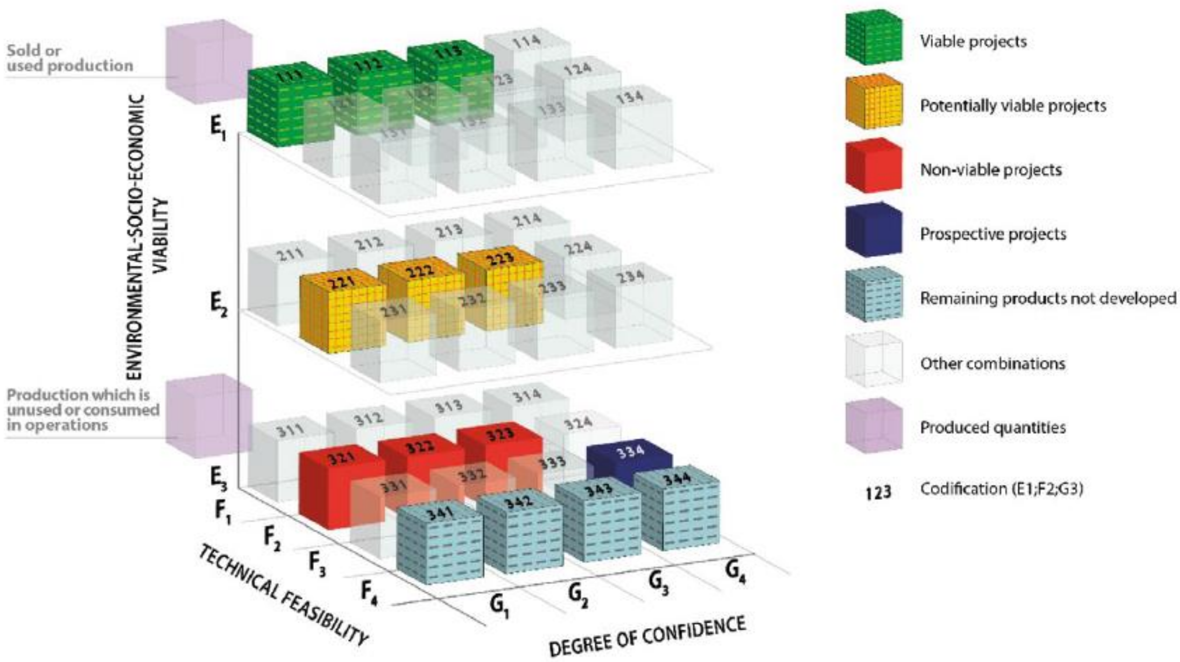

Figure 1. UNFC categories and examples of classes (UNECE 2019).

As a classification framework, the UNFC provides the associated level of confidence in the potential recoverability of the resource. Still, it does not facilitate the quantification methods for resource estimation. The Alberta No. 1 project, Alberta's first geothermal power facility, could be the platform to demonstrate the choice of suitable quantification method while implementing the UNFC framework (Hickson et al. 2020b). In its applications, the team will be carrying out a resource calculation for the project area and striving to comply with the intent of the UNFC in adhering to the UN's sustainability goals. The geological, technical and socio-economic attributes from the project will further establish the confidence of the investor in the assessment and development of the potential geothermal resources in Canada.

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