AFRICAN MINERAL AND ENERGY RESOURCES CLASSIFICATION AND MANAGEMENT SYSTEM (AMREC)

Draft Version 8.0 / Date 31 August 2019

AFRICAN MINERAL AND ENERGY RESOURCES CLASSIFICATION AND MANAGEMENT SYSTEM (AMREC)

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LIST OF ABBREVIATIONS

API	American Petroleum Institute
AMDC	African Mineral Development Centre
AMV	Africa Mining Vision
AU	African Union
AUC	African Union Commission
AWG	African Union-AMREC Working Group
CMV	Country Mining Vision
CP	Competent Person
CPD	Continuous Professional Development
GMIS	Geological and Mineral Information System
GSOs	Geological Survey Organizations
MDGs	Millennium Development Goals
PARC	Pan-African Resource Reporting Code
RECs	Regional Economic Communities
SDGs	Sustainable Development Goals
TCG	Technical Coordination Group
UNECA	United Nations Economic Commission for Africa
UNECE	United Nations Economic Commission for Europe
UNFC	United Nations Framework Classification for Resources
UNRMS	United Nations Resource Management System
AMREC	African Mineral and Energy Resources Classification and Management System

ACKNOWLEDGEMENTS

- African Union Commission (AUC) for supporting and facilitating the development of the document.
- African Minerals Development Centre (AMDC) under the United Nations Economic Commission for Africa (UNECA) for initiating the project in August 2017.
- United Nations Economic Commission for Europe (UNECE) for providing the technical support.
- The Expert Group on Resource Management (EGRM) and its Technical Advisory Group (TAG) for reviewing the document, in particular Mr. Claudio Virus (Alberta Energy Regulator, Canada).
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PART A - OVERVIEW AND CONTEXT

1. Introduction

African Mineral and Energy Resources Classification and Management System (AMREC) is a continental system for management of Africa's mineral and energy resources.

The AMREC is based on United Nations Framework Classification for Resources (UNFC) Principles, Generic Specifications and Guidelines and is aligned to Africa Mining Vision (AMV) and the Sustainable Development Goals (SDGs). Adapting to national or local needs, the AMREC provides the specifications and guidelines required for sustainable development of Africa's mineral and energy resources.

The objective of the document is to provide comprehensive guidance on sustainable energy and mineral resource management in Africa for the following functions:

- Regional Africa resource management: To enable and support coherent and consistent regional resource classification and management policies and associated regulations at African Union level in the service of delivering the African Union Agenda 2063 and the Africa Mining Vision.
- National resource management: To assist the development and implementation of sustainable resource management policies and regulations at national level.
- Company internal business process innovation: To enable companies to develop and adopt business processes that are sustainable, profitable, socially inclusive, environmentally responsible and resilient
- Financial reporting: To enable companies to report resource assets and raise finances from appropriate financial institutions in a manner consistent with international standards and good practices.

This document should be read and applied in conjunction with the latest version of UNFC and its Generic Specifications. Appropriate sectoral specifications, standards and guidelines (Minerals, Petroleum, Renewable Energy, Nuclear Fuels) should be applied for the concerned sectors.

This document is structured into four parts as below:

- Part A provides the background and general considerations of the system including the Africa Mining Vision and Sustainable Development Goals (Agenda 2030) context, which are deemed to be the overarching vision for the development of Africa's mineral and energy resources.
- Part B introduces the general, as well as sectoral principles of AMREC.
- Part C is the Pan-African Resource Reporting Code (PARC), which is a sub-component of AMREC that shall be used for public disclosures.
- Part D of the document provides guidelines for governance and maintenance of the document.

2. Agenda 2063

Agenda 2063 is a strategic framework for the socio-economic transformation of Africa over the next 50 years. Agenda 2063 builds on, and seeks to accelerate the implementation of past and existing continental initiatives for growth and sustainable development.

The guiding vision for Agenda 2063 is the African Union vision of:

> "An integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in international arena"

The foundations for Agenda 2063 are:

- The Constitutive Act of the African Union
- The African Union Vision
- The 8 Priority Areas of AU 50th Anniversary Solemn Declaration

- African Aspirations for 2063
- Regional and Continental Frameworks
- Member States National Plans and policies for sustainable development

The African Aspirations for 2063 that were derived through a consultative process with the African Citizenry are:

- A Prosperous Africa, based on inclusive growth and sustainable development
- An integrated continent, politically united, based on the ideals of Pan Africanism and the vision of Africa's Renaissance
- An Africa of good governance, democracy, respect for human rights, justice and the rule of law
- A Peaceful and Secure Africa
- Africa with a strong cultural identity, common heritage, values and ethics
- An Africa whose development is people driven, relying on the potential offered by people, especially its women and youth and caring for children
- An Africa as a strong, united, resilient and influential global player and partner

3. Sustainable Development Goals

On 25 September 2015, the 194 countries of the UN General Assembly adopted the 2030 Development Agenda titled Transforming our world: the 2030 Agenda for Sustainable Development. The Sustainable Development Goals (SDGs) is a set of 17 "Global Goals" with 169 targets among them.

The SDGs build on the success of the Millennium Development Goals (MDGs) and aim to go further to end all forms of poverty. The new Goals are unique in that they call for action by all countries, poor, rich and middle-income to promote prosperity while protecting the planet. They recognize that ending poverty must go hand-in-hand with strategies that build strong economic growth and addresses a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.

While the SDGs are not legally binding, governments are expected to take ownership and establish national frameworks for the achievement of the 17 Goals. Countries have the primary responsibility for follow-up and review of the progress made in implementing the Goals, which will require quality, accessible and timely data collection. Regional follow-up and review will be based on national-level analyses and contribute to follow-up and review at the global level for a positive and global transformation of the society

While all the SDGs are relevant to resource management and AMREC, the most relevant ones are:

- SDG #1 - End poverty in all its forms everywhere
- SDG #2 - End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- SDG #5 - Achieve gender equality and empower all women and girls
- SDG #6 - Ensure access to water and sanitation for all
- SDG #7 - Ensure access to affordable, reliable, sustainable and modern energy for all
- SDG #9 - Build resilient infrastructure, promote sustainable industrialization and foster innovation
- SDG #10 - Reduce inequality within and among countries
- SDG #11- Make cities inclusive, safe, resilient and sustainable
- SDG #12 - Ensure sustainable consumption and production patterns

- SDG #13 - Take urgent action to combat climate change and its impacts
- SDG #15 - Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss
- SDG #17 - Revitalize the global partnership for sustainable development

AMREC-PARC will have a specific reference to the following targets:

- 1.6 - Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions.
- 2.3 - By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, local communities, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.
- 5.7 - Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws.
- 6.3 - By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
- 7.1 - By 2030, ensure universal access to affordable, reliable and modern energy services
- 7.2 - By 2030, increase substantially the share of renewable energy in the global energy mix
- 9.4 - By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.
- 9.6 - Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States.
- 9.7 - Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.
- 10.9 - Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes
- 11.4 - Strengthen efforts to protect and safeguard the world’s cultural and natural heritage
- 11.8 - Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning
- 12.2 - By 2030, achieve the sustainable management and efficient use of natural resources
- 12.5 - By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse
- 12.6 - Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

- 15.3 - By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world
- 17.9 - Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the sustainable development goals, including through North-South, South-South and triangular cooperation

Specific sustainability in resource management emphasized by AMREC will be grounded in the following core values:

- Energy and minerals as an eco-system service
- Comprehensive recovery of all value
- Holistic management and development of energy basins in Africa
- Zero waste – zero harm
- Tight linkages to Food-Water-Energy security

4. Africa Mining Vision

The Africa Mining Vision (AMV), "Transparent, equitable and optimal exploitation of mineral resources to underpin broad-based sustainable growth and socio-economic development," was adopted by Heads of State at the February 2009 African Union summit following the October 2008 meeting of African Ministers responsible for Mineral Development. It is Africa's own response to tackling the paradox of great mineral wealth existing side by side with pervasive poverty. The term "mining" is meant all natural to refer to all-natural resources from the earth's endowment, such as minerals, oil and gas, renewables and water, and includes secondary (anthropogenic) as well as primary resources.

The AMV is holistic. It advocates thinking outside the "mining box". Accordingly, it is not just a question of improving mining regimes by making sure that tax revenues from mining are optimized and that the income is well spent – although that is clearly important. Rather it is a question of better integrating mining as a whole into development policies at local, national and regional levels.

The AMV stands for sustainable development of Africa's mineral endowment through a vision of building an industry that:

- Is knowledge-driven, contributing to broad-based growth and development
- Hinges on sustainability, stakeholder inclusiveness and good governance
- Based on economic diversification environmental responsibility, innovation and vibrancy
- Focuses on maximization of local content and related socio-economic linkages
- Optimizes the management of resources at commercial and small-scale (artisanal) levels
- Harnesses the potential of artisanal and small-scale mining
- Is competitive in national, continental and international capital markets
- Earns and retains the social licence to operate
- Incorporates and implements social accountability through local content.

In particular, the AMV looks into maximizing benefits through judicial management of:

- Local content
- Value at source including equity participation
- Development of national and regional capabilities (intangible assets/ human capital)
- Resource value optimization
- Physical infrastructure
- Downstream value addition
- Upstream value-addition
- Technology/product development

To realize the shared vision, intervention is required around the following critical points:

- Availability and quality of the resource characterization, quantification and classification and data
- Capacity to negotiate equitable contracts resulting in stable social licences to operate
- Good governance
- Capacity to create and manage equitable participation in resource prosperity
- Infrastructure development
- Encompass artisanal and small-scale mining
- Development of Policy, Law and Regulations for the mining sector
- Capacity to create more added value through energy and mineral resource valorisation and transformation.

Establishment of African Mineral and Energy Resources Classification and Management (AMREC) as the continental system is specifically in line with the AMV.

5. Country Mining Vision and Resource Policies

To help the adoption of the Africa Mining Vision (AMV) at the national level through a multi-stakeholder consultative process with a view to formulating a shared vision on how mineral management can promote broad-based development and structural transformation of their respective countries.

Country Mining Visions (CMVs) and AMV-compliant mineral policies should be designed as critical components of national efforts aimed at achieving a country's sustainable developmental objectives. The CMVs are not intended to replace sectoral national resource policies.

The CMV process requires a good understanding of the challenges confronting the extractive sector; an appreciation of the geopolitics and political economy of mineral and energy resource production as well as the social dynamics arising from it; identification of key actors and their potential roles; and an honest and realistic discussion of the structural and enabling factors that can support or hinder the realisation of the vision.

6. Geological and Mineral Information System

The Geological and Mineral Information System (GMIS) Strategy has been produced by the African Mineral Development Centre (AMDC) to facilitate the strengthening of the African production, management and dissemination of geological and mineral information necessary for several important legal, economic, social and environmental applications.

Lack of geological and geospatial information has long been identified as a major constraint upon African nations' ability to maximise the potential of their minerals. These information gaps have resulted in countries being disadvantaged when it comes to: land use planning, the development of strategies for minerals exploitation, the development of infrastructure, and during contract negotiations.

The GMIS consists of African geological survey organizations (GSOs), universities, and other national and sub-national agencies with geological functions, the private sector and civil society groups that generate, hold or use geological information, along with Regional Economic Communities (RECs), centres of excellence and other international institutions and initiatives that undertake or support the generation, management or sharing of geological information. Together these entities, their activities and their data form a system.

AMREC will provide the taxonomy and harmonized terminology that can be used by GMIS for enhanced contribution of geological information for informed policy and decision-making across the mineral value chain. Having GMIS implemented Africa-wide with use of consistent information generated by AMREC for mineral and energy projects will promote broad-based development.

7. United Nations Framework Classification for Resources

The United Nations Framework Classification for Resources (UNFC) is a classification system for sustainable development of energy and mineral endowments.

UNFC applies to energy resources including oil and gas; renewable energy; nuclear fuel resources; minerals; injection projects for the geological storage of CO_2; and the anthropogenic resources such as secondary resources recycled from residues and wastes.

The emerging challenges in these sectors are the sustainable, environmental friendly, carbon-neutral and efficient development, production of energy and raw materials required for a growing population. Innovations in production, consumption and transportation are fundamentally challenging how energy and material sectors function today. As a unique tool for harmonizing policy framework, government oversight, industry business process and efficient capital allocation, UNFC can manage the natural resources required for the present and future needs of the society and realizing the objectives on Sustainable Development Goals (SDGs).

UNFC, in its core principles, encompasses the holistic management of all social, environmental, economical, technological and uncertainty aspects of energy and mineral projects. The project maturity and resource progression model of UNFC can de-risk projects from costly failures and thus protect the investments. UNFC fully integrates social and environmental considerations and technology readiness required to bring clean and affordable energy resource projects into the market.

To help the application of UNFC uniformly worldwide, guidelines on requirements for competency of the personnel are included in the system. However, application of UNFC needs to be tailored for use nationally, regionally and globally.

The basic principles on UNFC are structured to drive the AMV vision of building a knowledge-driven mineral and energy industry in Africa that can contribute to broad-based growth and development. UNFC's emphasis on SDGs and linked guidelines on social and environmental considerations is tightly coupled to AMV's call for sustainability and good governance.

Aspiration for resiliency in energy and mineral industry is linked to developing diversification and vibrancy as called for in the AMV. Such an approach is urged by UNFC to tide of the recurrent "boom-and-bust" cycles common in the industry. This is also linked to maximization of local and regional socio-economic linkages and optimization resource management at commercial and small-scale levels including promotion of artisanal and small-scale mining.

UNFC, when applied within the context of the AMV and SDGs offers the opportunity to redefine the way resources can be most effectively managed to maximize its social, economic and environmental benefits. For this to happen policies, regulations, company business process innovation and financing must be working together with more harmony and understanding.

8. United Nations Resource Management System

Considering the scope and interconnectedness of sustainable resource management, UNFC is now being expanded as the United Nations Resource Management System (UNRMS). UNFC will remain at the core as the classification framework, while UNRMS will provide a tool kit for the systemic development of a project through time, whether comprising a single resource or combinations of different resources, to ensure its capacity to contribute to sustainable development within the "people, planet prosperity" remit of the 2030 Agenda for Sustainable Development.

UNRMS, through a systems approach to sustainable resource management seeks to enable tighter integration of the policies, especially the sustainable development programme of a country or a company to the project level implementation. Such an integration, if realized, will bring out an essential transformation in the resource management landscape, with emergent patterns such as:

- Resource centering, the life-cycle management of resources
- Value centering, discovery of economic resources and targeting social and environmental returns
- Service or customer centering, breaking away from the commodity paradigm
- Security of supply and criticality, examining the strategic needs.

Each of the above is contributory to a transition in resource management from a linear to a circular economy, where all resources whether primary or secondary are retained to the fullest extent possible within the system boundaries resulting in waste reduction to the point of eventual "zero waste".

While economic gains and operating profits matter, these need not be the prime drivers of a new resource management model. Profits should follow good social and environmental outcomes. This is not a radical view; many businesses have been built on similar foundations for a century or more.

Based on the first principles thinking of identification of current assumptions, collapsing the problem into its fundamental principles and creating new knowledge-based solutions, some of the core approaches in resource management can be easily identified. This approach, which will have to be implemented at a project level include, but is not limited to:

- Comprehensive resource recovery, the basic premise that the project footprints should be minimized by recovering all values, including co- and by-products and eco-system benefits
- Circularity, to include all actions to ensure raw materials remain within the boundaries set by the requirements of "reduce, reuse, recycle."
- Zero harm and zero waste, the movement towards maximization of safety for the people and the environment and elimination of all wastes.

Although the crucial roles of resource efficiency, circularity and waste minimization are well studied and reported, UNRMS through a comprehensive set of tools support the implementation these objectives.

9. Overall Framework of AMREC

AMREC is to be applied and implemented in conjunction with:

- The AMV which provides a holistic framework for the energy and mineral industry to contribute better social, environmental and economic outcomes in Africa.
- Agenda 2063, that calls for a Prosperous Africa, based on inclusive growth and sustainable development
- Global Agenda 2030 for Sustainable Development that urges furthering of prosperity while protecting the planet
- Principles, definitions, generic specifications, sectoral specifications and guidelines of UNFC.

Overall framework of AMREC System and PARC code that sits under the AMV, Agenda 2063 and 2030 Agenda is shown in Fig. A1. While the AMV, Agenda 2063 and Global Agenda 2030 provide the overarching frame for application of AMREC, the following broad definitions could be used:

- AMREC – African Mineral and Energy Resources Classification and Management System for regional and national resource management
- PARC – Pan-African Resource Reporting Code for public disclosure

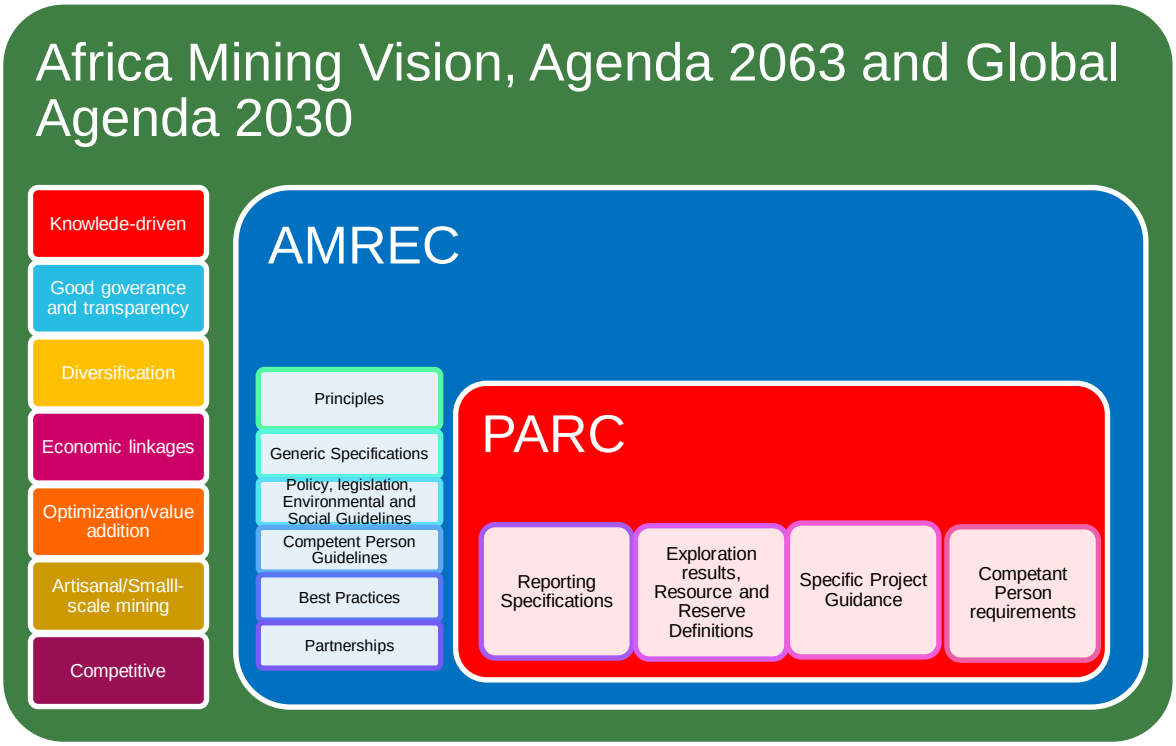

Figure A1. Overall structure of the AMREC-PARC

10. Language convention used in AMREC-PARC

The following language conventions will apply through this document:

- "Shall" is used where a provision is mandatory
- "Should" is used where a provision is preferred
- "May" is used where alternatives are equally acceptable.

Throughout this document, unless otherwise stated or the content requires otherwise, an expression which denotes any gender includes other genders.

PART B - THE AMREC SYSTEM

1. Scope

The African Mineral and Energy Resources Classification and Management System (AMREC) will facilitate comprehensive resource management for Africa, focused on six primary functions:

- Resource policy and strategy formulation aligned to SDGs and AMV
- Government/Industry resource management system
- Industry business process management
- Capital allocation (Economic)
- Capacity and capability building (human resources and institutions)
- Earning and keeping the social licence to operate and incorporate and implement social accountability.

The resource management value-chain aligned with AMREC has five aspects as given in Fig. B1 below (after World Bank).

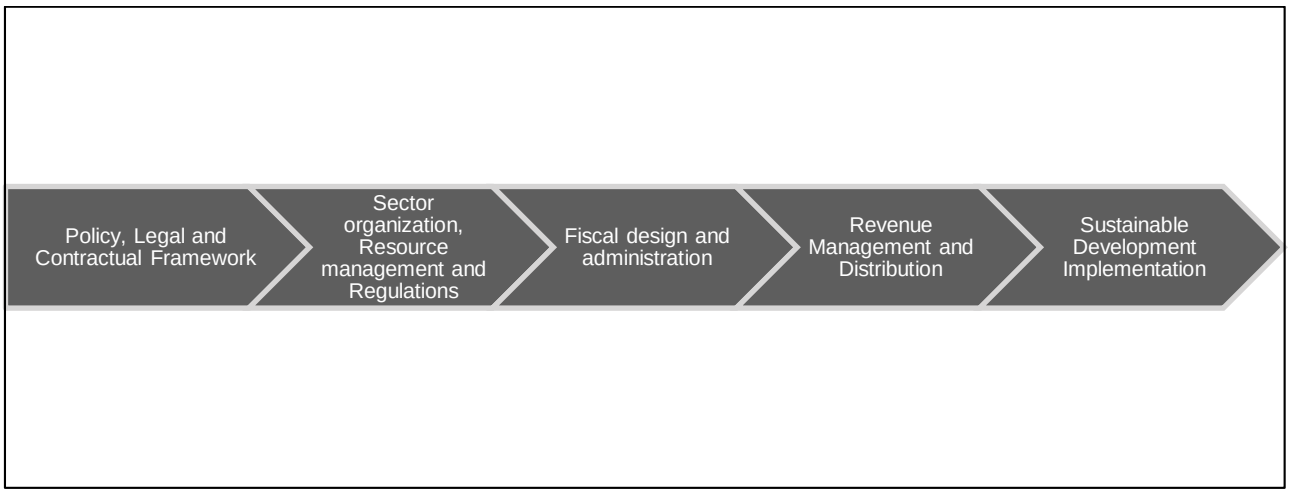

FIGURE B1 RESOURCE MANAGEMENT VALUE-CHAIN

They cover (1) the establishment of a legal framework that will convey and enforce rights to investors within a broad policy for development of publicly owned resources, (2) the institutional organization of the sector and particularly the regulation and monitoring of operations in the public interest, (3) the design and collection of taxes and royalties together with promotion of local content, (4) revenue management and distribution, and (5) the implementation of sustainable development policies.

The streamlined application of the framework model above will benefit stakeholders by addressing three technical factors that contribute to "resource curse", namely:

1. revenue volatility
2. the so-called "Dutch Disease"
3. resource exhaustion

In addition to the technical factors that contribute to negative outcomes from resource development, political factors too may play a role if not mitigated.

2. Classification and management of projects

Classification of projects within the AMREC system is aligned to the United Nations Framework Classification for Resources (UNFC) (Figure B2), while the resource management is aligned to the resource management value chain. It should be noted that the UNFC may be revised or updated where necessary through the annual meeting of the Expert Group on Resource Management (EGRM) of the United Nations Economic Commission for Europe (UNECE). AMREC Working Group will consider those updates and adapt it as necessary in alignment to AMV for subsequent updates of AMREC.

3. Application

The AMREC system is applicable but not limited to the following:

- Mineral[1] resources - solid, liquids
- Petroleum resources
- Renewable energy including but not limited to geothermal energy, bioenergy, solar energy, wind energy and hydro power.

4. Structure of the system

The AMREC system encompasses both the classification and management of natural resources and provides a clear distinction between:

- AMREC Principles (definitions)
- AMREC Specifications (mandatory rules) and
- AMREC Guidelines (non-mandatory guidance and best practices).

The term mandatory is used within the context of assumed consistent use of this system as recommended by the African Union, i.e., if AMREC is adopted for use, then its specifications will be mandatory for use in Africa.

5. AMREC Principles

High-level AMREC principles are provided in the following sections.

5.1. Categories and sub-categories

AMREC, as is based on UNFC, is a generic principle-based system. Resources are classified according to the three criteria:

E (E-axis) – Social, environmental and economic viability

F (F-axis) - Field project status and feasibility

G (G-axis) – Geological knowledge/Confidence in estimates

The first set of categories (the E axis) designates the degree of favourability of social, environmental and economic conditions in establishing the commercial viability of the project, including consideration of market prices and relevant legal, regulatory and contractual conditions. The second set (the F axis) designates the maturity of studies and commitments necessary to implement the projects. The third set of categories (the G

[1] Strict geological definition of minerals is not applied here.

axis) designates the level of confidence in estimates. Combinations of these criteria create a three-dimensional system (Fig B2).

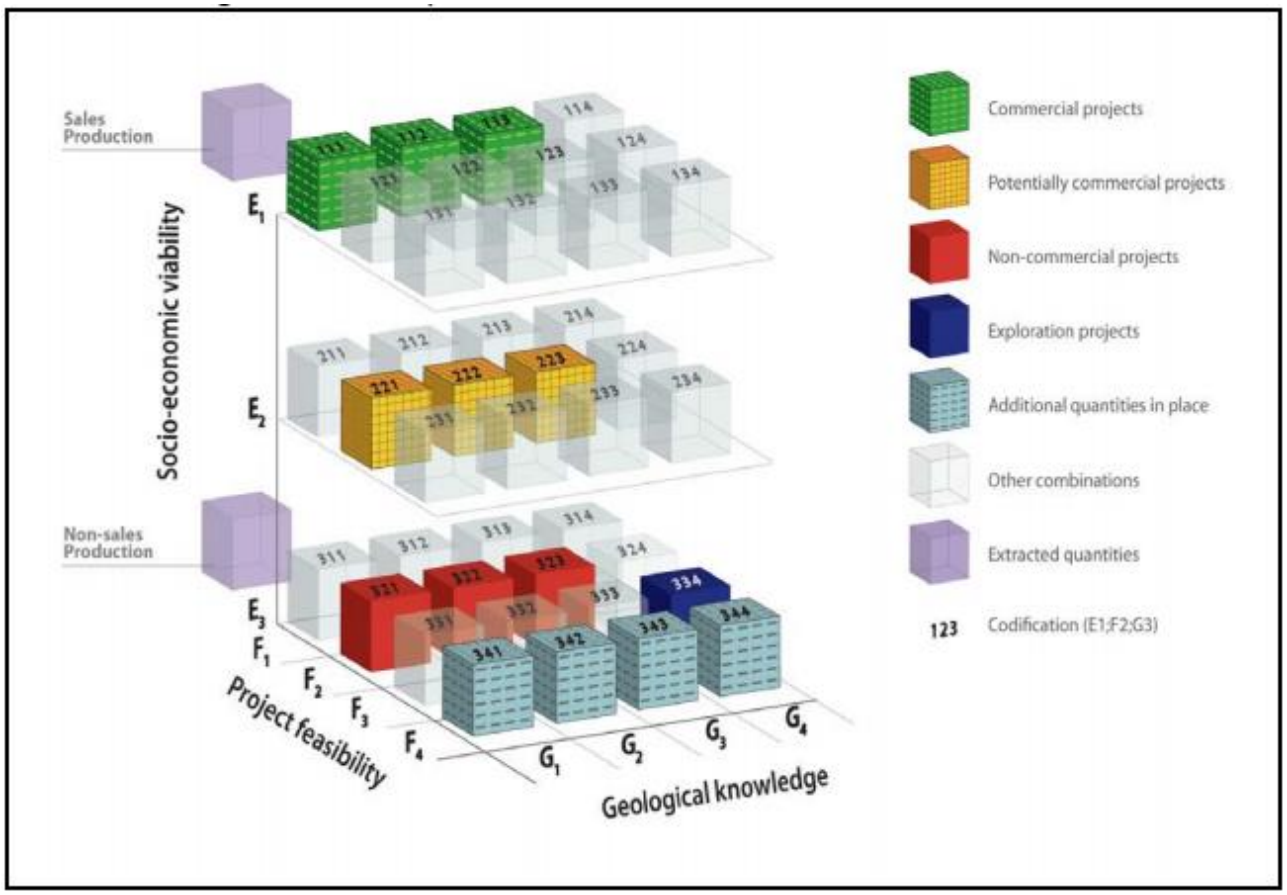

FIGURE B2 AMREC CATEGORIES AND EXAMPLES OF CLASSES

5.2. Definition of Categories and Supporting Explanations

AMREC, definitions are based on UNFC, tailored to the African context.

5.2.1. Social, environmental and economic viability

As shown in Table B1 resource progression on the E axis is differentiated in three stages, from 3 (low state) to 1, high state, in production or commercially viable.

Table B1 Social, economic and environmental viability, E axis

Category	Definition	Supporting Explanation
E1	Development has been confirmed to be socially, environmentally and economically viable.	Development is socially, environmentally and economically viable on the basis of current market conditions and realistic assumptions of future market conditions. All necessary conditions have been met or there are reasonable expectations that all necessary conditions will be met within a reasonable timeframe and there are no impediments to the delivery of the raw material or energy to a market. Social, environmental and economic viability is not affected by short-term adverse market conditions provided that longer-term forecasts remain positive.
E2	Development expected to become socially, environmentally and economically viable in the foreseeable future.	Development is not yet confirmed to be socially, environmentally and economically viable but, on the basis of realistic assumptions of future conditions, there are reasonable prospects for social, environmental and economic viability in the foreseeable future.
E3	Development not expected to become socially, environmentally and economically viable in the foreseeable future or evaluation is at too early a stage to determine economic, social and environmentally viability.	On the basis of realistic assumptions of future conditions, it is currently considered that there are not reasonable prospects for social, environmental and economic viability in the foreseeable future; or, economic viability of extraction cannot yet be determined due to insufficient information. Also included are estimates associated with projects that are forecast to be developed, but which will not be available for sale.

5.2.2. Field project status and feasibility

Field project status and feasibility (F axis) is differentiated in 4 resource progression stages, of which F4 is lowest and F1 in production or technically fully viable (Table B2).

Table B2 Field project status and feasibility, F axis

Category	Definition	Supporting Explanation
F1	Feasibility of a development project has been confirmed.	Development is currently taking place or, sufficiently detailed studies have been completed to demonstrate the feasibility of development.
F2	Feasibility of production by a defined project is subject to further evaluation.	Preliminary studies of a defined project provide sufficient evidence of the potential for development that further study is warranted. Further data acquisition and/or studies may be required to confirm the feasibility of development.

F3	Feasibility of a development project cannot be evaluated due to limited technical data.	Very preliminary studies of a defined (at least in conceptual terms) project or potential project, indicate the need for further data acquisition or study in order to evaluate the potential feasibility of development.
F4	No development project has been identified.	Remaining quantities that will not be developed by any currently defined Project.

5.2.3. General Level of Knowledge / Confidence in Estimates

As shown in Table B3, Level of geological knowledge the G axis is differentiated into 4 levels of which G4 represents the least and G1 the highest level of certainty.

Table B3 Level of geological knowledge/ confidence in resource estimates, G axis

Category	Definition	Supporting Explanation
G1	Quantities associated with a project can be estimated with a high level of confidence based on direct evidence.	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) based on direct evidence. 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 (P90, P50 and P10)[2] are selected. In both 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, potential production quantities are those associated with a defined Project. Additional Comments The G axis reflects the level of confidence in the potential recoverability of the quantities. Thus, the G axis categories are intended to reflect all significant uncertainties impacting the estimated quantities that are forecast to be produced by the Project. Uncertainties include both variability and the efficiency of the production methodology (where relevant). Typically, the various uncertainties will combine to provide a full range of possible outcomes. In such cases, categorization should reflect three scenarios or outcomes that are equivalent to G1, G1+G2 and G1+G2+G3.
G2	Quantities associated with a project that can be estimated with a moderate level of confidence.	
G3	Quantities associated with a project that can be estimated with a low level of confidence.	

[2] Where P90 means that there is a 90 per cent probability that the actual production quantity will exceed this estimate. Similarly, P50 and P10 reflect 50 per cent and 10 per cent probability respectively that the actual production quantity will exceed the estimate.

G4	Estimated quantities associated with a potential project, based primarily on indirect evidence.	A potential project is one where the existence of quantities of socio-environmental-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 R of AMREC. In addition, it is recommended that the chance (probability) that the potential quantities will eventually lead to a Commercial Project is assessed and documented.

5.3. Definition of Sub-Categories

5.3.1. E – Social, Environmental and Economic Viability

Sub categories of the E axis, social and economic variability, are shown in Table B4.

Table B4 Sub-categories of E axis

Category	Sub-Category	Sub-Category Definition
E1	E1.1	Development is socially, environmentally and economically viable on the basis of current conditions and realistic assumptions of future market conditions.
	E1.2	Development is not socially, environmentally and economically viable on the basis of current conditions and realistic assumptions of future conditions, but is made viable through government subsidies and/or other considerations.
E2	E2.1	Social and environmental viability is confirmed or, based on realistic assumptions of future conditions, there is a high probability that social and environmental viability will be confirmed within the foreseeable future.
	E2.2	Social and environmental viability is not confirmed, based on realistic assumptions of future conditions, but there is reasonable certainty that social and environmental viability will be confirmed within the foreseeable future.
E3	E3.1	Quantities that are forecast to be produced, but which will not be available for sale direct commercial use other than for development purpose.
	E3.2	Social, environmental and economic viability cannot yet be determined due to insufficient information.
	E3.3	On the basis of realistic assumptions of future conditions, it is currently considered that there are not reasonable prospects for social, environmental and economic viability in the foreseeable future.

5.3.2. F - Field Project Status and Feasibility

Sub categories of the F axis, field project status and feasibility, are shown in Table B5.

Table B5 Sub-categories of F axis

	F1.1	Development is currently taking place.
	F1.2	Capital funds have been committed and implementation of the development is underway.

F1	F1.3	Studies have been completed to demonstrate the feasibility of development.
F2	F2.1	Project activities are ongoing to justify development in the foreseeable future.
	F2.2	Project activities are on hold and/or where justification as a commercial development may be subject to significant delay.
	F2.3	There are no current plans to develop or to acquire additional data at the time due to limited potential.
F3	F3.1	Where site-specific studies have identified the potential development with sufficient confidence to warrant further testing.
	F3.2	Where local studies indicate the potential for development in a specific part of an area, but requires more data acquisition and/or evaluation in order to have sufficient confidence to warrant further testing.
	F3.3	At the earliest stage of studies, where favourable conditions for the potential development in an area may be inferred from regional studies.
F4	F4.1	The technology necessary is under active development, following successful pilot studies, but has yet to be demonstrated to be technically feasible for project or potential project.
	F4.2	The technology necessary is being researched, but no successful pilot studies have yet been completed.
	F4.3	The technology necessary is not currently under research or development.

5.3.3. G – General Level of Knowledge / Confidence in Estimates

In some situations, it may be helpful to express a range of uncertainty for quantities that are classified on the G axis as G4, e.g. Exploration Projects. In such cases, the following specification shall apply (Table B6):

Table B6 Sub-categories of G axis

G4	G4.1	Low estimate of the quantities.
	G4.2	Incremental amount to G4.1 such that G4.1+G4.2 equates to a best estimate of the quantities.
	G4.3	Incremental amount to G4.1+G4.2 such that G4.1+G4.2+G4.3 equates to a high estimate of the quantities.

Category G4, when used alone, shall reflect the best estimate and is equal to G4.1+G4.2. When category G4 is used, the probability of confirming the quantity should be given.

5.4. Definition of a resource project

A Project is a defined development or operation which provides the basis for social, environmental and economic evaluation and decision-making. In the early stages of evaluation, including exploration, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail. Where no development or operation can currently be defined for all or part of a resource, based on existing technology or technology currently under development, all quantities associated with that resource (or part thereof) are classified in Category F4.

5.5. Classes and sub-classes

A class is uniquely defined by selecting from each of the three criteria a particular combination of a category or a sub-category (or groups of categories/sub-categories). Since the codes are always quoted in the same sequence (i.e. E; F; G), the letters may be dropped and just the numbers retained. The numerical code defining a class is then identical in all languages using Hindu-Arabic numerals.

While there are no explicit restrictions on the possible combinations of E, F and G categories or sub-categories, only a limited number will generally be applicable. For the more important combinations (classes and sub-classes), specific labels are provided as a support to the numerical code, as illustrated in Tables B6 and B7.

As shown in Tables B7 and B8, the total estimated quantities are classified at a given date in terms of the following:

(a) Produced quantities that have been sold or had commercial use other than for the development of the project – Commercial Production.

(b) Produced quantities that have not been sold– Non-Commercial Production.

(c) Quantities that may be produced in the future. Technical and commercial evaluation studies based on defined projects constitute the basis for the classification.

(d) Remaining quantities not developed by any defined project.

(e) Quantities of a potential resource that may be produced in the future. Technical and commercial evaluation studies based on potential projects constitute the basis for the classification.

(f) Remaining quantities of commodity not developed by any potential project.

Material balance of total quantities can be maintained by full application of the classification.

Except for past production that may have been measured, quantities are always estimated. There will be a degree of uncertainty associated with the estimates. The uncertainty is communicated either by quoting discrete quantities of decreasing levels of confidence (high, moderate, low) or by generating three specific scenarios or outcomes (low, best and high estimates). A low estimate scenario is directly equivalent to a high confidence estimate (i.e. G1), whereas a best estimate scenario is equivalent to the combination of the high confidence and moderate confidence estimates (G1+G2). A high estimate scenario is equivalent to the combination of high, moderate and low confidence estimates (G1+G2+G3). Quantities may be estimated using deterministic or probabilistic methods.

Where relevant, known quantities that may be produced in the future are subdivided into quantities that are forecast to be sold and quantities that are forecast to be produced but not sold.

Quantities may be potentially produced in the future through projects that are contingent on one or more conditions yet to be fulfilled. Contingent projects are classified into projects for which the social-environmental-economic conditions are expected to be acceptable for implementation (Potentially Commercial

Projects) and those where they are not (Non-Commercial Projects). In the former case, contingency is caused by the project not being sufficiently matured to proceed to development, which would then provide the basis for a commitment to produce and sell the product it at a commercial scale. In the latter case, neither the project nor the social-environmental-economic conditions are sufficiently viable to indicate a reasonable potential for commercial production, sale and/or utilization in the foreseeable future. The total quantities in place may give rise to several projects with different status.

5.6. Definition of classes

Resource (Mining, Petroleum, Renewable Energy) Project - A defined mining/petroleum/renewable energy operation, which provides the basis for social, environmental and economic evaluation and decision-making. A project comprises a defined activity or set of activities, which provide the basis for estimating both costs and potential revenues associated with its implementation.

Table B7 Two-dimensional matrix with E and F axis categories (top) showing the classes and sub-classes as in the bottom.

	E3.3	E3.2	E3.1	E2	E1
F1.1					1
F1.2					2
F1.3					3
F2.1				4	
F2.2		7		5	
F2.3	8		6		
F3.1		9			
F3.2		10			
F3.3		11			
F4	12				

Code	Class	Sub-class
1	Commercial Projects	On Production
2		Approved for Development
3		Justified for Development
4	Potentially Commercial Projects	Development Pending
5		Development on Hold
6	Non-Sales Production	
7	Non-Commercial Projects	Development Unclarified
8		Development Not Viable

9	Exploration Projects	[Prospect], [Target Outline]
10		[Lead], [Early Exploration]
11		[Play], [Grassroots]
12	Additional Quantities in Place	

Commercial Projects – Current or future recovery by commercially viable mining/petroleum/Renewable Energy operations. Commercial Projects have been confirmed to be technically, socially, environmentally and economically feasible.

1. **On production** is used where the project is producing, and supplying one or more resource products to market, at the Effective Date of the evaluation.

2. **Approved for Development** requires that all approvals/permits/contracts are in place, and capital funds have been committed.

3. **Justified for development** requires that the project has been demonstrated to be technically feasible and commercially viable, and there shall be a reasonable expectation that all necessary approvals/contracts for the project to proceed to development will be forthcoming.

Potentially Commercial Projects - Potential future recovery by mining/petroleum/Renewable Energy operations, where development is pending or on-hold.

4. **Development pending** is limited to those projects that are actively subject to project-specific technical activities, such as the acquisition of additional data (e.g. appraisal drilling) or the completion of feasibility studies and associated social, environmental and economic analyses designed to confirm the commerciality including the determination of optimum development scenarios or mine plans. Also, the status may include projects that have non-technical contingencies, provided these contingencies are currently being actively pursued by the developers and are expected to be resolved positively within a reasonable time frame.

5. **Development on-hold** is used where a project is considered to have at least a reasonable chance of achieving commerciality (i.e. there are reasonable prospects for eventual social, environmental and economic recovery), but where there are currently major non-technical contingencies (e.g. environmental or social issues) that need to be resolved before the project can move towards development.

Non-Sales Production

6. **Non-Sales Production** are quantities that may be forecast to be extracted, but which will not be available for sale. Quantities those that will be used, lost, destroyed or otherwise disposed of during the production process, and hence will not be made available for sale, such as natural gas that is produced in association with oil and is then flared into the atmosphere or used on-site for operational purposes. In some situations, however, quantities may be extracted to the surface and then stored in some way for possible social, environmental and economically viable sale in the future.

Non-Commercial Projects - Potential future recovery by mining/petroleum/Renewable Energy operations, but where development is uncertain or development is currently assessed as not viable.

7. **Development unclarified** is appropriate for projects that are in the early stages of technical and commercial evaluation (e.g. a recent new discovery), and/or where significant further data acquisition is required, to make a meaningful assessment of the potential for a commercial

development (i.e. there is currently insufficient basis for concluding that there are reasonable prospects for eventual social, environmental and economically viable recovery).

8. **Development not viable** is used where a technically feasible project can be identified, but it has been assessed as having insufficient potential to warrant any further data acquisition activities or any direct efforts to remove commercial impairments.

Exploration Projects - Potential future recovery by successful exploration activities. An Exploration Project is associated with one or more major occurrences, i.e., a resource that has not yet been demonstrated to exist by direct evidence (e.g. drilling and/or sampling), but has been assessed primarily on indirect evidence (e.g. surface or airborne geophysical measurements).

Table B8 AMREC Classes defined by categories and sub-categories

AMREC Classes Defined by Categories and Sub-categories						
	Class		Sub-class	Minimum Categories		
				E	F	G
Estimated Total Quantities Initially in Place	Produced	Commercial Production				
		Non Commercial Production				
	Known Resource	Commercial Projects	On Production	1	1.1	1, 2, 3
			Approved for Development	1	1.2	1, 2, 3
			Justified for Development	1	1.3	1, 2, 3
		Potentially Commercial Projects	Development Pending	2	2.1	1, 2, 3
			Development On Hold	2	2.2	1, 2, 3
		Non-Commercial Projects	Development Unclarified	3.2	2.2	1, 2, 3
			Development Not Viable	3.3	2.3	1, 2, 3
		Additional Quantities in Place		3.3	4	1, 2, 3
	Potential Resource	Exploration Projects	[See Generic Specifications for sub-classes]	3.2	3	4
		Additional Quantities in Place		3.3	4	4

9. Prospect/Target Outline is used for quantities where site-specific studies and exploration activities have identified the potential for resources with sufficient confidence to warrant detailed studies (e.g. drilling or testing) that is designed to confirm the existence of that resource in such form, quality and quantity that the feasibility of production can be evaluated

10. Lead/Early Exploration is used where local studies and exploration activities indicate the potential for resources in a specific part of a province, but requires more data acquisition and/or evaluation in order to have sufficient confidence to warrant detailed studies (e.g. drilling or testing) that is designed to confirm the existence of the resource in such form, quality and quantity that the feasibility of production can be evaluated

11. Play/ Grassroots is used at the earliest stage of exploration activities, where favourable conditions for the potential discovery of resources in a province may be inferred from regional studies.

Additional quantities in place

12. **Additional quantities in place** associated with a known resource that will not be recovered by any currently defined or potential operation. Quantities should only be classified as additional quantities in place where no technically feasible projects have been identified that could lead to the recovery of any of these quantities.

6. AMREC Generic Specifications

Generic specifications set the minimum standards for using AMREC. Generic specifications are rules that will apply to all sectors and include a set of conditions that are mandatory under any circumstances.

6.1. Generic specifications applicable to all categories

A. Use of numerical codes

While the defined Classes and Sub-classes shown in AMREC may be used as supplementary terminology, the relevant Numerical Code(s) shall always be reported in conjunction with the estimated quantity. For example, these may be documented in the form 111, 111+112, or 1.1;1.2;1, as appropriate.

Note that some Sub-categories are defined below that are in addition to those provided in AMREC. These optional Sub-categories have been identified as potentially useful in certain situations and have been defined herein to ensure consistency in their application. Nothing in this document shall preclude the possible use of additional Sub-classes in the future that may be deemed to be useful in specific cases.

B. Bridging documents and aligned systems

If the application of AMREC is performed through a Bridging Document, it shall be mentioned.

C. Effective date

Classified quantities are estimates of remaining quantities as at the Effective Date of the evaluation. The Effective Date shall be clearly stated in conjunction with the reported quantities. The evaluation should take into account all data and information available to the evaluator prior to the Effective Date. If information becomes available subsequent to the Effective Date, but prior to classification, that could have significantly changed the estimated quantities as at the Effective Date, the likely effect of this information shall be mentioned.

D. Product type

Estimated quantities should be classified separately for each product type that will be sold, used, transferred or disposed of separately. Where estimates for different product types have been aggregated for classification purposes, and separate estimates are not provided, the aggregated estimates shall be accompanied by a statement clarifying which product types have been aggregated and the conversion factor(s) used to render them equivalent for the purposes of aggregation.

E. Basis for estimate

Estimated quantities may be those quantities attributable to the project as a whole or may reflect the proportion of those quantities that is attributable to the classifying entity's social, environmental and economic interest in the project. The reporting basis shall be clearly stated in conjunction with the reported quantities. Government royalty obligations are often treated as a tax to be paid in cash and are therefore generally classified as a cost of operations. In such cases, the reported quantities may include the proportion attributable to the royalty obligation. Where the reported quantities exclude the proportion attributable to the royalty obligation, this shall be disclosed.

F. Reference point

The Reference Point is a defined location within a production operation at which the classified quantities are measured or estimated. The Reference Point may be the product sales point from the operation, or it may be an intermediate stage, in which case the reported quantities would not take into account losses. The Reference Point shall be mentioned in conjunction with the classified quantities. Where the Reference Point is not the point of sale to third parties (or where custody is transferred to the entity's downstream operations), and such quantities are classified as E1, the information necessary to derive estimated sales quantities shall also be provided.

G. Aggregation of quantities

Estimated quantities associated with projects that are classified in different Categories on the Social, Environmental and Economic Viability or Feasibility axis shall not be aggregated with each other without proper justification and mention of the methodology adopted. In all cases, the specific Classes that have been aggregated shall be mentioned in conjunction with the classified quantity (e.g. 111+112+221+222) and a footnote added to highlight the fact that there is a risk that projects that are not classified as E1F1 (Commercial Projects) may not eventually achieve commercial operation.

Where estimated quantities have been aggregated from multiple projects, consideration should be given to sub-dividing the aggregated totals by type and by location (e.g. offshore vs. onshore).

H. Evaluator qualifications and accountability

Evaluators shall possess an appropriate level of expertise and relevant experience in the estimation of quantities associated with the type of resource under evaluation. The evaluator shall be accountable for the correct use of the classification and the correctness of the estimates reported irrespective of who have prepared them. See PARTC C PARC Section 5 Competence and Responsibility for the requirements of Competent Persons required for Public Disclosure.

I. Units and conversion factors

To facilitate global comparability of resource estimates the Système International d'Unités (SI units) shall be used for reporting of resource quantities.

J. Documentation

Estimates of resource quantities shall be documented in sufficient detail that would allow an independent evaluator or auditor to clearly understand the basis for estimation of the classified quantities and their classification.

6.2. Generic specifications applicable to E-axis categories

K. Socio-Environmental-Economic assumptions

In accordance with the definitions of E1, E2 and E3, socio-environmental-economic assumptions shall be based on current market conditions and realistic assumptions of future market conditions. Except where constrained by regulation, assumptions of future market conditions should reflect the view of either:

The organization responsible for the evaluation;

The view of a competent person or independent evaluator; or,

An externally published independent view, which is considered to be a reasonable forecast of future market conditions.

The basis for the assumptions (as opposed to the actual forecast) shall be disclosed.

L. Distinction between E1, E2 and E3

The distinction between quantities that are classified on the Socio-Environmental-Economic axis as E1, E2 or E3 is based on the phrase "reasonable prospects for economic, social and environmentally viable production and sale in the foreseeable future". The definition of "foreseeable future" can vary depending on the product type and hence more detailed specifications can be found in relevant sector-specific specifications.

The Socio-Environmental-Economic axis Categories encompass all non-technical issues that could directly impact the viability of a project, including product type prices, operating costs, legal/fiscal framework, environmental regulations and known environmental or social impediments or barriers. Any one of these issues could prevent a new project from proceeding (and hence quantities would be classified as E2 or E3, as appropriate), or it could lead to the suspension or termination of production activities in an existing operation. Where production activities are suspended, but there are "reasonable prospects for social environmental and

economical viable production and sale in the foreseeable future", remaining technically recoverable quantities shall be reclassified from E1 to E2. Where "reasonable prospects for social, environmental and economically viable production and sale in the foreseeable future" cannot be demonstrated, remaining quantities shall be reclassified from E1 to E3.

M. Produced quantities that may be saleable in the future

The Sub-categories of E3 permit a distinction to be made between those quantities that may be forecast to be produced, but which will not be available for sale (E3.1) and those for which there are currently no reasonable prospects for social, environmental and economically viable production and sale in the foreseeable future (E3.3). In the former case, the quantities are those that will be used, lost, destroyed or otherwise disposed of during the production process, and hence will not be made available for sale. In some situations, however, quantities may be produced and then stored in some way for possible social, environmental and economically viable sale in the future and these may be assigned to E3.3 (and subsequently moved to E2 and E1 as appropriate).

6.3. Generic specifications applicable to F-axis categories

N. Classification of projects based on level of maturity

Where it is considered appropriate or helpful to sub-classify projects to reflect different levels of project maturity, based on the current status of the project, the Sub-classes shown in Figure B7 and B8 of AMREC may be adopted.

O. Distinction between recoverable quantities and in situ (in-place) quantities

Other than quantities that are classified on the Feasibility axis as F4, all classified quantities shall be limited to those quantities that are potentially recoverable on the basis of existing technology or technology currently under development, and are associated with actual or possible future projects. In the absence of any consideration of potential social-environmental-economically viable recoverability, all reported quantities shall be classified as F4. This will add quality to the estimates by constraining the aggregate of recoverable quantities and otherwise. For stocks of resources affected by both inflow and outflow, e.g. anthropogenic resources it may be used to quantify the expected resource inflows during the project term.

P. Classification of quantities associated with Exploration Projects

In some situations, it may be helpful to sub-classify Exploration Projects on the basis of their level of maturity. In such cases, the following specification shall apply:

a) F3.1: where site-specific studies have identified the potential for an individual product type with sufficient confidence to warrant further testing;

b) F3.2: where local studies indicate the potential for one or more projects in a specific part of an area, but requires more data acquisition and/or evaluation in order to have sufficient confidence to warrant further testing;

c) F3.3: at the earliest stage of studies, where favourable conditions for the potential project are inferred.

Q. Classification of additional quantities in place

In some situations, it may be helpful to sub-classify Additional Quantities in Place on the basis of the current state of technological developments. In such cases, the following specification shall apply:

a) F4.1: the technology necessary to recover some or all of the these quantities is currently under active development, following successful pilot studies on other resources, but has yet to be demonstrated to be technically feasible for the style and nature of resource in which that product type is located;

b) F4.2: the technology necessary to recover some or all of the these quantities is currently being researched, but no successful pilot studies have yet been completed;

c) F4.3: the technology necessary to recover some or all of these quantities is not currently under research or development.

6.4. Generic specifications applicable to G-axis categories

R. Confidence levels for G1, G2 and G3

The level of confidence for quantities that are classified on the G axis as G1, G2 and G3 is defined as “high”, “medium” and “low”, respectively. These are not specified more precisely at a generic level because there are fundamental differences between the approaches that are appropriate for different product types. More detailed specifications can therefore be found in relevant sectoral specifications.

S. Expansion of G4 to account for uncertainty

In some situations, it may be helpful to express a range of uncertainty for quantities that are classified on the G axis as G4, e.g. Exploration Projects. In such cases, the following specification shall apply:

a) G4.1: low estimate of the quantities;

b) G4.2: incremental amount to G4.1 such that G4.1+G4.2 equates to a best estimate of the quantities;

c) G4.3: incremental amount to G4.1+G4.2 such that G4.1+G4.2+G4.3 equates to a high estimate of the quantities.

Category G4, when used alone, shall reflect the best estimate and is equal to G4.1+G4.2.

T. Optional labels for estimates

Where it is considered appropriate or helpful to use labels in addition to the numerical codes for a range of estimates for a specific project, the terms “Low Estimate”, “Best Estimate” and “High Estimate” may be used to correspond to quantities that are classified on the Geological axis as G1, G1+G2 and G1+G2+G3 respectively.

7. AMREC Sectoral Specifications

7.1. Minerals

This section provides the AMREC solid minerals related rules and the Controlling Factors to be considered for moving projects from lower to higher maturity.

7.1.1. Mining Project

A defined mining operation, which provides the basis for social, environmental and economic evaluation and decision-making. A project comprises a defined activity or set of activities, which provide the basis for estimating both costs and potential revenues associated with its implementation.

7.1.2. Commercial Projects

Current or future recovery by commercially viable mining operations. Commercial Projects have been confirmed to be technically, social, environmental and economically viable.

In production is used where the project is producing, and supplying one or more mineral products to market, at the Effective Date of the evaluation.

Approved for Development requires that all approvals/permits/contracts are in place, and capital funds have been committed.

Justified for development requires that the project has been demonstrated to be technically feasible and commercially viable, and there shall be a reasonable expectation that all necessary approvals/contracts for the project to proceed to development will be forthcoming.

7.1.3. Potentially Commercial Projects

Potential future recovery by mining operations, where development is pending or on-hold.

Development pending is limited to those projects that are actively subject to project-specific technical activities, such as the acquisition of additional data (e.g. appraisal drilling) or the completion of feasibility studies and associated social, environmental and economic analyses designed to confirm the commerciality including the determination of optimum development scenarios or mine plans. Also, the status may include projects that have non-technical contingencies, provided these contingencies are currently being actively pursued by the developers and are expected to be resolved positively within a reasonable time frame.

Development on-hold is used where a project is considered to have at least a reasonable chance of achieving commerciality (i.e. there are reasonable prospects for eventual social, environmental and economically viable production), but where there are currently major non-technical contingencies (e.g. environmental or social issues) that need to be resolved before the project can move towards development.

7.1.4. Non-Commercial Projects

Potential future recovery by mining operations, but where development is uncertain or development is currently assessed as not viable.

Development unclarified is appropriate for projects that are in the early stages of technical and commercial evaluation (e.g. a recent new discovery), and/or where significant further data acquisition is required, in order to make a meaningful assessment of the potential for a commercial development (i.e. there is currently insufficient basis for concluding that there are reasonable prospects for eventual social, environmental and economically viable production).

Development not viable is used where a technically feasible project can be identified, but it has been assessed as having the insufficient potential to warrant any further data acquisition activities or any direct efforts to remove commercial impairments.

7.1.5. Exploration Projects

Potential future recovery by successful exploration activities.

An Exploration Project is associated with one or more major occurrences, i.e., a deposit that has not yet been demonstrated to exist by direct evidence (e.g. drilling and/or sampling), but has been assessed primarily on indirect evidence (e.g. surface or airborne geophysical measurements).

7.1.6. Additional quantities in place

Additional quantities in place associated with a known deposit that will not be recovered by any currently defined mining operation. Quantities should only be classified as additional quantities in place where no technically feasible projects have been identified that could lead to the production of any of these quantities.

7.1.7. Assessment of Exploration Projects

AMREC's Exploration Project Class corresponds to undiscovered mineral potential. The terms "deposit", "resource", and "undiscovered" have specialized and specific meanings when applied to mineral assessment and estimation studies. A "deposit" is defined as a mineral (or brine) accumulation or concentration of sufficient quantity, quality and form that, under the most favourable of circumstances, is considered to have the potential for social-environmental-economic development, including deposits under development, actively producing, and past-producers. A "resource" is defined as an already explored mineral accumulation or concentration of sufficient quantity, quality, and form, and in such setting that social-environmental-economically viable recovery of a mineral from the accumulation or concentration is currently or foreseeably feasible. An "undiscovered mineral potential" is defined as an occurrence or showing postulated to exist by indirect geologic evidence, for which the quantity, quality or form are not known, or some combination thereof is only partially or incompletely known.

Assessment of undiscovered mineral potential may be qualitative, specifying the general geographic area and may include some degree of mineral potential and certainty, or quantitative, which includes probabilistic estimates of the number of undiscovered deposits and their contained undiscovered resources.

The three-part form of assessment works in both data-rich (brownfields) and data-poor (greenfields) settings. It provides internally consistent estimates of undiscovered minerals inventory represented as permissive tract maps and probability frequency distributions of an in-place mineral for a given permissive tract. The resulting probability estimates of undiscovered mineral potential can be evaluated using social-environmental-economic filters and other tools for land use, and policy analysis.

7.1.8. Defining the factors that control resource progression

Controlling Factors (CF) are all social, environmental, economic, technological and geological factors that should be considered when changing a mineral project from one class to another. In the early stages of the project, many of the CFs will be vague or unclarified. With the availability of more data, the CFs will acquire more clarity. The application and the adjustment of the following CFs and of the geological (technical) factors are represented in the G-Axis. At a higher level AMREC can only provide generic principles and specifications.

CFs that should be considered are:

1. Policy
2. Social
3. Economic
4. Regulatory
5. Treatment of exploration data
6. Mining Methods (including solution and brine mining)
7. Sorting
8. Processing
9. Refining
10. Metallurgical aspects
11. Comprehensive resource recovery
12. Value-addition
13. Environment
14. Anthropogenic resources /secondary management
15. Safety

16. Infrastructure
17. Marketing
18. The legal and contractual framework
19. Fiscal design and administration
20. Revenue management and distribution
21. Site closure
22. Remediation
23. External cost factors (esp. water treatment)
24. Human resources
25. Human rights
26. Gender equality and diversity
27. Sustainable Development Implementation

These AMREC controlling factors should be resolved to convert:

- G4 projects to E3 projects
- E3 projects to E2 projects
- E2F2 projects to E1F2 projects.

Efforts to advance Controlling Factors (CF) are commonly used to develop mineral potential and raise resources from lower classes (E3, E2) to higher ones, ultimately leading to production (E1). Such a set of defined and scaled factors will allow the harmonization and standardization of the mining business process through its entire value chain. In spite of the critical importance of the controlling factors related to technology, economics, environmental and social aspects, the measurements of these factors are presently vague and unscaled. The application of the conversion factors may lead to the conversion from "Potentially Commercial Projects" to bankable "Commercial Projects" and is among the most important steps for defining the social, environmental and economic viability of a mineral project and obtaining funding. As projects are assessed based on its combined social, environmental and economic viability it may be a case that some projects will be allowed to advance even when the bare economics are not viable according to strict market- or commodity-based measures of return, but if good social and environmental benefits overweigh the overall assessment.

However, many aspects of the CFs are currently unscaled and lack a structured and transparent classification such that any AMREC Evaluator with proven competence could apply these factors to any minerals worldwide. A classification of controlling factors should result in clear, transparent and comparable E1F1 estimates so that they can be applied to any mineral project anywhere in the world.

A meaningful, transparent and measurable classification of controlling factors requires a method to add and determine scaling for each controlling factor. Currently E2F2 to E1F1 conversion is applied by estimating the cost for mining, processing, metallurgical, processing and refining, infrastructure, social, environmental and economic considerations, marketing, legal and governmental factors, and subtracting the sum of these costs from the mineral value as defined by G2 and G1 resources.

The Metallurgical Factors could be scaled according to the environmental sustainability of the metallurgical flowsheet (e.g. if the acids used for processing are being recycled).'

7.1.9. Mining Methods

There are numerous conventional and unconventional mining methods, which could be utilized to produce minerals. Each has its pros and cons depending on situation-specific characteristics like deposit type, ore morphology, mineralization style, mineralization depth, rock mechanics, safety, geopolitical factors, infrastructure, social, environmental and economic viability.

The following mining methods are considered as conventional mining technologies:

- Surface Mining (Open Pit Mining, Quarrying)

- Subsurface Mining (Room & Pillar, Longwall, Slope Mining and others)
- Placer Mining (Trenching)

Unconventional mining technologies:

- In-situ Recovery (ISR) or In-situ Leaching (ISL)
- Bio-leaching
- Solution Mining
- Brine Mining
- Borehole Mining
- Seafloor Mining
- Tailings Re-mining
- Space Mining

The future role of digital mining is noted for elaboration in future releases.

7.2. Petroleum

This section provides the AMREC guidelines applicable to petroleum and the Controlling Factors to be considered for moving projects from a lower to higher maturity level. As mentioned earlier the AMREC is designed as a project based system.

7.2.1. Petroleum Project

In the Petroleum context a Project represents the link between the petroleum accumulation and the decision-making process, including budget allocation and may constitute the development of a single reservoir or field, or an incremental development in a producing field, or the integrated development of a group of several fields and associated facilities with a common ownership. An individual project will represent a specific maturity level at which a decision is made on whether or not to proceed and there should be an associated range of estimated recoverable resources for that project.

7.2.2. Commercial Project

On Production is used where the project is actually producing and selling Petroleum to market as at the Effective Date of the evaluation. Although implementation of the project may not be 100% complete at that date, the full project shall have all necessary approvals and contracts in place, and capital funds committed. If a part of the project development plan is still subject to separate approval and/or commitment of capital funds such that it is not currently certain to proceed, that part should be classified as a separate project in the appropriate Sub- class.

Approved for Development requires that all approvals/contracts are in place, and capital funds have been committed. Construction and installation of project facilities should be underway or due to start imminently. Only a completely unforeseeable change in circumstances that is beyond the control of the developers would be an acceptable reason for failure of the project to be developed within a reasonable time frame.

Justified for Development requires that the project has been demonstrated to be technically feasible and commercially viable, and there shall be a reasonable expectation that all necessary approvals/contracts for the project to proceed to development will be forthcoming. In the Petroleum sector the recommended benchmark is that development would be expected to be initiated within 5 years of assignment to this subclass.

7.2.3. Potentially Commercial Projects

Development Pending is limited to those projects that are actively subject to project-specific technical activities, such as acquisition of additional data or detailed evaluation designed to confirm project commerciality and/or to determine the optimum development scenario. In addition, it may include projects that have non-technical contingencies, provided these contingencies are currently being actively pursued by the developers and are expected to be resolved positively within a reasonable time frame. Such projects would be expected to have a high probability of achieving commerciality.

Development On Hold is used where a project is considered to have at least a reasonable chance of achieving commerciality (i.e. there are reasonable prospects for eventual socially, environmentally and economically viable production), but where there are currently major non-technical contingencies (e.g. environmental or social issues) that need to be resolved before the project can move towards development. The primary difference between Development Pending and On Hold is that in the former case the only significant contingencies are ones that can be, and are being, directly influenced by the developers (e.g. through negotiations), whereas in the latter case the primary contingencies are subject to the decisions of others over which the developers have little or no direct influence and both the outcome and the timing of those decisions is subject to significant uncertainty.

7.2.4. Non-commercial Projects

Development Unclarified is appropriate for projects that are still in the early stages of technical and commercial evaluation (e.g. a recent new discovery), and/or where significant further data acquisition will be required, in order to make a meaningful assessment of the potential for a commercial development, i.e. there

is currently insufficient basis for concluding that there are reasonable prospects for eventual economic, social and environmentally viable production.

Development not Viable is used where a technically feasible project can be identified, but it has been assessed as being of insufficient potential to warrant any further data acquisition activities or any direct efforts to remove commercial contingencies. In such cases, it can be helpful to identify and record these quantities so that the potential for a commercial development opportunity will be recognized in the event of a major change in technology or commercial conditions.

7.2.5. Additional Quantities in Place

Quantities should only be classified as Additional Quantities in Place where no technically feasible projects have been identified that could lead to the production of any of these quantities. Some of these quantities may subsequently become recoverable in the future due to the development of new technology.

7.2.6. Exploration Projects

Exploration projects includes estimates of undiscovered resources which are referred to as Prospective resources. They represent those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects.

7.3. Anthropogenic Resources

Anthropogenic resources or secondary resources that could be produced for residues and potential wastes need to be managed in line with the SDG 12 objectives, notably objective 12.5.

Energy and mineral value chains usually involve the generation of large quantities of residues. These residues often are defined a priori as "wastes" in laws or regulations or de facto end up as wastes and, if not properly managed threaten not only the environment but also the health and safety of the local populations. With energy and mineral production increasingly coming from lower grade sources, the quantities of residues and wastes are also growing exponentially, thus exacerbating the problem.

However, these residues are almost without exception important sources of secondary resources meaning that the residues themselves can safely be used for productive purposes rather than being consigned for disposal. In the past, there were technological challenges for the utilization of wastes but this is being addressed today through innovative approaches. The activities that produce valuable secondary raw materials and energy required for society could also be social, environmental and economically attractive. Use of secondary resources importantly helps to conserve non-renewable primary resources for the benefit of future generations. This activity helps to meet the target of Sustainable Development Goal (SDG) 12 "Responsible Production and Consumption" on waste minimization through prevention, reduction, recycling and reuse.

7.3.1. Waste Hierarchy

AMREC Waste Hierarchy as shown in Figure B3 shows that indefinite disposal is the least favoured option. It is also by some distance the most costly solution and typically involved the indefinite loss of land use for lands set aside for disposal (eg landfills). By contrast, reuse, recycling and the recovery of energy from wastes has now become central to the contemporary sustainable project life-cycle, notably any project framed as part of a circular economy resource management approach. In this model, provision for "end of life" (EoL) requirements, some of which, such as progressive remediation, run in parallel with the project and shall be included in the project financials. These include a care and maintenance plan with associated financial resources, for any residues or tailing left behind. An effective plan for waste, with, as a vision, "zero waste" as the outcome, according to which no legacy problem should be left of subsequent generations than can be dealt with in the current generation.

FIGURE B3 AMREC WASTE HIERARCHY

7.3.2. Anthropogenic Material

The physical matter without any attribution from a social, environmental, economic, legislative, perspective, and without a specification of the aggregate state (solid, liquid, gaseous). Anthropogenic materials include, for instance, mineral materials, sewage sludge, biomass and off-gas.

7.3.3. Anthropogenic Resource

A concentration or occurrence of Anthropogenic Material of intrinsic social, environmental and economic interest, in such form, quality and quantity that there are reasonable prospects for eventual social, environmental and economically viable production.

7.3.4. Anthropogenic Material System

The system that locates Anthropogenic Material quantities inside the Anthroposphere and its surrounding environment. It comprises Anthropogenic Material Processes, linked by Anthropogenic Material Flows within defined system boundaries. Primary raw materials are the product of the primary production sectors, which extracts resources from the earth's crust and transform them by processing or refining. The resultant materials include but are not restricted to primary commodities. Primary commodities are typically traded as base materials for subsequent manufacturing (value-add) and consumption or use. Residues from primary production and primary commodities if not disposed of as wastes comprise Anthropogenic Material Stocks, from which Anthropogenic Materials quantities (also known as secondary resources) can be sourced.

7.3.5. Anthropogenic Material Sourcing Project

An anthropogenic material sourcing Project is a defined development or sourcing operation, which provides the basis for social, environmental and economic evaluation and decision-making.

7.3.6. Anthropogenic Material Process

A process is defined as the transformation, transport or storage of materials. Depending on the location of the process, a process is further defined as Anthropogenic Material Process or Environmental Material Process. In waste management, for example, transformation and storage takes place in terms of "reuse" "recycling recovery" (preferred) and "disposal" (least preferred – see Figure B3) . Each process is subject to the mass conservation principle, which means that the sum of inflows, stock changes and outflows is zero.

7.3.7. Anthropogenic Material Stock

An Anthropogenic Material Stock results from the accumulation of an Anthropogenic Material quantity in an Anthropogenic Material Process.

7.3.8. Anthropogenic Material Flow

An Anthropogenic Material Flow is the movement of Anthropogenic Material between two Anthropogenic Material Processes and is measured in mass per time.

7.3.9. Anthropogenic Material Source.

Any Anthropogenic Material Stock or any Anthropogenic Material Flow can be an Anthropogenic Material Source. An Anthropogenic Material Source contains material quantities that can be converted to Anthropogenic Material Products.

7.3.10. Anthropogenic Material Product

An Anthropogenic Material Product is a quantity that is saleable in markets. The cumulative quantities are equivalent to "Sales Production" according to AMREC.

Table B9 Classes and Sub-classes for Anthropogenic Resource Projects

Estimated Total material quantity initially in place						
	Past sourcing		Sales Production			
			Non-Sales Production			
	Future sourcing					
		Class	Sub-class	Categories		
				E	F	G
	Known Anthropogenic Material source	Commercial Projects	On Production	1	1.1	1, 2, 3
			Approved for Development	1	1.2	1, 2, 3
			Justified for Development	1	1.3	1, 2, 3
		Potentially Commercial Projects	Development Pending	2	2.1	1, 2, 3
			Development On Hold	2	2.2	1, 2, 3
		Non-Commercial Projects	Development Unclarified	3.2	2.2	1, 2, 3
			Development Not Viable	3.3	2.3	1, 2, 3
		Additional quantities in place		3.3	4	1, 2, 3
	Potential Anthropogenic Material source	Exploration Projects	[No sub-classes defined]	3.2	3	4
		Additional quantities in place		3.3	4	4

7.3.11. Defining the Project

An anthropogenic material sourcing Project is a defined development or sourcing operation, which provides the basis for socio, environmental and economic evaluation and decision-making. In the early stages of evaluation, including exploration, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail.

Where no development or sourcing operation can currently be defined for quantities, based on existing technology or technology currently under development, all quantities associated with that Project (or part thereof) are classified in Category F4.

The classification procedure consists of identifying a Project, or Projects, estimating the existing and future quantities in place, with an associated level of confidence, and classifying the Project(s) based on Project status (or maturity) and commercial viability.

The “treatment and sourcing” process is the link between the quantities in the Anthropogenic Material Source and the Anthropogenic Material Products. There is a clear recognition of risk versus reward for the investors and key stakeholders such as governments and industry associations, linked to uncertainties and/or variability in the material quantity and quality, the efficiency of the sourcing process (e.g. reuse, preparation for reuse, recycling, recovery), the Anthropogenic Material Product prices and market conditions (including policy support mechanisms), social acceptance and the environmental benefits compared to primary material sourcing. In the early stages of evaluation, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail.

Anthropogenic Material Stocks cover Anthropogenic Material quantities and qualities, which change over time. So, estimates on future quantities are based primarily on indirect evidence. In AMREC, a deposit with quantities based on indirect evidence is defined as a "Potential deposit", which is a "Potential Anthropogenic Material Source" in this document. These quantities shall be added to category G4. It might be helpful to introduce sub-categories (G4.1, G4.2, and G4.3), based on the level of confidence, as it is defined for G1, G2 and G3.

7.3.12. Project lifetime

The estimated quantities for a Project shall be limited to quantities that will be produced during the Project Lifetime, which is defined as the social, environmental and economic limit, design life, or contract period for the Project, as defined below. The Project lifetime can sometimes be limited by the availability of the source material or by the extent of entitlement or social licenses. Because of its importance in estimating material quantities, the Project Lifetime and its basis shall be disclosed in association with any reported quantities.

The 'social, environmental and economic limit' is defined as the time at which the Project reaches a point beyond which the subsequent cumulative discounted net operating cash flows from the Project would be negative. For a Project, the social, environmental and economic limit may be the time when the expected recovery rate declines to a level that makes the Project unviable, or when it is unviable to invest in the further infrastructure required to retrieve remaining quantities from the Anthropogenic Material Source.

The 'design life' of a Project is the expected operating life of major physical infrastructure as defined during the technical and social, environmental and economic assessment of the Project. The replacement of significant project components will constitute a new Project, and a new evaluation and estimation of Anthropogenic Resources shall be performed.

The 'contract period' for an Anthropogenic Material sourcing Project is the term of all existing, or reasonably expected sales contracts for the Anthropogenic Material Products. The contract period should not include contract extensions unless there is a reasonable expectation of such extensions, based upon the historical treatment of similar contracts.

7.3.13. Entitlement

Entitlement refers to the rights to access Anthropogenic Material quantities that accrue to Project participants.

The 'entitlement period' is the term of all licenses and permits which provide rights to access the Anthropogenic Material Source, respectively, retrieve the material quantities and deliver the Anthropogenic Material Product into the market.

The Anthropogenic Material Source may be expected to last much longer than the Project Lifetime, but any future recovered quantities beyond those estimated for the Project would be assessed and classified as subsequent or additional Projects.

7.3.14. Development plan

In order to assign Anthropogenic Resources to any class, except for category F4 (no development project or sourcing operation has been identified), a development plan consisting of one or more Projects needs to be defined. The level of detail appropriate for such a plan may vary according to the maturity of the Projects and may also be specified by regulation.

7.4. Renewable energy

Renewable energy source is the equivalent of the terms “deposit” or “accumulation” used for petroleum and minerals. Renewable Energy Source is the primary energy (e.g., earth thermal energy, energy from sun, wind, biomass, river flow, tides, waves) available for production of (and conversion into) Renewable Energy Products. The main difference with fossil fuels or solid minerals is that, during the lifetime of the project, the Renewable Energy Source is being replenished.

A Renewable Energy Product is directly linked to (or a direct replacement of) a tangible energy commodity and is saleable in an established market. Examples of energy products are electricity, heat and biofuels. Other products extractable from the Renewable Energy Source in the same production process may not qualify as a Renewable Energy Product; nevertheless, they may contribute to the social, environmental and economic viability of the Project.

Renewable Energy Resources are the cumulative quantities of extractable Renewable Energy Products from the Renewable Energy Source, measured at the Reference Point.

7.4.1. Renewable energy project

The Renewable Energy Resource classification process consists of identifying a Project, or Projects, associated with a Renewable Energy Source, estimating the quantity of Renewable Energy Products that can be extracted from a Renewable Energy Source, with associated level of confidence, and classifying the Project(s) based on Project status (or maturity) and socio-environment-economic viability.

The Project is the link between the Renewable Energy Source and the quantities of Renewable Energy Products and provides the basis for social, environmental and economic evaluation and decision- making. There is a clear recognition of risk versus reward for the investor, linked to uncertainties and/or variability in the Renewable Energy Source (including the sustainability of production versus replenishment), the efficiency of the production and conversion process, Renewable Energy Product prices and market conditions (including policy support mechanisms) and social acceptance. In the early stages of evaluation, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail.

The cumulative quantity of Renewable Energy Products taken to the Project’s social, environmental and economic, contractual or other time limit defines the Renewable Energy Resource quantity.

7.4.2. Project lifetime

The forecasted Renewable Energy Resources associated with a Project are constrained by the Social, Environmental and Economic Limit on Project lifetime.

7.4.3. Entitlement

Entitlement defines the quantities of Renewable Energy Resource that accrue to Project participants.

7.4.4. Development plan

In order to assign Renewable Energy Resources to any class, except for category F4, a development plan needs to be defined consisting of one or more Projects. The level of detail appropriate for such a plan may vary according to the maturity of the Project and may also be specified by regulation.

7.5. Injection projects for geological storage

7.5.1. Geological Storage

The term Geological Storage refers mainly to permanent containment of carbon dioxide (CO_2) in subsurface geological formations, here referred to as reservoirs, with the purpose of isolating CO_2 emissions from the atmosphere. The storage reservoir can be for instance a depleted oil and gas reservoir or a saline aquifer. The application of AMREC described in this document has been developed primarily with Geological Storage of CO_2 in mind but can also be applied to other forms of injection projects where fluids are stored in geological formations.

Underground storage of hydrogen is sometimes referred to as Geological Hydrogen Storage. As hydrogen storage is likely to be temporary rather than permanent, this is more comparable to Underground Gas Storage as described below.

Natural gas is often held in inventory underground. The most commonly used underground facilities are depleted reservoirs in oil and gas fields, aquifers and salt caverns. The main difference between such storage and Geological Storage of CO_2, apart from the fluid itself, is that the natural gas is only temporarily stored and will at some point be withdrawn from the reservoir. The storage reservoir can be used repeatedly for temporary storage and subsequent withdrawal. Several different quantity measures will be associated with such storage. The total quantity that can be stored will be the sum of the quantity that is currently in storage and can be withdrawn (often referred to as working gas), the quantity of permanent inventory gas necessary to maintain sufficient pressure for withdrawal purposes (base gas or “cushion” gas), and the quantity currently available for storage.

When an Underground Gas Storage is developed, the technical and social, environmental and economical maturity of the project activities associated with it can be classified according to the principles of AMREC as outlined in this document. The different quantities associated with the classified projects should always be clearly stated.

Carbon dioxide (CO_2), nitrogen or natural gas is sometimes injected into a producing oil field in order to increase the amount of hydrocarbons that can be extracted. The resulting hydrocarbon resources can be classified using AMREC as it is defined for recovery activities.

Table B10 AMREC classes and sub-classes defined by sub-categories, adapted for application to injection projects for the purpose of geological storage

AMREC Classes Defined by Categories and Sub-Categories as Applied to Injection Projects						
Total Geological Storage	Injected and Stored Quantities					
	Lost Quantities					
	Class		Sub-class	Categories		
				E	F	G
	Known Reservoir	Commercial Injection Projects	Active Injection	1	1.1	1, 2, 3
			Approved for Development	1	1.2	1, 2, 3
			Justified for Development	1	1.3	1, 2, 3
		Potentially Commercial Injection Projects	Development Pending	2[b]	2.1	1, 2, 3
			Development on Hold	2	2.2	1, 2, 3
		Non-Commercial Injection Projects	Development Unclarified	3.2	2.2	1, 2, 3
			Development not Viable	3.3	2.3	1, 2, 3
		Storage Not Feasible		3.3	4	1, 2, 3
	Undiscovered Reservoir	Screening Projects	Geological Storage Identified	3.2	3.1[c]	4
			Geological Storage Indicated	3.2	3.2[c]	4
			Geological Storage Inferred	3.2	3.3[c]	4
		Storage Not Feasible		3.3	4	4

When geological storage of the injected CO_2 is part of the objective of an increased recovery project, the stored quantities can be classified in the same way, applying AMREC as described in this document. The geological storage part of the project is likely to be developed in parallel with the hydrocarbon recovery part, and the two activities will in this case have the same level of maturity, but with two different types of quantities associated with it; the quantities that will be extracted and the quantities that will be stored.

The Total Geological Storage of a reservoir is the total amounts of a given fluid that could be injected and stored in this reservoir, including amounts that could be dissolved in aquifer water, be trapped by chemical reaction or adsorbed onto the carbon in coal bed methane recovery. How much of the Total Geological Storage initially in place will eventually be utilized for geological storage, will depend on the specifics of the individual projects that are classified.

The Total Geological Storage is classified at a given date in terms of the following:

(a) Injected and Stored quantities: Quantities of a fluid that have been injected and are currently stored in the reservoir. Projects at this stage may still require activities such as monitoring of any fluid movements, making sure that there is reasonable confidence that the injected fluid is retained in the reservoir

(b) Lost quantities: Quantities that may be delivered to the injection site but which are lost in the transportation or surface facilities prior to injection. Equivalent to non-sales production.

(c) Commercial and Potentially Commercial Projects: Geological storage associated with a known reservoir where injection for the purpose of geological storage is ongoing or which may be used for storage in the future. The classification is based on technical and commercial studies related to defined injection activities.

(d) Non-Commercial Injection Projects: Additional geological storage associated with a known reservoir that will not be used for storage by any currently defined injection project.

(e) Screening Projects: Geological storage associated with an undiscovered reservoir that may be used for storage in the future provided that the reservoir is confirmed;

(f) Storage not feasible: Reservoir which will not be available for storage or where storage is for some reason not feasible.

7.5.2. Defining the Project

AMREC classifies quantities associated with projects. The injection project typically includes injection wells, monitoring wells, surface equipment, injection flow lines, and an operations control centre. The project may include pressure relief wells and produced fluid processing equipment. Depending on the location of the custody transfer, a delivery pipeline may be included in the injection project.

One or more injection wells may be required to store a projected rate and quantity of fluid. The monitoring well(s) may be within the storage unit and/or above the overlying cap rock or seal. The surface equipment may include injection lines and manifolds (and associated valves), a metre, and a pump or compressor (if needed to increase pipeline delivery pressure to injection wellhead pressure). An operations control centre may be at the injection site and/or remotely and is used to monitor and control injection operations.

The project should include estimates of storage quantities and injection rates. The reservoir, or the geologic formation planned to be used for storage and the respective overlying cap rock, should be characterized to meet the project goals. Projections of investments and other costs as well as revenue from storage should be estimated.

Once a project has been defined, AMREC can be used to classify the quantities stored according to the technical and social, environmental and economical maturity of the defined project activities.

7.5.3. Quantities Stored

The term Quantity refers to the quantity of a given fluid that could be stored in the reservoir being evaluated, given a defined project activity and a certain investment. CO2 storage quantities are typically quoted in mass. The quantitative evaluation shall take into account both the geological knowledge of the subsurface at the time of the evaluation, and the engineering considerations relating to the reservoir properties as well as the chosen technical solution and the socio-environmental-economic conditions governing the project. The quantity will also depend on the composition of the stored fluid, which should be given with the storage quantity. The quantity stored in one reservoir may be the aggregated quantities from several sources, from one single source or part of the total quantity from one source.

7.5.4. Development Plan

In order for a project to be approved for development, a Plan for Development of the injection site and its operation shall be prepared. The Development Plan typically includes timeline, design elements, and socio-environmental-economics for the injection project. It is often part of a larger integrated project including capturing the fluid and transporting it to the injection site. The timeline should include lead time for equipment, drilling and completing wells, and for characterizing the reservoir as well as acquiring necessary injection permits and managements approval. The design elements should include well locations, completion techniques, drilling methods, site facilities (as needed), transportation, and the source and type of injection fluid. Socio-Environmental-Economic evaluations should include source of revenue, as well as capital and operating expenses for the full Project Life Time. The duration of the availability of the injection fluids should be known. A risk assessment should always be part of the development plan.

7.5.5. Project Life Time

Feasibility of an injection project for the purpose of Geological Storage comprises two components;

(i) The injection of fluid and

(ii) The retention of the injected fluid through one or more trapping mechanisms.

An injection project will need to include activities also after the active injection has ceased, such as monitoring of any fluid movements and making sure that there is reasonable confidence that the injected fluid is retained in the reservoir. How this will affect the total life time of the project will depend on the specifics of the project, the reservoir, the injected fluid and the prevailing rules and regulations.

When an injection project is classified as social, environmental and economically and technically feasible according to AMREC, the evaluation shall comprise the complete Project Life Time.

7.5.6. Socio-Environmental-Economic Viability

In AMREC, the phrase "Socio-Environmentally-Economically viable" encompasses social, environmental and economic factors (in the narrow sense) plus other relevant "market conditions", and includes consideration of prices, costs, legal/fiscal frameworks and all other non-technical factors that could directly impact the viability of a development project. This definition is highly relevant also for geologic storage projects, where the strictly social, environmental and economic feasibility of a project may depend on government subsidies or other incentives. Classifying a geologic storage project as Socio-Environmentally-Economically Viable within AMREC requires that all relevant non-technical factors have been considered.

7.5.7. Storage Permission

Geological storage of CO2, or storage of other fluids in subsurface geological formations, may be subject to different local, national and/or international regulations and requirements. CO2 storage sites should not be operated without a Storage Permit. Such permits may be given independently by the AU Member States and should be issued by an established or designated competent authority. All Storage Permits should also be made available to the African Union Commission. Other regulations may be relevant in other parts of the world.

In order for an injection project to be classified as Socio-Environmentally-Economically Viable according to AMREC, all required Storage Permits or other relevant permits shall be in place, or there shall be reasonable expectations that such permits will be obtained within a reasonable time frame.

8. AMREC Guidelines

Guidelines provide additional instruction on how AMREC should be applied in specific circumstances.

8.1. Definition of a project

A Project is a defined development or operation which provides the basis for social, environmental and economic evaluation and decision-making. In the early stages of evaluation, including exploration, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail. Where no development or operation can currently be defined for all or part of a resource , based on existing technology or technology currently under development, all quantities associated with that resource(or part thereof) are classified in Category F4.

8.1.1. Principles

AMREC is designed as a Project-based system for the evaluation and classification of energy and minerals located on or below the Earth's surface. Further development has demonstrated that the system can also be applied to renewable energy sources, anthropogenic resources as well as for injection Projects for the purpose of geological storage.

A Project comprises a defined activity, or set of activities, which provides the basis for estimating both costs and potential revenues associated with its implementation. The cost and revenue estimates can then be used for a social, environmental and economic analysis on which the decision whether or not to proceed with the Project can be based, together with other relevant commercial considerations, such as legal, environmental and social issues, all of which could impact the viability of the defined Project. Since future potential revenues will be based on estimated future product(s) quantities that can be produced and sold, and the efficiency of the production process will depend on the design of the Project itself (production methodology, infrastructure, processing requirements, etc.) these three issues – costs, recoverable product quantities and revenues – are inextricably linked by the nature of the defined Project.

As noted above, the level of detail with which a Project is defined will be dependent on the maturity of the Project. For example, at the exploration stage the expected production methodology may be defined in broad conceptual terms only, whereas a development commitment will generally require very detailed documentation of the production methodology, processing requirements (where required), export route(s), capital and operating costs, environmental protection procedures, social licence considerations, etc.

8.1.2. Project definition guidelines

The activity or set of activities which constitute the defined Project will always include some consideration of the operation or development scheme that could or will be implemented, or has been implemented, without which no estimate of potentially recoverable quantities can be made.

At an early stage of Project evaluation, the level of detail in such a consideration may be limited to making a preliminary judgement as to the extent of quantities that may be assumed to be social, environmental and economically producible and/or by assuming an appropriate range of potential recovery factors, which may be based on analogues for the type of and likely production/development strategy.

As a Project matures in its scope and definition as it approaches an investment decision, it will often change in character as it becomes better defined and there may be several stages of data acquisition and/or studies prior to reaching a "final investment decision", at which point there would be a firm commitment to proceed with installation of the necessary facilities to produce and sell product(s). In many companies, these stages are separated by formal "decision gates" which are aligned with Project Maturity Sub-classes.

These decision gates typically require one or more of the following, where a failure to obtain any one of these approvals could stop the Project (as currently defined and proposed) from proceeding to the next stage (which would then be reflected in a move to a different Project Maturity Sub-class):

a) Approval by one or more governmental entities to proceed with the next phase of the Project;

b) Approval by the operating company (and its partners) for the expenditure of significant costs; and,

c) Confirmation, to the extent possible, that local environmental and social concerns beyond regulatory requirements have been appropriately addressed.

Once a Project has received all the necessary approvals for production to commence, decisions for routine operational activities that do not require any of the above approvals would generally not constitute a discrete Project.

A single Project can reflect the development of part, or all, of a resource or the development of multiple adjacent resources (if they are all subject to the same investment decision and approvals based on a single integrated development plan, pre-feasibility or feasibility study). Where an investment decision is made with respect to part of a resource, then the infrastructure, costs and estimated recoverable quantities associated with that investment decision will constitute a single Project. Any potential for additional recovery from that resource would be subject to one or more subsequent and discrete Projects, to the extent that each one required a separate decision and/or approval process. In such a case, incremental recovery associated with each subsequent defined Project is classified separately from the initial Project in accordance with the appropriate category (or sub-category) on the E, F and G axes for that specific incremental Project as at the Effective Date.

Sales quantities associated with an individual Project will always be classified under a single category (or sub-category) on the E axis and a single category (or sub-category) on the F axis. However, quantities associated with that Project could be, and in most cases will be, classified in more than one G axis category. The relationship between the Project and classification on the G axis depends on the nature of the production process, as noted in the Supporting Explanation for the definitions of the G1, G2 and G3 categories.

8.2. Use of project maturity to sub- classify projects

AMREC provides scope to sub-classify projects by applying the full range of Sub-category definitions. The application of this level of granularity of the system is optional, though it is becoming widely recognised as a powerful tool for portfolio management purposes, both as a corporate and at a national level. The Sub-classes reflect the concept of classification on the basis of project maturity, which broadly corresponds to the probability that the project will eventually achieve commercial operation and product type sales.

The Category and Sub-category definitions, as well as all generic specifications and relevant sectoral specifications necessary for the high-level classification into Commercial Projects, Potentially Commercial Projects and Non-commercial Projects, shall be satisfied before consideration is given to assignment to the appropriate Sub-class.

The project maturity Sub-classes are based on the associated actions (business decisions) required to move a project towards commercial production. The boundaries between different levels of project maturity are designed to align with internal (corporate) project “decision gates”, thus providing a direct link between decision-making and the capital value process within a company, and the characterization of its portfolio of assets through resource classification.

It is important to note that while the goal of the developer is always to move projects “up the ladder” toward higher levels of maturity, and eventually to commercial production, a change in circumstances (e.g. a change to local environmental, social or market considerations, or to the applicable fiscal regime, or disappointing results from further data acquisition) can lead to projects being “downgraded” to a lower Sub-class.

The following guidelines should be applied for sub-classes.

8.2.1. Commercial Projects

On Production is used where the project is actually producing and selling one or more product types to market as at the Effective Date of the evaluation. Although implementation of the project may not be 100% complete at that date, the full project shall have all necessary approvals and contracts in place, and capital funds committed. If a part of the project development plan is still subject to separate approval and/or commitment of

capital funds such that it is not currently certain to proceed, that part should be classified as a separate project in the appropriate Sub- class.

Approved for Development requires that all approvals/contracts are in place, and capital funds have been committed. Construction and installation of project facilities should be underway or due to start imminently. Only a completely unforeseeable change in circumstances that is beyond the control of the developers would be an acceptable reason for failure of the project to be developed within a reasonable time frame.

Justified for Development requires that the project has been demonstrated to be technically feasible and commercially viable, and there shall be a reasonable expectation that all necessary approvals/contracts for the project to proceed to development will be forthcoming.

8.2.2. Potentially Commercial Projects

Development Pending is limited to those projects that are actively subject to project-specific technical activities, such as acquisition of additional data or the completion of project feasibility studies and associated socio-environmental-economic analyses designed to confirm project commerciality and/or to determine the optimum development scenario. In addition, it may include projects that have non-technical contingencies, provided these contingencies are currently being actively pursued by the developers and are expected to be resolved positively within a reasonable time frame. Such projects would be expected to have a high probability of achieving commerciality.

Development On Hold is used where a project is considered to have at least a reasonable chance of achieving commerciality (i.e. there are reasonable prospects for eventual socially, environmentally and economically viable production), but where there are currently major non-technical contingencies (e.g. environmental or social issues) that need to be resolved before the project can move towards development. The primary difference between Development Pending and On Hold is that in the former case the only significant contingencies are ones that can be, and are being, directly influenced by the developers (e.g. through negotiations), whereas in the latter case the primary contingencies are subject to the decisions of others over which the developers have little or no direct influence and both the outcome and the timing of those decisions is subject to significant uncertainty.

8.2.3. Non-commercial Projects

Development Unclarified is appropriate for projects that are still in the early stages of technical and commercial evaluation (e.g. a recent new discovery), and/or where significant further data acquisition will be required, in order to make a meaningful assessment of the potential for a commercial development, i.e. there is currently insufficient basis for concluding that there are reasonable prospects for eventual social, environmental and viable production.

Development not Viable is used where a technically feasible project can be identified, but it has been assessed as being of insufficient potential to warrant any further data acquisition activities or any direct efforts to remove commercial contingencies. In such cases, it can be helpful to identify and record these quantities so that the potential for a commercial development opportunity will be recognized in the event of a major change in technology or commercial conditions.

8.2.4. Additional Quantities in Place

Quantities should only be classified as Additional Quantities in Place where no technically feasible projects have been identified that could lead to the production of any of these quantities. Some of these quantities may subsequently become recoverable in the future due to the development of new technology.

In some situations, it may be helpful to sub-classify Additional Quantities in Place on the basis of the current state of technological developments.

8.2.5. Basis of estimate

Reported quantities may be those quantities attributable to the mine/development project as a whole, or may reflect the proportion of those quantities that is attributable to the reporting entity's socio-environmental-economic interest in the project.

The reporting basis shall be clearly stated in conjunction with the reported quantities. Government royalty obligations are often treated as a tax to be paid in cash and are therefore generally classified as a cost of operations. In such cases, the reported quantities may include the proportion attributable to the royalty obligation.

8.2.6. Level of maturity

Where it is considered appropriate or helpful to sub-classify projects to reflect different levels of project maturity, based on the current status of the project, the optional Sub-classes may be adopted for reporting purposes.

8.3. Project life cycle and value chain

It is recommended that resources are classified taking into account the full project life cycle of a resource. Example of a mining fife cycle from exploration to final site remediation and further recycling of residues is shown in Figure B4 as an example.

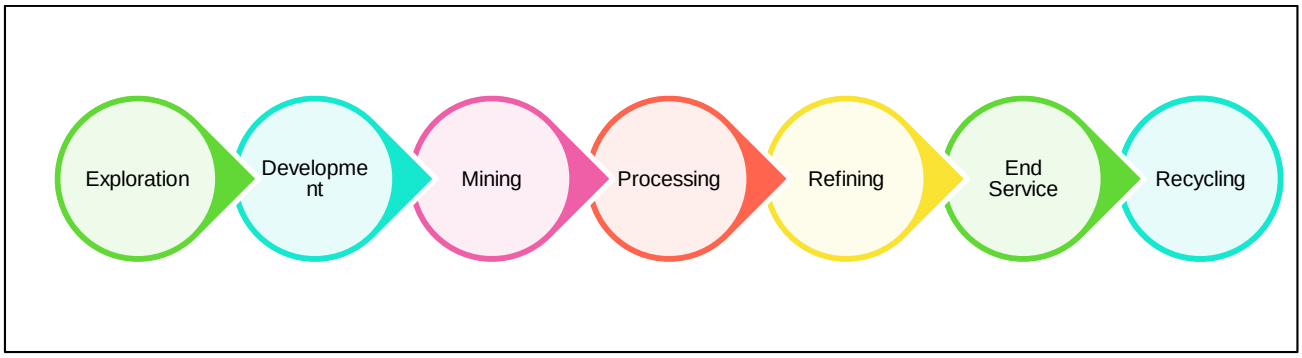

Figure B4. Example of a mining life cycle

8.3.1. Project Milestones and Decision Gates

The adoption of milestone and decision-gate approach to supporting mining and processing projects can facilitate smooth project planning and operation across the full project life-cycle including eventual closure, decommissioning and site handover. The methodology aligns with the AMREC criteria, geological knowledge, project feasibility, socio-environmental-economic viability focused on key milestones in a project life. A prerequisite of successful application of the model is a thorough needs and gap analysis. Based on the conclusions of the gap analysis capacity-building and resource deployment is targeted to a specific milestone rather than attempting to cover the whole life-cycle at once.

The desired outcome is a progressive strengthening of policy and regulatory frameworks achieved at a pace that a government can sustain, especially in a country where there is little or no familiarity with the demands of designing, licensing and operating a resource project. The example of a mining project is shown in Figure B5. Of these milestones the fulcrum is the (pre-) feasibility study. Once passed, the selected control points effectively allow decision-makers to monitor overall preparedness in the mining and processing life cycle and to apply decision gates to each critical control point in the project life-cycle.

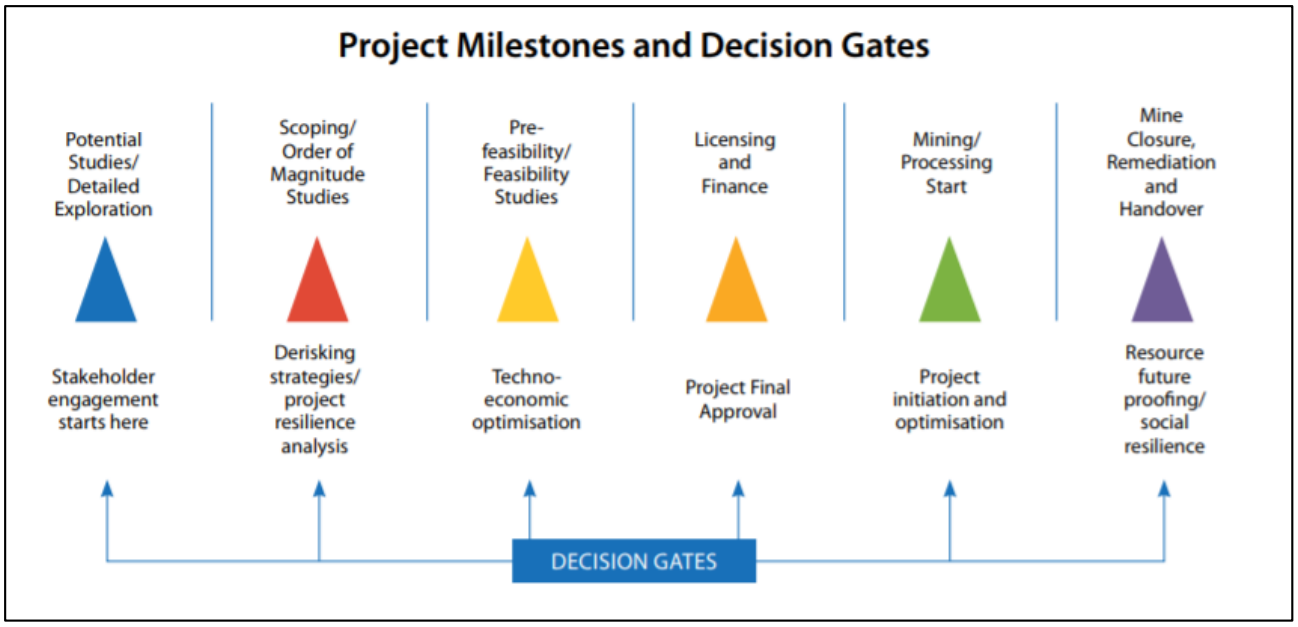

Figure B5 Project milestones and decision gates applicable to mining

Because the milestones are generic in nature the methodology can be used by a wide range of resource projects. Significant qualitative improvements and cost savings can be effected across a project life-cycle by focusing attention in a similar manner on a small group of control points. A particular feature of the method is the "one up/ one down" approach to project teamwork, communications and documentation in the life-cycle. The owners of and stakeholders in any given milestone shall have a good understanding of, and close working relationship with, their counterparts responsible for (a) the milestone that precedes theirs ("one up") and (b) the one that follows theirs ("one down"). That way the risk of losing key institutional knowledge and project momentum between the stages in the project life-cycle is much reduced.

8.3.2. Value-addition

The African Mining Vision calls for down-stream linkages into mineral beneficiation and manufacturing; up-stream linkages into mining capital goods, consumables & services industries; and side-stream linkages into infrastructure (power, logistics, communications, water) and skills and technology development (HRD and R&D. The potential for value addition shall be carefully assessed and the information used while classifying the quantities, especially vis a vis the social, environmental and economic viability. Some of the possible social and environmental impediments could be transformed into opportunities when the value-addition possibilities are examined over the full life-cycle of a project.

Downstream value addition may involve the use of the locational advantage of producing crude resources to establish resource-processing industries (beneficiation) that could then provide the feedstock for manufacturing and industrialisation. Upstream value-addition could use of the relatively large resources sector market to develop the resource supply/inputs sector (capital goods, consumables, services).

Mutually beneficial partnerships between the state, the private sector, civil society, local communities and other stakeholder should be fully examined while classifying the quantities and assigning them to appropriate AMREC classes.

8.3.3. Diversification

A resource sector that has become a key component of a diversified, vibrant and globally competitive industrialising African economy. A resource sector should be the pivot to establish a competitive African infrastructure platform, through the maximisation of its propulsive local and regional economic linkages. A resource sector that optimises and husbands Africa's finite mineral resource endowments and that is diversified, incorporating both high value and lower value resources at both commercial and small-scale levels

is required by AMV. Towards this end, it is desirable to consider all social and economic linkages at a local and regional level should be analysed before classifying the resources using AMREC principles.

8.3.4. Resource progression

It is not enough that resources are properly classified and assigned to appropriate AMREC classes. The potential of the quantities to progress to higher E, F and G categories should be considered and recorded. Such information is essential for effective management decisions and planning of activities to see that projects progress in time and within budget from discovery or exploration stage to production and beyond (Figure B6). The progression of resources should be linked to project milestones and decision gates as well as the detailed studies required to advance through E, F and G axis.

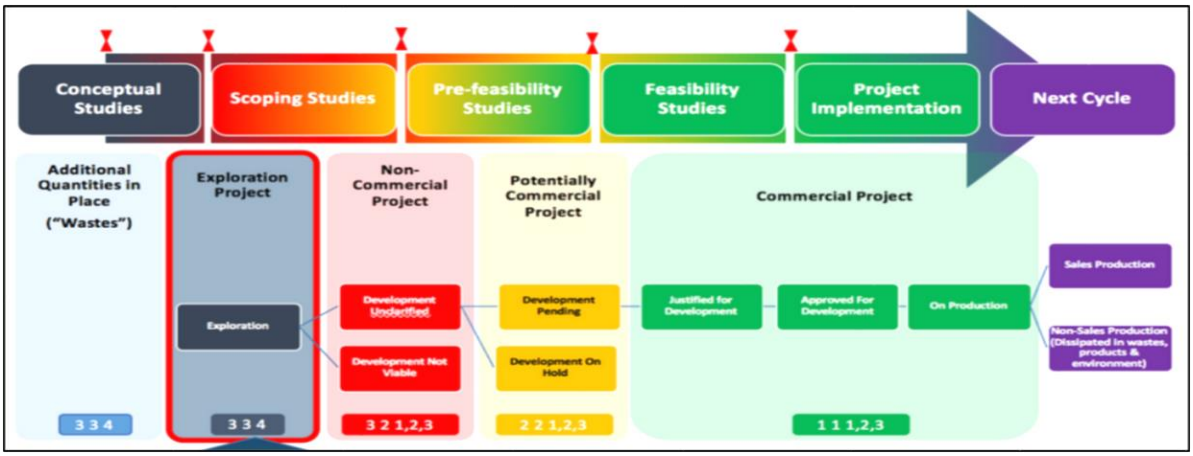

Figure B6 Resource progression model

8.3.5. Comprehensive resource recovery

The term "comprehensive resource recovery" describes methodologies that can maximize returns from mining and processing especially from low-grade, depleted and other non-commercial ore bodies. This has both opportunistic and sustainability aspects. On the opportunistic side, the nature of sedimentary basins containing energy materials is such that a number of different commodities are commonly collocated, such as uranium, phosphates, rare earths elements, oil, gas, and coal. Managing these resources in an integrated, multi-target manner is likely to achieve considerably higher aggregate recovery rates than a management strategy that targets only a single resource and effectively treats all other resources as if they were contaminants or wastes.

On the sustainability side, the premise is simpler: once a decision is made to break ground, there is an ethical imperative to maximise the return from that activity in conformity with the well-established fundamentals of sustainable development. These fundamentals are driven by the need for each project to make a balanced contribution to food, energy and water (FEW) security. In consequence, there is a strong case for considering adherence to comprehensive production as in and of itself a sustainable development indicator.

Comprehensive resource recovery seeks to maximize the returns from mining by a strategic, long-term approach to resource production and processing rather than focusing on a single commodity. This has implications for the way resources are assessed, for the sequence in which they are mined and the methods by which they are produced. One outcome from the comprehensive approach is the emergence of concepts such as "energy basin management" where the potential of a sedimentary basin that might include coal, oil and gas, uranium, phosphates and rare earths are managed as a single complex group rather than as a competing set of target minerals.

In line with both the opportunistic and ethical drivers, comprehensive resource recovery has the following operational objectives:

- Disturb the ground only once during mining and production, optimizing returns from all the valuable materials in an ore body, not just a single target mineral.
  Manage all valuable materials from a given site or resource, both individually and in combination, across the whole life-cycle.
- Integrate primary and secondary resource management for resource conservation and waste prevention.
- Foster flow-sheet modifications, and innovative, and if necessary, disruptive technologies and business to achieve sustained triple bottom line returns.
- Foster reuse, recycling and new product development (ie., from recycling tailings or residues) in line with the waste hierarchy.
- Leave zero waste at the end of the project life-cycle, thus eliminating long-term negative externalities.
- Base any mineral project life-cycle plan on finding the New Point of Equilibrium between the interests of Stockholders and Stakeholders, expressed in the form of a social licence and measured in TBL financial, social and environmental returns.
- Future-proof minerals through pro-active life-cycle management, including recovery and recycling, as a key sustainable development outcome.
- Build and sustain human resource capability (social capital) by net positive contribution to Food Energy and Water security (FEW); and education and training.

While undertaking AMREC based classification, the Evaluators may asses and report the possibilities of comprehensive resource recovery.

8.3.6. Recoverable quantities

All reported quantities under AMREC shall be limited to those quantities that are potentially recoverable on the basis of existing technology or technology currently under development, and are associated with actual or possible future exploration/development projects or mining operations.

8.3.7. Zero waste

In line with the principles of the waste hierarchy which are increasingly embedded in national and international law, the driving environmental expectation is now that at the end of the whole mining and processing cycle there should be zero waste. Applying this constraint constitutes a very significant challenge to the traditional mining and processing narrative, which is typically focused on a single mineral, such as uranium, or gold. Very commonly in both industries, the volume of tailings, or spoil or residues that may be generated in pursuit of the target mineral can by volume be vastly out of proportion to the target mineral itself.

8.4. Social and Environmental Considerations

This guidance is concerned with the social and environmental aspects of resource classification and does not address the following related and important factors:

(a) The processes of resolving social and environmental issues that are encountered during the development of a project as it matures to implementation;
(b) How social and environmental issues should be reported in a resource report;
(c) The social or environmental merits, or otherwise, of resource development.

The E axis is concerned with “socio-environmental-economic” criteria for the classification of resources using AMREC. Although the mandate of the Task Force is to consider the social and environmental aspects and not the social-environmental-economic aspects of the E axis, it was necessary to address the latter to a limited extent, to distinguish them from the social and environmental aspects, and the impact that the latter may have on project socio-environmental-economics. The relationship of social and environmental factors to the F and G axes was also considered but not examined in detail

Resource evaluation and classification traditionally focused on the immediate production process, by considering measures such as a Net Present Value (NPV) while ignoring externalities such as social and environmental issues. An externality is described as:

> "An externality is a cost or benefit resulting from an action that is borne or received by parties not directly participating in the action."

Although there may not be agreement on what should be included, nor on whether the effect of an externality is positive or negative, social and environmental externalities have become an increasingly important factor in decisions on resource production projects, and hence on classification. What was previously considered an externality may now have become an internality that shall be resolved for a project to proceed. For classification under AMREC, it is recommended that only those externalities that directly impact the project that is being assessed should be considered.

The need to obtain local stakeholder approval and broader acceptance for a project to proceed is typically described as a requirement for "social licence" or "social licence to operate" (SLO), a concept that has attracted greater interest and attention in recent years.

There are varying "definitions" of "social licence", and "social licence to operate", but it essentially requires the resolution of any social and environmental issues that could inhibit or prevent a decision to proceed with a project. Social licence is a generic term that collects all the social and environmental issues relevant to a resource project under one heading, and although a useful informal term, it is not always clear what might be included. Because of its generic nature, "social licence" is not recommended as a classification criterion, which should be based on the individual contingencies that apply to a project.

There is a high degree of commonality in the social and environmental aspects of different types of resources, and the guidance provided here is intended to be relevant for all resources to which AMREC applies. However, there will also be issues that are specific to a resource or jurisdiction, in which case, reference should be made to the relevant resource-specific or jurisdictional guidance.

8.4.1. Zero harm

AMREC Evaluators should apply a mitigation hierarchy that prioritises efforts to avoid negative environmental and social impacts, followed by minimisation, then restoration, with offsetting as a last resort. Because there are often trade-offs among the economic, social and environmental impacts of resource development projects that need to be understood by decision makers, a 'life-cycle' approach needs to be taken.

Stronger mitigation measures should be applied if a project could impact key biodiversity areas, and impacts to all forms of protected areas, including sacred natural sites and territories and areas conserved by indigenous peoples and local communities, should be avoided.

8.4.2. AMREC E Axis

8.4.2.1. The relationship between social, environmental, and other factors

The E axis is labelled as "socio-environmental-economic" and combines these two aspects of resource classification. A project may meet all the requirements of the F and G axes and the socio-environmental-economic component of the E axis, but unless it is also socially and environmentally acceptable, it often cannot proceed.

The various factors involved in resource classification do not exist in isolation, and the distinction between them may not be clear. Some of the social and environmental factors that affect the E axis may also affect the F axis, such as ownership, contract terms, legal, regulatory issues, and in some cases, fiscal terms (taxes, royalties, etc.). A change or delay in the development costs of projects, due to social and environmental issues, can have a significant impact on the near-term financial value of a project, even making it no longer viable. Subsidies may allow an otherwise strictly economically unviable project to proceed as part of a social or environmental initiative.

8.4.2.2. Other guidance on social and environmental factors

There is considerable literature on social and environmental matters, mainly on how to address them when developing a project, but little that is related to classification. Most of these discuss social and environmental factors, but none contain significant guidance on classification. This is unlike the F and G axes, which are

covered in considerable detail in resource-specific guidance and associated publications. The World Bank and the International Finance Corporation (IFC), must rate projects to assess their risk and uncertainty before making loans. Although their publications do not classify projects in the same way as AMREC, they provide a useful view on social and environmental classification. The System of Environmental-Economic Accounting (SEEA) is managed by the Statistics Division of the United Nations Department of Economic and Social Affairs and refers to UNFC as the standard for energy classification. Although SEEA refers to environmental and social factors, it provides no significant guidance as to how they affect classification.

The evaluation and classification of resources according to AMREC assume that it is carried out by a person with an appropriate level of expertise. However, the assessment of social and environmental contingencies falls outside the historic resource evaluation and classification process and the expertise of most evaluators, and it will often be necessary to involve others with the appropriate expertise as part of the evaluation team to assess the social and environmental aspects of resource classification.

8.4.3. Guidance on E-axis social and environmental classification

8.4.3.1. Social and environmental classification criteria

Contingencies are conditions that shall be resolved before a project can proceed to the next stage of project maturity as it advances to execution. Assignment into one of the AMREC Categories or Sub-Categories depends on the probability that the relevant contingencies, including the social and environmental issues, that are required for a project to proceed will be resolved. While almost all projects involve social and environmental issues, they will not always be contingencies that would affect categorization. The discussion below focuses mainly on social and environmental issues that may be contingencies.

The removal of a contingency requires action by the relevant parties. Simple examples would be a sales contract that allows product sales, attainment of access to markets, or testing an exploration well to confirm that it could produce at social, environmental and economically viable rates. For social and environmental issues, it may require action such as the application for, or receipt of, regulatory approval, agreements to limit operations during periods of environmental sensitivity (e.g. limiting or curtailing wind power generation during bird migration or breeding).

Environmental and social contingencies can be considered under two headings:

(a) Formal. Contingencies subject to formal legal and regulatory processes, such as the granting of environmental approval, approval to drill, explore, develop, or construct. Resolving these contingencies would generally lie within the control of an operator, partnership, or government. In this case, estimating the probability that a project will proceed with or without active engagement with stakeholder may be relatively straightforward, and in developed areas, regulatory approval may be a matter of routine and not considered to be a contingency;
(b) Informal. Formal approval may not be sufficient to allow a project to proceed, since there may be obstacles to the implementation of a project that lies outside a formal process. The probability of the resolution of this type of contingency will usually be more difficult to assess, and it may lie beyond the control or influence of an asset owner or even a government. For example, concerns of local communities about the positive or negative impacts of a mineral recovery project on the community, or of organisations that would not be directly affected by a project and could involve informal civil activity ranging from protests to violent action. These issues would typically be dealt with by discussion and negotiation between stakeholders, which could trigger further activity within a formal legal or regulatory setting. These are often referred to as Social Licence but could include force majeure due to civil unrest and war.

8.4.3.2. Steps in classification

The steps in the classification process include:

(a) Identifying the relevant social and environmental contingencies;
(b) Estimating the probability that social and environmental issues will be resolved and maintained over the life cycle of the project. This will depend on the specifics of a project and the legal, regulatory and

social environment in which it is proposed to be carried out. When there is a history of similar project developments, they may be used as analogues. Although an assessment of the probability of resolving social, environmental and economic contingencies is likely to be subjective, it should be based as much as possible on a documented analysis;

(c) Consideration of the level of activity needed and the status of this, to resolve social and environmental issues at the time of an evaluation and classification. This will depend on the project:
   i. When no or only routine activity is required, social and environmental issues may not be a contingency;
   ii. In other cases, a high level of effort and active engagement with stakeholders may be required over an extended period.
   iii. Evidence of active engagement with stakeholders towards the resolution of social and environmental contingencies shall be based on substantial documentation, and would not be satisfied by an unsubstantiated claim or a token effort. The nature of this will depend on the project and on the social and environmental issues that are involved. It could include, for example, documented proof that an Environmental and Social Impact Assessment (ESIA) was being carried out or has been submitted for approval, that there are constructive discussions with interested parties, the establishment of training and other social programmes, etc.;
   iv. Lack of active engagement with stakeholders in the resolution of social and environmental contingencies. The consequences of a lack of engagement will depend on the situation. In an established area with a history of resource development, project approval may be a matter of routine and require little or no effort. In other cases, it will result in a project not receiving approval and it being put on hold or abandoned.
   v. Active engagement with stakeholders does not necessarily mean that this will lead to successful resolution of the contingencies. Similarly, a lack of engagement at the time of an evaluation does not necessarily mean that a project will be unable to proceed.

The following points should be noted:

(a) The assessment of social and environmental factors for resource categorisation has not been common resource evaluation practice. Evaluators should ensure that they apply an appropriate level of expertise for an evaluation, which may require consulting with those who have such expertise;
(b) Evaluation and classification can only be based on the information that is available at the time of the evaluation. Subsequent changes may require a re-evaluation and reclassification;
(c) An estimate of probability should be at a level needed to classify to a AMREC sub-category (e.g., the resource Category may be the same whether the probability is 60 per cent or 70 per cent). It does not necessarily require formal calculation or great precision, and subjective estimation of probability (at different levels of sophistication) will usually be more appropriate;
(d) The uncertainty associated with any estimate should be recognized;
(e) There will usually be multiple contingencies and the lowest ranking one should be assigned to the overall project classification, as illustrated in the example in the Table in Annex II;
(f) The method used to estimate a probability should be documented. This will be particularly important when the information is to be used for investment decisions or raising of funds for a project.

8.4.4. E-axis social, environmental and environmental categories and sub-categories

E-axis Categories and Sub-categories are summarized in the following text.

(a) E1: Production and sale has been confirmed to be social, environmental and economically viable.
(b) E2: Production and sale is expected to become socially, environmentally and economically viable in the foreseeable future.

Two Sub-categories are based on the probability of approval, a significant aspect of which is the effort directed towards resolving the relevant contingencies. The level of engagement required for their resolution depends on the project, the formal regulatory requirements and the informal situation regarding social and environmental issues. However, the activity does not automatically relate to the

probability of approval. A high level of active stakeholder engagement could be tied to a low probability of approval, but in some cases, such as in a well-developed area with considerable prior, analogous, activity, there may be a high probability of approval because little, or only routine, activity is needed.

E2.1 Issues are yet to be resolved, but there is a high probability of their resolution evidenced by an active attempt to resolve all impediments (contingencies) with a high probability of success, a history of similar projects in the area, or other indications, within the foreseeable future.

E2.2 Issues are yet to be resolved, but there is either:

An active attempt to resolve all impediments (contingencies) with a medium probability of success, or;

No activity to resolve impediments but based on the characteristics of the project and previous history of similar projects in the area, or other supportive information there is a medium probability of their resolution within the foreseeable future.

The relationship of E2.1 and E2.2 to the Project Maturity sub-classes is discussed below, but it should be noted that it is not a simple one-to-one relationship.

(c) E3: Production and sale is not expected to become socially, environmentally, and economically viable in the foreseeable future, or evaluation is at too early a stage to determine social, environmental economic viability

E3.1: No additional guidance

E3.2: Whether or not there is an active effort to resolve social, environmental and economic issues, the outcome is unknown or unclarified.

E3.3: Whether or not there is an active effort to obtain approval, the probability of receiving approval is less than medium and may be zero

Classification depends on the probability of resolving all relevant contingencies. Although the estimation of probabilities will be largely subjective, the percentages given below are based on studies of common usage of terms, such as “high probability”. When it is uncertain into which category a contingency would fall, the lower one should be selected.

For social and environmental contingencies, the probability of successful resolution depends on the significance of the issues and the level of activity needed for their resolution.

The criteria of Probability of Approval and the Level of Stakeholder Engagement are related and may be combined as follows:

(a) Active Stakeholder Engagement with:

- High probability of approval (> 80 per cent)
- Medium probability of approval (50 – 80 per cent)
- Low (< 50 per cent), or unknown probability of approval.

(b) No Active Stakeholder Engagement:

- High probability (> 80 per cent) of approval based on a demonstrated history of outcomes in analogous situations.
- Medium probability (50 – 80 per cent) of approval based on a demonstrated history of outcomes in analogous situations

- Low (< 50 per cent) or unknown probability of approval.

The application of the above to classification in AMREC is summarized in the Table B11.

Table B11 Categorisation based on Level of Stakeholder Engagement and Probability of Approval

Stakeholder Engagement	Active	Not Active
Probability of Approval		
High (> 80%)	E2.1	E2.2
Medium (50 – 80%)	E2.2	E3.3
Low (< 50%)	E3.3	
Unknown or unclarified	E3.2	

This is not a requirement for a specific probability estimate, but for a determination of which range, < 50 per cent, 50 – 80 per cent or > 80 per cent, is appropriate. In most cases, this will be a qualitative, not a quantitative, estimate. When there is doubt, the lower probability should be assigned.

When determining the appropriate resource category, the evaluator should consider the significance of the social and environmental contingencies, the level of concern of regarding these issues by stakeholders and the activities, including the necessary level of engagement, between them that is required to resolve the issue.

8.5.5. Related contingencies

As noted above, other E-axis factors may be affected by social and environmental issues. The effect of these on classification is likely to vary between different operators and others with different Realms of Discourse. For example:

(a) Ownership and regulatory Approval are unlikely to be factors for governments but will be significant for others;

(b) The decision to commit to executing a project usually lies with an owner, not with a government.

This may result in different classifications for the same project. This is recognized in National Resource Management, although that focuses mainly on aggregation. They may include the following:

(a) Legal framework. The right to produce and sell (or benefit) from a resource.

- E3 if there is no legal right to produce and sell, as is the case for many exploration activities, and no negotiation or application in process.
- E2 if the legal right to produce and sell is being negotiated but not finalized or is in dispute.
- E1 if the legal right to produce and sell is established and not in dispute.

(b) Regulatory approval. This is required for many aspects of production operations, ranging from major environmental approval to routine minor issues such as individual well abandonment approvals.

- E3 if required but not applied for or applied for and not approved.
- E2 if applied for but not yet received.
- E1 if received or, located in areas and jurisdictions where there is an established history of approval indicates that approval can be expected.

Classification may be relatively straightforward for formal legal and regulatory processes since they have either:

(a) Not been initiated (i.e., not been applied for);

(b) Been initiated and in the process of being considered;

(c) Been initiated and approval has not been granted;

(d) Been approved.

Other E-axis non-economic factors mentioned in AMREC, for which classification may be less clear, include:

(a) Fiscal framework. The terms regarding taxes, royalties, production sharing, or other fiscal provisions under which production operations are carried out may be influenced by social and environmental considerations.

- E3 if not determined.
- E2 if it is being negotiated but not finalized, is in dispute, or there is uncertainty due to the possibility of a change that could affect the commercial viability of a project.
- E1 if established, not in dispute or uncertain, and allows a decision to implement a project to be made.

(b) Contractual conditions. These are specific to an asset or project, but may contain terms beyond those of the legal or fiscal framework (e.g., a requirement to use local labour, private sector contracts, lease expiry after a specific time, abandonment and reclamation obligations, etc.). A contract may not always be required, but if it is:

- E3 if it does not yet exist.
- E2 if they are being negotiated but not finalized, are in dispute, or there is uncertainty due to the possibility of a change that could affect the commercial viability of a project.
- E1 if established, not in dispute or uncertain in any manner, and is expected to be concluded with a high degree of certainty.

The contingencies relevant for a specific project will vary, and there may be others that are not listed previously. An environmental or social contingency that results in the delay of a project can have a major impact on the social, environmental and economic viability (e.g. a decrease in the discounted NPV) that may warrant a reclassification. Users of AMREC may elect to use attributes to distinguish between projects where the contingencies are within their control and where they are not. This may be done, for instance, to improve information to government or others of what the quantitative effects of changes in the framework conditions they control may be.

8.4.6. Project Maturity Sub-Classes

Project Maturity describes the current status of a project, but a project that is On Hold or Development Pending could have a probability of the resolution of the relevant issues that range from low to high but provides no indication of the probability that the relevant contingencies will be resolved.

8.4.7. Example of E-axis resource specific classification

The overall ranking shown in Table B12 is that of the lowest potential E Category.

Table B12 Example of E-axis resource specific classification

Issue / potential contingency	Level of engagement	Probability of approval	Potential E Category
Legal	Relevant licences	done	E1

Issue / potential contingency	Level of engagement	Probability of approval	Potential E Category
Regulatory	Relevant permissions	granted	E1
Market access	Local use	99%	E1
Social	No objections expected	90%	E1
Economic	Project screened economic	95%	E1
Political	No worries expected	99%	E1
Internal & external approvals/commitments	Commitments made	100%	E1
Environmental	Licence approval in process. Issue with the black-rimmed beetle frog habitat	50%	E2
Timing (<5 years or>5 years)	<5 years	Uncertain (see environmental)	E2
Total = lowest ranking issue			E2

8.4.8. Social Responsiveness

Social factors are an important constraint, but could be also an opportunity to resource management. This section discusses the factors that should be assessed on the social issues, because they directly impact the project as they bring people together, facilitate agreements, help drive efforts in same direction and bridge the gap between what is and what should be.

8.4.9. Stakeholder mapping

Stakeholders may be divided into broad groups as follows:

- Resource providers (Operators)
- Local people around the resource – the power that a community has over individuals to behave in a particular way – may also influence the willingness of resource providers to adopt the management system
- Associations
- Legislators
- Policy Makers/ governments
- Financial People (stock markets, economists)
- Others (marketers, buyers, users, environmentalists,

Proposed stakeholder map with three different levels is suggested to clarify interface between governments/states and communities in their dealings with exploration or mining companies to avoid possible negative consequences

- Level 1 Project-affected communities
- Level 2 Businesses and commercial organizations
- Level 3 Governmental authorities and regulators

The stakeholder mapping should consider small scale and artisanal operations where applicable.

8.4.10. Stakeholder engagement

A stakeholder engagement should be in place from the start of the resource life-cycle and should be maintained throughout. The stakeholder engagement may involve

- Group discussions, meetings and workshops
- Networks
- News letters
- Social media

8.4.11. Agreements

Stakeholder agreements where appropriate should be done with the engagement of legal experts, regulators and policy maker. Attempts should be made to integrate ideas to demonstrate

- Interdependence
- Inclusiveness
- Interconnections (upward and backward linkages)
- Interlinkages
- Innovation

8.4.12. Assessments on changes in social systems

While undertaking AMREC based assessment, the Evaluators may consider the the gap between what is and what should be from a social responsiveness perspective and provide solutions to bridge this gap. This could include meeting the provisions of AMV, GMIS, Agenda 2030, Agenda 2063 and the reality. The AMREC Evaluators also need to consider the potential changes foreseen in the social systems, especial with regard to population growth and conflicts that may rise due to sharing of limited resources. Social Impact Assessment as part of ESIA deliverables should include a discussion regarding the same.

Some of the tools for bridging the gap could include

- Education and training
- Tools and instruments to measure SDGs indicators
- Social recognition
- Demonstrations and field days
- Social Leadership programs

The power of the community is in its social capital, which can increase the range of knowledge, skills, expertise, and support available to individuals involved in resource development. The social capital has a major role in increasing their capacity to implement sustainable resource development.

Keeping communities informed and facilitating the growth of trust shall be an important component of resource development. Building the trust can involve aspects, including, but not limited to

- Access to professional advice to reliable information
- Local knowledge (indigenous and ethnic people)
- Appropriate information, advice and solutions

8.4.13. Social institutions

Social infrastructure and services such as water supply, electricity, waste disposal, education and health facilities in the project neighbourhood should be considered in aN AMREC assessment. Other social institutions may include

- Local decision-making institutions
- Cultural heritage - Careful attention should be paid to avoid such areas
- Local conflict of interests
- Water usage or water rights and communal rights
- Health and wellbeing including incidence of infectious diseases such as HIV/AIDS

8.4.14. Human rights

Human rights are rights inherent to all human beings, regardless of race, sex, nationality, ethnicity, language, religion, or any other status. Human rights include the right to life and liberty, freedom from slavery and torture, freedom of opinion and expression, the right to work and education, and many more. Everyone is entitled to these rights, without discrimination.

International human rights law[3] lays down the obligations of Governments to act in certain ways or to refrain from certain acts, in order to promote and protect human rights and fundamental freedoms of individuals or groups.

The Universal Declaration of Human Rights (UDHR)[4] is a milestone document in the history of human rights. The Declaration was proclaimed by the United Nations General Assembly in Paris on 10 December 1948 by General Assembly resolution 217 A (III) as a common standard of achievements for all peoples and all nations. It sets out, for the first time, fundamental human rights to be universally protected.

The UDHR, together with the International Covenant on Civil and Political Rights[5] and its two Optional Protocols (on the complaints procedure and on the death penalty) and the International Covenant on Economic, Social and Cultural Rights and its Optional Protocol, form the so-called International Bill of Human Rights[6].

8.4.15. Rights of Workers

The United Nations Declaration of Human Rights, which is the basis of the International Covenant on Economic, Social and Cultural Rights (article 6-8) reads as follows:

Article 23

- Everyone has the right to work, to free choice of employment, to just and favorable conditions of work and to protection against unemployment.
- Everyone, without any discrimination, has the right to equal pay for equal work.
- Everyone who works has the right to just and favourable remuneration ensuring for himself and his family an existence worthy of human dignity, and supplemented, if necessary, by other means of social protection.
- Everyone has the right to form and to join trade unions for the protection of his/her interests.

Article 24

- Everyone has the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay.

[3]The Foundation of International Human Rights Law https://www.un.org/en/sections/universal-declaration/foundation-international-human-rights-law/index.html

[4] The Universal Declaration of Human Rightshttps://www.un.org/en/universal-declaration-human-rights/index.html

[5] International Covenant on Civil and Political Rightshttps://www.ohchr.org/en/professionalinterest/pages/ccpr.aspx

[6] https://www.ohchr.org/Documents/Publications/Compilation1.1en.pdfTHE INTERNATIONAL BILL OF HUMAN RIGHTS

Identified by the ILO in the 'Declaration of the Fundamental Principles and Rights at Work,[2] core labour standards are:

- Freedom of association: workers are able to join trade unions that are independent of government and employer influence;
- The right to collective bargaining: workers may negotiate with employers collectively, as opposed to individually;
- The prohibition of all forms of forced labour: includes security from prison labour and slavery, and prevents workers from being forced to work under duress;
- Elimination of the worst forms of child labour: implementing a minimum working age and certain working condition requirements for children;
- Non-discrimination in employment : equal pay for equal work.

8.4.16. Rights of Women

The Universal Declaration of Human Rights, adopted in 1948, enshrines "the equal rights of men and women", and addressed both the equality and equity issues. In 1979, the United Nations General Assembly adopted the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) for legal implementation of the Declaration on the Elimination of Discrimination against Women[7]. Described as an international bill of rights for women, it came into force on 3 September 1981.

The Convention defines discrimination against women in the following terms:

> Any distinction, exclusion or restriction made on the basis of sex which has the effect or purpose of impairing or nullifying the recognition, enjoyment or exercise by women, irrespective of their marital status, on a basis of equality of men and women, of human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field.

It also establishes an agenda of action for putting an end to sex-based discrimination for which states ratifying the Convention are required to enshrine gender equality into their domestic legislation, repeal all discriminatory provisions in their laws, and enact new provisions to guard against discrimination against women. They must also establish tribunals and public institutions to guarantee women effective protection against discrimination and take steps to eliminate all forms of discrimination practiced against women by individuals, organizations, and enterprises.

8.4.17. Rights of Children

The 1989 Convention on the Rights of the Child (CRC)[8] defines a child as "any human being below the age of eighteen years, unless under the law applicable to the child, majority is attained earlier."

Children's rights includes their right to association with both parents, human identity as well as the basic needs for physical protection, food, universal state-paid education, health care, and criminal laws appropriate for the age and development of the child, equal protection of the child's civil rights, and freedom from discrimination on the basis of the child's race, gender, sexual orientation, gender identity, national origin, religion, disability, color, ethnicity, or other characteristics. Interpretations of children's rights range from allowing children the capacity for autonomous action to the enforcement of children being physically, mentally and emotionally free from abuse, though what constitutes "abuse" is a matter of debate. Other definitions include the rights to care and nurturing.

8.4.18. Rights of local populations local communities

Resource development can also have complex social impacts related to displacement, land rights, cultural heritage, indigenous peoples, gender equality, employment, public health, safety and security, sexual exploitation and abuse, and other issues. Rights-based social safeguards, inclusive dialogue and risk

[7] See Convention on the Elimination of All Forms of Discrimination against Women and its Optional Protocol: Handbook for Parliamentarians http://archive.ipu.org/PDF/publications/cedaw_en.pdf

[8] Convention on the Rights of the Child https://www.ohchr.org/en/professionalinterest/pages/crc.aspx

management principles should be applied to resource development projects to ensure that it benefits the poor, leaves no one behind, and respects human rights. Chief among these is the need for inclusive, participatory, transparent, and ongoing stakeholder consultation to be built into infrastructure planning processes. Resource project development should be based on free, prior and informed consent, in line with the UN Declaration on the Rights of Indigenous Peoples[9].

8.4.19. Age consideration issues

As stage in life can be important constraint in resource management, this may be considered for project implementers. For example, the less than 30 years age group are generally known as having family commitments and debt and may have a bearing on how they impact a project.

8.4.20. Site remediation and financial guarantees

When resource development and production ceases in a site, the site should be resorted to acceptable conditions for other use and handed over to the appropriate authority. All development plans should have a remediation plan from the before it is approved, and the start of the operation.

Preferably, remediation actions of a site may be carried out in parallel as operations proceed, so that the entire activity should not be postponed to the very end. Previous experiences have demonstrated that progressive remediation is cost effective and more robust.

The operator should commit the necessary financial guarantees for remediation of the site, which may be revised on a periodical basis depending on the remediation that is required after the anticipated close of the operations.

8.5. Commercial guidelines

Commercial assessments are about the likely availability and value of future production. This may vary between stakeholders depending on whether costs and revenues are shared equally or not. The difference between commercial assessments of projects and of the assets defining stakeholder interests in projects will be explained in more detail in the section on commercial assessments of assets. The future production is certainly not measurable (yet) nor provable.

Uncertainties can be estimated using deterministic or probabilistic methods.

AMREC supports commercial assessments based on an uncertainty evaluated using either deterministic or probabilistic methods (or combination thereof). The choice will depend on:

(a) The application of the commercial assessment

(b) The need, preference and/or capability of the user

(c) The information available to the preparer.

Assuming that projects have been classified according to project maturity, estimation of associated recoverable quantities under a defined project and assignment to uncertainty categories may be based on one or a combination of analytical procedures. Such procedures may be applied using an incremental and/or scenario approach; moreover, the method of assessing relative uncertainty in these estimates of recoverable quantities may employ both deterministic and probabilistic methods.

8.5.1. Assessments of commercial supplies

AMREC inventories show the commercial product quantities. These are quantities of production that will be available for purchase and sale from projects that will be carried out. In other words, their projects have no contingencies in the economic, social and environmental domain (category E1) and no contingencies with

[9]United Nations Declaration on the Rights of Indigenous Peoples, https://www.un.org/development/desa/indigenouspeoples/declaration-on-the-rights-of-indigenous-peoples.html

respect to technical execution (F1) that will stop them from proceeding. Although there will be no blocking contingencies in these domains, commercial assessments will still need to consider uncertainties arising from market conditions, changes in the framework conditions, operational changes, etc.

The quantities to be produced are categorised according to the level with which they have been defined in categories G1, G2 and G3, alternatively as G1 quantities, G1+G2 quantities and G1+G2+G3 quantities. For petroleum and when probabilistic estimation is done, G1 represents a high level of confidence as having at least a 90% probability (P90) that the quantities recovered will equal or exceed the estimate. G1+G2 represents a moderate level of confidence near the expected (mean) value with at least a 50% probability (P50) that the actual quantities recovered will equal or exceed the estimate. For the high estimate of G1+G2+G3 this probability should be equal or greater than 10% (P10). Deterministic estimates will strive to have the same levels of confidence as is defined for probabilistic estimates.

8.5.2. Commercial assessments of assets

In addition to selling and buying commercial quantities, it is common to sell, buy or trade the rights to produce these quantities. These rights are defined here as assets and are distinguished from the projects that AMREC classifies. The relationship between the asset and the project is defined by the legal, regulatory, fiscal and contractual conditions contained in the definition of the rights. The values attached to these rights are not limited to the value of the commercial production that is referred to above, but relates to the entire resource base, i.e. in all AMREC classes.

The rights may be defined in terms of quantities as is the case when fixed royalties are imposed. They will more often than not be defined in terms of the cash flow that the projects may produce. Assessment of the commerciality of the assets will therefore in general require consideration of the project information that defines the cash flows including quantities to be produced, time series of revenue, investment, operating costs, taxes, fees, tariffs, physical and human inputs, emissions and other information carried by the projects. Then the rules embedded in the rights define the corresponding time series for the assets, i.e. how they and the risks involved are distributed to stakeholders, including government. This information is not generally publicly available. Some users may have access to it while other sophisticated users may be able to understand the general nature and quantification from available information in the AMREC inventories of quantities and other related observations available to them. Depending on the nature of the rules defining an asset, the asset holder may find that the class of hers or his asset may differ from the class of the project i.e. a project that is acceptable to government may not necessarily be acceptable to all licensees.

Below is a non-exhaustive list of where commercial assessments of assets are used:

(a) in resource management considerations;

(b) in fiscal and contractual design;

(c) in capital allocation, project development and commodity transaction, including valuation;

(d) in asset transactions;

(e) in portfolio optimization;

(f) in public and financial reporting.

8.5.3. Fiscal and contractual designs

Fiscal and contractual designs determine, together with market values and costs, the perceived value of the produced commodity at the point of valuation (reference point), typically the point of sale or the point where a netback price may be assessed. This is the value, that together with the costs of bringing quantities to the reference point, govern the value at the source of production and thereby the recovery decisions. The lower the value at source, the lower the commercial recoverable quantities will be. Many recovery processes are physically irreversible processes, i.e. the total outcome depends on the history of recovery. Failures of initial

recovery decisions to design for the recovery of economically marginal quantities (that can be very large) cannot be repaired by later efforts, at least not without additional cost and effort relative to what could be achieved if the quantities were targeted for recovery from the start. A prerequisite for efficient recovery is therefore a high perceived value at source, facilitated by time stable fiscal and contractual designs that do not harvest economic rent downstream or act as costs in reducing the value at source.

Fiscal and contractual designs might cause the value of the commodity produced not to be the same for all stakeholders, including governments.

This causes misalignment of interest that may be an impediment for reaching balanced decisions for the recovery of the commodity seen from a project perspective.

The fiscal design to produce a given value to government may in itself affect the quantities that the producer can afford to extract and have an effect on the way quantities are classified. One extreme is a situation where only gross taxes are applied (royalty, production fees, etc.) that will cause the value at the source of production, and the potentially recoverable quantities to differ seen by the payer and receiver of gross taxes. The other extreme is where the taxes have been designed not to distort incentives and where the public and private sector interests in pursuing recovery will be aligned and equal to what they would be for a project with only one stakeholder.

When there is full alignment of interests, and ignoring portfolio effects, the stakeholders may categorise their assets on the E-axis in the same way. When there is not full alignment this may not be the case.

8.5.4. Capital allocation, project development and commodity transactions

There are at least three parts to project and asset economics involving commercial transactions:

- Allocation of capital to development and production activities
- Selling of the commodity produced including valuation
- Managing the opportunities and risks associated with the above.

As was the case with fiscal and contractual design, the analyses require access to the project information. This allows one to see the project and asset perspectives. Both may affect the appropriate project and asset decisions and thereby the appropriate E and F categories of the projects and the assets.

Allocation of capital may take place at the project or asset level or as a combination of the two. It will generally depend on the technical shaping of the project or development process and on the position of the stakeholders. The F-categories reflect the project maturity decisions in this respect. Allocation of capital will also depend on the availability and cost of capital. Project finance will depend on the business model of the project, while asset finance may in addition depend on the financial position of the asset holder. If capital is not available at satisfactory conditions, the project cannot be categorised as E1 and will therefore not be a commercial project for one or all asset holders in the project.

Future produced quantities, project development and commercial value are all associated with uncertainty. Risks and opportunities represent the consequences of uncertainty, often quantified as the probability that an uncertain outcome will occur times the consequence this will have. The consequence is always to someone and therefore inherently subjective.

Uncertainties may be combined probabilistically to help in capital allocation by determining the ranges of resources or values.

Different views of the future are some of the factors driving capital allocation as well as asset transactions that are described next.

Opportunities and risks for the project, the asset or the asset holders may play a role in shaping the decisions. The asset holders may not have, or wish to, develop the capabilities required to proceed. The asset holder may see higher value in selling the asset or may wish to hold on to it without developing it for strategic reasons or

no reason at all as discussed in the chapter on portfolio optimisation below. The appropriate category to use in the classification is always dependent on what is done, not what should be done. Firstly, this reflects the physical realities, and is therefore valuable for users. Secondly, it separates classification from decision making, making classification easier relative to the much more difficult task of decision making.

8.5.5. Asset transaction

There are at least three types of asset transactions in which the AMREC may be applied:

- Asset trades and swaps
- Mergers of projects and/or assets including agreements for joint development of multiple assets and unitization
- Asset acquisition and divestment.

These transactions refer to value in one form of another.

8.5.5.1. Asset trades and swaps

Asset trades and swaps may involve resource quantities of all classes. Here, commercial assessments of trades may be based on estimated recoverable resource quantities or quantities in place adjusted for obvious differences in value. Trades may be guided by other similar transactions observed in the market. Detailed cash flow analyses are often not available for some of these assets due to lack of sufficient project definition.

Resource quantities with categories E3, F3 and F4 fall in this category.

Trades and swaps of assets with sufficiently mature projects to define cash flows are guided by the estimated cash flows.

8.5.5.2. Mergers of assets including agreements for joint development of multiple assets and unitization

Mergers (or the joining) of two or more assets to form a new asset is quite natural when the value of the new asset is higher than the sum of the values of the merged assets. It is also natural to merge assets when misalignment of interests in individual assets represents an impediment to efficient and fair asset development.

Several assets may, for instance be combined to utilise a joint infrastructure where the new asset takes full advantage of this and exploits the combined asset as a unit.

Combining several assets is common when they have overlapping legal rights that cause misalignment of interests (unitisation). This is the case for oil and gas fields that cover two or more licenses and where the quantities in one can be produced from another.

To achieve an efficient resource management, it is important that the allocation of value from the new asset to the initial asset holders is done through mechanisms that are not affected by the way development and production takes place. An example is the use of initial quantities in place to allocate value. Allocation of value between the initial asset holders may be based on information that becomes better defined as development and production proceeds. This causes the agreement governing the new asset to contain clauses on the redistribution of asset ownership, including future production, cost and reallocation of past costs as new information becomes available. The AMREC holds the relevant resource quantities used for redetermination of future production, and the project information holds the cash flow information required for cash adjustments and distribution of future costs. Past costs are found in the accounts.

8.5.5.3. Asset acquisition and divestment

Asset and company transactions involve asset trades as described above as well as commercial transactions involving cash, shares, etc.

Examples are companies who prefer to specialize in capabilities required for one part of the value chain. This can be exploration, development, production operations, tail end production or abandonment. These companies seek opportunities in their segment where they can do better than the seller or seek to exit their segment when they have done what they are best at and have improved the asset value accordingly.

In the context of AMREC, the project information and the terms and conditions governing the assets are again key for determining the values, risks and opportunities for seller and buyers. If the partners to the transaction agree on making a cash transfer, then it is necessary to aggregate the asset values of the projects involved in the transaction to assess what a reasonable price will be. This requires valuing and aggregating assets in immature projects. It is sometimes not possible to do this, as movement from one category to another may be both a chance, with an estimated probability of occurrence that can be estimated, but also a decision that may need to be negotiated. Whether it is a chance, or a decision depends on the role of the evaluator. Aggregation of resource quantities for projects or assets with an equivalent chance of being realised, indicated by them having the same E and F categories is possible depending on whether the uncertainties indicated through the G-categories are discrete estimates, scenario estimates or probability density functions with information on dependencies and correlations between assets. As should happen with all simulations/estimates, all assumptions need to be exposed so that the outcome can be tested.

Aggregation of uncertain time series for production and sales, costs, cash flows etc. is complex. For instance, a production forecast can reflect delays in start-up but high production later. It will be a low forecast in early years and high one in later years and cannot be described as a high or low forecast without taking time into account. A way to work around this is to describe the forecasts by using scalar quantities such as start-up dates, build up rates, production capacity, production rates at various levels of cumulative production, recoverable quantities etc. where the range of uncertainty of each of these scalars can be described using probability density functions. They are then used together through mathematical equations using a Monte Carlo type simulation to produce alternative production profiles. Both simple closed form solutions and/or elaborated numerical simulations of the development and production processes can be used. From this it is possible to generate a field of forecasts (a swarm) that can be used to generate a probability density functions for scalar project information of interest such as net present value, cumulative sales, non-sales production over a given time period, etc. These probability density functions can in turn be aggregated using a second Monte Carlo simulation or more sophisticated methods like Global Optimization, taking into account the dependencies and correlations of the key uncertainties.

8.5.6. Portfolio optimisation

The value of a portfolio depends on the nature, size, number and characteristics of its elements. In portfolio optimisation, the optimiser can, within the limits that agreements with others allow include or exclude elements from the portfolio, change their magnitude and timing, shape their dependencies and influence their uncertainties, in search for an optimal portfolio. What an optimal portfolio is depends on the interests and constraints of the optimiser. It may be a portfolio that maximises value for a certain amount of risk, but also one that produces manageable opportunities and risks, that can meet commitments, respect financial constraints, provide full employment of people and equipment, fill infrastructure capacities, minimise waste, etc.

AMREC with the underlying project information may be used as a key instrument in portfolio optimisation. Portfolio optimisation may in turn impact the commercial value it holds for the owner of the portfolio or for a buyer of it.

8.5.7. Public reporting, including corporate and financial reporting

Public reporting can be on a supranational, national, regional, project, company or asset level. It invariably requires a high professional quality of estimates at a frequency and an aggregation level where numbers are reasonably stable over time and estimated in a transparent and auditable manner for the public to use.

Reporting resource quantities at the project level and at the level of aggregated projects does not necessarily require going into project information. The AMREC inventories display the quantities directly. The reporting should be done using the instructions provided in Part C PARC of this document.

8.5.8. Appropriation

Appropriation answers the question on who owns the resource quantities and how the cash flows are shared, and depends on the fiscal and contractual conditions.

8.5.9. Allocation

Allocation is regarding who owns (or benefits from) the produced quantities? This is generally governed by how the cash flows are shared and depends on the fiscal and contractual conditions. This must be handled outside the classification, but in conjunction with for instance partners' financial reports.

When purchased quantities are being produced together with those recovered from the estimated quantities initially in place (the indigenous quantities), then there is a need for an accounting procedure to calculate the remaining project quantities. The most reasonable convention is Last In First Out (LIFO). This reflects that the purchased quantities are acquired and stored, while the indigenous quantities are uncertain resources to be extracted. The Last in First Out (LIFO) principle will in practice assign the uncertainty to the indigenous quantities.

8.5.10. Valuation

Commercial assessments are strongly linked to valuation. Project valuation is typically required internally by entities for future investment and operation. It is also required for selling or buying an asset. Asset valuation could be a complex process that requires a careful consideration of the assumptions and methodologies applied. Depending on the type of asset and available information, different methods can be used for valuation. Analysis of net present value of a discounted cash flow (DCF) is typically one of them. All future cash flows are estimated and discounted using a discount rate to give their net present value. Aspects to consider in valuation beyond the cash flows are what discount rate to use for a project or an asset. It will always reflect the time value of money. It may also be used as a blunt instrument to account for the risk of projects underperforming. Alternatively, the risks and opportunities may be accounted for as real options associated with the cash flow.

Commercial assessments may require an assessment of:

- Time distributed future costs and revenues, and thereby of produced quantities
- Uncertainties in these costs and revenues
- Future framework conditions distributing costs and revenues to stakeholders (assets) including government
- Uncertainties in future frameworks, including but not limited to policy measures enforced to reach the SDGs and climate ambitions. In particular, the effects of imposing a sufficient greenhouse gas cost to limit emissions to tolerable levels may need to be considered.

Project values may be observed from accounts in the case of past projects, from transactions, or from forecasts of future cash flows.

Valuation may help determine the appropriate category to use for a project. Project values may be observed from accounts in the case of past projects, from transactions, or from forecasts of future cash flows. Of these, valuation based on forecasts is the most complex, but also the most common. Forecasts are often based on financial accounting methods that integrate historical price developments and current market trends; however, they can also be supported by systems analysis methodologies such as Dynamic Material Flow Analysis.

The net present value (NPV) of future cash flows is a common measure of value. It can be written using continuous variables:

$$\text{NPV} = \int_{t=0}^{\infty} (1 + r_c)^{-t} . \, \text{v(t)dt} \qquad (1)$$

Where:

r_c is the continuously compounded discount factor[10]; and

v(t) is the rate of expected cash flow over time t.

Assuming that the project is of average risk and that project owners are financed by institutions constituting a well-diversified capital market – or at least can choose to be, the appropriate discount factor at which NPV is maximized for these institutions include a risk premium similar to that applying to the financial market as a whole (stock market plus bond market). In this formulation, the cash flows should reflect the actual risk and opportunities arising from the uncertainties associated with the project (Laughton, Gurrero, & Lessard, 2008) by taking their values directly into the v(t), the cash flow in period t. The appropriate risk premium on the discount factor may be chosen to be higher for projects near break-even.

Contingent projects can then be valued as follows:

$NPV_p = NPV_s \times P_s + NPV_f \times (1-P_s)$

Where:

NPV_p is the project value.

NPV_s is the success value, i.e. the value given that the contingency is removed.

P_s is the probability that the contingency will be removed, and the project will succeed.

NPV_f the failure value, i.e. the value given that the contingency will eliminate the project. It will generally be the negative value of the costs up to the abandonment of the project.

$(1-P_s)$ is the probability that the project will fail.

If the value NPVp of the contingent project is satisfactory relative to for instance the net present value that alternative use of funds will yield, it is reasonable to assume that activities to remove the contingencies will proceed and the project can remain with the original category. If the NPVp is not positive enough, then the project may have been assigned too high a category and should be considered for degrading.

8.5.11. Accounting

Material balance is preserved when the classification is applied to the recovery of non-renewable quantities.

The estimated total quantities initially in place will equal the sum of the quantities:

- produced and sold
- produced and not sold
- To be produced and sold in the future
- To be produced and not sold in the future
- Not produced due to project abandonment or non-realization
- Remaining in place after production

Quantities that are produced, but not sold (e.g flared gas) should be accounted.

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[10] There is a one-to-one relation between the continuously compounded discount factor and discount factors compounded over at fixed time periods, say annually. The formula for the NPV when discounted over fixed periods is: $NPV=\sum_{i=1}^{t} \frac{V(i)}{(1+r)^i}$

Where NPV is the net present value of forecasted cash flows;
i is the number of the time period (year number i);
V(i) is the value element (cost or revenue) in period i;
r is the discount factor per period i.
t is the total number of time periods

8.6. National resource management

National resource inventory management requires aggregation of information generated by all the resource projects in a country. This national inventory could aid the strategic policy formulation and put in place appropriate regulations. Regulatory requirements for periodic reporting by operators in a country should be through the AMREC system. Such a national inventory should also be integrated to the GMIS.

At a government level, national resource estimates may be based on an aggregation of reported or published corporate and other estimates for individual projects. However, such estimates may not cover all known or potential resources in the country. Furthermore, where government organizations have a responsibility for developing resource estimates at a regional or national level, the estimates may be different from corporate estimates on an individual project basis. In such cases, regional or national inventory estimates using AMREC shall be derived using an appropriate methodology based on the nature and extent of available data. In accordance with Generic Specification G, the aggregation methodology shall be mentioned.

When classifying aggregated estimates using AMREC, it is mandatory that the relevant Numerical Codes for the individual Classes are mentioned. For example, it may be useful at a national level to determine the sum of estimated quantities for Commercial Projects and Potentially Commercial Projects at a “best estimate” level, though it is preferred that the breakdown by Class is also provided.

8.7. Public Disclosure

Disclosure of information on initial and recoverable quantities is made subject to laws, regulations and contractual commitments. Public reporting can be on a supranational, national, regional, project, company or asset level. It invariably requires a high professional quality of estimates at a frequency and an aggregation level where numbers are reasonably stable over time and estimated in a transparent and auditable manner for the public to use.

AMREC provides the rules and guidelines for public disclosure through Part C - Pan-African Reserves and Resources Reporting Code (PARC).

The PARC compliant report should draw numbers from a central inventory and track the disclosures made by the information owner in an effort to keep the conversations about the resources as factual as possible.

PART C - PAN-AFRICAN RESERVES AND RESOURCES REPORTING CODE (PARC)

1. Introduction

The Pan-African Reserves and Resources Reporting Code (PARC), is the AMREC based code for public reporting for resources under relevant financial and security regulations in Africa. The fundamental purpose of PARC is to support stockholder as well as stakeholder confidence and ensure that in alignment to the Africa Mining Vision and Agenda 2063, good social, environmental and economic benefits are assured for Africa.

The relevant constituency that PARC addresses include investors (stockholders) and stakeholders such as communities, governments, operators, professional bodies etc.

Resource reporting under PARC shall be based on the available internal AMREC inventory. Only the AMREC classes and sub-classes, with their numerical codes as mentioned for each Product Type (minerals, petroleum, renewable energy) in this document, shall be used for Public Reporting. Other AMREC classes meant for internal uses should not be used for Public Reporting

The AMREC Working Group recognises that further reviews and revisions of PARC may be required. Additional information, rules, lists and best-practice guidelines will be published on the AMREC website from time to time, after due process has been followed.

2. Scope

The main principles governing the operation and application of PARC are good social, environmental and economic benefits as called for in the African Mining Vision including transparency, materiality and competence.

Reference in PARC to a Public Report or Public Reporting refers to any report on projects, prepared for the purpose of informing investors or potential investors and their advisers, or to satisfy regulatory requirements.

Estimation of quantities is inherently subject to some level of uncertainty and inaccuracy. The uncertainty in the estimates should be discussed in documentation and, where material, in Public Reports, and reflected in the appropriate choice of categories.

PARC is applicable to:

- Minerals (See PART C Section 6)
- Petroleum (See PART C Section 7)
- Renewable energy resources (See PART C Section 8).

3. Public Reports

PARC will apply to any information on resources that a company make available to the public.

Public Reports are reports prepared for the purpose of informing investors or potential investors and their advisers on projects. They include, but are not limited to, annual and quarterly company reports, press releases, information memoranda, technical papers, website postings and public presentations.

PARC applies to other publicly released company information in the form of postings on company web sites, press releases and briefings for shareholders, stockbrokers and investment analysts. PARC also applies to any reports that have been prepared for the purposes such as environmental statements; Information Memoranda; Expert Reports, and technical papers referring to projects.

4. Benefits, materiality and transparency

4.1. Good social, environmental and economic benefits

A Public Report should contain all the relevant information on how the project will address the social and environmental impacts and contribute to eco-system benefits that is called for in the Agenda 2063, African Mining Vision and Sustainable Development Goals.

4.2. Transparency

Transparency requires that the reader of a Public Report is provided with sufficient information, the presentation of which is clear and unambiguous, so as to understand the report and not to be misled.

4.3. Materiality

Materiality requires that a Public Report contains all the relevant information which investors and their professional advisers would reasonably require, and reasonably expect to find in a Public Report, for the purpose of making a reasoned and balanced judgement regarding the quantities being reported.

4.4. Competency

Competency requires that the Public Report be based on work that is the responsibility of suitably qualified and experienced persons who are subject to an enforceable professional code of ethics and rules of conduct.

5. Competence and responsibility in public reporting

5.1. Competent Person

A Competent Person is one who has the ability to put skills, knowledge and experience into practice in order to perform activities or a job in an effective and efficient manner for resource classification, management and reporting.

Classification, management and reporting of resources may be a team effort involving several technical disciplines. In the case of a team effort, it is recommended that there is a clear division of responsibility in a team where each Competent Person and his or her contribution should be identified and responsibility accepted for their particular contribution. If a single Competent Person accepts responsibility for the whole of the documentation, he or she should be satisfied that the supporting work prepared in whole or part by others is acceptable.

The full name, affiliation, education and experience of the Competent Person providing the estimation should be disclosed. If a group is performing the actions, each member of the group should satisfy all the generic requirements and the specific requirements of the sector for which the person is responsible. All members of the group should disclose their full name, affiliation, education and experience and indicate which specific part of the reporting they are responsible for.

5.2. Competent Person requirements

Competency requirements are differentiated as:

(a) Core values that influences a competent person's action and choices
(b) Generic competencies, which are applicable for any sector for which resource reporting is carried out, such as petroleum, minerals, uranium, renewables (geothermal, bioenergy, solar, wind, hydro and others), injection projects, and anthropogenic resources; and
(c) Specific functional competencies, which are applicable to the particular sector for which reporting is carried out.

5.3. Core values

Principles that influence a competent person's actions and choices in connection with resource reporting are:

- African values: Should demonstrate in-depth knowledge of Africa Mining Vision (AMV), Agenda 2063 and the 2030 Agenda for Sustainable Development.
- Integrity: Should demonstrate the values of impartiality, fairness, honesty and truthfulness, in daily activities and behaviours. Takes prompt action in cases of unprofessional or unethical behaviour.
- Professionalism: Should demonstrate skill, good judgment and mastery of the subject matter.
- Care for the Environment: Should have commitment to protect the environment and preserve the earth's natural resources, both for today and for generations into the future.
- Respect for Diversity: Should have commitment to respect for gender justice and diversity such as race/ethnicity, culture, language, gender, age, sexual orientation or expression, religion and disability.

5.4. Generic requirements

The generic requirements for a Competent Person are listed below:

(a) *Single Person or Group*: Competent Person may be a single person or a team of experts with different backgrounds performing resource management functions. For complex projects where knowledge in different areas are required, reporting should be performed by a team of Competent Persons, each having appropriate education, experience and continuous training in relevant areas.

(b) *Disclosure:* The full name, affiliation, education and experience of the Competent Person providing the evaluation should be disclosed. If a group is performing the actions, each member of the group should satisfy all the generic requirements and the specific requirements of the sector for which the person is responsible. All members of the group should disclose their full name, affiliation, education and experience and indicate which specific part of the reporting they are responsible for.

(c) *Responsibility:* The responsibility of the reporting should in all cases rest on the organization or entity reporting the quantities or volumes.

(d) *Education:* A Competent Person should have undergone a managed process of individual learning at a university or academic institution which provides basic knowledge that underpins the science, technology and socio-environmental-economics of the sectors for which quantity or volume assesment is being carried out. At a minimum, a Competent Person should have a relevant tertiary degree.

(e) *Experience:* A Competent Person should have a minimum of **five** years of relevant experience in resource management functions or activities for the specific technical discipline in the sector for which the resource evaluation and reporting is being carried out.

(f) *Continuous Training:* A Competent Person should undergo Continuous Professional Development (CPD). This is a managed process that is focused on the continuous development of specialized knowledge needed to meet resource management functions.

(g) *Licences:* A Competent Person should hold appropriate licences issued by a competent authority if required in the jurisdiction in which he or she is reporting.

(h) *Professional body affiliation:* For the purpose of public reporting, a Competent Person should be affiliated with a professional body or association with an enforceable code of ethics and performance expectations. The list of professional bodies associations recognized for reporting under PARC is provided in Annexure 1. As the list may be revised periodically by the AMREC Secretariat, please refer to the latest version available at the AMREC website.[URL to be provided].

(i) *General guidance:* Persons being called upon to act as a Competent Person should be clearly satisfied in their minds that they could face their peers and demonstrate competence in the particular activity and sector under consideration. Should doubt exist, the person should seek opinions from appropriately experienced colleagues or should decline to act as a Competent Person.

5.5. Governance

Competent Person and disclosure requirements shall be governed by the AMREC Secretariat at the African Union Commission.

6. Minerals Reporting

6.1. Introduction

Public Reports shall only use the terms set out in Figure 1.

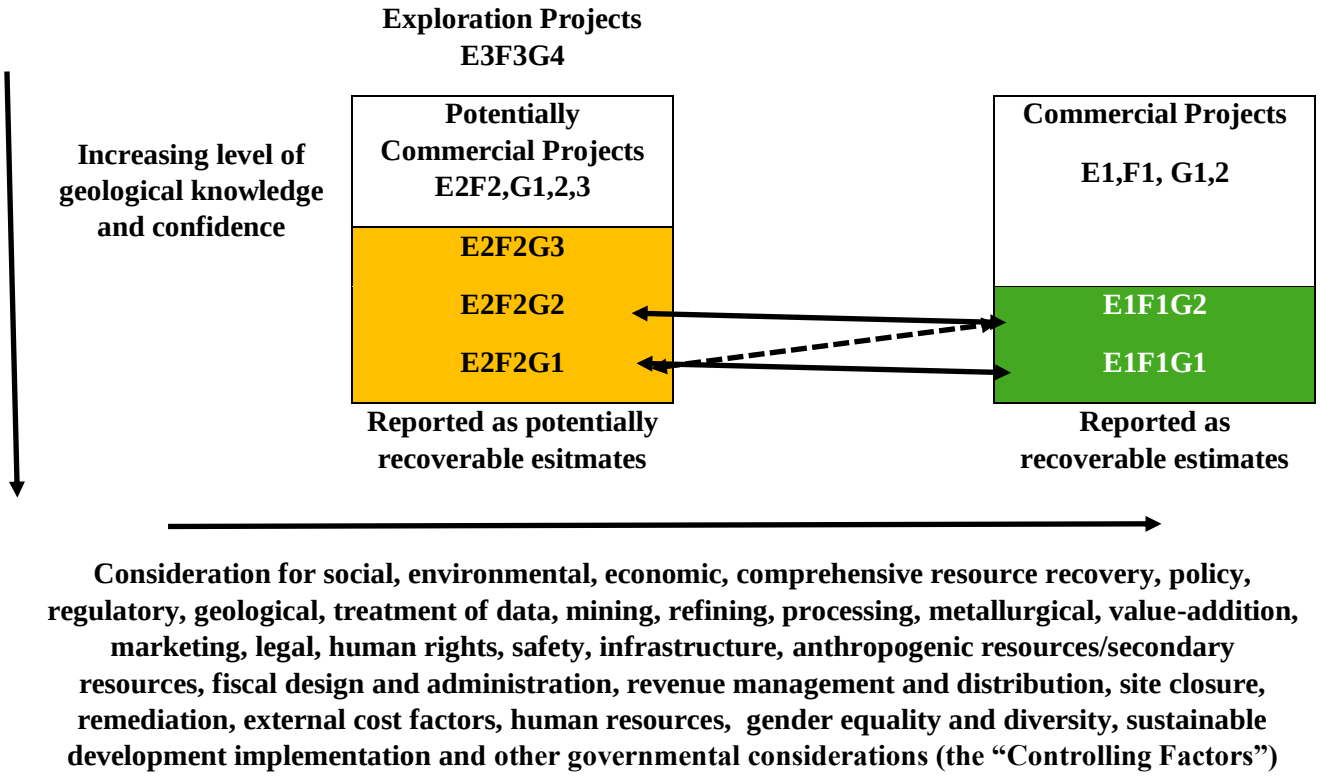

Figure C1 PARC reporting classes for minerals

Figure C1 sets out the framework for classifying tonnage and grade estimates so as to reflect different levels of geoscientific confidence and different degrees of technical, social, environmental and economic evaluation. Quantities associated with Potential Commercial Projects (E2F2G1,2,3) in minerals can be estimated on the basis of geoscientific information with some input from other relevant disciplines. Quantities associated with Commercial Projects (E1F1G1,2) require consideration of the Controlling Factors affecting production.

E2F2G1 quantities may convert to either E1F1G1 quantities or E1F1G2 if there are uncertainties associated with Controlling Factors that are taken into account in the conversion from Potentially Commercial Projects to Commercial Projects. The broken arrow in Figure C1 demonstrates this relationship. Although the trend of the broken arrow includes a vertical component, it does not, in this instance, imply a reduction in the level of geoscientific knowledge or confidence. In such a situation these Controlling Factors shall be fully explained.

The term 'Controlling Factors' is defined to include social, environmental, economic, comprehensive resource recovery, policy, regulatory, treatment of data, mining, refining, processing, metallurgical, value-addition, marketing, legal, human rights, safety, infrastructure, anthropogenic resources/secondary resources, fiscal design and administration, revenue management and distribution, site closure, remediation, external cost factors, human resources, gender equality and diversity, sustainable development implementation and other governmental considerations.

6.2. General

Public Reporting concerning a company's Exploration Projects, Potentially Commercial Projects and Commercial Projects shall include a description of the style and nature of mineralisation.

A company shall disclose relevant information concerning the status and characteristics of a mineral deposit that could materially influence the social, environmental and economic value of the deposit and promptly report any material changes in its Exploration Projects, Potentially Commercial Projects and Commercial Projects.

Throughout PARC, where appropriate, 'quality' may be substituted for 'grade' while 'volume' may be substituted for 'tonnage'. In the Code, any reference to the singular shall include a reference to the plural, where appropriate.

6.3. Exploration Projects

Exploration Projects (E3F3G4) include data and information generated by mineral exploration programmes that might be of use to investors but which do not form part of a declaration of Potentially Commercial Projects and Commercial Projects.

Estimates of quantities associated with an Exploration Project may be provided. It is a statement or estimate of the exploration potential of a mineral deposit in a defined geological setting where the statement or estimate, quoted as a range of tonnes and a range of grade or quality, relates to mineralisation for which there has been insufficient exploration to estimate Potentially Commercial Projects.

Estimates of quantities shall be always declared as ranges of estimates and never be done as single estimates. The range should always be at the minimum +/- 50 percent of the estimated mean value.

Quantities associated with Exploration Projects shall not be part of a formal declaration of quantities associated Potentially Commercial Projects and Commercial Projects and shall not be presented in a way that unreasonably implies the discovery of potentially socially, environmentally and economic viable quantities.

Exploration Projects shall include relevant data and information relating to the mineral property – both positive and negative.

Exploration data and information may include survey, geological, geophysical, geochemical, sampling, drilling, trenching, analytical testing, assaying, mineralogical, metallurgical and other information, where available. At least some physical evidence of assumed continuity of the mineralisation of socio-environmental-economic interest on the property of interest shall be presented by the Competent Person.

Historical data and information may also be included if, in the considered opinion of the Competent Person, it is relevant and reliable, giving reasons for such conclusions.

The data and information may be derived from adjacent or nearby properties if the Competent Person can provide justification of continuity for such an association. The actual data and/or information shall be appropriately described and presented where not already in the public domain.

A company may comment on and discuss the qualities associated Exploration Project in terms of size and type. However, any such comment in a Public Report shall comply with the following requirements:

- An quantities associated with Exploration Project is related a concept of mineralisation with respect to type, quantity and quality, which would be of interest to an exploration or mining company. There shall be a likelihood that this quantities occurs in an area of geological prospectivity for that specific mineral and mineralisation type. An Exploration Project may not represent any discovered mineralisation of socio-environmental-economic, nor does it imply reasonable prospects for possible social, environmental and economically viable production.

- Any such information relating to an Exploration Project shall, however, be expressed so that it cannot be misrepresented or misconstrued as an estimate of quantities associated with a Potentially

Commercial Project or a Commercial Project. The terms Potentially Commercial Project or a Commercial Project shall not be used in this context. Details of the Exploration Project should not appear in any tabulation of Potentially Commercial Project or a Commercial Project or be included in a Scoping Study, Pre-Feasibility or Feasibility study.

Any statement referring to potential quantity, quality and content, as appropriate for a Exploration Project shall be substantiated and include a detailed explanation of the basis for the statement and a proximate statement, with the same prominence, that the potential quantity, quality and content, as appropriate, are conceptual in nature, that there has been insufficient exploration to define a Potentially Commercial Project and that it is uncertain if further exploration could result in the determination of a Potentially Commercial Project.

A cautionary statement shall not be by way of a footnote and a general disclaimer elsewhere in the disclosure document shall not satisfy this requirement.

Where the statement includes information relating to ranges of tonnages and grades these shall be represented as approximations. The explanatory text shall include a description of the process used to determine the grade and tonnage ranges used to describe the quantities associated with Exploration Project.

Given the level of uncertainty surrounding the supporting data, the tonnage or grade of quantities associated with Exploration Projects, these shall not be reported as a 'headline statement' in a Public Report.

If mineralization associated with a Exploration Project is shown pictorially (for instance as cross-sections or maps) or with a graph, it shall be accompanied by text that meets the requirements above.

A Public Report that includes an Exploration Project shall be accompanied by a Competent Person's statement taking responsibility for the form and context in which the Exploration Project appears in the Report.

6.4. Potentially Commercial Projects

Quantities associated with a Potentially Commercial Project (E2F2G1,2,3) is a concentration or occurrence of material of social, environmental and economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual social, environmental and economically viable production. The location, quantity, grade, continuity and other geological characteristics of the quantities associated with a Potentially Commercial Project are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

Quantities associated with a Potentially Commercial Project are subdivided, and shall be so reported, in order of increasing confidence in respect of geoscientific evidence, into E2F2G3, E2F2G2 or E2F2G1 sub-categories.

Any quantities that does not have demonstrated reasonable prospects for eventual social, environmental and economically viable production shall not be included in a Potentially Commercial Project. The Competent Person shall disclose and discuss the parameters used to support the concept of 'eventual'.

Geological evidence and knowledge required for the estimation of quantities associated with a Potentially Commercial Project shall include sampling data of a type, and at spacings, appropriate to the geological, chemical, physical, and mineralogical complexity of the mineral occurrence, for all sub-classifications of E2F2G3, E2F2G2 or E2F2G1 quantities.

Quantities associated with a Potentially Commercial Project cannot be estimated in the absence of sampling information.

For each sub-class of quantities associated with a Potentially Commercial Project, the basis of classification shall be disclosed (Table C1).

E2F2G3 quantities

E2F2G3 quantities are that part of the quantities associated with a Potentially Commercial Project for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. E2F2G3 quantities have a lower level of confidence than that applying to an E2F2G2 quantities and shall not be converted to a Commercial Project. It is reasonably expected that the majority of E2F2G3 quantities could be upgraded to E2F2G2 quantities with continued exploration.

Where the quantities being reported is predominantly an E2F2G3, sufficient supporting information shall be provided to enable the reader to evaluate and assess the risk associated with the reported quantities associated with a Potentially Commercial Project.

E2F2G3 quantities may be based on interpolation between widely spaced data where there is reason to expect geological continuity of mineralisation of socio-environmental-economic interest. The extent of extrapolation outside of the nominal drill or sampling grid spacing shall be justified. The report shall contain sufficient information to inform the reader of:

- The maximum distance that the quantities associated with a Potentially Commercial Project is extrapolated beyond the sample points;
- The proportion of the quantities associated with a Potentially Commercial Project that is based on extrapolated data;
- The basis on which the quantities associated with a Potentially Commercial Project is extrapolated to these limits; and
- A diagrammatic representation of the E2F2G3 quantities showing clearly the extrapolated part of the estimated quantities associated with a Potentially Commercial Project.

It is accepted that mine design and planning may include a proportion of E2F2G3 quantities. If this sub-class is considered in mine design, mine planning or socio-environmental-economic studies, the results of which are publicly reported, full disclosure shall be made and the effect on the results of the studies shall be stated. E2F2G3 quantities may be included in mine design, mine planning and socio-environmental-economic studies only if a mine plan exists and a statement of Commercial Project that states that E2F2G3 quantities have been used. Where a material amount of mining in the mine plan includes E2F2G3 quantities, a comparison of the results with and without these E2F2G3 quantities shall be shown, and the rationale behind their inclusion shall be explained.

Controlling Factors and assumptions that were applied to the E2F2G2 and E2F2G1 quantities associated with a Potentially Commercial Project to determine the quantities associated with a Commercial Project shall be equally applied to the E2F2G3 quantities if included in the Life of Mine Plan.

E2F2G3 quantities cannot be converted to Commercial Projects and shall not be stated as part of the quantities associated with Commercial Projects.

E2F2G2 quantities

The quantities associated with a E2F2G2 sub-class is that part of the quantities associated with Potentially Commercial Project for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Controlling Factors in sufficient detail to support mine planning and evaluation of the socio-environmental-economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.

E2F2G1 quantities

The quantities associated with a E2F2G1 is that part of a Commercial Project for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Controlling Factors to support detailed mine planning and final evaluation of the socio-

environmental-economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. E2F2G1 quantities have a higher level of confidence than that applying to either E2F2G2 or E2F2G3 quantities. It may be converted to E1F1G1 or to a E2F2G2 quantities.

Depending upon the level of confidence in the various Controlling Factors it may be converted to a E1F1G1 sub-class (high confidence in Controlling Factors), E1F1G2 sub-class (some uncertainty in Controlling Factors) or may not be converted at all (low or no confidence in some of the Controlling Factors; or no plan to mine, e.g. pillars in an underground mine or outside socio-environmental-economic pit limits).

The Competent Person responsible for the Resource estimate shall determine the appropriate Commercial Project sub-class based upon the quantity, distribution and quality of data available and the level of confidence attached to the data with reference to Table C1. The method of determining these confidence levels shall be disclosed.

The statement of quantities associated with the Potentially Commercial Project is a summary report, with key assumptions used in their derivation as per the guidelines in Table 1. Details regarding Exploration Projects shall not be included in Potentially Commercial Project statements.

Public Reports of Potentially Commercial Projects shall specify one or more of the sub-classes of E2F2G1, E2F2G2, E2F2G3. Reports shall not contain Potentially Commercial Project information combining two or more of the sub-classes unless information for the individual categories is also provided.

Quantities associated with Potentially Commercial Projects shall not be aggregated with that of Commercial Project. Inclusive reporting of Commercial Projects, that is, reporting quantities of Commercial Project to be inclusive of Potentially Commercial Project is not permitted in PARC.

The quantities associated with a Potentially Commercial shall not be reported in terms of contained mineral content (or metal equivalents) unless corresponding tonnages and grades of individual elements (and recoveries) are also reported.

Reports and statements shall continue to refer to the appropriate sub-class or sub-classes of Potentially Commercial Project until technical feasibility and social, environmental and economic viability have been established. If re-evaluation indicates that the Commercial Project is no longer viable, the quantities shall be reclassified as Potentially Commercial Project or removed from Potentially Commercial Project/Commercial Project statements.

Estimates of quantities associated Potentially Commercial Project are not precise calculations, being dependent on the interpretation of limited information about the location, shape and continuity of the occurrence and on the available sampling results.

6.5. Commercial Projects

Quantities associated with Commercial Project is the socially, environmentally and economically viable part of a E2F2G2 and/or E2F2G1 subclass of a Potentially Commercial Project. It includes diluting materials and allowances for losses, which may occur when the material is mined or produced and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Controlling Factors. Such studies demonstrate that, at the time of reporting, production could reasonably be justified. The reference point at which Commercial Projects are defined, usually the point where the ore is delivered to the processing plant, shall be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

Quantities associated with a Commercial Project are reported as inclusive of diluting and contaminating material delivered for treatment or dispatched from the mine without treatment. To avoid confusion in reporting Commercial Project, the definition of treatment is taken to include any beneficiation of the raw

product that might take place before or during the metallurgical process. For clarity, tonnages and grades of saleable product may be reported for certain product types, with clear descriptions indicating such.

E1F1G2 quantities

Quantities associated with E1F1G2 sub-class is the socio-environmental-economic mineable part of an E2F2G2, and in some circumstances, E2F2G1 sub-class. The confidence in the Controlling Factors applying to a E1G1G2 sub-class is lower than that applying to a E1F1G1 sub-class.

E1F1G1 quantities

E1F1G1 sub-class is the socio-environmental-economic mineable part of E2F2G1 sub-class. E1F1G1 implies a high degree of confidence in the Controlling Factors.

The classification of quantities associated with a Commercial Project is governed by the relevant level of confidence of the Potentially Commercial Project and the Controlling Factors, and shall be made by the Competent Person.

Estimates of quantities of Commercial Project are not precise calculations, and tonnages and grades shall be expressed so as to convey the order of accuracy of the estimates by rounding off to appropriately significant figures.

Public Reports of Commercial Project shall not contain combined E1F1G1 and E1F1G2 unless the relevant information for each of the sub-class is also provided. Reports shall not present mineral contents unless corresponding tonnages and grades are given.

When revised Potentially Commercial Project and Commercial Project statements are publicly reported, they shall be reconciled with previous statements. A detailed account of differences between the figures is not essential, but sufficient comment shall be made to enable material variances to be understood by the reader.

In situations in which quantities associated with both Potentially Commercial Projects and Commercial Projects are reported, the Public Report shall not report Potentially Commercial Projects inclusive of Commercial Projects.

The above clauses apply equally to low-grade mineralization of socio-economic-environmental interest, often intended for stockpiling and treatment towards the end of the life of the mine.

If some portion of stope-fill or stockpile, residue or low grade stockpiles, remnants, pillars and tailings is currently not socially, environmentally and economically viable, but there is a reasonable expectation that it will become socially, environmentally and economically viable, then this material may be classified as a Potentially Commercial Project. If technical and social, environmental and economic studies have demonstrated that social, environmental and economically viable production could be reasonably justified under realistically assumed conditions, then the material may be classified as a Commercial Project.

If there are no reasonable prospects for the socially, environmentally and economically viable production of a particular portion of the above-mentioned material, then this material cannot be classified as either Potentially Commercial Project or a Commercial Project. Mineralized remnants, shaft pillars and mining pillars that are not potentially mineable shall not be included in Potentially Commercial Project and Commercial Project statements.

For clarity of understanding, the tonnage and grade estimates of such material shall be itemized separately as Potentially Commercial Projects or Commercial Projects in Public Reports, although they may be aggregated in total Potentially Commercial Project and Commercial Project.

6.6. Technical Studies

A mining project typically passes through exploration, Potentially Commercial Project estimation and design phases; each of which involves rapidly escalating levels of investment. Each phase requires an increasing level

of socio-environmental-economic and technical assessment with increasing levels of confidence for the project design, scheduling, costs and risks; to justify progression of the project to the next investment level.

A Scoping Study is an order of magnitude technical and socio-environmental-economic study of the potential viability of Potentially Commercial Project that includes appropriate assessments of realistically assumed Controlling Factors together with any other relevant operational factors that are necessary to demonstrate at the time of reporting that progress to a Pre-Feasibility Study can be reasonably justified.

A Pre-Feasibility Study is a comprehensive study of a range of options for the technical and socio-environmental-economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on the Controlling Factors and the evaluation of any other relevant factors which are sufficient for a Competent Person, acting reasonably, to determine if all or part of the quantities associated with a Potentially Commercial Project may be converted to a Commercial Project at the time of reporting. A Pre-Feasibility Study is at a lower confidence level than a Feasibility Study.

A Feasibility Study is a comprehensive technical and socio-environmental-economic study of the selected development option for a mineral project that includes appropriately detailed assessments of applicable Controlling Factors together with any other relevant operational factors and detailed financial analysis that are necessary to demonstrate at the time of reporting that production is reasonably justified (socially, environmentally and economically viable). The results of the study may reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. The confidence level of the study will be higher than that of a Pre-Feasibility Study.

Table C1 is applicable to all declarations in terms of the requirements of PARC. Table C1 is a high-level checklist of reporting and assessment criteria to be used as a reference by those preparing reports on Exploration Projects, Potentially Commercial Projects and Commercial Projects.

In the context of complying with the principles of the PARC, comment on the relevant sections of Table C1 shall be provided on an 'if not, why not' basis within the Competent Person's Report and shall be provided where required according to the specific requirements of sections 6.1, 6.4 and 6.5. This is to ensure that it is clear to the reader whether items have been considered and deemed to be of low consequence or have yet to be addressed or resolved.

Social, environmental, and economic viability, transparency, competency and materiality are overriding principles that determine what information should be publicly reported. The Competent Person shall provide sufficient comment on all matters that might materially affect a reader's understanding or interpretation of the results or estimates being reported.

The order and grouping of criteria in Table C1 reflect the normal systematic approach to exploration and evaluation. The table shall be approached from left to right. In other words, criteria in the first column, Exploration Projects, shall be considered to apply also when reporting Potentially Commercial Projects and Commercial Projects. Similarly, additional criteria in the Potentially Commercial Projects column apply also to Commercial Projects reporting. Some criteria apply to only Exploration Projects, Potentially Commercial Projects or Commercial Projects.

PARC reports shall identify the units of measure, currency and relevant exchange rates.

TABLE C1: Checklist of reporting and assessment criteria to be used as a reference by those preparing reports on Exploration Projects, Potentially Commercial Projects and Commercial Projects.

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 1: Project Outline					
1.1	Property Description	(i)	Brief description of the scope of project (i.e. whether in preliminary sampling, advanced exploration, scoping, pre-feasibility, or feasibility phase, Life of Mine plan for an ongoing mining operation or closure).		
		(ii)	Describe (noting any conditions that may affect possible prospecting/mining activities) topography, elevation, drainage, fauna and flora, the means and ease of access to the property, the proximity of the property to a population centre, and the nature of transport, the climate, known associated climatic risks and the length of the operating season and to the extent relevant to the mineral project, the sufficiency of surface rights for mining operations including the availability and sources of power, water, mining personnel, potential tailings storage areas, potential waste disposal areas, heap leach pad areas, and potential processing plant sites.		
		(iii)	Specify the details of the personal inspection on the property by each CP or, if applicable, the reason why a personal inspection has not been completed.		
1.2	Location	(i)	Description of location and map (country, province, and closest town/city, coordinate systems and ranges, etc.).		
		(ii)	Country Profile: describe information pertaining to the project host country that is pertinent to the project, including relevant applicable legislation, environmental and social context etc. Assess, at a high level, relevant technical, environmental, social, economic, political and other key risks.		
		(iii)	Provide a general topocadastral map	Provide a Topo-cadastral map in sufficient detail to support the assessment of eventual socio-environmental-economics. State the known associated climatic risks.	Provide a detailed topo-cadastral map. Confirm that applicable aerial surveys have been checked with ground controls and surveys, particularly in areas of rugged terrain, dense vegetation or high altitude.
1.3	Adjacent Properties	(i)	Discuss details of relevant adjacent properties If adjacent or nearby properties have an important bearing on the report, then their location and common mineralized structures should be included on the maps. Reference all information used from other sources.		
1.4	History	(i)	State historical background to the project and adjacent areas concerned, including known results of previous exploration and mining activities (type, amount, quantity and development work), previous ownership and changes thereto.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 1: Project Outline					
1.4	History	(ii)	Present details of previous successes or failures with reasons why the project may now be considered potentially socio-environmental-economic.		
		(iii)		Discuss known or existing historical Potentially Commercial Projects estimates and performance statistics on actual production for past and current operations.	
		(iv)			Discuss known or existing historical Commercial Project estimates and performance statistics on actual production for past and current operations.
1.5	Legal Aspects and Permitting	Confirm the legal tenure to the satisfaction of the Competent Person, including a description of the following:			
		(i)	Discuss the nature of the issuer's rights (e.g. prospecting and/or mining) and the right to use the surface of the properties to which these rights relate. Disclose the date of expiry and other relevant details.		
		(ii)	Present the principal terms and conditions of all existing agreements, and details of those still to be obtained, (such as, but not limited to, concessions, partnerships, joint ventures, access rights, leases, historical and cultural sites, wilderness or national park and environmental settings, royalties, consents, permission, permits or authorizations).		
		(iii)	Present the security of the tenure held at the time of reporting or that is reasonably expected to be granted in the future along with any known impediments to obtaining the right to operate in the area. State details of applications that have been made.		
		(iv)	Provide a statement of any legal proceedings for example; land claims, that may have an influence on the rights to prospect or mine for minerals, or an appropriate negative statement.		
		(v)	Provide a statement relating to governmental/statutory requirements and permits as may be required, have been applied for, approved or can be reasonably be expected to be obtained.		
1.6	Royalties	(i)	Describe the royalties that are payable in respect of each property.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 1: Project Outline					
1.7	Liabilities	(i)	Describe any liabilities, including rehabilitation guarantees that are pertinent to the project. Provide a description of the rehabilitation liability, including, but not limited to, legislative requirements, assumptions and limitations.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 2: Geological Setting, Deposit, mineralization of socio-environmental-economic interest					
2.1	Geological Setting, Deposit, of socio—environmental-economic-mineralisation	(i)	Describe the regional geology.		
		(ii)	Describe the project geology including deposit type, geological setting and style of mineralization.		
		(iii)	Discuss the geological model or concepts being applied in the investigation and on the basis of which the exploration program is planned. Describe the inferences made from this model.		
		(iv)	Discuss data density, distribution and reliability and whether the quality and quantity of information are sufficient to support statements, made or inferred, concerning the Exploration Project.		
		(v)	Discuss the significant minerals present in the deposit, their frequency, size and other characteristics. Includes minor and gangue minerals where these will have an effect on the processing steps. Indicate the variability of each important mineral within the deposit.		
		(vi)	Describe the significant mineralized zones encountered on the property, including a summary of the surrounding rock types, relevant geological controls, and the length, width, depth, and continuity of the mineralization, together with a description of the type, character, and distribution of the mineralization		
		(vii)	Confirm that reliable geological models and / or maps and cross sections that support interpretations exist.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 3: Exploration and Drilling, Sampling Techniques and Data					
3.1	Exploration	(i)	Describe the data acquisition or exploration techniques and the nature, level of detail, and confidence in the geological data used (i.e. geological observations, remote sensing results, stratigraphy, lithology, structure, alteration, mineralization, hydrology, geophysical, geochemical, petrography, mineralogy, geochronology, bulk density, potential deleterious or contaminating substances, geotechnical and rock characteristics, moisture content, bulk samples etc.). Confirm that data sets include all relevant metadata, such as unique sample number, sample mass, collection date, spatial location etc.		
		(ii)	Identify and comment on the primary data elements (observation and measurements) used for the project and describe the management and verification of these data or the database. This should describe the following relevant processes: acquisition (capture or transfer), validation, integration, control, storage, retrieval and backup processes. It is assumed that data are stored digitally but hand-printed tables with well-organized data and information may also constitute a database.		
		(iii)	Acknowledge and appraise data from other parties and reference all data and information used from other sources.		
		(iv)	Clearly distinguish between data / information from the property under discussion and that derived from surrounding properties		
		(v)	Describe the survey methods, techniques and expected accuracies of data. Specify the grid system used.		
		(vi)	Discuss whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the estimation procedure(s) and classifications applied.		
		(vii)	Present representative models and / or maps and cross sections or other two- or three-dimensional illustrations of results, showing location of samples, accurate drill-hole collar positions, down-hole surveys, exploration pits, underground workings, relevant geological data, etc		
		(viii)	Report the relationships between mineralization widths and intercept lengths. The geometry of the mineralization with respect to the drill hole angle is particularly important. If it is not known and only the down-hole lengths are reported, confirm it with a clear statement to this effect (e.g. 'down-hole length, true width not known').		
3.2	Drilling Techniques	(i)	Present the type of drilling undertaken (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Banka, sonic, etc) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 3: Exploration and Drilling, Sampling Techniques and Data					
3.2	Drilling Techniques	(ii)	Describe whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Potentially Commercial Project estimation, technical studies, mining studies and metallurgical studies.		
		(iii)	Describe whether logging is qualitative or quantitative in nature; indicate if core photography. (or costean, channel, etc) was undertaken		
		(iv)	Present the total length and percentage of the relevant intersections logged.		
		(v)	Results of any downhole surveys of the drill hole to be discussed.		
3.3	Sample method, collection, capture and storage	(i)	Describe the nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.		
		(ii)	Describe the sampling processes, including sub-sampling stages to maximize representivity of samples. This should include whether sample sizes are appropriate to the grain size of the material being sampled. Indicate whether sample compositing has been applied.		
		(iii)	Appropriately describe each data set (e.g. geology, grade, density, quality, diamond breakage, geo-metallurgical characteristics etc.), sample type, sample-size selection and collection methods		
		(iv)	Report the geometry of the mineralisation with respect to the drill-hole angle. State whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type. State if the intersection angle is not known and only the downhole lengths are reported.		
		(v)	Describe retention policy and storage of physical samples (e.g. core, sample reject, etc.)		
		(vi)	Describe the method of recording and assessing core and chip sample recoveries and results assessed, measures taken to maximise sample recovery and ensure representative nature of the samples and whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 3: Exploration and Drilling, Sampling Techniques and Data					
3.3	Sample method, collection, capture and storage	(vii)	If a drill-core sample is taken, state whether it was split or sawn and whether quarter, half or full core was submitted for analysis. If a non- core sample, state whether the sample was riffled, tube sampled, rotary split etc. and whether it was sampled wet or dry.		
3.4	Sample Preparation and Analysis	(i)	Identify the laboratory(s) and state the accreditation status and Registration Number of the laboratory or provide a statement that the laboratories are not accredited.		
		(ii)	Identify the analytical method. Discuss the nature, quality and appropriateness of the assaying and laboratory processes and procedures used and whether the technique is considered partial or total.		
		(iii)	Describe the process and method used for sample preparation, sub-sampling and size reduction, and likelihood of inadequate or non representative samples (i.e. improper size reduction, contamination, screen sizes, granulometry, mass balance, etc.)		
3.5	Sampling Governance	(i)	Discuss the governance of the sampling campaign and process, to ensure quality and representivity of samples and data, such as sample recovery, high grading, selective losses or contamination, core/hole diameter, internal and external QA/QC, and any other factors that may have resulted in or identified sample bias.		
		(ii)	Describe the measures taken to ensure sample security and the Chain of Custody.		
		(iii)	Describe the validation procedures used to ensure the integrity of the data, e.g. transcription, input or other errors, between its initial collection and its future use for modelling (e.g. geology, grade, density, etc.)		
		(iv)	Describe the audit process and frequency (including dates of these audits) and disclose any material risks identified.		
3.6	Quality Control/Quality Assurance	(i)	Demonstrate that adequate field sampling process verification techniques (QA/QC) have been applied, e.g. the level of duplicates, blanks, reference material standards, process audits, analysis, etc. If indirect methods of measurement were used (e.g. geophysical methods), these should be described, with attention given to the confidence of interpretation.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 3: Exploration and Drilling, Sampling Techniques and Data					
3.7	Bulk Density	(i)	Describe the method of bulk density determination with reference to the frequency of measurements, the size, nature and representativeness of the samples.		
		(ii)	If target tonnage ranges are reported state the preliminary estimates or basis of assumptions made for bulk density.		
		(iii)	Discuss the representivity of bulk density samples of the material for which a grade range is reported.		
		(iv)	Discuss the adequacy of the methods of bulk density determination for bulk material with special reference to accounting for void spaces (vugs, porosity etc.), moisture and differences between rock and alteration zones within the deposit.		
3.8	Bulk-Sampling and/or trial-mining	(i)	Indicate the location of individual samples (including map).		
		(ii)	Describe the size of samples, spacing/density of samples recovered and whether sample sizes and distribution are appropriate to the grain size of the material being sampled.		
		(iii)	Describe the method of mining and treatment.		
		(iv)	Indicate the degree to which the samples are representative of the various types and styles of mineralisation and the mineral deposit as a whole.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 4: Estimation and Reporting of Exploration Projects and Potentially Commercial Projects					
4.1	Geological model and interpretation	(i)	Describe the geological model, construction technique and assumptions that forms the basis for the Exploration Projects or Potentially Commercial Projectestimate. Discuss the sufficiency of data density to assure continuity of mineralisation and geology and provide an adequate basis for the estimation and classification procedures applied.		
		(ii)	Describe the nature, detail and reliability of geological information with which lithological, structural, mineralogical, alteration or other geological, geotechnical and geo-metallurgical characteristics were recorded.		
		(iii)	Describe any obvious geological, mining, metallurgical, environmental, social, infrastructural, legal and economic factors that could have a significant effect on the prospects of any possible exploration target or deposit.		
		(iv)		Discuss all known geological data that could materially influence the estimated quantity and quality of the Mineral Resource.	
		(v)		Discuss whether consideration was given to alternative interpretations or models and their possible effect (or potential risk) if any, on the Potentially Commercial Projectestimate.	
		(vi)		Discuss geological discounts (e.g. magnitude, per reef, domain, etc.), applied in the model, whether applied to mineralized and / or un-mineralized material (e.g. potholes, faults, dykes, etc).	
4.2	Estimation and modelling techniques	(i)	Describe in detail the estimation techniques and assumptions used to determine the grade and tonnage ranges.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 4: Estimation and Reporting of Exploration Projects and Potentially Commercial Projects					
4.2	Estimation and modelling techniques	(ii)		Discuss the nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values (cutting or capping), compositing (including by length and/or density), domaining, sample spacing, estimation unit size (block size), selective mining units, interpolation parameters and maximum distance of extrapolation from data points.	
		(iii)		Describe assumptions and justification of correlations made between variables.	
		(iv)		Provide details of any relevant specialized computer program (software) used, with the version number, together with the estimation parameters used.	
		(v)		State the processes of checking and validation, the comparison of model information to sample data and use of reconciliation data, and whether thePotentially Commercial Projectestimate takes account of such information.	
		(vi)		Describe the assumptions made regarding the estimation of any co-products, by-products or deleterious elements.	
4.3	Reasonable and realistic prospects for eventual socio-environmental -economic production	(i)		Disclose and discuss the geological parameters. These would include (but not be limited to) volume / tonnage, grade and value / quality estimates, cut-off grades, strip ratios, upper- and lower- screen sizes.	
		(ii)		Disclose and discuss the engineering parameters. These would include mining method, dilution, processing, geotechnical, geohydraulic and metallurgical) parameters.	
		(iii)		Disclose and discuss the infrastructure, including, but not limited to, power, water, site- access.	
		(iv)		Disclose and discuss the legal, governmental, permitting, statutory parameters.	
		(v)		Disclose and discuss the environmental and social (or community) parameters.	
		(vi)		Disclose and discuss the marketing parameters.	

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 4: Estimation and Reporting of Exploration Projects and Potentially Commercial Projects					
4.3	Reasonable and realistic prospects for eventual socio-environmental-economic production	(vii)		Disclose and discuss the socio-environmental-economic assumptions and parameters. These factors will include, but not limited to, commodity prices and potential capital and operating costs	
		(viii)		Discuss any material risks	
		(ix)		Discuss the parameters used to support the concept of "eventual"	
4.4	Classification Criteria	(i)		Describe criteria and methods used as the basis for the classification of the Potentially Commercial Projects into varying confidence categories.	
4.5	Reporting	(i)	Discuss the reported low and high-grades and widths together with their spatial location to avoid misleading the reporting of Exploration Projects, Potentially Commercial Projects or Commercial Projects.		
		(ii)	Discuss whether the reported grades are regional averages or if they are selected individual samples taken from the property under discussion.		
		(iii)	State assumptions regarding mining methods, infrastructure, metallurgy, environmental and social parameters. State and discuss where no mining related assumptions have been made.		
		(iv)	State the specific quantities and grades / qualities which are being reported in ranges and/or widths, and explain the basis of the reporting		
		(v)		Present the detail for example open pit, underground, residue stockpile, remnants, tailings, and existing pillars or other sources in the Potentially Commercial Project statement	

TABLE C1					
			Exploration Projects	Potentially Commercial Projects	Commercial Projects
Section 4: Estimation and Reporting of Exploration Projects and Potentially Commercial Projects					
4.5	Reporting	(vi)		Present a reconciliation with any previous Potentially Commercial Projects estimates. Where appropriate, report and comment on any historic trends (e.g. global bias).	
		(vii)		Present the defined reference point for the tonnages and grades reported as Potentially Commercial Projects. State the reference point if the point is where the run of mine material is delivered to the processing plant. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.	
		(viii)	If the CP is relying on a report, opinion, or statement of another expert who is not a CP, disclose the date, title, and author of the report, opinion, or statement, the qualifications of the other expert and why it is reasonable for the CP to rely on the other expert, any significant risks and any steps the CP took to verify the information provided.		
		(ix)	State the basis of equivalent metal formulae, if applied.		

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.1	Introduction	(i)	Technical Studies are not applicable to Exploration Projects	State the level of study – whether scoping, prefeasibility, feasibility or ongoing Life of Mine	State the level of study – whether prefeasibility, feasibility or ongoing Life of Mine. The PARC requires that a study to at least a Pre-Feasibility level has been undertaken to convert Potentially Commercial Projectto Mineral Reserve. Such studies will have been carried out and will include a mine plan or production schedule that is technically achievable and socially, environmentally and economically viable, and that all Modifying Factors have been considered.
		(ii)			Provide a summary table of the Modifying Factors used to convert the Potentially Commercial Project to Commercial Project for Pre- feasibility, Feasibility or on-going life-of-mine studies.
5.2	Mining Design	(i)	Technical Studies are not applicable to Exploration Projects	State assumptions regarding mining methods and parameters when estimating Potentially Commercial Projects or explain where no mining assumptions have been made.	

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.2	Mining Design	(ii)			State and justify all modifying factors and assumptions made regarding mining methods, minimum mining dimensions (or pit shell) and internal and, if applicable, external) mining dilution and mining losses used for the techno-socio-environmental-economic study and signed-off, such as mining method, mine design criteria, infrastructure, capacities, production schedule, mining efficiencies, grade control, geotechnical and hydrological considerations, closure plans, and personnel requirements.
		(iii)			State what Potentially Commercial Project models have been used in the study.
		(iv)			Explain the basis of (the adopted) cut-off grade(s) or quality parameters applied. Include metal equivalents if relevant
		(v)			Description and justification of mining method(s) to be used.
		(vi)			For open-pit mines, include a discussion of pit slopes, slope stability, and strip ratio.
		(vii)			For underground mines, discussion of mining method, geotechnical considerations, mine design characteristics, and ventilation/cooling requirements.

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.2	Mining Design	(viii)			Discussion of mining rate, equipment selected, grade control methods, geotechnical and hydrogeological considerations, health and safety of the workforce, staffing requirements, dilution, and recovery.
		(ix)			State the optimisation methods used in planning, list of constraints (practicality, plant, access, exposed Commercial Projects , stripped Commercial Projects , bottlenecks, draw control).
5.3	Metallurgical and Testwork	(i)	Technical Studies are not applicable to Exploration Projects		Discuss the source of the sample and the techniques to obtain the sample, laboratory and metallurgical testing techniques.
		(ii)			Explain the basis for assumptions or predictions regarding metallurgical amenability and any preliminary mineralogical test work already carried out.
		(iii)		Discuss the possible processing methods and any processing factors that could have a material effect on the likelihood of eventual socio-environmental-economic production. Discuss the appropriateness of the processing methods to the style of mineralisation.	Describe and justify the processing method(s) to be used, equipment, plant capacity, efficiencies, and personnel requirements.

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.3	Metallurgical and Testwork	(iv)			Discuss the nature, amount and representativeness of metallurgical test work undertaken and the recovery factors used. A detailed flow sheet / diagram and a mass balance should exist ,especially for multi-product operations from which the saleable materials are priced for different chemical and physical characteristics.
		(v)			State what assumptions or allowances have been made for deleterious elements and the existence of any bulk-sample or pilot-scale test work and the degree to which such samples are representative of the ore body as a whole.
		(vi)			State whether the metallurgical process is well-tested technology or novel in nature.
5.4	Infrastructure	(i)	Technical Studies are not applicable to Exploration Projects	Comment regarding the current state of infrastructure or the ease with which the infrastructure can be provided or accessed	

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.4	Infrastructure	(ii)			Report in sufficient detail to demonstrate that the necessary facilities have been allowed for (which may include, but not be limited to, processing plant, tailings dam, leaching facilities, waste dumps, road, rail or port facilities, water and power supply, offices, housing, security, resource sterilisation testing etc.). Provide detailed maps showing locations of facilities.
		(iii)			Statement showing that all necessary logistics have been considered.
5.5	Environmental and Social	(i)	Technical Studies are not applicable to Exploration Projects	Confirm that the company holding the tenement has addressed the host country environmental legal compliance requirements and any mandatory and/or voluntary standards or guidelines to which it subscribes	
		(ii)		Identify the necessary permits that will be required and their status and where not yet obtained, confirm that there is a reasonable basis to believe that all permits required for the project will be obtained	
		(iii)		Identify and discuss any sensitive areas that may affect the project as well as any other environmental factors including I&AP and/or studies that could have a material effect on the likelihood of eventual socio-environmental-economic production. Discuss possible means of mitigation.	
		(iv)		Identify any legislated social management programmes that may be required and discuss the content and status of these.	
		(v)		Outline and quantify the material socio-environmental-economic and cultural impacts that need to be mitigated, and the~~ir~~ mitigation measures and where appropriate the associated costs.	

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.6	Market Studies and socio-environmental-economic criteria	(i)	Technical Studies are not applicable to Exploration Projects		Describe the valuable and potentially valuable product(s) including suitability of products, co-products and by products to market.
		(ii)			Describe product to be sold, customer specifications, testing, and acceptance requirements. Discuss whether there exists a ready market for the product and whether contracts for the sale of the product are in place or expected to be readily obtained. Present price and volume forecasts and the basis for the forecast.
		(iii)			State and describe all socio-environmental-economic criteria that have been used for the study such as capital and operating costs, exchange rates, revenue / price curves, royalties, cut- off grades, reserve pay limits.
		(iv)			Summary description, source and confidence of method used to estimate the commodity price/value profiles used for cut-off grade calculation, socio-environmental-economic analysis and project valuation, including applicable taxes, inflation indices, discount rate and exchange rates.

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.6	Market Studies and socio-environmental-economic criteria	(v)			Present the details of the point of reference for the tonnages and grades reported as Commercial Projects (e.g. material delivered to the processing facility or saleable product(s)). It is important that, in any situation where the reference point is different, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.
		(vi)			Justify assumptions made concerning production cost including transportation, treatment, penalties, exchange rates, marketing and other costs. Provide details of allowances that are made for the content of deleterious elements and the cost of penalties.
		(vii)			Provide details of allowances made for royalties payable, both to Government and private.
		(viii)			State type, extent and condition of plant and equipment that is significant to the existing operation(s).
		(ix)			Provide details of all environmental, social and labour costs considered
5.7	Risk Analysis	(i)	Technical Studies are not applicable to Exploration Projects	Report an assessment of technical, environmental, social, economic, political and other key risks to the project. Describe actions that will be taken to mitigate and/or manage the identified risks.	

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 5: Technical Studies					
5.8	Socio-environmental-economic analysis	(i)	Technical Studies are not applicable to Exploration Projects	At the relevant level (Scoping Study, Pre-feasibility, Feasibility or on-going Life-of Mine), provide an socio-environmental-economic analysis for the project that includes:	
		(ii)		Cash Flow forecast on an annual basis using Commercial Projects or an annual production schedule for the life of the project	
		(iii)		A discussion of net present value (NPV), internal rate of return (IRR) and payback period of capital	
		(iv)		Sensitivity or other analysis using variants in commodity price, grade, capital and operating costs, or other significant parameters, as appropriate and discuss the impact of the results.	

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 6: Estimation and Reporting of Commercial Projects					
6.1	Estimation and modelling techniques	(i)		Describe the Potentially Commercial Project estimate used as a basis for the conversion to a Mineral Reserve.	
		(ii)		Report the Commercial Project Statement with sufficient detail indicating if the mining is open pit or underground plus the source and type of mineralisation, domain or ore body, surface dumps, stockpiles and all other sources.	
		(iii)			Provide a reconciliation reporting historic reliability of the performance parameters, assumptions and modifying factors including a comparison with the previous Reserve quantity and qualities, if available. Where appropriate, report and comment on any historic trends (e.g. global bias)
6.2	Classification Criteria	(i)			Describe and justify criteria and methods used as the basis for the classification of the Commercial Projects into varying confidence categories, based on the Potentially Commercial Project category, and including consideration of the confidence in all the modifying factors.
6.3	Reporting	(i)			Discuss the proportion of E2F2G2 Commercial Projects, which have been derived from E2F2G1 Potentially Commercial Projects (if any), including the reason(s) therefore.

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 6: Estimation and Reporting of Commercial Projects					
6.3	Reporting	(ii)			Present details of for example open pit, underground, residue stockpile, remnants, tailings, and existing pillars or other sources in respect of the Commercial Project statement
		(iii)			Present the details of the defined reference point for the Commercial Projects. State whether the reference point is the point where the run of mine material is delivered to the processing plant. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. State clearly whether the tonnages and grades reported for Commercial Projects are in respect of material delivered to the plant or after recovery.
		(iv)			Present a reconciliation with the previous Commercial Project estimates. Where appropriate, report and comment on any historic trends (e.g. global bias).
		(v)			Only E2F2G1 and E2F2G2 Potentially Commercial Projects can be considered for inclusion in the Mineral Reserve.
		(vi)			State whether the Potentially Commercial Projects are inclusive or exclusive of Commercial Projects.

TABLE C1					
			Exploration Projects	**Potentially Commercial Projects**	**Commercial Projects**
Section 7: Audits and Reviews					
7.1	Audits and Reviews	(i)	State type of review/audit (e.g. independent, external), area (e.g. laboratory, drilling, data, environmental compliance etc), date and name of the reviewer(s) together with their recognized professional qualifications.		
		(ii)	Disclose the conclusions of relevant audits or reviews. Note where significant deficiencies and remedial actions are required.		
Section 8: Other Relevant Information					
8.1		(i)	Discuss all other relevant and material information not discussed elsewhere.		
Section 9: Qualification of Competent Person(s) and other key technical staff. Date and Signature Page					
9.1		(i)	State the full name, registration number and name of the professional body or RPO, for all the Competent Person(s). State the relevant experience of the Competent Person(s) and other key technical staff who prepared and are responsible for the Public Report.		
		(ii)	State the Competent Person's relationship to the issuer of the report.		
		(iii)	Provide the Certificate of the Competent Person (Section 6.8), including the date of sign-off and the effective date, in the Public Report.		

Table C2 provides guidelines for Technical Studies pertaining to various studies relating to Potentially Commercial Projects and Commercial Projects. It is designed to be read in conjunction with Table 1 and the PARC.

Scoping Studies, Pre-Feasibility Studies, Feasibility Studies (and on-going life-of-mine studies) analyse and assess the same geological, engineering, and socio-environmental-economic factors with increasing detail and precision. Therefore, the same criteria may be used as a framework for reporting the results of all three studies. The criteria for Pre-Feasibility Study are considered the minimum requirements for a Life of Mine Plan. Scoping Studies cannot convert E2F2G3 Potentially Commercial Projects to Commercial Projects.

Technical studies shall not include quantities associated with Exploration Projects.

Table C2 Guidelines for Technical Studies

TABLE C2			
General	**Scoping Study**	**Prefeasibility Study**	**Feasibility Study**
Potentially Commercial Projects categories	Mostly E2F2G3	Mostly E2F2G2	E2F2G1 and E2F2G2
Commercial Projects categories	None	Mostly E1F1G2	E1F1G1 and E1F1G2
Mining method and geotechnical contraints	Conceptual	Preliminary Options	Detailed and Optimized
Mine design	None or high-level conceptual	Preliminary mine plan and schedule	Detailed mine plan and schedule
Scheduling	Annual approximation	Quarterly to annual	Monthly for much of payback period
Mineral Processing	Metallurgical test work	Preliminary Options	Detailed and Optimized
Permitting - (water, power, mining, prospecting & environmental)	Required permitting listed	Preliminary applications submitted	Authorities engaged and applications submitted
Social licence to operate	Initial contact with local communities	Formal communication structures and engagement models in place	Contracts/agreements in place with local communities and municipalities (local government)
Risk tolerance	High	Medium	Low

Capital Cost Category	**Scoping Study**	**Prefeasibility Study**	**Feasibility Study**
Basis of Estimate to include the following areas:	Order-of-magnitude, based on historic data or factoring. Engineering < 5% complete.	Estimated from historic factors or percentages and vendor quotes based on material volumes. Engineering at 5- 20% complete.	Detailed from engineering at 20% to 50% complete, estimated material take-off quantities, and multiple vendor quotations
Civil/structural, architectural, piping/HVAC, electrical, instrumentation, construction labour, construction labour productivity, material volumes/amounts, material/equipment, pricing, infrastructure			
Contractors	Included in unit cost or as a percentage of total cost	Percentage of direct cost by area for contractors; historic for subcontractors	Written quotes from contractor and subcontractors

Engineering, procurement, and construction management (EPCM)	Percentage of estimated construction cost	Key parameters, Percentage of detailed construction cost	Detailed estimate
Pricing	FOB mine site, including taxes and duties	FOB mine site, including taxes and duties	FOB mine site, including taxes and duties
Owner's costs	Factored, benchmark, database or historic estimate	Budgeted quotes on key parameters and estimates from experience, factored from similar project	Detailed estimate
Environmental compliance / Closure Cost	Factored from historic estimate	Estimate from experience, factored from similar project	Estimate prepared from detailed zero-based budget for design engineering and specific permit requirements
Escalation	Not considered	Based on entity's current budget percentage	Based on cost area with risk
Accuracy Range (Order of magnitude)	±25-50%	±15-25%	±10-15%
Contingency Range (Allowance for items not specified in scope that will be needed)	±30%	15-30%	10% - 15% (actual to be determined based on risk analysis)

Operating Cost Category	Scoping Study	Prefeasibility Study	Feasibility Study
Basis	Order-of-magnitude, based on historic data or factoring.	Estimated from historic factors or percentages and vendor quotes based on material volumes.	Detailed estimate
Operating quantities	General	Specific estimates with some factoring	Detailed estimates
Unit costs	Based on historic data for factoring	Estimates for labour, power, and consumables, some factoring	Letter quotes from vendors; minimal factoring
Accuracy Range	±25-50%	15% - 25%	10% - 15%
Contingency Range (Allowance for items not specified in scope that will be needed)	± 25%	± 15%	± 10% (actual to be determined based on risk analysis)

6.7. Recommended Table of Contents for Competent Person's Report

This table of contents is given only as a guide to the compilation of CPRs. It is designed to incorporate all of the requirements of Table 1. This Appendix should be read in conjunction with Table 1 and the PARC. It is recommended that a Public Report include a CPR or reference to where the supporting documentation can be found e.g. a website.

6.7.1. General

The Terms of Reference or scope of work should be presented.

State for whom the report was prepared, whether it is intended as a full or partial evaluation or for other purpose, what work was conducted, the effective date of the report, and what work remains to be done.

List the sources of information and data contained in the report or used in its preparation, with citations if applicable.

Transparency, competency and materiality are overriding principles that determine what information should be publicly reported. The Competent Person (CP) shall provide sufficient comment on all matters that might materially affect a reader's understanding or interpretation of the results or estimates being reported.

Publicly reported information should be sufficient to enable a reader to make a reasonable and balanced assessment of the significance of this information. It is, however, important to report any matters that might materially affect a reader's understanding or interpretation of the results or estimates being reported. This is particularly important where inadequate or uncertain data affect the reliability of, or confidence in, a statement of Exploration Projects or an estimate of Potentially Commercial Projects or Commercial Projects.

In some cases it will be appropriate for a Public Report to exclude some commercially sensitive information. A decision to exclude commercially sensitive information would be a decision for the entity issuing the Public Report. The decision shall be disclosed and justification provided. In these cases, the report should provide summary information (for example, the methodology used to determine the socio-environmental-economic assumptions where the numerical values of those assumptions are commercially sensitive) and context for the purpose of informing investors or potential investors and their advisors.

The Public Report should include sufficient context and cautionary language to allow a reader to understand the nature, importance, and limitations of the data, interpretations, and conclusions.

The evaluation and reporting of mineral projects and forward-looking mine plans or statements from ongoing operations are expressions of judgment, predicated on knowledge and experience.

The CP shall state that 'the declaration has been made in terms of the guidelines of the PARC'.

Diagrams, maps, plans, sections and illustrations in Public Reports should be legible and prepared at an appropriate scale to distinguish important features. Maps should be dated and include a legend, author or information source, coordinate system and datum, a scale in bar or grid form, and an arrow indicating north. Include and reference a location or index map and more detailed maps showing all important features described in the text, including all relevant cadastral and other infrastructure features.

6.7.2. Title Page

Include a title page setting out the title of the CPR, the general location of the mineral project, the name and professional designation of each CP, the effective date of the CPR and the date of signature.

6.7.3. Executive Summary

Briefly summarise important information in the Public Report, including property description and ownership, geology and mineralisation, the status of exploration, development and operations, Potentially Commercial Project and Commercial Project estimates, and the CP's conclusions and recommendations. If E2F2G3 Potentially Commercial Projects are used, show the summary valuation with and without inclusion of such

E2F2G3 Potentially Commercial Projects. The Executive Summary should be sufficiently detailed so as to allow the reader to understand the essentials of the project.

6.7.4 Table of Contents

Provide a table of contents listing the contents of the CPR, including figures and tables.

1 Introduction

- Terms of reference and scope of work
- Sources of information
- Units and currency
- Site inspection or Field involvement of CP
- Disclaimers and reliance on other experts or third-party information.

2 Project Outline

- Property description
- Property location
- Country profile
- Alignment to Agenda 2063, AMV and SDGs
- Legal aspects and permitting
- Royalties and liabilities.

3 Accessibility, Physiography, Climate, Local Resources and Infrastructure

- Topography, elevation, fauna and flora
- Climate
- Access
- Proximity to population centres
- General infrastructure.

4 Project History

- Previous ownership
- Previous exploration and/or project/mine development (compliance or noncompliance with the PARC or other international reporting code should be presented)
- Previous Potentially Commercial Project estimates (compliance or noncompliance with the PARC or other international reporting code should be presented)
- Previous Commercial Project estimates (compliance or noncompliance with the PARC or other international reporting code should be presented)
- Previous production.

5 Geological setting, mineralisation and deposit Types

- Geological setting
- Nature of, and controls on, mineralisation
- Geological models
- Nature of deposits on the property
- Deposit types and mineralisation.

6 Exploration Data/Information

- Remote sensing data and interpretations
- Geophysics

- Mapping
- Structural studies
- Drilling
- Sampling
- Database management
- QA/QC analysis
- Survey data verification, audits and reviews
- Metallurgical sampling and test work.

7 Potentially Commercial Project Estimates

- Estimation and modelling techniques
- Potentially Commercial Project classification criteria
- Reasonable prospects for eventual socio-environmental-economic production
- Potentially Commercial Project statement
- Potentially Commercial Project reconciliation.

8 Technical Studies (refer to Table C2)

- Geotechnical and geohydrology
- Mine design and schedule
- Metallurgical (processing/recovery)
- Project infrastructure
- Market studies and contracts
- Environmental studies
- Legal and permitting
- Taxation
- Social or Community Impact
- Mine closure
- Risk assessment
- Capital and operating costs
- Socio-Environmental-Economic criteria
- Socio-Environmental-Economic analysis.

9 Commercial Project Estimates

- Estimation and modelling techniques
- Commercial Project classification criteria
- Commercial Project statement
- Commercial Project reconciliation.

10 Other Relevant Data and Information

- Adjacent properties
- Risk assessments.

11 Interpretation and Conclusions

Summarise the relevant results and interpretations of the information and analysis being reported. Discuss any significant risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the Exploration Projects, Potentially Commercial Project or Commercial Project estimates, or projected socio-environmental-economic outcomes. Discuss any reasonably foreseeable impacts of these risks and uncertainties to the project's potential socio-environmental-economic viability or continued viability. A CPR concerning exploration information should include the conclusions of the CP.

12 Recommendations

Provide particulars of recommended work programmes and a breakdown of costs for each phase. If successive phases of work are recommended, each phase should culminate in a decision point. The recommendations should not apply to more than two phases of work. The recommendations should state whether advancing to a subsequent phase is contingent on positive results in the previous phase. In some specific cases, the CP may not be in a position to make meaningful recommendations for further work. Generally, these situations will be limited to properties under development or in production where material exploration activities and engineering studies have largely concluded. In such cases, the CP should explain why they are not making further recommendations.

13 References

Include a detailed list of all references cited in the CPR.

14 Appendices

- Supporting information
- Glossary of terms
- Abbreviations
- Compliance statement and certificate of competence
- Consent form (if relevant).

Date and Signature Page

The CPR should have a signature page (at either the beginning or end of the CPR). The effective date of the CPR and date of signing should be on the signature page.

6.8. Certificate of Competent Person

This Certificate of Competent Person is given only as a guide to the CP. It is designed to incorporate all of the requirements of the PARC.

Certificate of Competent Person

As the author of the report entitled [report title], I hereby state:-

1. My name is [Competent Person's name] and [details – position in company, company name, address].

2. [Profession and details of registration body].

3. [Qualifications]

4. [Relevant experience].

5. I am a 'Competent Person' as defined in PARC.

6. [Work undertaken or services rendered].

7. [Site inspection details].

8. [Details of aspects of this report for which the CP is responsible].

9. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission of which would make the Report misleading.

10. I declare that this Report appropriately reflects the Competent Person's/author's view.

11. I am independent/not independent of [name of issuer].

12. I have read the AMREC and PARC (2019) and the Report has been prepared in accordance with the guidelines of PARC.

13. I do not have, nor do I expect to receive, a direct or indirect interest in the [project/mine details] or [name of issuer] OR I am an [employee/shareholder/director or other interested party] in respect of the issuer [name of issuer] or the project/mine.

14. At the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

Dated at [place] and [date].

[Signed]

[Name of CP]

6.9. Compliance Statements

These compliance statements are given only as a guide to the CP (delete bullet points which do not apply). They are designed to incorporate all of the requirements of the PARC.

For Public Reports of Exploration Targets, initial or materially changed reports of Exploration Projects, Potentially Commercial Projects or Commercial Projects:

'The information in this report that relates to Exploration Targets, Exploration Projects, Potentially Commercial Projects is based on information compiled by [insert name of Competent Person]), a Competent Person who is registered with the Professional body as in Appendix 1 or a Recognised Professional Organisation (RPO) included in a list of recognised organisations promulgated by the AU AWG from time to time (select as appropriate and insert the name of the professional organisation of which the Competent Person is a member and the Competent Person's grade of membership).

- If the Competent Person is a full-time employee of the company:

'[name of Competent Person] is a full-time employee of the [name of company].'

- If the Competent Person is not a full-time employee of the company:

'[name of Competent Person] is employed by [name of Competent Person's employer].'

- The full nature of the relationship between the Competent Person and the reporting Company should be declared together with the Competent Person's details. This declaration should outline and clarify any issue that could be perceived by investors as a conflict of interest.

For all reports:

'[name of Competent Person] has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2016 Edition of the

'The Pan-African Reporting Code'. [name of Competent Person] consents to the inclusion in the report of the matters based on his (or her) information in the form and context in which it appears.'

For any subsequent Public Report based on a previously issued Public Report that refers to those Exploration Projects or estimates of Potentially Commercial Projects or Commercial Projects:

Where a Competent Person has previously issued the written consent to the inclusion of their findings in a report, a company re-issuing that information to the Public whether in the form of a presentation or a subsequent announcement shall, state the report name, date and reference the location of the original source Public Report for public access.

- 'The information is extracted from the report entitled [report title] created on [date] and is available to view on [website name]. The company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Potentially Commercial Projects or Commercial Projects , that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.'

7. Petroleum Reporting

This section provides the basis for minimum disclosure of information for public reporting of oil and gas reserves and resources. Such reports shall comply with this PARC and be reported in the manner prescribed by Form 7A.

7.1. Application

The PARC provides the basis for minimum disclosure of information for public reporting of oil and gas reserves and resources. Such reports shall comply with this PARC and be reported in the manner prescribed by Form 7A.

The definitions described below relate to the interpretation and application of PARC for petroleum application.

7.2. Oil and gas activities

(i) Include any of the following:

(A) The search for Products in their natural locations;

(B) The acquisition of property rights or properties for the purpose of exploring for or removing Products from their natural locations on those properties;

(C) The activities necessary to remove Products from their natural locations, including construction, drilling, mining, development, production, and the acquisition, construction, installation and maintenance of field gathering, transportation and storage systems including product treatment, field processing and field storage; and decommissioning.

(D) The production of synthetic crude oil and synthetic gas

(ii) But do not include any of the following:

(A) Activities that occur after the first point of sale;

(B) Activities relating to the production of natural resources other than Products and their by-products; or

(C) The production of hydrocarbons as a consequence of the production of geothermal steam.

Products includes but is not limited to any of the following:

(i) In respect of liquid hydrocarbons, any of the following:

(A) light crude oil;

(B) medium crude oil;

(C) heavy crude oil;

(D) bitumen;

(E) natural gas liquids;

(F) synthetic crude oil; or

(G) any other unconventional oil (Shale Oil, Oil Shale etc.)

(ii) In respect of gaseous hydrocarbons, any of the following:

(A) conventional natural gas;

(B) unconventional natural gas (Shale gas etc.)

(C) gas hydrates;

(D) synthetic gas.

7.3. Reporting Terminology

All reports shall be prepared having taken into account the principles incorporated in AMREC.

For the purpose of reporting in Africa, preparers are specifically required to adhere to the next section on "Requirements Applicable to All Disclosure".

Table C3 Petroleum reporting: AMREC Classes Defined by Categories and Sub-categories.

AMREC Classes Defined by Categories and Sub-categories						
	Class		Sub-class	Minimum Categories		
				E	F	G
Estimated Total Quantities Initially in Place	Produced	Commercial Production				
		Non Commercial Production				
	Known Resource	Commercial Projects	On Production	1	1.1	1, 2, 3
			Approved for Development	1	1.2	1, 2, 3
			Justified for Development	1	1.3	1, 2, 3
		Potentially Commercial Projects	Development Pending	2	2.1	1, 2, 3
			Development On Hold	2	2.2	1, 2, 3
		Non-Commercial Projects	Development Unclarified	3.2	2.2	1, 2, 3
			Development Not Viable	3.3	2.3	1, 2, 3
		Additional Quantities in Place		3.3	4	1, 2, 3
	Potential Resource	Exploration Projects	[See Generic Specifications for sub-classes]	3.2	3	4
		Additional Quantities in Place		3.3	4	4

7.4. Requirements applicable to all disclosure

7.4.1. Application

This Part applies to disclosure made by or on behalf of a *reporting entity:*

(a) To the public; or
(b) In other circumstances in which, at the time of making the disclosure, the reporting entity knows, or ought reasonably to know, that the disclosure is or will become available to the public.

7.4.2. Disclosure of Commercial Project and other information

If a *reporting entity* makes disclosure of Commercial Project or other information of a type that is specified in *Form 7A*, the reporting entity shall ensure that the disclosure satisfies as a minimum the following requirements:

a. Estimates of Commercial Project or future net revenue shall:

(i) disclose the *effective date* of the estimate;
(ii) have been prepared by a Competent Person;
(iii) have been prepared in accordance with AMREC;
(iv) be based on a general discussion in Form 7A, that avoids misleading statements. The discussion should include the technologies used to establish the appropriate level of certainty for the reserve estimates. This discussion should describe methodologies used for the reserve bookings, and how in-place volumes were calculated, production tests were interpreted, and recovery factors assigned.
(v) have been made assuming that development of each *property*, in respect of which the estimate is made, will occur, without regard to the likely availability to the *reporting entity* of funding required for that development, where reported under the category 'Justified for Development'; and
(vi) in the case of estimates of possible Commercial Project of related future net revenue disclosed in writing, also include a cautionary statement that is proximate to the estimate to the following effect:
"Possible Commercial Project are those additional Commercial Project that are less certain to be recovered than probable Commercial Project. There is a 10% probability that the quantities actually recovered will equal or exceed the sum of proved plus probable plus possible Commercial Project"

(b) for the purpose of determining whether *Commercial Project* should be attributed to a particular *project*, reasonably estimated future abandonment and reclamation costs related to the project shall have been taken into account;

(c) In disclosing aggregate *future net revenue* the disclosure shall comply with the requirements for the determination of *future net revenue* specified in *Form 7A*; and

(d) A statement of the Commercial Project data and other information stated in Form 7A shall be disclosed as at the last day of the reporting entity's most recent financial year or a later date if more than six months have elapsed since the most recent financial year

7.4.3. Commercial Projects and Potentially Commercial Projects Classification

(1) Disclosure of Commercial Project or Potentially Commercial Project shall apply the E, F and G-axis category and sub-category definitions set out in AMREC (see Part B) and shall relate to the most specific sub-class of Commercial Project or Potentially Commercial Project in which the Commercial Project or Potentially Commercial Project quantities can be classified.

(2) The Competent Person who prepared the report under this PARC shall indicate that it was prepared in accordance with AMREC (see Part B).

7.4.4. Oil and Gas Potentially Commercial Projects and Sales

(1) Disclosure of quantities or of sales of Products or associated by-products shall be made with respect to the first point of sale

(2) Despite subsection (1), a reporting entity may disclose quantities or sales of Products or associated by-products with respect to an alternate reference point if, to a reasonable person, Products or associated by-products would be marketable at the alternate reference point;

(3) If a reporting entity discloses quantities or sales of Products or associated by- products with respect to an alternate reference point, the reporting entity shall:

(i) State that the disclosure is made with respect to an alternate reference point,
(ii) Disclose the location of the alternate reference point, and
(iii) Explain why disclosure is not being made with respect to the first point of sale.

7.4.5. Future Net Revenue Not Fair Market Value

Disclosure of an estimate of *future net revenue*, whether calculated without discount or using a discount rate, shall include a statement to the effect that the estimated values disclosed do not represent fair market value

7.4.6. Consent of Competent Person

A statement shall be included that the Competent Person has ensured that the information disclosed in the report is in compliance with the PARC and that the report may be published in its current form and context by the reporting entity.

7.4.7. Disclosure of Quantities Less Than All Commercial Project

If a reporting entity that has more than one Project makes written disclosure of any Commercial Project quantities attributable to a particular Project:

(a) the disclosure shall include a cautionary statement to the effect that "The estimates of Commercial Project quantities and future net revenue for individual Projects may not reflect the same confidence level as estimates of Commercial Project and future net revenue for all Projects, due to the effects of aggregation; and
(b) the document containing the disclosure of any Commercial Project quantities attributable to one Projects shall also disclose total Commercial Project quantities of the same classification for all Projects of the reporting entity in the same country (or, if appropriate and not misleading, in the same foreign geographic area).

7.4.8. Disclosure of Potentially Commercial Project

(1) If a reporting entity discloses anticipated results from Potentially Commercial Project

which are not currently classified as Commercial Project, the reporting entity shall also disclose in writing, in the same document

(a) the reporting entity's equity holding in the Potentially Commercial Project

(b) the location of the Potentially Commercial Project

(c) the Products reasonably expected

(d) a description of the project including

(a) each significant event in the project and the specific time period in which each event is expected to occur
(b) the production technology and
(c) whether the project is a conceptual or pre-development study

(e) the risks and the level of uncertainty associated with recovery of the Potentially Commercial Project; and

(f) in the case of Exploration Project if its quantities are disclosed,

(i) the basis of the calculation of its value; and
(ii) Whether the value was prepared by an independent party.

(2) If disclosure referred to in subsection (1) includes an estimate of a quantity of Potentially Commercial Project in which the reporting entity has an interest or intends to acquire an interest, or an estimated value attributable to an estimated quantity, the estimate shall:

(a) have been prepared by a *CP*;
(b) relate to the most specific sub-class of Potentially Commercial Project in which the Potentially Commercial Project quantities can be classified, as set out in AMREC and shall identify what portion of the estimate is attributable to each category; and

(c) be accompanied by the following information:

(i) a definition of the Potentially Commercial Project sub-class used for the estimate:
(ii) the effective date of the estimate;
(iii) the significant positive and negative factors relevant to the estimate;
(iv) in respect of Potentially Commercial Project, the specific contingencies which prevent the classification of the Potentially Commercial Project as Commercial Project ; and
(v) a cautionary statement in bold that is proximate to the estimate to the effect that:
(A) in the case of Potentially Commercial Project or a sub-class of Potentially Commercial Project other than Commercial Project:

"There is no certainty that it will be socio-environmentally-economically and/or technologically viable to produce any portion of the Potentially Commercial Project." or

(B) in the case of Exploration Project or a sub-class of Exploration Project:

"There is no certainty that any portion of the Exploration Project will be discovered. If discovered, there is no certainty that it will be socio-environmentally-economically and/or technologically viable to

produce any portion of the Exploration Project."

7.4.9. Analogous Information

(1) Sections 7.4.2, 7.4.3 and 7.4.8 do not apply to the disclosure of analogous information provided that the reporting entity discloses the following:

(a) The source and date of the analogous information;

(b) Whether the source of the analogous information was independent;

(c) If the *reporting entity* is unable to confirm that the analogous information was prepared by a *CP* or in accordance with AMREC, a cautionary statement to that effect proximate to the disclosure of the analogous information; and

(d) The relevance of the analogous information to the reporting entity's oil and gas activities.

(2) For greater certainty, if a reporting entity discloses information that is an anticipated result, an estimate of a quantity of Commercial Project or Potentially Commercial Project, or an estimate of value attributable to an estimated quantity of Commercial Project or Potentially Commercial Project for an area in which it has an interest or intends to acquire an interest, that is based on an extrapolation from analogous information, sections 7.4.2, 7.4.3 and 7.4.8 apply to the disclosure of the information.

7.4.10. Net Asset Value and Net Asset Value per Share

Written disclosure of net asset value or net asset value per share shall include a description of the methods used to value assets and liabilities and the number of shares used in the calculation.

i. Commercial Project Quantity Replacement

Written disclosure concerning Commercial Project quantity replacement shall include an explanation of the method of calculation applied.

7.4.11. Netbacks

If Netbacks are disclosed the following information shall be included:

1. Reflect netbacks calculated by subtracting royalties, taxes and operating costs from revenues; and

2. State the method of calculation.

7.4.12. Disclosure using Oil and Gas Metrics

(1) If a reporting entity discloses an oil and gas metric, other than an estimate of volume or value of quantities prepared in accordance with section 7.4.2 or 7.4.8 or a comparative or equivalency measure under sub-sections 2,3,4,5 or 6 of Form 7A, the reporting entity shall include disclosure that:

(a) Identifies the standard and source of the oil and gas metric;

(b) Provides a brief description of the method used to determine the oil and gas metric;

(c) Provides an explanation of the meaning of the oil and gas metric;

(d) Cautions readers as to the reliability of the oil and gas metric.

(2) If there is no identifiable standard for an oil and gas metric, the reporting entity shall also include disclosure that:

(a) Provides a brief description of the parameters used in the calculation of the oil and gas metric; and

(b) States that the oil and gas metric does not have any standardised meaning and shall not be used to make comparisons.

7.4.13. Restricted Disclosure: Summation of Classes

(1) A reporting entity shall not disclose a summation of an estimated quantity, or estimated value, of two or more of the following:

(a) Commercial Project;

(b) Potentially Commercial Project;

(c) Exploration Project;

(d) Additional Quantities in Place (E3.3F4G1,2,3);

(e) Additional Quantities in Place (E3.3F4G4);

(2) Despite subsection (1), a reporting entity may disclose an estimate of Estimated Total Quantities in Initially in Place, Known Resource quantities or Potential Resource quantities if the reporting entity includes, proximate to that disclosure, an estimate of each of the following, as applicable:

(a) Commercial Project;

(b) Potentially Commercial Project;

(c) Exploration Project;

(d) Additional Quantities in Place (E3.3F4G1,2,3);

(e) Additional Quantities in Place (E3.3F4G4);

(3) A reporting entity may disclose an estimate of Estimated Total Quantities Initially in Place, Known Resource quantities or Potential Resource quantities as the most specific sub-class that it can assign to its quantities if, proximate to its disclosure, the reporting entity.

(a) explains why the Estimated Total Quantities Initially in Place, Known Resource quantities or Potential Resource quantities , as the case may be, is the most specific assignable sub-class; and

(b) Includes

(i) In the case of disclosure of Known Resource quantities , the cautionary statement required by clause 7.4.8 (2) (c) (v) (A), or

(ii) In the case of disclosure of Estimated Total Quantities Initially in Place or Potential Resource, the cautionary statement required by clause 7.4.8 (2) (c) (v) (B).

7.4.14. Disclosure of High-Case Estimates of Commercial Project and of Potentially Commercial Project other than Commercial Project

(1) If a reporting entity discloses an estimate of G1 plus G2 plus G3 quantities associated with a Commercial Project, the reporting entity shall also disclose the corresponding estimates of G1 and G2 plus G3 quantities associated with the Commercial Project or of G2 and G3 quantities associated with the Commercial Project.

(2) If a reporting entity discloses a G3 estimate of Potentially Commercial Project other than Commercial Project, the reporting entity shall also disclose the corresponding G1 and G2 estimates.

7.5. Definitions

Throughout this PARC Code, unless otherwise stated or the content requires otherwise, an expression which denotes any gender includes other genders and the following terms will have the meanings set out below. Definitions in this section is also applicable to Form 7A.

Abandonment costs

Abandonment costs means all costs associated with:

(i) rendering all intervals of a well incapable of flow into the wellbore or between intervals
(ii) removing all wellhead equipment; and
(iii) the physical removal of surface facilities, and the decommissioning of any facilities, in the vicinity of the well, required for the transport, treatment and metering of a Product.

Alternate reference point

Alternate reference point means a location at which quantities and values of a Product are measured before the first point of sale.

Analogous Information

Information about an area outside the area in which the reporting entity has an interest or intends to acquire an interest, which is referenced by the reporting entity for the purpose, in the opinion of a Competent Person, of drawing a comparison or conclusion to an area in which the reporting entity has an interest or intends to acquire an interest and may include:

(i) historic information concerning Commercial Project;
(ii) estimates of the volume or value of Commercial Project;
(iii) historic information concerning Potentially Commercial Project;
(iv) estimates of the volume or value of Potentially Commercial Project;
(v) historic production amounts;
(vi) production estimates; or
(vii) information concerning a field, well, basin or reservoir.

Anticipated Results

Information that may, in the opinion of a Competent Person, indicate the potential value or quantities of

Potentially Commercial Project in respect of the reporting entity's Potentially Commercial Project or a portion of its Potentially Commercial Project which may include:

(i) an estimate of volume;
(ii) an estimate of value;
(iii) a real extent;
(iv) anticipated pay thickness;
(v) flow rates; or
(vi) hydrocarbon content;

Bitumen

Bitumen means the naturally occurring viscous mixture, consisting mainly of pentanes and heavier hydrocarbons, with a viscosity greater than 10 000 mPa's (cP) measured at the mixture's original temperature in the reservoir and at atmospheric pressure on a gas-free basis.

TOE (Tonnes of Oil Equivalent)

Unit representing energy generated by burning one metric ton (1000 kilograms or 2204.68 pounds) or 7.33 barrels of oil equivalent, and equivalent to the energy obtained from 1270 cubic meters of natural gas or 1.4 metric tons of coal that is, 41.868 gigajoules (GJ), 39.68 million Btu (MMBtu), or 11.63 megawatt hours (MWh).

By-product

By-product means a hydrocarbon or non-hydrocarbon that is recovered as a consequence of producing a Product.

Coal bed Methane

Coal bed methane means natural gas, primarily made up of methane, contained in coal deposits

Potentially Commercial Project data

Potentially Commercial Project data means an estimate of Potentially Commercial Project quantities and related future net revenue, estimated using forecast prices and costs.

Conventional natural gas

Conventional natural gas means natural gas contained in and produced from pore space in an accumulation for which the primary trapping mechanism is related to hydrodynamic forces and localised or depositional geological features.

Effective Date

1) the cut-off date for all geological, engineering, and financial data after which no new information can be included in the evaluation; and
2) It is the date to which all future net revenue or other cash flow forecasts are discounted to determine net present values.

Entity

An Entity is a corporation, joint venture, partnership, trust, individual, principality, agency, or other person engaged directly or indirectly in

(i) the exploration for, or production of, oil and gas;
(ii) the acquisition of properties or interests therein for the purpose of conducting such exploration or production; or

(iii) the ownership of properties or interests therein with respect to which such exploration or production is being, or will be, conducted.

First point of Sale

First point of sale means the first point after initial production at which there is a transfer of ownership of a Product.

Future Net Revenue

Future net revenue means a forecast of revenue, estimating using forecast prices and costs or constant prices and costs, arising from the anticipated development and production of Potentially Commercial Project and Commercial Project net of the associated royalties, operating costs, development costs, abandonment costs and reclamation costs. Corporate general and administrative expenses and financing costs are not deducted. Net present values of future net revenue shall be calculated using a discount rate and without discount rate.

Gas hydrates

Gas hydrates means naturally occurring crystalline substances composed of water and gas, in an ice lattice structure.

Heavy crude oil

Heavy crude oil means crude oil with a density greater than 10 degrees API gravity and less than or equal to 22.3 degrees API gravity.

Hydrocarbon

Hydrocarbon means a compound consisting of hydrogen and carbon, which, when naturally occurring, may also contains other elements such as sulphur.

Light crude oil

Light crude oil means crude oil with a density greater than 31.1 degrees API gravity

McfGE's (Thousand cubic feet of Gas Equivalent)

Converting oil volumes to the gas equivalent is customarily done on the basis of the nominal heating content or calorific value of the fuel. Common industry conversion factors range from barrel crude oil = 6 McfGE to 5.6 McfGE. (Other operators use the metric conversion ratio of 1 m3 crude oil = 1 McfGE)

Medium crude oil

Medium crude oil means crude oil with a density that is greater than 22.3 degrees API gravity and less than or equal to 31.1. Degrees API gravity.

Natural gas

Natural gas means a naturally occurring mixture of hydrocarbon gases and non-hydrocarbon gases.

Natural gas liquids

Natural gas liquids means those hydrocarbon components that can be recovered from natural gas as a liquid including, but not limited to, ethane, propane, butanes, pentanes plus, condensate and may contain non-hydrocarbons.

Net back

The price of oil or gas at any interim point in the production and processing flow calculated based on the

price of the derived sales products at a defined reference point.

Oil and Gas metric

Oil and Gas metric means a numerical measure of a reporting entity's oil and gas activities.

Property

A volume of the Earth's crust wherein a corporate entity or individual has contractual rights to produce, process, and market a defined portion of specified in-place minerals (including petroleum). Defined in general as an area but may have depth and/or stratigraphic constraints. May also be termed a lease, concession, or license.

Exploration Project data

Exploration Project means an estimate of Exploration Project quantities and related future net revenue, estimated using forecast prices and costs.

Reclamation costs

Reclamation costs means all costs, other than abandonment costs, associated with restoring land as close as possible to its original state or to a standard prescribed or imposed by a government or regulatory authority.

Reporting Entity

The entity submitting the Potentially Commercial Project and Commercial

Project Report. (See above) (Could also be Reporting Issuer):

(a) A "reporting issuer" as defined in securities legislation; or

(b) In a jurisdiction in which the term is not defined in securities legislation, an issuer of securities that is required to file financial statements with the securities regulatory authority.

Commercial Project Data

Estimates of G1 quantities associated with a Commercial Project and G2 quantities associated with Commercial Project and related future net revenue estimated using forecast prices and costs.

Commercial Project Information

Commercial Project Information consists of various estimates pertaining to the extent and value of oil and gas properties. Commercial Project Information will include:

Estimates of oil and gas Commercial Project quantities and may, but will not necessarily, include estimates of

(i) the future production rates from such Commercial Project
(ii) the future net revenue from such Commercial Project
(iii) the present value of such future net revenue.

All such Commercial Project Information shall be estimated and classified as appropriate to stated Commercial Project definitions.

Synthetic gas

Synthetic gas means a gaseous fluid:

(A) generates as a result of the application of an in-situ transformation process to coal or other hydrocarbon-bearing rock type; and

(B) comprised of not less than 10% by volume of methane.

Synthetic crude oil

Synthetic crude oil means a mixture of liquid hydrocarbons derived by upgrading bitumen, kerogen from oil shales, coal or from gas to liquid conversion and may contain sulphur or other non-hydrocarbon compounds.

7.6. FORM 7A - Oil and gas public report and other oil and gas information

TABLE OF CONTENTS

This is the form referred to in Part 1 and section 7.4.2 of PARC.

GENERAL INSTRUCTIONS

(1) Terms for which a meaning is given in the PARC have the same meaning in this Form 7A.

(2) It is not necessary to include the headings or numbering, or to follow the ordering of Items, in this Form 7A. Information may be provided in tables.

(3) To the extent that any Item or any component of an Item specified in this Form 7A does not apply to a reporting entity and its activities and operations, or is not material, no reference need be made to that Item or component. It is not necessary to state that such an Item or component is "not applicable" or "not material".

(4) This Form 7A sets out minimum requirements. A reporting entity may provide additional information not required in this Form 7A provided that it is not misleading and not inconsistent with the requirements of the PARC, and provided that material information required to be disclosed is not omitted.

(5) A reporting entity may satisfy the requirement of this Form 7A for disclosure of information "by country" by instead providing information by foreign geographic area in respect of countries outside Africa as may be appropriate for meaningful disclosure in the circumstances.

PART 1 DATE OF STATEMENT

Item 1.1 Relevant Dates

1. Date the statement.

2. Disclose the effective date of the information being provided.

3. Disclose the preparation date of the information being provided.

INSTRUCTIONS

(1) The same effective date applies to Commercial Project of each class or sub-class reported and to related future net revenue. References to a change in an item of information, such as changes in production or a change in Commercial Project, mean changes in respect of that item during the twelve months ended on the effective date.

(2) The preparation date, in respect of written disclosure, means the most recent date to which information relating to the period ending on the effective date was considered in the preparation of the disclosure. The preparation date is a date subsequent to the effective date because it takes time after the end of the effective date to assemble the information for that completed period that is needed to prepare the required disclosure as at the end of the effective date.

(3) Because of the interrelationship between certain of the reporting entity's Commercial Project data and other information referred to in this Form 7A and certain of the information included in its financial statements, the reporting entity shall ensure that its financial auditor and its CPs are kept appraised of relevant events and transactions, and shall facilitate communication between them.

(4) If the reporting entity provides information as at a date more recent than the effective date, in addition to the information required as at the effective date, also disclose the date as at which that additional information is provided. The provision of such additional information does not relieve the reporting entity of the obligation to provide information as at the effective date.

PART 2 DISCLOSURE OF COMMERCIAL PROJECT AND POTENTIALLY COMMERCIAL PROJECT

Item 2.1 Commercial Project Data (Constant or Forecast Prices and Costs)

1. Breakdown of Commercial Project Disclose, by country and in the aggregate, Commercial Project, gross and net, estimated using constant or forecast prices and costs, for each Product, in the following classes:

(a) On Production Commercial Project G1 Quantities;

(b) Approved for Development Commercial Project G1 Quantities;

(c) Justified for Development Commercial Project G1 Quantities;

(d) Commercial Project G1 Quantities (in total);

(e) Commercial Project G2 (in total); and

(f) Commercial Project G1 plus G2 Quantities (in total); and

(g) if the reporting entity discloses an estimate of Commercial Project G3 quantities in the statement:

(i) Commercial Project G3 quantities (in total); and

(ii) Commercial Project G1 plus G2 plus G3 Quantities (in total).

2. The reporting entity shall provide a general discussion in Form 7A, that avoids misleading statements. The discussion shall include the technologies used to establish the appropriate level of certainty for the Commercial Project quantity estimates. This discussion shall describe methodologies used for the Commercial Project quantity bookings, and how in- place volumes were calculated, production tests were interpreted, and recovery factors assigned.

3. Net Present Value of Future Net Revenue– Disclose, by country and in the aggregate, the net present value of future net revenue attributable to the Commercial Project sub-classes referred to in section 1 of this Item, estimated using constant or forecast prices and costs, before and after deducting future income tax expenses, calculated without discount and using discount rates of 5 percent, 10 percent, 15 percent and 20 percent.

4. Additional Information Concerning Future Net Revenue

(a) Section 3 applies to future net revenue attributable to each of the following Commercial Project sub-classes disclosed under item 2.1 (1) estimated using constant or forecast prices and costs:

(i) Commercial Project G1 Quantities (in total);

(ii) Commercial Project G1 plus G2 Quantities (in total); and

(iii) if paragraph 1(g) of this Item applies, Commercial Project G1 plus G2 plus G3 Quantities (in total).

(b) Disclose, by country and in the aggregate, the following elements of future net revenue estimated using constant or forecast prices and costs and calculated without discount:

(i) revenue;

(ii) royalties;

(iii) operating costs;

(iv) development costs;

(v) abandonment costs and reclamation costs;

(vi) future net revenue before deducting future income tax expenses;

(vii) future income tax expenses; and

(viii) future net revenue after deducting future income tax expenses.

(c) Disclose, by Product in each case with associated by-products, and on a unit value basis for each Product, in each case with associated by-products (e.g.,

$/unit of oil or $/unit of gas using net Commercial Project), the net present value of future net revenue (before deducting future income tax expenses) estimated using constant or forecast prices and costs and calculated using a discount rate of 10 percent.

5. Potentially Commercial Project or Exploration Project

If the reporting entity publicly discloses Potentially Commercial Project or Exploration Project in the Competent Person Report, they shall be disclosed separately from the disclosure required by items 1, 2 and 3 of section 2.1 of Form 7A as follows:

(a) The Potentially Commercial Project or Exploration Project, as applicable, gross and net, estimated using constant or forecast prices and costs, for each Product, in each of the following sub-classes:

(i) Potentially Commercial Project (G1)

(ii) Potentially Commercial Project (G2)

(iii) Potentially Commercial Project (G3)

(iv) Exploration Project (G4.1)

(v) Exploration Project (G4.2)

(vi) Exploration Project (G4.3); and

(b) The net present value of future net revenue attributable to each sub-class of Potentially Commercial Project referred to in paragraph (a) of this item, estimated using constant or forecast prices and costs, before deducting future income tax expenses, calculated using discount rates of 0 percent, 5 percent, 10 percent, 15 percent and 20 percent.

INSTRUCTIONS

(1) Disclose all of the Commercial Project over which the reporting entity has a direct or indirect ownership, working or royalty interest.

(2) Do not include, in the Commercial Project data, Potentially Commercial Project data or Exploration Project data, a Product that is subject to purchase under a long-term supply, purchase or similar agreement, However, if the reporting entity is a party to such an agreement with a government or governmental authority, and participates in the operation of the properties in which the Product is situated or otherwise serves as producer of the Potentially Commercial Project (in contrast to being an independent purchaser, broker, dealer or importer) disclose separately the reporting entity’s interest in the Potentially Commercial Project that subject to such agreements at the effective date and the net quantity of the Product received by the reporting entity under the agreement during the 12 months ended on the effective date.

(3) Future net revenue includes the portion attributable to the reporting entity’s interest under an agreement referred to in Instruction 2.

(4) If the reporting entity’s disclosure of Potentially Commercial Project would, to a reasonable person, be misleading, and if stated without an explanation of the reporting entity’s ownership of or control over those Potentially Commercial Project, explain the nature of the reporting entity’s ownership of no control over Potentially Commercial Project disclosed in the Form 7A report.

(5) If a reporting entity voluntarily discloses Potentially Commercial Project or Exploration Project and the G1 or loss estimate, as applicable, has a negative net present value at any of the discount rates referred to in paragraph 4 (b), the reporting entity shall disclose the negative net present value.

(6) Future net revenue includes the portion attributable to the reporting entity's interest under an agreement referred to in Instruction (2).

(7) Constant prices and costs are prices and costs used in an estimate that are:

(a) the reporting entity's prices and costs as at the effective date of the estimation, held constant throughout the estimated lives of the properties to which the estimate applies;

(b) if, and only to the extent that, there are fixed or presently determinable future prices or costs to which the reporting entity is legally bound by a contractual or other obligation to supply a physical product, including those for an extension period of a contract that is likely to be extended, those prices or costs rather than the prices and costs referred to in paragraph (a).

For the purpose of paragraph (a), the reporting entity's prices will be the posted price for oil and the spot price for gas, after historical adjustments for transportation, gravity and other factors.

PART 3 PRICING ASSUMPTIONS

Item 3.1 Constant Prices

For each Product, disclose the benchmark reference prices for the countries or regions in which the reporting entity operates, as at the last day of the reporting entity's most recent financial year, reflected in the Commercial Project data disclosed in response to Item 2.1

Item 3.2 Forecast Prices Used in Estimates

1. For each Product, disclose:

(a) the pricing assumptions used in estimating Commercial Project data, Potentially Commercial Project or Exploration Project data disclosed in response to

Item 2.1:

(i) for each of at least the following five financial years; and

(ii) generally, for subsequent periods; and

(b) the reporting entity’s weighted average historical prices for the most recent financial year.

2. The disclosure in response to section 1 shall include the benchmark reference pricing schedules for the countries or regions in which the reporting entity operates, and inflation and other forecast factors used.

3. If the pricing assumptions specified in response to section 1 were provided by a Competent Person who is independent of the reporting entity, disclose that fact and identify the CP.

INSTRUCTIONS

(1) Benchmark reference prices may be obtained from sources such as public product trading exchanges or prices posted by purchasers.

(2) The term "constant prices and costs" and the defined term "forecast prices and costs" include any fixed or presently determinable future prices or costs to which the reporting entity is legally bound by a contractual or other obligation to supply a physical product, including those for an extension period of a contract that is likely to be extended.

In effect, such contractually committed prices override benchmark reference prices for the purpose of estimating Commercial Project data, Potentially Commercial Project data or Exploration Project data. To ensure that disclosure under this Part is not misleading, the disclosure shall reflect such contractually committed prices.

(3) Under subsection 7.4.6 of the PARC, the reporting entity shall obtain the written consent of the CP to disclose his or her identity in response to section 3 of this Item.

PART 4 RECONCILIATION OF CHANGES IN COMMERCIAL PROJECT

Item 4.1 Commercial Project Reconciliation

1. Provide the information specified in section 2 of this Item in respect of the following

Commercial Project sub-classes as published in terms of Item 2.1:

(a) Commercial Project G1 Quantities (in total);

(b) Commercial Project G2 Quantities (in total); and

(c) Commercial Project G1 plus G2 (in total).

2. Disclose changes between the Commercial Project estimates made as at the effective date and the corresponding estimates ("prior-year estimates") made as at the last day of the preceding year of the reporting entity:

(a) by country;

(b) for each of the following:

(i) light crude oil;

(ii) medium crude oil

(iii) heavy crude oil;

(iv) bitumen;

(v) natural gas liquids;

(vi) synthetic crude oil;

(vii) any other unconventional oil;

(viii) conventional natural gas;

(ix) unconventional natural gas;

(x) gas hydrates;

(xi) synthetic gas;

(c) separately identifying and explaining each of the following:

(i) extensions and improved recovery;

(ii) technical revisions;

(iii) discoveries;

(iv) acquisitions;

(v) dispositions;

(vi) socio-environmental-economic factors; and

(vii) production.

INSTRUCTIONS

(1) The reconciliation required under this Item 4.1 shall be provided in respect of Commercial Project estimated using constant or forecast prices and costs, with the price and cost case indicated in the disclosure.

(2) For the purpose of this Item 4.1, it is sufficient to provide the information in respect of the products specified in paragraph 2(b), excluding solution gas, natural gas liquids and other associated by products.

(3) Reporting entities shall not include infill drilling Commercial Project in the group of technical revisions specified in clause 2(c) (ii). Commercial Project additions from infill drilling shall be included in the group of extensions and improved recovery in clause 2(c) (i) (or, alternatively, in an additional separate group under paragraph 2(c) labelled "infill drilling").

PART 5 ADDITIONAL INFORMATION RELATING TO COMMERCIAL PROJECT DATA

Item 5.1 Commercial Project – Approved for Development and Commercial Project – Justified for Development

1. For G1 Commercial Project – Approved for Development:

(a) disclose for each Product the volumes of G1 Commercial Project – Approved for Development that were first attributed in each of the most recent three financial year's end,; and

(b) discuss generally the basis on which the reporting entity attributes G1 Commercial Project – Approved for Development, its plans (including timing) for developing the G1 Commercial Project – Approved for Development quantities and, if applicable, its reasons for deferring the development of particular G1 Commercial Project – Approved for Development during the following five years.

2. For G2 Commercial Project – Approved for Development :

(a) disclose for each Product the volumes of G2 Commercial Project – Approved for Development that were first attributed in each of the most recent three financial years end ; and

(b) discuss generally the basis on which the reporting entity attributes G2 Commercial Project – Approved for Development quantities, its plans (including timing) for developing the G2 Commercial Project – Approved for Development and, if applicable, its reasons for deferring the development of particular G2 Commercial Project – Approved for Development during the following five years.

For G1 Commercial Project – Justified for Development:

(a) disclose for each Product the volumes of G1 Commercial Project – Justified for Development that were first attributed in each of the most recent three financial year's end,; and

(b) discuss generally the basis on which the reporting entity attributes G1 Commercial Project – Justified for Development, its plans (including timing) for developing the G1 Commercial Project – Justified for Development quantities and, if applicable, its reasons for deferring the development of particular G1 Commercial Project – Justified for Development during the following five years.

4. For G2 Commercial Project – Justified for Development:

(a) disclose for each Product the volumes of G2 Commercial Project – Justified for Development that were first attributed in each of the most recent three financial years end ; and

(b) discuss generally the basis on which the reporting entity attributes G2 Commercial Project – Justified for Development quantities, its plans (including timing) for developing the G2 Commercial Project – Justified for Development and, if applicable, its reasons for deferring the development of particular G2 Commercial Project – Justified for Development during the following five years.

INSTRUCTIONS

(1) The phrase "first attributed" refers to the initial allocation of an volume of oil or gas Commercial Project – Approved for Development and Commercial Project – Justified for Development by a reporting entity. Only previously unassigned volumes of oil or gas may be included in the first attributed volumes for

the applicable reporting period/ For example, in 2011 a reporting entity allocated by way of an acquisition, discovery, extension and improved recovery 300 Mcf of G1 Commercial Project – Approved for Development and Commercial Project – Justified for Development conventional natural gas, that would be the first attributed volume for 2011

(2) The discussion for a reporting entity's plan for developing Commercial Project – Approved for Development and Commercial Project – Justified for Development or the reporting entity's reasons for deferring the development of Commercial Project – Approved for Development and Commercial Project – Justified for Development shall enable a reasonable investor to assess the efforts made by the reporting entity to convert Commercial Project – Approved for Development and Commercial Project – Justified for Development to Commercial Project – On Production.

Item 5.2 Significant Factors or Uncertainties affecting Commercial Project Data

1. Identify and discuss important socio-environmental-economic factors or significant uncertainties that affect particular components of the Commercial Project data.

INSTRUCTIONS

(1) A reporting entity shall , under this Item, include a discussion of any significant abandonment costs and reclamation costs, unusually high expected development costs or operating costs, or contractual obligations to produce and sell a significant portion of production at prices substantially below those which could be realised but for those contractual obligations. If the information required by this Item is presented in the reporting entity's financial statements and notes thereto for the most recent financial year ended, the reporting entity satisfies this Item by directing the reader to that presentation.

Item 5.3 Future Development Costs

1. (a) Provide the information specified in paragraph 1(b) in respect of development costs deducted in the estimation of future net revenue attributable to each of the following Commercial Project sub-classes:

(i) Commercial Project G1 Quantities (in total) estimated using constant or forecast prices and costs; and

(ii) Commercial Project G1 plus G2 (in total) estimated using constant or forecast prices and costs.

(b) Disclose, by country, the amount of development costs estimated

(i) in total, calculated using no discount; and

(ii) by year for each of the first five years estimated.

2. Discuss the reporting entity's expectations as to:

(a) the sources (including internally-generated cash flow, debt or equity financing, farm- outs or similar arrangements) and costs of funding for estimated future development costs; and

(b) the effect of those costs of funding on disclosed Commercial Project or future net revenue.

3. If the reporting entity expects that the costs of funding referred to in section 2, could make development of a property socially, environmentally and economically non-viable for that reporting entity, disclose that expectation and its plans for the property.

Item 5.4 Alignment to Agenda 2063, AMV and SDGs

1. Brief information pertaining to alignment to Agenda 2063, AMV and SDGs shall be provided.

PART 6 OTHER OIL AND GAS INFORMATION

Item 6.1 Oil and Gas Properties and Wells

1. Identify and describe generally the reporting entity's material properties, plants, facilities and installations:

(a) identifying their location (e.g. province, country etc.);

(b) indicating whether they are located onshore or offshore;

(c) in respect of properties to which Commercial Project have been attributed and which are capable of producing but which are not producing, disclosing how long they have been in that condition and discussing the general proximity of pipelines or other means of transportation;

(d) describing any statutory or other mandatory relinquishments, surrenders, back-ins or changes in ownership; and

(e) any material factor that could impact the legal status.

2. State, separately for oil wells and gas wells, the number of the reporting entity's producing wells and non-producing wells, expressed in terms of both gross wells and net wells, by location.

Item 6.2 Significant Factors or Uncertainties Relevant to Properties with Resource disclosure

If disclosure is made under Item 2.1 (4) then identify and discuss significant socio-environmental-economic factors or significant uncertainties that affect the anticipated developments or production activities on properties.

INSTRUCTIONS

(1) A reporting entity shall, under this Item, include a discussion of any significant abandonment costs and reclamation costs, unusually high expected development costs or operating costs, or contractual obligations to produce and sell a significant portion of production at prices substantially below those which could be realised but for those contractual obligations.

(2) If the information required by this Item is presented in the reporting entity's financial statements and notes thereto for the most recent financial year ended, the reporting entity satisfies this Item by directing the reader to that presentation

Item 6.3 Forward Contracts

1. If the reporting entity is bound by an agreement (including a transportation agreement), directly or through an aggregator, under which it may be precluded from fully realizing, or may be protected from the full effect of, future market prices for oil or gas, describe generally the agreement, discussing dates or time periods and summaries or ranges of volumes and contracted or reasonably estimated values.

2. If the reporting entity's transportation obligations or commitments for future physical deliveries of oil or gas exceed the reporting entity's expected related future production from its G1 Commercial Project, estimated using constant or forecast prices and costs and disclosed under Part 2, discuss such excess, giving information about the amount of the excess, dates or time periods, volumes and reasonably estimated value.

Item 6.5 Tax Horizon

If the reporting entity is not required to pay income taxes for its most recently completed financial year, discuss its estimate of when income taxes may become payable.

Item 6.6 Costs Incurred

1. Disclose by country for the most recent financial year each of the following:

(a) Project acquisition costs, separately for Commercial Projects, Potentially Commercial Projects, Non-Commercial Projects and Exploration Project;

(b) exploration costs; and

(c) development costs.

INSTRUCTIONS

(1) If the costs specified in paragraphs (a) (b) and (c) are presented in the reporting entity's financial statements and the notes to those statements for the most recent financial year ended, the reporting entity satisfies this Item by directing the reader to that presentation

Item 6.7 Exploration and Development Activities

1. Disclose, by country and separately for exploratory wells and development wells:

(a) the number of gross wells and net wells completed in the reporting entity's most recent financial year; and

(b) for each group of wells for which information is disclosed under paragraph (a), the number completed as oil wells, gas wells and service wells and the number that were dry holes.

2. Describe generally the reporting entity's most important current and likely exploration and development activities, by country.

Item 6.8 Production Estimates

1. Disclose, by country, for each Product, the volume of production estimated for the first year reflected in the estimates of gross G1 Commercial Project and gross G2 Commercial Project disclosed under Item 2.1.

2. If one field accounts for 20 percent or more of the estimated production disclosed under section 1, identify that field and disclose the volume of production estimated for the field for that year.

Item 6.9 Production History

1. Disclose for each quarter of its most recent financial year, by country for each Product:

(a) the reporting entity's share of average daily production volume, before deduction of royalties; and

(b) as an average per unit of volume:

(i) the prices received;

(ii) royalties paid;

(iii) production costs; and

(iv) the resulting netback.

2. For each important field, and in total, disclose the reporting entity's production volumes for the most recent financial year, for each Product.

INSTRUCTION

In providing information for each Product for the purpose of Item 6.9, it is not necessary to allocate among multiple Products attributable to a single well, reservoir or other Commercial Project entity. It is sufficient to provide the information in respect of the principal Product attributable to the well, reservoir or other Commercial Project entity. Resulting netbacks may be disclosed on the basis of units of equivalency between

Oil and Gas (e.g. TOE) but if so that shall be made clear and disclosure shall comply with section 7.4.12 of the PARC.

8. Renewable Energy Reporting

The section provides the basis for minimum disclosure of information for public reporting of Renewable Energy Projects. Such reports shall comply with this PARC and be reported in the manner prescribed by Form 8A.

8.1. Application

The PARC provides the basis for minimum disclosure of information for public reporting of Renewable Energy Projects. Such reports shall comply with this PARC and be reported in the manner prescribed by Form 8A.

The definitions described below relate to the interpretation and application of PARC for Renewable Energy application.

8.2. Renewable Energy activities

(i) Include any of the following:

(A) The search for Renewable Energy Products in their natural locations;

(B) The acquisition of property rights or properties for the purpose of exploring for or producing Renewable Energy Products from their natural locations on those properties;

(C) The activities necessary to produce Renewable Energy Products from their natural locations, including construction, development, production, and the acquisition, construction, installation and maintenance of field gathering, transportation and storage systems including product treatment, field processing and field storage; and decommissioning.

(ii) But do not include any of the following:

(A) Activities that occur after the first point of sale;

(B) Activities relating to the production of natural resources other than Renewable Energy Products and their by- products; or

Products includes but is not limited to any of the following:

(A) Geothermal Energy

(B) Bioenergy

(C) Solar Energy

(D) Wind Energy

(E) Hydro Energy

(F) Marine Energy

8.3. Reporting Terminology

All reports shall be prepared having taken into account the principles incorporated in AMREC (Table C4).

For the purpose of reporting in Africa, preparers are specifically required to adhere to the next section on “Requirements Applicable to All Disclosure”.

Table C4 Renewable energy reporting: AMREC Classes Defined by Categories and Sub-categories

AMREC Classes Defined by Categories and Sub-categories						
	Class		Sub-class	Minimum Categories		
				E	F	G
Estimated Total Quantities Initially in Place	Produced	Commercial Production				
		Non CommercialProduction				
	Known Resource	Commercial Projects	On Production	1	1.1	1, 2, 3
			Approved for Development	1	1.2	1, 2, 3
			Justified for Development	1	1.3	1, 2, 3
		Potentially Commercial Projects	Development Pending	2	2.1	1, 2, 3
			Development On Hold	2	2.2	1, 2, 3
		Non-Commercial Projects	Development Unclarified	3.2	2.2	1, 2, 3
			Development Not Viable	3.3	2.3	1, 2, 3
		Additional Quantities in Place		3.3	4	1, 2, 3
	Potential Resource	Exploration Projects	[See Generic Specifications for sub-classes]	3.2	3	4
		Additional Quantities in Place		3.3	4	4

8.4. Requirements applicable to all disclosure

8.4.1. Application

This Part applies to disclosure made by or on behalf of a reporting entity:

(a) To the public; or
(b) In other circumstances in which, at the time of making the disclosure, the reporting entity knows, or ought reasonably to know, that the disclosure is or will become available to the public.

8.4.2. Disclosure of Commercial Project and other information

If a reporting entity makes disclosure of Commercial Project or other information of a type that is specified in Form 8A, the reporting entity shall ensure that the disclosure satisfies as a minimum the following requirements:

a. Estimates of Commercial Project or future net revenue shall:

(i) disclose the *effective date* of the estimate;

(ii) have been prepared by a Competent Person (See PART C Section 5);

(iii) have been prepared in accordance with AMREC;

(iv) be based on a general discussion in Form 8A, that avoids misleading statements. The discussion shall include the technologies used to establish the appropriate level of certainty for the Commercial Project quantity estimates. This discussion shall describe methodologies used for the Commercial Project quantity bookings, and how in-place quantities were calculated, production tests were interpreted and recovery factors assigned;

(v) have been made assuming that development of each Project, in respect of which the estimate is made, will occur, without regard to the likely availability to the reporting entity of funding required for that development, where reported under the category 'Approved for Development' and 'Justified for Development'; and

(vi) in the case of estimates of E1F1G3 Commercial Project quantities of related future net revenue disclosed in writing, also include a cautionary statement that is proximate to the estimate to the following effect:
"E1F1G3 Commercial Project are those additional Commercial Project quantities that are less certain to be recovered than E1F1G2 Commercial Project quantities. There is a 10% probability that the quantities actually produced will equal or exceed the sum of E1F1G1 plus E1F1G2 plus E1F1G3 Commercial Project quantities."

(b) for the purpose of determining whether Commercial Project shall be attributed to a particular Project, reasonably estimated future abandonment and reclamation costs related to the Project shall have been taken into account;

(c) In disclosing aggregate future net revenue the disclosure shall comply with the requirements for the determination of future net revenue specified in Form 8A; and

(d) A statement of the Commercial Project data and other information stated in Form 8A shall be disclosed as at the last day of the reporting entity's most recent financial year or a later date if more than six months have elapsed since the most recent financial year.

8.4.3. Commercial Projects and Potentially Commercial Projects Classification

1. Disclosure of Commercial Project or Potentially Commercial Project shall apply the E, F and G-axis category and sub-category definitions set out in AMREC (see Part B) and shall relate to the most specific sub-class of Commercial Project or Potentially Commercial Project in which the Commercial Project or Potentially Commercial Project quantities can be classified.

2. The Competent Person who prepared the report under this PARC shall indicate that it was prepared in accordance with AMREC (see Part B).

8.4.4. Renewable Energy Potentially Commercial Projects and Sales

1. Disclosure of quantities or of sales of products or associated by-products shall be made with respect to the first point of sale

2. Despite subsection (1), a reporting entity may disclose quantities or sales of products or

associated by-products with respect to an alternate reference point if, to a reasonable person, products or associated by-products would be marketable at the alternate reference point;

3. If a reporting entity discloses quantities or sales of products or associated by- products with respect to an alternate reference point, the reporting entity shall:

   i. State that the disclosure is made with respect to an alternate reference point,
   ii. Disclose the location of the alternate reference point, and
   iii. Explain why disclosure is not being made with respect to the first point of sale.

8.4.5. Future Net Revenue Not Fair Market Value

Disclosure of an estimate of future net revenue, whether calculated without discount or using a discount rate, shall include a statement to the effect that the estimated values disclosed do not represent fair market value.

8.4.6. Consent of Competent Person

A statement shall be included that the Competent Person has ensured that the information disclosed in the report is in compliance with the PARC and that the report may be published in its current form and context by the reporting entity.

8.4.7. Disclosure of Quantities Less Than All Commercial Project

If a reporting entity that has more than one Project makes written disclosure of any Commercial Project quantities attributable to a particular Project:

(a) the disclosure shall include a cautionary statement to the effect that "The estimates of Commercial Project quantities and future net revenue for individual Projects may not reflect the same confidence level as estimates of Commercial Project and future net revenue for all Projects, due to the effects of aggregation; and

(b) the document containing the disclosure of any Commercial Project quantities attributable to one Projects shall also disclose total Commercial Project quantities of the same classification for all Projects of the reporting entity in the same country (or, if appropriate and not misleading, in the same foreign geographic area).

8.4.8. Disclosure of Potentially Commercial Projects

(1) If a reporting entity discloses anticipated results from Potentially Commercial Project which are not currently classified as Commercial Project, the reporting entity shall also disclose in writing, in the same document

   (a) the reporting entity's equity holding in the Potentially Commercial Project
   (b) the location of the Potentially Commercial Project
   (c) the Products reasonably expected
   (d) a description of the project including

      (a) each significant event in the project and the specific time period in which each event is expected to occur
      (b) the production technology and
      (c) whether the project is a conceptual or pre-development study

   (e) the risks and the level of uncertainty associated with recovery of the

Potentially Commercial Project and

(f) in the case of Exploration Project if its quantities are disclosed

(i) the basis of the calculation of its value; and
(ii) Whether the value was prepared by an independent party.

(2) If disclosure referred to in subsection (1) includes an estimate of a quantity of Potentially Commercial Project in which the reporting entity has an interest or intends to acquire an interest, or an estimated value attributable to an estimated quantity, the estimate shall

(a) have been prepared by a *CP*
(b) relate to the most specific sub-class of Potentially Commercial Project in which the Potentially Commercial Project quantities can be classified, as set out in AMREC and shall identify what portion of the estimate is attributable to each category; and
(c) be accompanied by the following information:

(i) a definition of the Potentially Commercial Project sub-class used for the estimate
(ii) the effective date of the estimate
(iii) the significant positive and negative factors relevant to the estimate
(iv) in respect of Potentially Commercial Project, the specific contingencies which prevent the classification of the Potentially Commercial Project as Commercial Project and
(v) a cautionary statement in bold that is proximate to the estimate to the effect that:
(A) in the case of Potentially Commercial Project or a sub-class of Potentially Commercial Project other than Commercial Project:

"There is no certainty that it will be socio-environmentally-economically and/or technologically viable to produce any portion of the Potentially Commercial Project." or

(B) in the case of Exploration Project or a sub-class of Exploration Project:

"There is no certainty that any portion of the Exploration Project will be estimated as Potentially Commercial Project or as a Commercial Project. If discovered, there is no certainty that it will be socio-environmentally-economically and/or technologically viable to produce any portion of the Exploration Project."

8.4.9. Analogous Information

(1) Sections 8.4.2, 8.4.3 and 8.4.8 do not apply to the disclosure of analogous information provided that the reporting entity discloses the following:

(a) The source and date of the analogous information;
(b) Whether the source of the analogous information was independent;
(c) If the *reporting entity* is unable to confirm that the analogous information was prepared by a *CP* or in accordance with AMREC, a cautionary statement to that effect proximate to the disclosure of the analogous information; and
(d) The relevance of the analogous information to the reporting entity's Renewable Energy activities.

(2) For greater certainty, if a reporting entity discloses information that is an anticipated result, an estimate of a quantity of Commercial Project or Potentially Commercial Project, or an estimate of value attributable to an estimated quantity of Commercial Project or Potentially

Commercial Project for an area in which it has an interest or intends to acquire an interest, that is based on an extrapolation from analogous information, sections 8.4.2, 8.4.3 and 8.4.8 apply to the disclosure of the information.

8.4.10. Net Asset Value and Net Asset Value per Share

Written disclosure of net asset value or net asset value per share shall include a description of the methods used to value assets and liabilities and the number of shares used in the calculation.

8.4.11. Netbacks

If Netbacks are disclosed the following information shall be included:

1. Reflect netbacks calculated by subtracting royalties, taxes and operating costs from revenues; and
2. State the method of calculation.

8.4.12. Disclosure using Renewable Energy Metrics

1. If a reporting entity discloses an Renewable Energy metric, other than an estimate of quantities or value of quantities prepared in accordance with section 8.4.2 or 8.4.8 or a comparative or equivalency measure under Part 2,3,4,5 or 6 of Form 8A, the reporting entity shall include disclosure that:

    (a) Identifies the standard and source of the Renewable Energy metric;
    (b) Provides a brief description of the method used to determine the Renewable Energy metric;
    (c) Provides an explanation of the meaning of the Renewable Energy metric;
    (d) Cautions readers as to the reliability of the Renewable Energy metric.

2. If there is no identifiable standard for an Renewable Energy metric, the reporting entity shall also include disclosure that:

    a. Provides a brief description of the parameters used in the calculation of the Renewable Energy metric; and
    b. States that the Renewable Energy metric does not have any standardised meaning and shall not be used to make comparisons.

8.4.13. Restricted Disclosure: Summation of Classes

(1) A reporting entity shall not disclose a summation of an estimated quantity, or estimated value, of two or more of the following:

    (a) Commercial Project;
    (b) Potentially Commercial Project;
    (c) Exploration Project;
    (d) Additional Quantities in Place (E3.3F4G1,2,3);
    (e) Additional Quantities in Place (E3.3F4G4);

(2) Despite subsection (1), a reporting entity may disclose an estimate of Estimated Total Quantities Initially in Place, Known Resource quantities or Potential Resource quantities if the reporting entity includes, proximate to that disclosure, an estimate of each of the following, as applicable:

    (a) Commercial Project;

(b) Potentially Commercial Project;
(c) Exploration Project;
(d) Additional Quantities in Place (E3.3F4G1,2,3);
(e) Additional Quantities in Place (E3.3F4G4);

(3) A reporting entity may disclose an estimate of Estimated Total Quantities Initially in Place, Known Resource quantities or Potential Resource quantities as the most specific sub-class that it can assign to its quantities if, proximate to its disclosure, the reporting entity.

(a) explains why the Estimated Total Quantities Initially in Place, Known Resource quantities or Potential Resource quantities , as the case may be, is the most specific assignable sub-class; and
(b) Includes

(i) In the case of disclosure of Known Resource quantities, the cautionary statement required by clause 8.4.8 (2) (c) (v) (A), or
(ii) In the case of disclosure of Estimated Total Quantities Initially in Place or Potential Resource quantities, the cautionary statement required by clause 8.4.8 (2) (c) (v) (B).

8.4.14. Disclosure of High-Case Estimates of Commercial Project and of Potentially Commercial Project other than Commercial Project

(3) If a reporting entity discloses an estimate of G1 plus G2 plus G3 quantities associated with a Commercial Project, the reporting entity shall also disclose the corresponding estimates of G1 and G2 plus G3 quantities associated with the Commercial Project or of G2 and G3 quantities associated with the Commercial Project.
(4) If a reporting entity discloses a G3 estimate of Potentially Commercial Project other than Commercial Project, the reporting entity shall also disclose the corresponding G1 and G2 estimates.

8.5. Definitions

Throughout this PARC Code, unless otherwise stated or the content requires otherwise, an expression which denotes any gender includes other genders and the following terms will have the meanings set out below. Definitions in this section is also applicable to Form 8A.

Abandonment costs

Abandonment costs means all costs associated with:

(i) rendering all intervals of a operation incapable of production or between intervals
(ii) removing all equipment; and
(iii) the physical removal of surface facilities, and the decommissioning of any facilities, in the vicinity of the operation, required for the transport, treatment and metering of a product.

Alternate reference point

Alternate reference point means a location at which quantities and values of a products are measured before the first point of sale.

Analogous Information

Information about an area outside the area in which the reporting entity has an interest or intends to acquire an interest, which is referenced by the reporting entity for the purpose, in the opinion of a Competent Person, of drawing a comparison or conclusion to an area in which the reporting entity has an interest or intends to

acquire an interest and may include:

(i) historic information concerning Commercial Project;
(ii) estimates of the quantities or value of Commercial Project;
(iii) historic information concerning Potentially Commercial Project;
(iv) estimates of the quantities or value of Potentially Commercial Project;
(v) historic production amounts;
(vi) production estimates; or
(vii) information concerning a site.

Anticipated Results

Information that may, in the opinion of a Competent Person, indicate the potential value or quantities of Potentially Commercial Project in respect of the reporting entity's Potentially Commercial Project or a portion of its Potentially Commercial Project which may include:

(i) an estimate of quantities
(ii) an estimate of value
(iii) a real extent
(iv) production rates.

By-product

By-product means a renewable energy product that is recovered as a consequence of producing a product.

Potentially Commercial Project data

Potentially Commercial Project data means an estimate of Potentially Commercial Project quantities and related future net revenue, estimated using forecast prices and costs.

Effective Date

1) the cut-off date for all engineering and financial data after which no new information can be included in the evaluation; and
2) It is the date to which all future net revenue or other cash flow forecasts are discounted to determine net present values.

Entity

An Entity is a corporation, joint venture, partnership, trust, individual, principality, agency, or other person engaged directly or indirectly in

(iv) the exploration for, or production of Renewable Energy;
(v) the acquisition of properties or interests therein for the purpose of conducting such exploration or production; or
(vi) the ownership of properties or interests therein with respect to which such exploration or production is being, or will be, conducted.

First point of Sale

First point of sale means the first point after initial production at which there is a transfer of ownership of a Product.

Future Net Revenue

Future net revenue means a forecast of revenue, estimating using forecast prices and costs or constant prices

and costs, arising from the anticipated development and production of Potentially Commercial Project and Commercial Project net of the associated royalties, taxes, operating costs, development costs, abandonment costs and reclamation costs. Corporate general and administrative expenses and financing costs are not deducted. Net present values of future net revenue shall be calculated using a discount rate and without discount rate.

Net back

The price of Renewable Energy at any interim point in the production calculated based on the price of the derived sales products at a defined reference point.

Renewable Energy metric

Renewable Energy metric means a numerical measure of a reporting entity's Renewable Energy activities.

Property

A area wherein a corporate entity or individual has contractual rights to produce, process, and market a defined portion of specified in-place Renewable Energy. May also be termed a lease, concession, or license.

Exploration Project data

Exploration Project means an estimate of Exploration Project quantities and related future net revenue, estimated using forecast prices and costs.

Reclamation costs

Reclamation costs means all costs, other than abandonment costs, associated with restoring land as close as possible to its original state or to a standard prescribed or imposed by a government or regulatory authority.

Reporting Entity

The entity submitting the Potentially Commercial Project and Commercial

Project Report. (See above) (Could also be Reporting Issuer):

(c) A "reporting issuer" as defined in securities legislation; or

(d) In a jurisdiction in which the term is not defined in securities legislation, an issuer of securities that is required to file financial statements with the securities regulatory authority.

Commercial Project Data

Estimates of G1 quantities associated with a Commercial Project and G2 quantities associated with Commercial Project and related future net revenue estimated using forecast prices and costs.

Commercial Project Information

Commercial Project Information consists of various estimates pertaining to the extent and value of Renewable Energy products. Commercial Project Information will include:

Estimates of Renewable Energy Commercial Project quantities and may, but will not necessarily, include estimates of

(i) the future production rates from such Commercial Project
(ii) the future net revenue from such Commercial Project
(iii) the present value of such future net revenue.

All such Commercial Project Information shall be estimated and classified as appropriate to stated Commercial Project definitions.

8.7. FORM 8A renewable energy public report and other information

TABLE OF CONTENTS

This is the form referred to in Section 8.1 and Part 8.2 of PARC.

GENERAL INSTRUCTIONS

(1) Terms for which a meaning is given in the PARC have the same meaning in this Form 8A.

(2) It is not necessary to include the headings or numbering, or to follow the ordering of Items, in this Form 8A. Information may be provided in tables.

(3) To the extent that any Item or any component of an Item specified in this Form 8A does not apply to a reporting entity and its activities and operations, or is not material, no reference need be made to that Item or component. It is not necessary to state that such an Item or component is "not applicable" or "not material".

(4) This Form 8A sets out minimum requirements. A reporting entity may provide additional information not required in this Form8 A provided that it is not misleading and not inconsistent with the requirements of the PARC, and provided that material information required to be disclosed is not omitted.

(5) A reporting entity may satisfy the requirement of this Form 8A for disclosure of information "by country" by instead providing information by foreign geographic area in respect of countries outside Africa as may be appropriate for meaningful disclosure in the circumstances.

PART 1 DATE OF STATEMENT

Item 1.1 Relevant Dates

1. Date the statement.

2. Disclose the effective date of the information being provided.

3. Disclose the preparation date of the information being provided.

INSTRUCTIONS

(1) The same effective date applies to Commercial Project of each class or sub-class reported and to related future net revenue. References to a change in an item of information, such as changes in production or a change in Commercial Project, mean changes in respect of that item during the twelve months ended on the effective date.

(2) The preparation date, in respect of written disclosure, means the most recent date to which information relating to the period ending on the effective date was considered in the preparation of the disclosure. The preparation date is a date subsequent to the effective date because it takes time after the end of the effective date to assemble the information for that completed period that is needed to prepare the required disclosure as at the end of the effective date.

(3) Because of the interrelationship between certain of the reporting entity's Commercial Project data and other information referred to in this Form 8A and certain of the information included in its financial statements, the reporting entity shall ensure that its financial auditor and its CPs are kept appraised of relevant events and transactions, and shall facilitate communication between them.

(4) If the reporting entity provides information as at a date more recent than the effective date, in addition to the information required as at the effective date, also disclose the date as at which that additional information is provided. The provision of such additional information does not relieve the reporting entity of the obligation to provide information as at the effective date.

PART 2 DISCLOSURE OF COMMERCIAL PROJECT AND POTENTIALLY COMMERCIAL PROJECT

Item 2.1 Commercial Project Data (Constant or Forecast Prices and Costs)

1. Breakdown of Commercial Project Disclose, by country and in the aggregate, Commercial Project, gross and net, estimated using constant or forecast prices and costs, for each Product, in the following classes:

(a) On Production Commercial Project G1 Quantities;

(b) Approved for Development Commercial Project G1 Quantities;

(c) Justified for Development Commercial Project G1 Quantities;

(d) Commercial Project G1 Quantities (in total);

(e) Commercial Project G2 (in total); and

(f) Commercial Project G1 plus G2 Quantities (in total); and

(g) if the reporting entity discloses an estimate of Commercial Project G3 quantities in the statement:

(i) Commercial Project G3 quantities (in total); and

(ii) Commercial Project G1 plus G2 plus G3 Quantities (in total).

2. The reporting entity shall provide a general discussion in Form 8A, that avoids misleading statements. The discussion shall include the technologies used to establish the appropriate level of certainty for the Commercial Project quantity estimates. This discussion shall describe methodologies used for the Commercial Project quantity bookings, and how in- place volumes were calculated, production tests were interpreted, and recovery factors assigned.

3. Net Present Value of Future Net Revenue– Disclose, by country and in the aggregate, the net present value of future net revenue attributable to the Commercial Project sub-classes referred to in section 1 of this Item, estimated using constant or forecast prices and costs, before and after deducting future income tax expenses, calculated without discount and using discount rates of 5 percent, 10 percent, 15 percent and 20 percent.

4. Additional Information Concerning Future Net Revenue

(a) Section 3 applies to future net revenue attributable to each of the following Commercial Project sub-classes disclosed under item 2.1 (1) estimated using constant or forecast prices and costs:

(i) Commercial Project G1 Quantities (in total);

(ii) Commercial Project G1 plus G2 Quantities (in total); and

(iii) if paragraph 1(g) of this Item applies, Commercial Project G1 plus G2 plus G3 Quantities (in total).

(b) Disclose, by country and in the aggregate, the following elements of future net revenue estimated using constant or forecast prices and costs and calculated without discount:

(i) revenue;

(ii) royalties;

(iii) operating costs;

(iv) development costs;

(v) abandonment costs and reclamation costs;

(vi) future net revenue before deducting future income tax expenses;

(vii) future income tax expenses; and

(viii) future net revenue after deducting future income tax expenses.

(c) Disclose, by Product in each case with associated by-products, and on a unit value basis for each Product, in each case with associated by-products (e.g.,

$/unit of Renewable Energy Product using net Commercial Project), the net present value of future net revenue (before deducting future income tax expenses) estimated using constant or forecast prices and costs and calculated using a discount rate of 10 percent.

5. Potentially Commercial Project or Exploration Project

If the reporting entity publicly discloses Potentially Commercial Project or Exploration Project in the Competent Person Report, they shall be disclosed separately from the disclosure required by items 1, 2 and 3 of section 2.1 of Form 8A as follows:

(a) The Potentially Commercial Project or Exploration Project, as applicable, gross and net, estimated using constant or forecast prices and costs, for each Product, in each of the following sub-classes:

(i) Potentially Commercial Project (G1)

(ii) Potentially Commercial Project (G2)

(iii) Potentially Commercial Project (G3)

(iv) Exploration Project (G4.1)

(v) Exploration Project (G4.2)

(vi) Exploration Project (G4.3); and

(b) The net present value of future net revenue attributable to each sub-class of Potentially Commercial Project referred to in paragraph (a) of this item, estimated using constant or forecast prices and costs, before deducting future income tax expenses, calculated using discount rates of 0 percent, 5 percent, 10 percent, 15 percent and 20 percent.

INSTRUCTIONS

(1) Disclose all of the Commercial Project over which the reporting entity has a direct or indirect ownership, working or royalty interest.

(2) Do not include, in the Commercial Project data, Potentially Commercial Project data or Exploration Project data, a Product that is subject to purchase under a long-term supply, purchase or similar agreement, However, if the reporting entity is a party to such an agreement with a government or governmental authority, and participates in the operation of the properties in which the Product is situated or otherwise serves as producer of the Potentially Commercial Project (in contrast to being an independent purchaser, broker, dealer or importer) disclose separately the reporting entity’s interest in the Potentially Commercial Project that subject to such agreements at the effective date and the net quantity of the Product received by the reporting entity under the agreement during the 12 months ended on the effective date.

(3) Future net revenue includes the portion attributable to the reporting entity’s interest under an agreement referred to in Instruction 2.

(4) If the reporting entity’s disclosure of Potentially Commercial Project would, to a reasonable person, be misleading, and if stated without an explanation of the reporting entity’s ownership of or control over those Potentially Commercial Project, explain the nature of the reporting entity’s ownership of no control over Potentially Commercial Project disclosed in the Form 8A report.

(5) If a reporting entity voluntarily discloses Potentially Commercial Project or Exploration Project and the G1 or loss estimate, as applicable, has a negative net present value at any of the discount rates referred to in paragraph 4 (b), the reporting entity shall disclose the negative net present value.

(6) Future net revenue includes the portion attributable to the reporting entity's interest under an agreement referred to in Instruction (2).

(7) Constant prices and costs are prices and costs used in an estimate that are:

(a) the reporting entity's prices and costs as at the effective date of the estimation, held constant throughout the estimated lives of the properties to which the estimate applies;

(b) if, and only to the extent that, there are fixed or presently determinable future prices or costs to which the reporting entity is legally bound by a contractual or other obligation to supply a physical product, including those for an extension period of a contract that is likely to be extended, those prices or costs rather than the prices and costs referred to in paragraph (a).

For the purpose of paragraph (a), the reporting entity's prices will be the posted price for Renewable Energy Products, after historical adjustments for transportation and other factors.

PART 3 PRICING ASSUMPTIONS

Item 3.1 Constant Prices

For each Product, disclose the benchmark reference prices for the countries or regions in which the reporting entity operates, as at the last day of the reporting entity's most recent financial year, reflected in the Commercial Project data disclosed in response to Item 2.1

Item 3.2 Forecast Prices Used in Estimates

1. For each Product, disclose:

(a) the pricing assumptions used in estimating Commercial Project data, Potentially Commercial Project or Exploration Project data disclosed in response to

Item 2.1:

(i) for each of at least the following five financial years; and

(ii) generally, for subsequent periods; and

(b) the reporting entity’s weighted average historical prices for the most recent financial year.

2. The disclosure in response to section 1 shall include the benchmark reference pricing schedules for the countries or regions in which the reporting entity operates, and inflation and other forecast factors used.

3. If the pricing assumptions specified in response to section 1 were provided by a Competent Person who is independent of the reporting entity, disclose that fact and identify the CP.

INSTRUCTIONS

(1) Benchmark reference prices may be obtained from sources such as public product trading exchanges or prices posted by purchasers.

(2) The term "constant prices and costs" and the defined term "forecast prices and costs" include any fixed or presently determinable future prices or costs to which the reporting entity is legally bound by a contractual or other obligation to supply a physical product, including those for an extension period of a contract that is likely to be extended.

In effect, such contractually committed prices override benchmark reference prices for the purpose of estimating Commercial Project data, Potentially Commercial Project data or Exploration Project data. To ensure that disclosure under this Part is not misleading, the disclosure shall reflect such contractually committed prices.

(3) Under subsection 8.4.6 of the PARC, the reporting entity shall obtain the written consent of the CP to disclose his or her identity in response to section 3 of this Item.

PART 4 RECONCILIATION OF CHANGES IN COMMERCIAL PROJECT

Item 4.1 Commercial Project Reconciliation

1. Provide the information specified in section 2 of this Item in respect of the following

Commercial Project sub-classes as published in terms of Item 2.1:

(a) Commercial Project G1 Quantities (in total);

(b) Commercial Project G2 Quantities (in total); and

(c) Commercial Project G1 plus G2 (in total).

2. Disclose changes between the Commercial Project estimates made as at the effective date and the corresponding estimates ("prior-year estimates") made as at the last day of the preceding year of the reporting entity:

(a) by country;

(b) for each of the Renewable Energy Products

(c) separately identifying and explaining each of the following:

(i) extensions and improved production;

(ii) technical revisions;

(iii) acquisitions;

(iv) dispositions;

(v) socio-environmental-economic factors; and

(vi) production.

INSTRUCTIONS

(1) The reconciliation required under this Item 4.1 shall be provided in respect of Commercial Project estimated using constant or forecast prices and costs, with the price and cost case indicated in the disclosure.

(2) For the purpose of this Item 4.1, it is sufficient to provide the information in respect of the Products specified in paragraph 2(b).

PART 5 ADDITIONAL INFORMATION RELATING TO COMMERCIAL PROJECT DATA

Item 5.1 Commercial Project – Approved for Development and Commercial Project – Justified for Development

1. For G1 Commercial Project – Approved for Development:

(a) disclose for each Product the quantities of G1 Commercial Project – Approved for Development that were first attributed in each of the most recent three financial year’s end; and

(b) discuss generally the basis on which the reporting entity attributes G1 Commercial Project – Approved for Development, its plans (including timing) for developing the G1 Commercial Project – Approved for Development quantities and, if applicable, its reasons for deferring the development of particular G1 Commercial Project – Approved for Development during the following five years.

2. For G2 Commercial Project – Approved for Development:

(a) disclose for each Product the quantities of G2 Commercial Project – Approved for Development that were first attributed in each of the most recent three financial years end; and

(b) discuss generally the basis on which the reporting entity attributes G2 Commercial Project – Approved for Development quantities, its plans (including timing) for developing the G2 Commercial Project – Approved for Development and, if applicable, its reasons for deferring the development of particular G2 Commercial Project – Approved for Development during the following five years.

3. For G1 Commercial Project – Justified for Development:

(a) disclose for each Product the quantities of G1 Commercial Project – Justified for Development that were first attributed in each of the most recent three financial year's end; and

(b) discuss generally the basis on which the reporting entity attributes G1 Commercial Project – Justified for Development, its plans (including timing) for developing the G1 Commercial Project – Justified for Development quantities and, if applicable, its reasons for deferring the development of particular G1 Commercial Project – Justified for Development during the following five years.

4. For G2 Commercial Project – Justified for Development:

(a) disclose for each Product the volumes of G2 Commercial Project – Justified for Development that were first attributed in each of the most recent three financial years end; and

(b) discuss generally the basis on which the reporting entity attributes G2 Commercial Project – Justified for Development quantities, its plans (including timing) for developing the G2 Commercial Project – Justified for Development and, if applicable, its reasons for deferring the development of particular G2 Commercial Project – Justified for Development during the following five years.

INSTRUCTIONS

(1) The phrase "first attributed" refers to the initial allocation of quantities of Renewable Energy Commercial Project – Approved for Development and Commercial Project – Justified for Development by a reporting entity. Only previously unassigned quantities of Renewable Energy may be included in the first attributed volumes for the applicable reporting period.

(2) The discussion for a reporting entity's plan for developing Commercial Project – Approved for Development and Commercial Project – Justified for Development or the reporting entity's reasons for deferring the development of Commercial Project – Approved for Development and Commercial Project – Justified for Development shall enable a reasonable investor to assess the efforts made by the reporting entity to convert Commercial Project – Approved for Development and Commercial Project – Justified for Development to Commercial Project – On Production.

Item 5.2 Significant Factors or Uncertainties affecting Commercial Project Data

1. Identify and discuss important socio-environmental-economic factors or significant uncertainties that affect particular components of the Commercial Project data.

INSTRUCTION

(1) A reporting entity shall, under this Item, include a discussion of any significant abandonment costs and reclamation costs, unusually high expected development costs or operating costs, or contractual obligations to produce and sell a significant portion of production at prices substantially below those which could be realised but for those contractual obligations. If the information required by this Item is presented in the reporting entity's financial statements and notes thereto for the most recent financial year ended, the reporting entity satisfies this Item by directing the reader to that presentation.

Item 5.3 Future Development Costs

1. (a) Provide the information specified in paragraph 1(b) in respect of development costs deducted in the estimation of future net revenue attributable to each of the following Commercial Project sub-classes:

(i) Commercial Project G1 Quantities (in total) estimated using constant or forecast prices and costs; and

(ii) Commercial Project G1 plus G2 (in total) estimated using constant or forecast prices and costs.

(b) Disclose, by country, the amount of development costs estimated

(i) in total, calculated using no discount; and

(ii) by year for each of the first five years estimated.

2. Discuss the reporting entity's expectations as to:

(a) the sources (including internally-generated cash flow, debt or equity financing, farm- outs or similar arrangements) and costs of funding for estimated future development costs; and

(b) the effect of those costs of funding on disclosed Commercial Project or future net revenue.

3. If the reporting entity expects that the costs of funding referred to in section 2, could make development of a property socially, environmentally and economically non-viable for that reporting entity, disclose that expectation and its plans for the property.

5.4 Alignment to Agenda 2063, AMV and SDGs

1. Brief information pertaining to alignment to Agenda 2063, AMV and SDGs shall be provided.

PART 6 OTHER RENEWABLE ENERGY INFORMATION

Item 6.1 Renewable Energy Operations

1. Identify and describe generally the reporting entity’s material properties, plants, facilities and installations:

(a) identifying their location (e.g. province, country etc.);

(b) indicating whether they are located onshore or offshore;

(c) in respect of properties to which Commercial Project have been attributed and which are capable of producing but which are not producing, disclosing how long they have been in that condition and discussing the general proximity of transmission and distribution ;

(d) describing any statutory or other mandatory relinquishments, surrenders, back-ins or changes in ownership; and

(e) any material factor that could impact the legal status.

Item 6.2 Significant Factors or Uncertainties Relevant to Properties with Resource disclosure

If disclosure is made under Item 2.1 (4) then identify and discuss significant socio-environmental-economic factors or significant uncertainties that affect the anticipated developments or production activities on properties.

INSTRUCTIONS

(1) A reporting entity shall, under this Item, include a discussion of any significant abandonment costs and reclamation costs, unusually high expected development costs or operating costs, or contractual obligations to produce and sell a significant portion of production at prices substantially below those which could be realised but for those contractual obligations.

(2) If the information required by this Item is presented in the reporting entity's financial statements and notes thereto for the most recent financial year ended, the reporting entity satisfies this Item by directing the reader to that presentation

Item 6.3 Forward Contracts

1. If the reporting entity is bound by an agreement (including a transportation agreement), directly or through an aggregator, under which it may be precluded from fully realizing, or may be protected from the full effect of, future market prices for oil or gas, describe generally the agreement, discussing dates or time periods and summaries or ranges of volumes and contracted or reasonably estimated values.

2. If the reporting entity's transportation, transmission and distribution obligations or commitments for future physical deliveries of Renewable Energy exceed the reporting entity's expected related future production from its G1 Commercial Project, estimated using constant or forecast prices and costs and disclosed under Part 2, discuss such excess, giving information about the amount of the excess, dates or time periods, volumes and reasonably estimated value.

Item 6.5 Tax Horizon

If the reporting entity is not required to pay income taxes for its most recently completed financial year, discuss its estimate of when income taxes may become payable.

Item 6.6 Costs Incurred

1. Disclose by country for the most recent financial year each of the following:

(a) Project acquisition costs, separately for Commercial Projects, Potentially Commercial Projects, Non-Commercial Projects and Exploration Project;

(b) research costs; and

(c) development costs.

INSTRUCTIONS

(1) If the costs specified in paragraphs (a) (b) and (c) are presented in the reporting entity's financial statements and the notes to those statements for the most recent financial year ended, the reporting entity satisfies this Item by directing the reader to that presentation

Item 6.7 Research and Development Activities

1. Disclose, by country and separately for research and development studies

2. Describe generally the reporting entity's most important current and likely research and development activities, by country.

Item 6.8 Production Estimates

1. Disclose, by country, for each Product, the volume of production estimated for the first year reflected in the estimates of gross G1 Commercial Project and gross G2 Commercial Project disclosed under Item 2.1.

2. If one field accounts for 20 percent or more of the estimated production disclosed under section 1, identify that field and disclose the volume of production estimated for the project for that year.

Item 6.9 Production History

1. Disclose for each quarter of its most recent financial year, by country for each Product:

(a) the reporting entity's share of average daily production volume, before deduction of royalties and taxes; and

(b) as an average per unit of quantity

(i) the prices received;

(ii) royalties paid;

(iii) production costs; and

(iv) the resulting netback.

2. For each important field, and in total, disclose the reporting entity's production volumes for the most recent financial year, for each Product.

INSTRUCTION

In providing information for each Product for the purpose of Item 6.9, it is not necessary to allocate among multiple Products attributable to a single Commercial Project entity. It is sufficient to provide the information in respect of the principal Product attributable to Commercial Project. disclosure shall comply with section 8.4.12 of the PARC.

PART D - ADMINISTRATION OF AMREC-PARC

Development, maintenance and monitoring progress of AMREC-PARC will be the responsibility of African Union-AMREC Working Group (AU-AWG) with AMDC providing the secretariat.

AU-AWG will be constituted by nominated members of AU member States.

Similarly, each country may have a Country AWG (CAWG) for implementing AMREC-PARC at country levels.

EGRM, with UNECE as the secretariat, that has the mandate for developing and maintaining UNFC will provide technical support for the development and maintenance of the system. This document and its subsequent revision will be reviewed and approved for technical consistency with the UNFC by the Technical Coordination Group and the EGRM.

Glossary of Terms

Term	Definition
Abandonment	Seal off to ensure safety of Project site.
Audit*	A systematic and detailed examination of the relevant resource quantities in AMREC classes meant for public disclosure, processes of estimation (including geological, geotechnical and other models), assumptions and conclusions undertaken in order to validate the appropriateness of the various components that contribute to the estimates of the public disclosed quantities. An Audit includes a detailed examination of the base data and validation of the resource quantity estimates. When compliance with the PARC is declared and signed off, the audit shall have been conducted by a Competent Person.
Category	Primary basis for classification using each of the three fundamental Criteria of social-environmental-economic viability (related Categories being E1, E2, and E3), field project status and feasibility (related Categories being F1, F2, F3 and F4), and general level of knowledge and/or confidence in estimates of quantities (related Categories being G1, G2, G3 and G4). Definitions of Categories are provided in AMREC Part B.
Class(es)	Primary level of resource classification resulting from the combination of a Category from each of the three Criteria (axes).
Classify (according to AMREC)	To assign estimated quantities to a specific Class (or Sub-class) of AMREC by reference to the definitions of Categories or Sub- categories for each of the three Criteria and taking into account both the Generic Specifications and the Sectoral Specifications or requirements that are included in the Aligned System, as set out in the relevant Bridging Document.
Competent Person (CP)*	Competent Person is one who has the ability to put skills, knowledge and experience into practice in order to perform activities or a job in an effective and efficient manner for resource classification, management and reporting.
Competent Person's Report (CPR)*	A report on the technical aspects of a project prepared by a Competent Person (CP). The contents are determined by the nature/status of the project being reported and may include a techno-socio-environmental-economic model as appropriate for the level of study.
Commercial	A project is commercial when it has been confirmed to be socially, environmentally, economically and technically feasible and satisfies all the relevant criteria of the E, F, and G axes that are required for it to proceed.
Contingencies	Criteria or conditions that shall be satisfied before a project can proceed.
Criteria	AMREC utilizes three fundamental Criteria for resource classification: social, environmental and economical viability (E axis); field project status and feasibility (F axis); and, level of knowledge/confidence in estimates (G axis). These Criteria are each subdivided into Categories and Sub-categories, which are then combined in the form of Classes or Sub-classes.
Decommissioning	The closing and potentially removing facilities associated with a project. These could include anything from minor local facilities, to major facilities such as large processing plants, or offshore structures

Dilution /Contamination*	Low or zero grade (waste) material that is produced during the course of the operations and thereby forms part of the Commercial Project
Economic	A project is economic when the anticipated monetary revenues equal or exceed the costs by a margin that satisfies financing requirements, taking the risks and opportunities into account, and provides a positive return on investment, often measured by a monetary criterion, such as having a positive NPV at a particular discount factor.
Effective Date*	The date of the most recent scientific or technical information included in the technical report
Environmental	The physical, chemical, and biological impact on, or changes to, the surrounding pre-existing environment, due to a project (e.g. heavy metal contamination in soils or water, disruption of wildlife habits and migration characters, etc.).
Estimated Total Quantities Initially in Place	Cumulative quantities in a Potential Resource, Known Resource and that are Produced. See Potential Resource, Known Resource
Evaluator	Person, or persons, performing resource estimation and/or classification.
Exploration Project	A Project that is associated with one or more Potential Resource (See Potential Resource).
Generic Specifications	Specifications that apply to the classification of quantities of any resource using AMREC.
Guidelines	Additional instruction on how AMREC may be applied in specific circumstances.
Historical Estimate*	An estimate of the quantity, grade, or metal or mineral content of a deposit, accumulation or renewable energy source that an issuer has not verified as a current Commercial Project. The estimate predates the issuing of the PARC and/or was prepared before the issuer acquiring, or entering into an agreement to acquire, an interest in the property or site that contains the quantities.
Known Resources	Quantities that has been demonstrated to exist by direct evidence. More detailed specifications can be found in relevant sectoral specifications.
Life of Mine Plan*	A design and financial/ socio-environmental-economic study of an existing operation in which appropriate assessments have been made of existing geological, mining, metallurgical, economic, marketing, legal, environmental, social, governmental, engineering, operational and all other Controlling Factors, which are considered in sufficient detail to demonstrate that continued production is reasonably justified. Refer to Table C2 for guidance.
Material Information*	Material information is any information relating to the business and affairs of a company that results in or would reasonably be expected to result in a significant change in the market price or value of any of the company's assets. Material information consists of both material facts and material changes related to the business and affairs of a company.
Mineable*	Those parts of the orebody, both socio-environmental-economic and not socio-environmental-economic, that can be produced during the normal course of mining.

Mine Design*	A framework of mining components and processes taking into account such aspects as mining methods used, access to the orebody, personnel and material handling, ventilation, water, power, and other technical requirements, such that mine planning can be undertaken.
Mineral Deposit (or Deposit)*	A mass of naturally occurring mineral material, usually of socio-environmental-economic interest, without regard to mode of origin. No commercial value is implied.
Mineral Occurrence*	Any mineral of potential socio-environmental-economic interest in any concentration found in bedrock or as float; especially a valuable (or potentially valuable) mineral in sufficient concentration to suggest further exploration.
Mineralisation*	The process or processes by which a mineral or minerals are introduced into the host rock, resulting in a potentially valuable deposit. It is a general terms, incorporating various types, e.g. fissure filling, impregnation, replacement, etc.
Numerical Code	Numerical designation of each Class or Sub-class of resource quantity as defined by AMREC. Numerical Codes are always quoted in the same sequence (i.e. E;F;G).
PARC	Pan-African Resource Reporting Code
Political	Action by a controlling organization that may influence, impede, prevent, or facilitate the ability to proceed with a project.
Potential Resources	Quantities that has not yet been demonstrated to exist by direct evidence, but is assessed as potentially existing based primarily on indirect evidence. More detailed specifications can be found in relevant sectoral specifications.
Product	The output from a Project that is directly linked to (or a direct replacement of) a Product Type and is saleable in an established market. (See also Product Type)
Product type	Cluster or group of outputs of potential socio-environmental-economic interest from a Project such as Petroleum, Minerals, Nuclear Fuels, Renewable Energy, Anthropogenic Resources or Geological Storage. A Product Type may include multiple products. (See also Product)
Project	A Project is a defined operation which provides the basis for socio-environmental-economic evaluation and decision-making. In the early stages of evaluation, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail. Where no operation can currently be defined for all or part of the resources, based on existing technology or technology currently under development, all quantities associated with that resource (or part thereof) are classified in Category F4.
Realms of Discourse (ROD)	Realms of Discourse (ROD) describes the context and the reason for evaluating and classifying a resource project. The same project is likely to be assessed under different conditions by various organisations. An organisation such as an operating company is likely to assess all its projects under the same ROD; a government agency will have its own, but different, ROD for all the projects that it assess.
Recognised Professional Organisation (RPO)*	A RPO shall : 1. Be a self-regulatory organisation covering professionals in resource production cycle;

	2. Admit members primarily on the basis of their academic qualifications and experience; 3. Require compliance with the professional standards of competence and ethics established by the organisation; 4. Have disciplinary powers, including the power to suspend or expel a member; and 5. Have been accepted by the African Union Commission, AMREC Secretariat as an RPO.
Regeneration	Site is returned to or reconstituted for productive use (not necessarily measured by its socio-environmental-economic value), for example, a rock quarry used as a reservoir or lake for recreation.
Remediation (or Reclamation)	The restoration of a project site conditions that are required by regulatory or other provisions.
Residue / low grade stockpile / tailings*	Material resulting from mining or processing operations.
Resource	The cumulative quantities associated with Known and Potential Resource. See Known Resource, Potential Resource
Sector/Sectoral	Pertaining to a specific Product Type (See Product Type)
Social	The resulting impact on humans and society, from a project, such as: (a) Effects stemming from environmental changes (e.g. health issues due to heavy metal contamination). (b) Changes in social systems and structures, (e.g. ownership claims, traditional land usage, land and other value changes, changes in local population community structures, the creation of jobs and economic activity, etc.).
Specifications	Additional details (mandatory rules) as to how a resource classification system is to be applied, supplementing the framework definitions of that system. Generic Specifications provided for the AMREC ensure clarity and comparability and are complementary to the sectoral requirements, including in Aligned Systems, as set out in the relevant Bridging Document.
Sub-categories	Subdivision of Categories for each of the fundamental Criteria of social-environmental-economic viability, field project status and feasibility, and level of knowledge/confidence in estimates. Definitions of Sub-categories are provided in Part B.
Sub-classes	Subdivision of resource classification based on project maturity principles resulting from the combination of Sub- categories. Project maturity Sub-classes are discussed further in Part B.

* Applies to only PARC

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6. Committee for Mineral Reserves International Reporting Standards (2013) CRIRSCO International Reporting Template for Exploration Results, Mineral Resources and Mineral Reserves http://www.crirsco.com/template.asp

7. SAMREC (2016) The South African Code for the Reporting of Exploration Results, Mineral Resources And Mineral Reserves https://www.samcode.co.za/

8. SMGOG (2017) The South African Code for the Reporting of Oil and Gas Resources https://www.samcode.co.za/

Annexure 1

Professional and statutory bodies recognized by PARC as of May 2019 [List incomplete]

COUNTRY	NAME OF INSTITUTION	FIELD OF EARTH SCIENCE E.G. PETROLEUM	STATUTORY/ VOLUNTARY	CONTACT DETAILS				
				EMAIL / WEBSITE	TEL.	FAX	POSTAL ADDRESS	CONTACT PERSON
Africa	Geological Society of Africa	All mineral resources		gbengaokunlola@ yahoo.com		NA		Prof. Gbenga Okunlola
Angola	ANGOLA GEOLOGICAL INSTITUTE	All mineral resources	Statutory	IgeoAngola@hotmail.com	244,914,077,737	NA	P. Bag 1260 C, Ministry Square, Ho-Chi-Min Street, Luanda, Angola	Director Dr. Canga Xiaquivuila
	NATIONAL DIRECTORATE OF MINERAL RESOURCES	All mineral resources	Statutory	anbuneto@gmail.com	244,925,044,048	NA	4 de Fevereiro Avenue, nº 105 – Ingombota District, P.Bag 1279, Luanda, Angola	Director Dr. André Buta Neto
	ORDER OF ENGINEERS FROM ANGOLA	All mineral resources	Statutory	NA	00244917543508; +244931355454; +244934798531	NA	Coqueiros District, Rainha Ginga Streetn n.º 6468, Hyundai Building (COSAL), 11th Floor, Luanda, Angola	President

	ANGOLAN ASSOCIATION OF GEOLOGISTS	All mineral resources	Statutory	secretariado@aageologos.org	00244 914 461 769; +244 926 887 944	NA	4 de Fevereiro Avenue, 1st Floor, right side, Ingombota District, Luanda, Angola	President / Secretary
	FACULTY OF SCIENCE and FACULTY OF ENGENEERING, UNIVERSITY AGOSTINHO NETO	All mineral resources	Statutory	comunicacao@uan.ao	+244 924 975 656	NA	4 de Fevereiro Avenue, no.º 71, Luanda, Angola	Dean
Namibia	Geoscience Council of Namibia		Statutory	Secretary@geocouncil.org.na / www.geocouncil.org.na	264 61 2848111		Geoscience Council of Namibia, Private Bag 41524, Windhoek, Namibia	Secretariat
	Engineering Council of Namibia		Statutory	ecnamibia@iway.na	264 61 233 264		Postal Address PO Box 1996, Windhoek, Namibia	
	Engineering Council of Namibia		Statutory	ecnamibia@iway.na		400821		

South Africa	South African Council for Natural Scientific Professions (SACNASP)		Statutory	https://www.sacnasp.org.za/				
	Engineering Council of South Africa		Statutory					
	South African Council for Professional and Technical Surveyors (PLATO)		Statutory	http://www.plato.org.za/				
Zimbabwe	Minerals Marketing Corporation of Zimbabwe (MMCZ) Act Chapter 21:04		Statutory	mmcz@mmcz.co.zw	+263 4 487200-4		MMCZ BUILDING 90 Mutare Road Msasa Harare, Zimbabwe	Director
	The Chamber of Mines of Zimbabwe (CoMZ) Chapter 21:02		Statutory	info@chamines.co.zw	+263 (4)334517 + 263 (4)334507		20 Mount Pleasant Drive, Mount Pleasant, Harare, Zimbabwe P.O. BOX 712, Harare, Zimbabwe	CEO

	Zimbabwe Mining Development Corporation (ZMDC) Chapter 21:08		Statutory	info@zmdc.co.zw	+263 782 708 397-401	+263 (4) 487022	MMCZ Building 90 Mutare Road Msasa Harare Zimbabwe	Director
	Parliamentary Portfolio Committee on Mines and Energy,		Statutory					Chairperson
	The Zimbabwe School of Mines Presidential Charter in 1994		Statutory	admin@zsm.co.zw	263 9 291247, +263-9-290596-8 +263-9-291598	+263 9 291246	Coghlan Ave Extension, Killarney, Bulawayo, Zimbabwe	CEO
Sudan	National Geological Council of Sudan		statutory					
Benin	Office Béninois de Recherches Géologiques et Minières		Statutory	attingandedji47@yahoo.fr	22921302279	22921314120	01 BP 249 Cotonou	Director

	Direction Générale de l'industrie Minière et Pétrolière		Statutory	adjokanonbasile@yahoo.fr	22921322272			Director
Nigeria	Council of Mining Engineers and Geoscientists (COMEG)		Statutory		+234 810 245 3857		9 Okemesi Crescent, Garki, Abuja, Nigeria	