2015 ANNUAL GENERAL MEETING
ENVIRONMENTAL AND SOCIAL RISK MANAGEMENT TOOLS FOR FINANCIAL INSTITUTIONS

Public Breakfast Meeting
WELCOME AND INTRODUCTION

Hugh Wheelan
Managing Editor, Responsible Investor Magazine
CARBON ASSET RISK: ASSESSMENT AND MANAGEMENT APPROACHES

Marisa Buchanan
Vice President, Sustainable Finance, JPMorgan Chase
Carbon Asset Risk Discussion Framework

UNEP FI Annual General Meeting
October 12, 2015

Presented by:
Marisa Buchanan, Vice President, Sustainable Finance, JPMorgan Chase & Co.
(Working Group Chair)

Framework authors:
Christopher Weber, WRI/UNEP FI
Mark Fulton, Energy Transition Advisors, and consultant to WRI
Portfolio Carbon Initiative

- In mid-2014, the WRI/UNEP FI process on “financed emissions” accounting was restructured into the Portfolio Carbon Initiative, focused on three work-streams:
  - **Carbon Asset Risk: Discussion Framework**
  - Climate metrics for investors (document published Sept 2015)
  - Climate metrics for banks (draft expected Dec 2015)
Background

A discussion has emerged about whether banks and investors are sufficiently integrating considerations of potential carbon-related risks in their financing decisions.

- This discussion has been stimulated by concepts such as “unburnable carbon” and “stranded assets.”

- Idea is that various constraints on greenhouse gas (GHG) emissions could impact the operational viability of companies and assets – thereby creating financial risk (known as “carbon asset risk”) for lenders and investors.

- WRI and UNEP FI saw an opportunity to develop guidance to help banks and investors in their efforts to more systematically identify, assess and manage potential carbon asset risk.
  - Guidance was also intended to address a perceived limitation of “financed emissions” accounting as a measure of carbon asset risk.

<table>
<thead>
<tr>
<th>What are Financed Emissions (FE)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>FE are the GHG emissions indirectly attributed to a lender/investor, based on its share of financing for a company or asset.</td>
</tr>
<tr>
<td>It is not the general emissions profile [Scope 1+2+(3)] of a company/asset being financed.</td>
</tr>
<tr>
<td>Example FE Calculation: 1 million tonnes * 1% = 10,000 tonnes</td>
</tr>
</tbody>
</table>
Objective and Process

Framework Objective
- Assist banks and investors in efforts to more systematically assess potential carbon-related risks facing companies or assets, and understand how those may (or may not) translate to credit or investment risk

Scope
- Focuses on policy/regulatory, market/economic, technological and reputational risk factors
  - While emphasis is on producers or consumers of fossil fuels, the general concepts can be applied to other sectors

Audience
- Research analysts, banking teams, risk managers, corporate responsibility teams, and other stakeholders

Process
- Over 80 individuals from banks, investment firms, insurance companies, academics, consultants and NGOs participated in a multi-stakeholder process.
Defining carbon asset risk

**Operator carbon risk**: risk of financial loss to an operator of a physical asset due to non-physical climate change related factors (predominantly policy, market, and technology)

**Operator carbon strategy**: the strategy by which an operator of carbon assets minimizes its operator carbon risk by positioning itself to adapt to a carbon-constrained world

**Carbon asset risk**: Potential for a financial intermediary or investor to experience financial loss due to unmanaged operator carbon risk in its clients or investee companies
Analytical Framework

- Assess Exposure
  - Carbon Risk Factors
    - Policy and legal factors
    - Technology factors
    - Market and economic factors
    - Reputational factors
  - Exposure to Carbon Risks
    - Physical assets
      - Company/operator
      - Underwriter/originator
    - Financial assets: Carbon asset risk
      - Loans
      - Bonds
      - Equity
    - Lenders
    - Investors
    - Financial portfolios
  - Operators: Carbon risk

- Evaluate Risk
  - Analysis Types
    - Screening
      - Low Exposure: Avoid the risk: Sector/security avoidance Divestment
      - Low Risk: Manage the risk: Risk disclosure, Sectoral policies, Due diligence, risk pricing, Diversification, Engagement
Disclaimer

- Participation in this process does not suggest or imply endorsement, and is not an endorsement, of the framework, or any of the concepts described herein, by the individuals or their respective institutions.

- Nothing in this paper should be construed as investment advice or investment research.

- The framework also describes a variety of commercially or freely available tools that may be used to support carbon asset risk assessment.
  - The highlighted tools are ones available at the time this document was published from providers who were involved in the development and review of this framework; the list will not be updated over time.
  - The list of tools is intended to be for illustrative purposes only and should not suggest or imply endorsement, and is not an endorsement, by WRI, UNEP-FI, or any of the participants in the process or their respective institutions.
Framework Structure

Assess Exposure
- Chapter 2: Types of carbon risk factors
- Chapter 3: Identifying carbon risk in sectors and companies
- Chapter 4: Financial risk in the capital stack

Evaluate Risk
- Chapter 5: Carbon asset risk: evaluating the financial impacts

Manage Risk
- Chapter 6: Managing carbon asset risk
Chapter 2: Risk Factors

- In addition to these risk factors, investors and intermediaries also face **reputational risks** from investments in and relationships with carbon-intensive operators.
- Reputational risks may be significant and operate on shorter timescales but their management is different from other carbon risk factors.

<table>
<thead>
<tr>
<th>Category of Risk</th>
<th>Definition</th>
<th>Nature of Impact</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Legal</td>
<td>Policies or regulations that could impact the operational and financial viability of carbon assets</td>
<td>Impacts physical carbon assets and companies that own/operate assets</td>
<td>Fuel-efficiency standards for personal vehicles; emissions trading systems; U.S. EPA regulations targeting air pollution and GHGs from power plants</td>
</tr>
<tr>
<td>Technology</td>
<td>Developments in the commercial availability and cost of alternative and low-carbon technologies</td>
<td>Impacts technology choices, deployment and costs and demand profiles</td>
<td>Energy storage technologies; advances in renewable energy technologies, carbon capture and storage; alternative fuels</td>
</tr>
<tr>
<td>Market and Economic</td>
<td>Changes in market or economic conditions that would negatively impact carbon assets</td>
<td>Impacts physical carbon assets and companies that own/operate assets</td>
<td>Changes in fossil fuel prices; changes in consumer preferences</td>
</tr>
</tbody>
</table>
Chapter 3: Assessing exposure using key metrics
Chapter 3: Risk types by sector and asset class

<table>
<thead>
<tr>
<th>Category</th>
<th>Example Sectors</th>
<th>Principal Types of Risk Facing the Category</th>
<th>Typical Financial Asset Classes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fossil-fuel assets</td>
<td>Coal mining; oil and gas production</td>
<td>Policy; technology market and economic; reputational</td>
<td>Equities; bonds; corporate lending</td>
</tr>
<tr>
<td>2. Fossil-fuel dependent infrastructure</td>
<td>Oil and gas pipelines; rail lines (for example, those shipping coal)</td>
<td>Policy; market and economic; reputational</td>
<td>Bonds; project finance</td>
</tr>
<tr>
<td>3. High-carbon assets facing shift to low-carbon technologies</td>
<td>Fossil fuel-fired power plants</td>
<td>Policy; technology market and economic</td>
<td>Equities; bonds; corporate lending</td>
</tr>
<tr>
<td>4. High-carbon assets without low-carbon competitors</td>
<td>Cement; steel; glass</td>
<td>Policy; technology market and economic</td>
<td>Equities; bonds; corporate lending</td>
</tr>
</tbody>
</table>

*See Chapter 4 for a detailed discussion of asset classes and the capital stack
Chapter 4: The Capital Stack

Questions to consider:

• Where does capital sit in the stack?

• Is it backed by collateral, or are there other forms of recourse?

• What is the duration/tenor of the financing?

Source: Adapted from Guggenheim Investments
Chapter 5: Operator-level Stress test
(Disclosed by the company? Time horizon?)
### Chapter 5: Top-down portfolio process

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Macro-scenarios</th>
<th>Risk assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify risk factors</td>
<td>Assign risk factor assumptions</td>
<td>Analyse and optimise portfolio</td>
</tr>
<tr>
<td>Test relationship between risk factors</td>
<td>Macro-scenario data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stress testing</td>
<td></td>
</tr>
</tbody>
</table>
## Chapter 6: Risk management options:
Mandate-dependent: Disclosure, Diversification, Engagement, Divestment

<table>
<thead>
<tr>
<th>New investments</th>
<th>Financial Intermediaries (underwriters)</th>
<th>Financial Intermediaries (lenders)</th>
<th>Bond buyers</th>
<th>Shareholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid the risk</td>
<td>Sector/security avoidance</td>
<td>Sector/security avoidance</td>
<td>Sector/security avoidance</td>
<td>Sector/security avoidance</td>
</tr>
<tr>
<td>Manage the risk</td>
<td>Promote risk disclosure</td>
<td>Proper risk pricing, Sectoral policies, Thorough due diligence, Engage in key areas</td>
<td>Promote risk disclosure, Due diligence as possible in disclosure</td>
<td>Investment with ESG screens, Diversification</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current holdings</th>
<th>Avoid the risk</th>
<th>Divestment at sector or loan level</th>
<th>Diversification at sector or security level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage the risk</td>
<td>N/A</td>
<td>Diversification (sector and subsector), Engagement to understand risk management</td>
<td>Diversification, Engagement to understand risk management, Engagement to align risk and return perspectives</td>
</tr>
</tbody>
</table>
WATER SCARCITY RISK: CORPORATE BONDS TOOL

Simone Dettling
GIZ
Integrating Water Risk in Corporate Bond Valuation

Simone Dettling
Annual Global Meeting UNEP-FI, 12th October 2015
Project Partners

Project Partners

Expert Council (Examples)
Water Stress vs. Water Prices

Copenhagen $ 7.38/m³ (TEV: $3.99)
Mumbai $ 0.22/m³ (TEV: $13.58)
Mexico-City $ 0.95/m³ (TEV: $8.66)
Vancouver $ 2.22/m³ (TEV: $2.01)
Sao Paulo $ 1.28/m³ (TEV: $5.33)
Mumbai $ 0.22/m³ (TEV: $13.58)

→ Gap between shadow price and current cost as measure for risk
Approach

Combine Three Sources of Data

Global data on water stress (WRI)

Data on location of operations (Bloomberg)

Corporate credit Information

Calculate shadow prices

Combine company data with location-specific price

adjust credit ratios
Annual Water Use

In thousand cubic meters; for 24 companies in three sectors

Glencore used nearly 1 billion m³ of water (Finland: 1.6)

No beverage firm used more than 65 million m³
Blended Shadow Prices of Water

USD per cubic meter

Sempra and Rio Tinto face average shadow prices >8 USD per cubic meter
Highlighted Results: Mining

**Rio Tinto:** ratio rises by 200% to 2.96x in 2017

**Vedanta:** ratio rises to 4 in 2014 → non-investment grade?
Highlighted Results: Power Sector

**Eskom:** already high leverage (>9) rises dramatically → Ba1/BBB-Neg rating under threat

**Sempra Energy:** ratio of 6.7 would be high for a utility → non-investment grade?
Highlighted Results: Beverages

Beverage firm ratios do not change greatly (geographic diversification and comparatively low water consumption)

Exception:

Femsa: leverage doubles to 2.27x
Environmental Stress Testing

Starting November 2015, 8-10 Partner Banks from G20 Economies

1) Develop **science-based scenarios** for droughts in several G20 markets and their impacts on water availability.

2) Create **index of exposure** to water scarcity for companies in 10-15 industries and **model** both direct economic **costs** and macro-economic impacts.

3) Develop a model (potentially Excel-based) that **links drought impacts to drivers of corporate credit quality** (such as profitability, leverage) and can be plugged into or inform banks’ internal stress testing models.
Thank you!

Download the tool and report at:
http://www.naturalcapitaldeclaration.org/ncdtools/
WATER SCARCITY RISK: EQUITY TOOL

Yiannis Bartzilas
Bloomberg
WATER RISK VALUATION IN MINING

YIANNIS BARTZILAS
OCTOBER 12 2015
WATER SCARCITY IS ALREADY HURTING COMPANIES
...AND CAN BE VERY EXPENSIVE TO MITIGATE

Chapter: Chile, Peru Water Risks

Chile Desalination Bill Implies $13 Billion Copper Mining Cost
Analysts Barbara Pomfret (ESG) & Kenneth Hoffman (Metals)
Dashboard: Environmental, Social & Governance, Global (BI BESGG)
Jan 9, 2014

BHP and Rio Tinto's $3.4 billion Escondida desalination plant investment implies a cost of $2 per cubic meter (m³) of water, assuming copper extraction water use is 0.72 m³ per ton, and 70% water recycling, the median for large miners. This suggests Chilean miners would need to invest more than $13 billion to realize all current reserves if desalination is enforced. Costs, up to half from energy, may vary widely depending on ease of access to seawater.
MODELLING BAU VS. WATER STRANDING

Business as Usual (No Stranding)

WATER STRANDING SCENARIO

Based on water intensity of mine and basin-level water supply-demand gap
COMPANIES ANALYSED IN THE MODEL

<table>
<thead>
<tr>
<th>Company</th>
<th>Bloomberg Ticker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia Mining Plc</td>
<td>ACA LN</td>
</tr>
<tr>
<td>Agnico Eagle Mines Ltd</td>
<td>AEM CN</td>
</tr>
<tr>
<td>Alamos Gold Inc</td>
<td>AGI CN</td>
</tr>
<tr>
<td>Anglogold Ashanti Ltd</td>
<td>ANG SJ</td>
</tr>
<tr>
<td>Argonaut Gold Inc</td>
<td>AR CN</td>
</tr>
<tr>
<td>Aurico Gold Inc</td>
<td>AUQ CN</td>
</tr>
<tr>
<td>Barrick Gold Corp</td>
<td>ABX CN</td>
</tr>
<tr>
<td>Centamin Plc</td>
<td>CEY LN</td>
</tr>
<tr>
<td>Eldorado Gold Corp</td>
<td>ELD CN</td>
</tr>
<tr>
<td>Gold Fields Ltd</td>
<td>GFI SJ</td>
</tr>
<tr>
<td>Goldcorp Inc</td>
<td>G CN</td>
</tr>
<tr>
<td>Kingsgate Consolidated</td>
<td>KCN AU</td>
</tr>
<tr>
<td>Gold Corp</td>
<td>K CN</td>
</tr>
<tr>
<td>Lake Shore Gold Corp</td>
<td>LSG CN</td>
</tr>
<tr>
<td>Newcrest Mining Ltd</td>
<td>NCM AU</td>
</tr>
<tr>
<td>Oceanagold Corp</td>
<td>OGC CN</td>
</tr>
<tr>
<td>Polys Gold Ojsc</td>
<td>PLZL RM</td>
</tr>
<tr>
<td>Resolute Mining Ltd</td>
<td>RSG AU</td>
</tr>
<tr>
<td>Wesdome Gold Mines Ltd</td>
<td>WDO CN</td>
</tr>
<tr>
<td>Yamana Gold Inc</td>
<td>YRI CN</td>
</tr>
<tr>
<td>Antofagasta Plc</td>
<td>ANTO LN</td>
</tr>
<tr>
<td>Capstone Mining Corp</td>
<td>CS CN</td>
</tr>
<tr>
<td>Oz Minerals Ltd</td>
<td>OZL AU</td>
</tr>
</tbody>
</table>

- Together account for **50% of production of publicly listed gold producers tracked by Bloomberg Intelligence (100+ companies)**
- Largest impacts on production and revenues → **smaller & less diversified companies**
- **Capital expenditure** appears to be a viable route to value preservation in most cases
## AGGREGATED COMPANY LEVEL WATER RISK

### Water Risk Valuation Tool

**Anglogold Ashanti Ltd**

<table>
<thead>
<tr>
<th>Overall Water Stress* - World Resources Institute</th>
<th>% Total Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely high (&gt;80%)</td>
<td>17%</td>
</tr>
<tr>
<td>High (40-80%)</td>
<td>0%</td>
</tr>
<tr>
<td>Medium-high (20-40%)</td>
<td>10%</td>
</tr>
<tr>
<td>Low-medium (10-20%)</td>
<td>0%</td>
</tr>
<tr>
<td>Low (&lt;10%)</td>
<td>31%</td>
</tr>
<tr>
<td>Arid and low water use</td>
<td>20%</td>
</tr>
<tr>
<td>No data</td>
<td>7%</td>
</tr>
</tbody>
</table>

*baseline year: 2010

### Projected (2020) Water Stress - World Resources Institute

<table>
<thead>
<tr>
<th>1.4x decrease</th>
<th>Near Baseline</th>
<th>No data</th>
<th>2x increase</th>
<th>2.8x or greater increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>5%</td>
<td>0%</td>
<td>12%</td>
<td>0%</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>31%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>11%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Total Production Breakdown by Baseline (2010) Water Stress

- Extremely high (>80%): 20%
- High (40-80%): 10%
- Medium-high (20-40%): 31%
- Low-medium (10-20%): 17%
- Low (<10%): 7%
- Arid and low water use: 0%
- No data: 0%

### Total Production Breakdown by Projected (2020) Water Stress

- 1.4x decrease: 1%
- Near Baseline: 0%
- No data: 0%
- 2x increase: 15%
- 2.8x or greater increase: 47%
## PINPOINT EXPOSURE BY ASSET

### List of AngloGold Ashanti Ltd Mine Sites

<table>
<thead>
<tr>
<th>Mine Name</th>
<th>Mine Ticker</th>
<th>Country</th>
<th>World Resources Institute - 2010 Water Stress Category</th>
<th>World Resources Institute - Projected Water Stress Category - 2020</th>
<th>Attributable Mine Output M oz</th>
<th>Mine Output % of Total Company Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morro da Gloria Gold Mine</td>
<td>0694760D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raposos Gold Mine</td>
<td>0694792D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mina Grande Gold Mine</td>
<td>0694774D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kukuluma Gold Deposit</td>
<td>0694777D Equity</td>
<td>Tanzania</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuiaba Gold Mine</td>
<td>0694798D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velha Gold Mine</td>
<td>0694801D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veduga Gold Deposit</td>
<td>0694788D Equity</td>
<td>Russia</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrego do Sítio Tailings Gold Min</td>
<td>0694756D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LMS Gold deposit</td>
<td>0694799D Equity</td>
<td>United States</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescatada Gold Deposit</td>
<td>0694770D Equity</td>
<td>Peru</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerro Vanguardia Gold Mine</td>
<td>0694757D Equity</td>
<td>Argentina</td>
<td>Arid and low water use</td>
<td>Near Baseline</td>
<td>0.25</td>
<td>6%</td>
</tr>
<tr>
<td>AngloGold Ashanti Mi</td>
<td>0694781D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td>0.40</td>
<td>9%</td>
</tr>
<tr>
<td>Cresson Gold Mine</td>
<td>0694796D Equity</td>
<td>United States</td>
<td>Extremely high (&gt;80%)</td>
<td>Near Baseline</td>
<td>0.21</td>
<td>5%</td>
</tr>
<tr>
<td>Sunrise Dam Gold Min</td>
<td>0694782D Equity</td>
<td>Australia</td>
<td>Arid and low water use</td>
<td>Near Baseline</td>
<td>0.26</td>
<td>6%</td>
</tr>
<tr>
<td>Geita Gold Mine</td>
<td>0694802D Equity</td>
<td>Tanzania</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td>0.48</td>
<td>11%</td>
</tr>
<tr>
<td>La Colosa Gold Depos</td>
<td>0694783D Equity</td>
<td>South Africa</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gramalote Gold Deposit</td>
<td>0694772D Equity</td>
<td>Peru</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tropicana Gold Deposit</td>
<td>0694773D Equity</td>
<td>Australia</td>
<td>Arid and low water use</td>
<td>No data</td>
<td>0.36</td>
<td>8%</td>
</tr>
<tr>
<td>Crixas (Serra Grande) Gold Mine</td>
<td>0694779D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td>0.07</td>
<td>2%</td>
</tr>
<tr>
<td>Sao Bento Gold Mine</td>
<td>0739304D Equity</td>
<td>Brazil</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tebererebe Gold Mine</td>
<td>0694784D Equity</td>
<td>Ghana</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obuasi Gold Mine</td>
<td>0694797D Equity</td>
<td>Ghana</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
<td>0.24</td>
<td>6%</td>
</tr>
<tr>
<td>Suhum Gold Mine</td>
<td>0694789D Equity</td>
<td>Ghana</td>
<td>Low (&lt;10%)</td>
<td>Near Baseline</td>
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<td>Near Baseline</td>
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<td>Near Baseline</td>
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</table>
COMPANY REACTION: REDUCE PRODUCTION (ASSETS STRANDED)

Bloomberg

Water Risk Valuation Tool

Select a company:
Argonaut Gold Inc

Set a scenario to test potential water stranding:

1. Impact of water supply gap on production
2. Company reaction to water scarcity:*
   - Reduce Production
3. Regulatory action: all water diverted for domestic use at this supply-demand gap, %

* a combination of both "Reduce Production" and "Invest in CAPEX" can be achieved by setting "2. Company reaction to water scarcity" to "Invest in CAPEX" and reducing production on "Production & Water Demand" tab

Model Outputs - Stock Price Comparison ($)

- Current
- Consensus
- Model
- w/Stranding

*Prices in USD

Additional Water Procurement Related Costs - USD/short ton throughput

<table>
<thead>
<tr>
<th></th>
<th>Gold</th>
<th>Copper</th>
</tr>
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<tbody>
<tr>
<td>Desalination operating cost</td>
<td>0.5</td>
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</tr>
<tr>
<td>Recycling - operating cost</td>
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<tr>
<td>Capex Spend (USD/m3)</td>
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<td>5</td>
</tr>
<tr>
<td>Capex - Year Incurred</td>
<td>2015</td>
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</table>

Currency: USD
WACC: 4.71%
Growth Rate: 2.99%
Water intensity (m³/ton) Au: 16.00
Water intensity (m³/short ton) Cu: 120.4
Valuation Model: EV/EBITDA
Include TEV Data?: N

Effects of Stranding vs. Business as Usual

Δ Gold Production
Δ FCF Margin
Δ Capex/Sales
COMPANY REACTION: INVEST IN CAPEX

Bloomberg

Water Risk Valuation Tool

Select a company:
Argonaut Gold Inc

Set a scenario to test potential water stranding:
1. Impact of water supply gap on production
   Moderate
   Invest in CAPEX

2. Company reaction to water scarcity:
   a combination of both “Reduce Production” and “Invest in CAPEX” can be achieved by setting “2. Company reaction to water scarcity” to “Invest in CAPEX” and reducing production on “Production & Water Demand” tab

3. Regulatory action: all water diverted for domestic use at this supply-demand gap %

Model Outputs - Stock Price Comparison ($)

*Prices in USD

Additional Water Procurement Related Costs - USD/short ton throughput

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<tr>
<td>Capex Speed (m³/oz)</td>
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</tr>
<tr>
<td>Capex - Year incurred</td>
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<th>Currency</th>
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<tr>
<td>Water intensity (m³/short ton) Cu</td>
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<td>Valuation Model</td>
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<td>Include TEV Data</td>
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Effects of Stranding vs. Business as Usual

△ Gold Production
△ FCF Margin
△ Capex/Sales

0% -4% 0% -2% 0% 0% 0% 0% 0% 0% 0% 0%
INCLUDE SHADOW PRICE OF WATER

Bloomberg

Water Risk Valuation Tool

Select a company:
Argonaut Gold Inc

Set a scenario to test potential water stranding:

1. Impact of water supply gap on production
   Moderate

2. Company reaction to water scarcity*
   Invest in CAPEX

3. Regulatory action: all water diverted for domestic use at this supply-demand gap %
   *Prices in USD

Additional Water Procurement Related Costs -USD/short ton throughput

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Currency

WACC 4.71%
Growth Rate 2.09%
Water intensity (m3/oz) Au 16.00
Water intensity (m3/short ton) Cu 1.0645

Include TEV Data? Y

Model Outputs - Stock Price Comparison ($)

<table>
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<th>Current</th>
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Effects of Stranding vs. Business as Usual

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<td>26%</td>
<td>19%</td>
<td>17%</td>
<td>22%</td>
<td>5%</td>
<td>2%</td>
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CUSTOMIZE INPUTS: COST OF WATER SOLUTIONS

Bloomberg Water Risk Valuation Tool

Select a company:
Argonaut Gold Inc

Set a scenario to test potential water stranding:
1. Impact of water supply gap on production
   - Moderate
2. Company reaction to water scarcity*
   - Invest in CAPEX
3. Regulatory action: all water diverted for domestic use at this supply-demand gap%

*Prices in USD

Additional Water Procurement Related Costs - USD/short ton throughput

<table>
<thead>
<tr>
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Effects of Stranding vs. Business as Usual

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<tr>
<th>Year</th>
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<th>2018</th>
<th>2019</th>
<th>2020</th>
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<td>Gold Production Delta</td>
<td>-2%</td>
<td>-1%</td>
<td>-17%</td>
<td>-22%</td>
<td>-5%</td>
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<tr>
<td>FCF Margin Delta</td>
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<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>Capex/Debt Delta</td>
<td>0%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
</tr>
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</table>

Currency: USD
WACC: 4.71%
Growth Rate: 2.09%
Water intensity (m3/metric Au): 18.00
Water intensity (m3/short ton Cu): 1.9645
Valuation Model: EV/EBITDA
Include TEV Data? Y
THANK YOU

YIANNIS BARTZILAS
YBARTZILAS@BLOOMBERG.NET

METHODOLOGY: KEY POINTS

• "WATER RISK" = PHYSICAL AVAILABILITY OF WATER

• ASSUMPTIONS
  • Water scarcity does NOT impact the global/realized metals prices
  • Forecasting
    • Financial metrics in BAU scenario – broker estimates
    • Production figures at individual mine sites – historical growth rates
    • Future scarcity sets in a linear fashion 2010-20
LAND USE RISK: DEFORESTATION VALUE AT RISK TOOL

Iain Henderson
UNEP FI REDD+ and Sustainable Land Use Coordinator
DEFORESTATION VALUE-AT-RISK: THE CASE OF PALM OIL

Iain Henderson, CFA
UNEP FI Paris AGM
CONTEXT: LAND USE SECTOR > 1/3RD OF GLOBAL MITIGATION POTENTIAL

But, total mitigation potential is emissions plus removals by regrowth

24-30%

Mitigation potential from agriculture and forestry combined

37-43%

Adapted from Centre for Global Development
BUT IT IS HARD & COMPLEX: DIFFICULT TO DIFFERENTIATE THE BROWN FROM GREEN
INTERNALIZATION OF RISK

C. Systemic risks
- Global ecosystems
- Impact on global supplies and demand for new regulations

D. Externalities
- CO2 emissions (indirect causality)
- Local ecosystems
- Social conflicts
- Degraded service provision

B. Background risks
- Reinforced damages
- Direct climate damages
- Push for more regulation
- Regulatory and demand uncertainties

A. Activity risks
- Local pollutions
- Degraded local conditions
- Company level
WHAT ARE THE RISK FACTORS AFFECTING PALM OIL?

- Biophysical risks
- Stranded Assets risks (climate change)
- Social risks
- Health risks
- Legal risks
- Commercial and Market risks (reputation)

These results are based on our assumptions and need to be validated through a comprehensive review process.
100 POSSIBLE CASH FLOW TRAJECTORIES - RANDOM IMPACT FROM 9 RISK FACTORS

We use a time horizon of 30 years which is characteristic of the actual average life cycle of oil palm.

The initial negative values reflect the assumption that significant and upfront CAPEX will be required in the first years of the plantation.
OVERALL RISK PROFILE AND NPV VOLATILITY

Based on the model, there is a 20% chance of having a negative NPV.

At the 95% risk threshold, the plantation has a negative NPV.

Expected NPV: In average, the plantation might lose potential profits due to deforestation-related risks.

Baseline in absence of deforestation-related risks.
**Model results**

- **Legal and stranded assets risks** are the largest due to their direct influence on the share of concession available for production.

- **Social risks**, due to the inclusion of criminal fires, also share this characteristic.

- **Commercial risks** are significant, considering they do not directly impact the productive assets.

- **Biophysical risks** are more limited as a result of their lower volatility.

- **Market risks** are influencing cost of capital, which is an indirect, “second-order” impact that might explain the limited magnitude.
THANK YOU

iaih.henderson@unep.org
Disaster losses in the past decade:

- Average annual economic losses: USD 190 billion
- Average annual insured losses: USD 60 billion

21st century so far:
More than 1 million deaths due to disasters

Many nations spend more on disaster relief and recovery than on disaster risk reduction

BUT

Funds are diverted to dealing with disasters after the fact, rather than being spent on reducing the risk of disasters happening

Collaborating for sustainable development through the PSI Initiative

Principles for Sustainable Insurance
The Australian Business Roundtable for Disaster Resilience & Safer Communities

Australian government investment

Disaster risk reduction $50 million

Post-disaster relief & recovery $560 million

Australian Productivity Commission recommendation

Disaster risk reduction $200 million

Awarded certificate of distinction at 2015 UN Sasakawa Awards for Disaster Reduction

Australian Productivity Commission
The PSI Global Resilience Project
Building disaster-resilient communities and economies

Collaborative project led by Insurance Australia Group

Phase 1 (2014)
Global research on risk reduction measures

Phase 2 (2015)
Publicly accessible online global risk map

Phase 3 (2015-16)
Country engagements + How-to resilience guide

Examples:
- Australian Business Roundtable for Disaster Resilience & Safer Communities
- Partners for Action Network on flood resilience in Canada
- City Innovation Platform for African Infrastructure Risk & Resilience
- Resilient New Zealand initiative

http://globalriskmap.nicta.com.au
The PSI Global Resilience Project: Building disaster-resilient communities and economies

First phase: Assessing the effectiveness of risk reduction

Disaster risk reduction measures

- Behavioural
- Structural
- Ecosystems

Multi-hazard measures (cyclone, flood, earthquake)

- Education & communication
- Risk mapping
- Early warning & evacuation

Cyclone
- Mangroves
- Sand dunes
- Seawalls

Flood
- Controlled barriers
- Wetlands
- Land-use planning

Earthquake
- Building codes
- Retrofitting
- Relocation
The PSI Global Resilience Project:
Building disaster-resilient communities and economies

Second phase: PSI Global Risk Map
(http://globalriskmap.nicta.com.au)
Principles for Sustainable Insurance

Insurance for sustainable development

www.unepfi.org/psi
HUMAN RIGHTS RISK: BASIC HUMAN RIGHTS RISK MANAGEMENT IN BANKING TOOL

Philippa Birtwell
Head of Reputation Risk Management, Barclays PLC
A GUIDE TO BASIC HUMAN RIGHTS RISK MANAGEMENT IN BANKING

UNEP Finance Initiative
Annual General Meeting
12 October 2015, Paris
HUMAN RIGHTS ISSUES AT UNEP FI

• Recognition that respect for human rights is integral to a sustainable finance approach
• Dedicated finance and human rights work stream established 2006
• Focus on enhancing understanding of human rights risks among financial institutions

Work to date:
➢ Human rights dialogue at UNEP FI Global Roundtables since 2007
➢ CEO Briefing on Human Rights, 2008
➢ Banking and human rights project, 2013 - 2015
➢ Online guidance tool on human rights for finance, launched 2007, revised in 2011 and 2014
WHY IS THIS TOOL RELEVANT?

• Increasing focus on human rights responsibilities of businesses, including finance sector

• FIs expected to demonstrate sound understanding and good practice around human rights issues

• Need for practical guidance on integration of human rights into risk management policies and process, particularly in respect of client relationships and transactions

• Online tool designed to guide FIs, in particular banks, through actions to prevent, mitigate and address adverse human rights risks and impacts

http://www.unepfi.org/humanrightstoolkit/
HUMAN RIGHTS TOOL COVERAGE

- Background information on human rights and finance
- Relevant international laws, standards and initiatives
- Key questions to assess human rights risks & impacts
- Issues & concerns relating to different industries
- Key human rights topics
- Links to relevant resources for the finance sector
The UNEP FI Human Rights Guidance Tool for the Financial Sector is designed as an online signposting tool providing information on human rights risks for financial institutions.

Included in the tool finance practitioners will find:

- background information on human rights and how they relate to finance
- relevant international laws, standards and initiatives
- key questions to assist in assessing human rights risks and impacts
- issues relating to different industry sectors
- key human rights topics
- links to other relevant resources

The tool focuses specifically on human rights issues relevant to the assessment of business relationships and transactions. Links are also provided within each of the sector briefings to the broader environmental and social risk guidance provided by UNEP FI. Together these form part of the growing array of tools and guidance available to financial institutions to enhance their understanding of human rights risks.

This tool provides a framework for finance sector professionals to:

- identify potential human rights risk in lending operations
- assess the materiality of the human right risk
- identify possible risk mitigants.

Financial institutions will want to use the tool to assess the human rights issues in their own business and its supply chain. They will also find it useful in reviewing other aspects of financial services provision, in addition to lending policies and practices. Whilst the tool is mainly addressed to lending managers, human rights are important in relation to all financial sector activity, so others will also find much of interest and relevance in it.

The Human Rights Guidance Tool has been fully revised in 2014. The tool was originally launched in 2007 and updated in 2011.

http://www.unepfi.org/humanrightstoolkit/
HUMAN RIGHTS AND BUSINESS: BASIC QUESTIONS

Below are some questions which will provide an initial indication of a company's awareness of human rights.

Does the company have a written human rights policy?

There may be a specific human rights policy or position statement, or human rights may be covered in a number of other policies (for example, a code of conduct, sustainability/corporate social responsibility policy, sector-specific policy, and policies relating to recruitment, employment, health and safety or community relations).

Is the human rights policy fully implemented? Is it integrated into core business processes?

The company may be able to provide evidence of how it has operational processes in place that ensure the policy is implemented, trains people in it, monitors and communicates the implementation of the policy. Some companies use the Global Reporting Initiative (GRI) Framework to report on human rights as part of their reporting on environmental, social and governance issues. An indication of good practice would be a defined process to identify and manage material human rights impacts, and communicate good practice effectively.

Does the company have a human rights due diligence system in place?

Ideally, a human rights due diligence system will be integrated into core internal functions and processes. The system should outline how the company identifies, prevents or mitigates and accounts for adverse human rights impacts. A due diligence process may not be in the public domain, so a discussion with the client may be needed to find about their system. See Risk Management for more on due diligence.

Does the company make any public commitment to human rights?

The company's website, annual report or CSR/sustainability report may endorse the Universal Declaration of Human Rights. The company may participate in the UN Global Compact or another international initiative which includes human rights commitments. The company may acknowledge the UN Framework and Guiding Principles.

Does the company encounter significant human rights issues in its business activities?

Some companies are associated with high profile human rights issues or risks in their own business or supply chain (e.g. working conditions, child labour, operating in regions with poor human rights records, operating in areas which are more sensitive in terms of health and environment). In such cases, carrying out a human rights impact assessment may be appropriate.

http://www.unepfi.org/humanrightstoolkit/

UNEP Finance Initiative
HUMAN RIGHTS TOOLKIT

MINING AND METALS

Core products and processes
Products include metals and minerals, coal, precious and semi-precious gemstones, building and road materials and industrial non-metal products. The mining and metals sector (which includes quarrying) covers the key life-cycle phases:

- exploration (geological surveying; mapping)
- mine planning (modelling the ore reserve, mine layout, scheduling)
- mine development and operation (construction of mining infrastructure, extraction of ore, waste management)
- processing (smelting, refining, casting and finishing, electroplating)
- mine closure (decommissioning, dismantling)

Key human rights related risks

- Workplace conditions, including collective bargaining and the right to join a trade union
- Health and safety
- Use of forced and child labour
- Security for workforce and local communities
- Threats to livelihoods due to monopolisation of resources (including land and other natural resources dependent on by local populations) and relocation of communities away from traditional means of living
- Loss of income from the mine following closure
- Large migrant populations, mainly male, can disrupt social cohesion and can lead to the spread of disease (e.g. HIV/AIDS) to the existing population
- Security contractors in areas of conflict may be connected to military/paramilitary groups
- Misuse of revenues (corruption) by government officials may reduce local populations’ access to services
- Local infrastructure (including health and access to water) may be overstretched by the mine development.

http://www.unepfi.org/humanrightstoolkit/

UNEP Finance Initiative
ABUSE OF HUMAN RIGHTS BY HOST GOVERNMENTS

This covers human rights abuses carried out by or on behalf of the government. A company may have a relationship with the government in the region where operations are carried out. Issues to consider include:

- Any benefits derived (directly or indirectly) from abuses perpetrated by the government may result in the company being perceived as complicit in the abuse.
- In operations with a large footprint involving natural resources there may be potential for government use of forced or bonded labour to extract and utilise the resources.
- The violent removal, severe repression or arrest of protestors and resisting indigenous groups by governments or their agents.

Controls and mitigants

- Compliance with local/national law is the starting point.
- Even if local/national law, standards or enforcement are lower than internationally accepted good practice, a company should apply the same consistent and effective management practices globally (on workforce, community health and safety, supplier screening, site safety and security).
- Ensuring that agreements with host governments reflect the rights of indigenous and local people.
- Transparency in reporting all payments made to host governments, locally and nationally.

See Resources.

December 2014  United Nations Environment Programme Finance Initiative

http://www.unepfi.org/humanrightstoolkit/
CONTINUOUS IMPROVEMENT

We want a tool that is:

- **Up to date**: in line with the dynamic finance & human rights agenda
- **User-friendly**: simple content, clear terminology, capturing the basics
- **Practical**: reference to current practices within the industry
- **An initiation platform**: non-exhaustive, reference to other resources for deepening understanding of human rights issues

How you can help:

- **Share** your human rights policies and approaches for the FI’s section
- **Give feedback** on features that you would like to see improved or added – new sections possible!
- **Share news from your country / region**: case studies, legal developments, etc.
- **Disseminate** weblink to fellow FIs and other relevant stakeholders

http://www.unepfi.org/humanrightstoolkit/
THANK YOU!

UNEP FI Social Issues Advisory Group
http://www.unepfi.org/work-streams/social-issues/
Q&A

Eric Usher
Acting Head, UNEP Finance Initiative
2015 ANNUAL GENERAL MEETING