Achieving Common Information Structures for Comprehensive Quantitative Analyses

For the UN, Governments, Industry and the Capital Markets
To-date, UNFC has been adopted mainly for disclosure & reporting.

UNFC is also to compare & contrast across resource types:
- Policies
- Portfolios
- Projects

Impact on
- People
- Planet
- Prosperity

To demonstrate this capability, a Minimum Viable Tool is built:
- Based on an established Resource Data Management System
- Populated with realistic project data
- Aimed for practitioners to use and improve
- Supporting UNFC adoption and further gaps identification
- For well-informed decisions on sustainable resource management
Roadmap to the Minimum Viable Tool

Minimum –
- Starts with resources volumes/forecasts, cash flow, employment, CO2 intensity
- Extendable - for other socio-economic and environmental quantities or criteria
- Scalable – from projects to portfolios to policies

Viable – generates value to its users

Tool – it can be used today

- Create UNFC Environment within the RMS
- Input Initial Data
- Introduce Origin Category
- Update Input Data
- Create Information Panels
- Obtain UNFC User Feedback

TODAY
UNFC Categories in 3D

UNFC Categories and Examples of Classes

Part of the Required Element
### Resource Categories – Flattened in 2D

#### Opening and Closing Balance of Resource Volumes

<table>
<thead>
<tr>
<th>Hydrocarbon Resources [10^12 m³]</th>
<th>Closing Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Np</strong></td>
<td><strong>111</strong></td>
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<tr>
<td>1.641</td>
<td>719</td>
</tr>
<tr>
<td>1.432</td>
<td>332</td>
</tr>
<tr>
<td>1.380</td>
<td>332</td>
</tr>
<tr>
<td>6.578</td>
<td>48</td>
</tr>
<tr>
<td>1.200</td>
<td>113</td>
</tr>
<tr>
<td>1.440</td>
<td>332</td>
</tr>
<tr>
<td>338</td>
<td>338</td>
</tr>
</tbody>
</table>

| Revisions                        | 19     | 2      | 4      | 44     | 12     | 23     | 20      | 0       | 1       | 35      | 291     | 72      | 159     | 177     |

#### Employment (TFU/year)

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<thead>
<tr>
<th><strong>Np</strong></th>
<th><strong>111</strong></th>
<th><strong>112</strong></th>
<th><strong>113</strong></th>
<th><strong>221</strong></th>
<th><strong>222</strong></th>
<th><strong>223</strong></th>
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<th><strong>342</strong></th>
<th><strong>343</strong></th>
<th><strong>344</strong></th>
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</thead>
<tbody>
<tr>
<td>2,900</td>
<td>756</td>
<td>915</td>
<td>1,098</td>
<td>287</td>
<td>603</td>
<td>156</td>
<td>33</td>
<td>73</td>
<td>715</td>
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</tbody>
</table>

#### Annually Reported Categories

- **Deteriorating**
- **Maturing**
Projects Overview & Details

GLASS POINT MIRAAH SOLAR TO STEAM

Continent: Asia
Country: Oman
Resource Type: Solar
Lifecycle Duration [years]: 20

UNFC Resource Estimate – Project Units [MW]

<table>
<thead>
<tr>
<th>Resource Class</th>
<th>111</th>
<th>112</th>
<th>113</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Units</td>
<td>1,050</td>
<td>250</td>
<td>500</td>
</tr>
</tbody>
</table>

Lifecycle Resource – 111 [Exajoule]: 0.66
Eqv. CO2 Emissions [g/MJ]: 13.9
Construction Duration [years]: 3.5
Employment-Construction [FTE]: 1,100
Employment-Operational [FTE]: 75
Financing Request [MM$]: 90
### PROJECT COMPARISON

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</thead>
<tbody>
<tr>
<td>Oman</td>
<td>Asia</td>
<td>Solar</td>
<td>30</td>
<td>1,050</td>
<td>0.99</td>
<td>3.5</td>
<td>1,100</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>Oman</td>
<td>Asia</td>
<td>Hydrocarbon</td>
<td>35</td>
<td>35</td>
<td>13.9</td>
<td>2.0</td>
<td>900</td>
<td>150</td>
<td>35</td>
</tr>
<tr>
<td>Turkey</td>
<td>Asia/Europe</td>
<td>Hydro-Electric</td>
<td>50</td>
<td>2,500</td>
<td>3.94</td>
<td>5.1</td>
<td>3,500</td>
<td>90</td>
<td>120</td>
</tr>
</tbody>
</table>

**MIRAAH SOLAR**

- **Country**: Oman
- **Continent**: Asia
- **Resource Type**: Solar
- **Lifecycle Duration [years]**: 30
- **Lifecycle Resource – 111 [EJ]**: 1,050
- **Eqv. CO2 Emissions [g/MJ]**: 0.99
- **Construction Duration [years]**: 3.5
- **Employment-Construction [FTE]**: 1,100
- **Employment-Operational [FTE]**: 75
- **Financing Request [MM$]**: 90

**GREATER BARIK**

- **Country**: Oman
- **Continent**: Asia
- **Resource Type**: Hydrocarbon
- **Lifecycle Duration [years]**: 35
- **Lifecycle Resource – 111 [EJ]**: 35
- **Eqv. CO2 Emissions [g/MJ]**: 13.9
- **Construction Duration [years]**: 2.0
- **Employment-Construction [FTE]**: 900
- **Employment-Operational [FTE]**: 150
- **Financing Request [MM$]**: 35

**ATATÜRK DAM**

- **Country**: Turkey
- **Continent**: Asia/Europe
- **Resource Type**: Hydro-Electric
- **Lifecycle Duration [years]**: 50
- **Lifecycle Resource – 111 [EJ]**: 50
- **Eqv. CO2 Emissions [g/MJ]**: 3.94
- **Construction Duration [years]**: 5.1
- **Employment-Construction [FTE]**: 3,500
- **Employment-Operational [FTE]**: 90
- **Financing Request [MM$]**: 120
Based on reported saving of 300,000 tons of CO₂ emissions each year.
Dashboard Forecasts

Testing Policies

Sensitivities on Example Project with No CO2-Tax, $30/t, $50/t, $100/t CO2

Example indicates project at $100/t CO2 tax is impaired
Requirements for Testing Policies

Requirements:
- Production profile for each resource category
- Cashflow profile for the project;
- GHG profile calculation in line with agreed sustainability reporting standard
Learnings from Early Adoption

- 3D representation are illegible; **2D representation work** well

- **Reporting requirements** to cover production and (non-)sales volumes, revisions, transfers, discoveries and extensions

- **Single reporting standard set** needed for
  - Carbon intensity
  - Financial reporting
  - Local/in-country employment
  - Extensible to other quantities like anthropogenic, geothermal, CCUS

- **International Centers of Excellence**
  - For learning by doing
  - Sandbox for practitioners

- Ready for Adopters with project/portfolio data
Conclusion

- UNFC to compare & contrast projects across resource types:
  - Policies
  - Portfolios
  - Projects

- Scalable – Projects, Assets, Entity, Jurisdiction, Trans-jurisdictional Entities

- Minimum Viable Tools exist to build trusted data systems

- Double-Materiality assessments can become data-driven, dynamic, and context-driven, using a wider scope of data

- UNFC becomes a "negotiation" tool for
  - “Balanced and integrated resource management“
  - Resolving conflict and
  - Create the win-win-win for People, Planet & Prosperity

- Time to adopt the UNFC
  - For well-informed decisions on sustainable resource management
Thank you!

And thanks to
TARGET ENERGY SOLUTIONS LTD
For providing the minimum viable tool

Matthias Hartung
Executive Consultant Data & Digital
UNECE
29 I 04 I 2021, Geneva
Contributing Factors to Eqv. CO₂ Emissions

**Solar**
- **Source:** [https://www.nrel.gov/docs/fy13osti/56487.pdf](https://www.nrel.gov/docs/fy13osti/56487.pdf)
- Study conducted by National Renewable Energy Laboratory (NREL)
- Study aims to provide more precise estimates of life cycle GHG emissions from PV systems
- Contributing Factors to Eqv. CO₂ Emissions:
  - Mining and fabrication of PV Panels;
  - Mining and fabrication of power lines;
  - Mining and fabrication of panel reinforced foundation;
  - Logistics of material and construction staff;
  - Potential loss of vegetation that converts CO₂ to oxygen due to space occupation and shade creation.

**Hydrocarbon**
- **Source:** [https://www.osti.gov/pages/servlets/purl/1485127](https://www.osti.gov/pages/servlets/purl/1485127)
- Study conducted by Stanford University
- HC eqv. CO₂ emissions range between 3-20 g/MJ with a median of 10.3 g/MJ.
- Study focusses on the “well-to-wheels” life-cycle GHG emissions of transport fuels
- Contributing Factors to Eqv. CO₂ Emissions:
  - Mining and fabrication of concrete;
  - Mining and fabrication of steel;
  - Mining, fabrication & operation of heavy machinery;
  - Power generation requirement for operational usage;
  - Logistics of material and construction/operational staff;
  - Potential loss of vegetation that converts CO₂ to oxygen due to space occupation for access roads and facilities;
  - Impact on vegetation of potential spills;
  - Clean up efforts of potential spills.

**Hydro-electric**
- **Source:** [https://www.hydropower.org/greenhouse-gas-emissions](https://www.hydropower.org/greenhouse-gas-emissions)
- Based on UNESCO G-res tool (life-cycle)
- Contributing Factors to Eqv. CO₂ Emissions:
  - Mining and fabrication of concrete;
  - Mining and fabrication of reinforcement steel;
  - Mining, Fabrication & operation of heavy machinery;
  - Decay of submerged vegetation
  - Loss of vegetation that converts CO₂ to oxygen.