Environmental Product Declaration
SULB Company B.S.C.(c)

Hot-Rolled Structural Steel
1. General Information

Name of the Manufacturer: SULB Company B.S.C.(c)

Program Operator: ASTM International

Declaration Number: EPD 080


Date of Issuance: April 24, 2018

End of Validity: April 24, 2023

Product Name: Hot Rolled Steel

EPD Owner: SULB Company B.S.C.(c)
  PO Box 50177, Hidd
  Kingdom of Bahrain

Product Group: Structural Steels

Declared Product/Declared Unit: 1 ton hot rolled steel

EPD Scope: Cradle-to-gate A1, A2, and A3

Verification:


☐ internal  ☑ external

LCA Reviewer and EPD Verifier:
Name: Timothy S. Brooke
Organization: ASTM International

Signature: [Signature]

ASTM INTERNATIONAL
2. Product

2.1 Product Description
The declared unit is 1 metric ton of hot rolled steel – as Manufactured by SULB Company B.S.C.(c). Product specifications are available upon request.

The SULB Company B.S.C.(c) product range includes Equal Leg Angles, I-Beams, H-Beams, H-Piles (HP), Parallel Flange Channels (PFC), Universal Beams (UB) and Universal Columns (UC).

The products are manufactured in accordance with the following international standards:

**ASTM International:**
- A36/A36M Standard Specification for Carbon Structural Steel
- A572/A572M Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
- A992/A992M Standard Specification for Structural Steel Shapes

**EN (European Norms):**
- EN 10025-2 Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels

**JIS (Japanese Industrial Standards):**
- JIS G 3101 Rolled steels for general structure
- JIS G 3106 Rolled steels for welded structure

**KS (Korean Standards):**
- KS D 3503 Rolled steels for general structure
- KS D 3515 Rolled steels for welded structure

2.2 Application:
Hot rolled steel is used in a variety of structural applications. Various profiles and grades are specified according to engineering requirements specific to the application.

2.3 Technical Data:

<table>
<thead>
<tr>
<th>Table 1: Technical Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Density</td>
</tr>
</tbody>
</table>

Strength and other technical properties vary and are available from the manufacturer for specific orders.
2.4 Delivery Status:
The declared unit is 1 ton of hot rolled steel. The product is available in the following profiles: Equal Leg Angles, I-Beams, H-Beams, H-Piles (HP), Parallel Flange Channels (PFC), Universal Beams (UB) and Universal Columns (UC).

2.5 Base Materials:
The steel product is 100% steel. Steel is an iron alloy that also contains small amounts of carbon and other base metals. For the purposes of toxicity screening, steel is considered a base ingredient with CAS # 12597-69-2.

2.6 Manufacturing:
The processes that occur at the SULB Company B.S.C.(c) Bahrain facility include: direct reduction of iron (DRI), electric arc furnace (EAF), ladle furnace (LF), continuous casting (CCM), and hot-rolling.

2.7 Environment and Health Considerations during Manufacturing:
All relevant Environmental legislation is complied with. The Environmental Management System, based on ISO 14001, is a crucial tool in achieving our aims. Workplace environmental standards are continuously monitored to ensure compliance. Monitoring of workplace environmental standards and incident records are well established procedures at the heart of the EMS. Also "Near miss" investigation is a key tool in improving environmental standards leading to continual improvement.

All relevant Occupational health and safety legislation is complied with. In addition, properly engineered facilities and equipment are provided, together with robust systems of work. The Occupational health and safety Management System is a crucial tool in achieving our aims. OHSAS 18001 is the standard on which the H&SMS is based. Monitoring of workplace safety standards and accident records are well established procedures at the heart of the H&SMS. Also "Near miss" investigation is a key tool in improving safety standards leading to continual improvement.

2.8 Product Processing/Installation:
The product is installed in a manner and with equipment that is specific to the application for which it was purchased.

2.9 Packaging:
Hot rolled steel is considered a bulk product and is not customarily packaged for shipment. The product is secured to transport vehicles using straps. Any packaging that is required by a
particular customer is negotiated separately from the materials contract and is thus outside the system boundary. No packaging was included in the product system.

2.10 Conditions of Use:
No special features of contents are required for the period of use.

2.11 Environment and Health Considerations During Use:
Hot rolled steel is comprised of inert materials and poses no significant environmental or health considerations during the use phase.

2.12 Reference Service Life:
No reference service life is declared in this EPD as the scope is limited to A1-A3.

2.13 Extraordinary Effects:
SULB Company B.S.C.(c) holds a Certificate of Factory Production Control (FPC) against EN 10025-1 for the CE Marking of products. SULB Company B.S.C.(c) also holds two KS Certificates (Korean Standards) against KS D 3503 and KS D 3515 for the KS Marking of products and operates a BIS (Bureau of Indian Standards) Certification Marks License against IS 2062. SULB Company B.S.C.(c) Declarations of Performance (DoP’s) for structural steel sections complying with EN Standards are available upon request.

2.14 Re-use Phase:
At the end of the product’s service life, hot rolled steel may be reused or recycled, however, neither of these are included in this EPD. No energy recovery possibilities exist.

2.15 Disposal:
The waste code in accordance with the European Waste Index is 17 04 05. At the end of service life the product may either be re-used, disposed in a landfill, or recycled.

2.16 Further Information:
No further information is reported in this EPD.

2.17 Content Declaration Regarding Potential Toxicity
This EPD makes no claim as to the potential toxicity of the product during use. As noted in Section 2.5, the product is 100% steel which is considered a base ingredient with CAS # 12597-69-2. No known health risks are associated the use of hot rolled steel.
3: LCA Calculation Rules

3.1 Declared Unit:
The declared unit is 1 metric ton of hot rolled steel produced by SULB Company B.S.C.(c).

3.2 System Boundary:
The system boundary for this study is limited to a cradle-to-gate focus. The following three life cycle stages as per the governing PCR are included in the study scope:

- A1 - Raw material supply (upstream processes): extraction, handling, and processing of the iron ore, natural gas, limestone, and other material inputs.
- A2 - Transportation: transportation of all input materials and fuels from the suppliers to the gate of the manufacturing facility.
- A3 - Manufacturing (core process): the processes that occur at the SULB Company B.S.C.(c) facility: direct reduction of iron (DRI), electric arc furnace (EAF), ladle furnace (LF), continuous casting (CCM), and hot-rolling.

3.3 Estimates and Assumptions:
All significant foreground data was gathered from the manufacturer based on measured values (i.e. without estimation). The weighted average product profile is assumed to be representative of the various dimensions and options offered by SULB Company B.S.C.(c) product offerings.

3.4 Cut-off Criteria:
The cut-off criteria for all activity stage flows considered within the system boundary conform with ISO14044:2006, section 6 of the IBU PCR Part A:

- All inputs and outputs to a (unit) process were included in the calculation for which data is available. Data gaps were filled by conservative assumptions with average or generic data. Any assumptions for such choices were documented;
- In case of insufficient input data or data gaps for a unit process, the cut-off criteria were 1% of renewable and non-renewable primary energy usage and 1% of the total mass of that unit process. The total neglected input flows, e.g. per module A1-A3 were a maximum of 5% of energy usage and mass. Conservative assumptions in combination with plausibility considerations and expert judgement were used to demonstrate compliance with these criteria;
- Particular care was taken to include material and energy flows known to have the potential to cause significant emissions into air and water or soil related to the environmental indicators of this standard. Conservative assumptions in combination with plausibility considerations and expert judgement were be used to demonstrate compliance with these criteria.
### 3.5 Background Data and 3.6 Data Quality:

Data was gathered for the primary material inputs used in the production of the hot rolled steel for calendar year 2016. Table 2 describe each LCI data source for raw materials (A1), transportation by mode (A2) and the core manufacture process (A3). Table 2 also includes a data quality assessment for all secondary data on the basis of the technological, temporal, and geographical representativeness as per the IBU PCR.

<table>
<thead>
<tr>
<th>A1: Raw Material Inputs</th>
<th>LCI Data Source</th>
<th>Geography</th>
<th>Year</th>
<th>Data Quality Assessment</th>
</tr>
</thead>
</table>
<pre><code>                      | market for Alloc Def, U            |           | Process models average global technology |
</code></pre>
|                         | Data is <5 years old               |           |      | Geography: very good  
                          | Data is representative of global conditions. |
| Natural Gas             | Ecoinvent 3.2: Natural gas, high pressure [RoW] | Global    | 2015 | Technology: very good  
                          | market for Alloc Def, U            |           | Process models average global technology |
|                         | Data is <5 years old               |           |      | Geography: very good  
                          | Data is representative of global conditions. |
| Limestone               | ecoinvent 3.2: Limestone, crushed, washed [GLO] | Global    | 2015 | Technology: very good  
                          | market for Alloc Def, U            |           | Process models average global technology |
|                         | Data is <5 years old               |           |      | Geography: very good  
<pre><code>                      | Data is representative of global conditions. |
</code></pre>
<table>
<thead>
<tr>
<th>Material</th>
<th>Source and Market</th>
<th>Region</th>
<th>Year</th>
<th>Technology:</th>
<th>Time:</th>
<th>Geography:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolomite</td>
<td>ecoinvent 3.2: Dolomite (GLO)</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
<td>very good</td>
<td>very good</td>
</tr>
<tr>
<td>Oxygen (O2)</td>
<td>ecoinvent 3.2: Oxygen, liquid (RER)</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
<td>very good</td>
<td>very good</td>
</tr>
<tr>
<td>Carbon (C)</td>
<td>ecoinvent 3.2: Graphite (RoW)</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
<td>very good</td>
<td>very good</td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>ecoinvent 3.2: Nitrogen, liquid (RER)</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
<td>very good</td>
<td>very good</td>
</tr>
</tbody>
</table>
### Table 2 Continued: Secondary Data Sources and Data Quality Assessment

<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>Region</th>
<th>Year</th>
<th>Technology:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argon (Ar)</td>
<td>ecoinvent 3.2: Argon, liquid (GLO)</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Process models average global technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Time: very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is &lt;5 years old</td>
</tr>
<tr>
<td>Ferro-Alloys</td>
<td>ecoinvent 3.2: Ferrite, at plant/GLO with US electricity U</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Process models average global technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Time: very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is &lt;5 years old</td>
</tr>
<tr>
<td>Electrodes</td>
<td>ecoinvent 3.2: Graphite {RoW}</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
</tr>
<tr>
<td></td>
<td>production</td>
<td>Alloc Def, U</td>
<td></td>
<td>Process models average global technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Time: very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is &lt;5 years old</td>
</tr>
<tr>
<td>Refractory</td>
<td>ecoinvent 3.2: Refractory, high aluminium oxide, packed (GLO)</td>
<td>Global</td>
<td>2015</td>
<td>very good</td>
</tr>
<tr>
<td></td>
<td>market for</td>
<td>Alloc Def, U</td>
<td></td>
<td>Process models average global technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Time: very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is &lt;5 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Geography: very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is representative of global conditions.</td>
</tr>
</tbody>
</table>
### Table 2 Continued: Secondary Data Sources and Data Quality Assessment

#### A2: Transportation

<table>
<thead>
<tr>
<th>Inputs</th>
<th>LCI Data Source</th>
<th>Geography</th>
<th>Year</th>
<th>Data Quality Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trucking</td>
<td>ecoinvent 3.2: Transport, freight, lorry &gt;32 metric ton, EURO3 [GLO] market for Alloc Def, U</td>
<td>Global</td>
<td>2015</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Technology:</strong> very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Process models average global technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Time:</strong> good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is &lt; 5 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Geography:</strong> very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is representative of global conditions</td>
</tr>
</tbody>
</table>

| Ocean Transport | ecoinvent 3.2: Transport, freight, sea, transoceanic ship [GLO] market for Alloc Def, U | Global    | 2015 | **Technology:** very good                                                                 |
|                 |                                                                                 |           |      | Process models average global technology                                                    |
|                 |                                                                                 |           |      | **Time:** good                                                                          |
|                 |                                                                                 |           |      | Data is < 5 years old                                                                     |
|                 |                                                                                 |           |      | **Geography:** very good                                                                   |
|                 |                                                                                 |           |      | Data is representative of global conditions                                               |

#### A3: Manufacturing

<table>
<thead>
<tr>
<th>Energy</th>
<th>LCI Data Source</th>
<th>Geography</th>
<th>Year</th>
<th>Data Quality Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>ecoinvent 3.2: Bahrain custom electricity grid based on IEA(^1) for fuel breakdown (100% Natural Gas) and line loss (2.4%) and ecoinvent 3.2 for electricity generation process data</td>
<td>Bahrain</td>
<td>2015</td>
<td><strong>Technology:</strong> very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Process models average Bahrain technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Time:</strong> very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is less than 5 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Geography:</strong> very good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data is representative of Bahrain electricity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water</th>
<th>LCI Data Source</th>
<th>Geography</th>
<th>Year</th>
<th>Data Quality Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal Water</td>
<td>Modeled as elementary flow</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

---

Environmental Product Declaration:
SULB Company B.S.C.(c)
Hot Rolled Steel

<table>
<thead>
<tr>
<th>Ancillary Materials</th>
<th>LCI Data Source</th>
<th>Geography</th>
<th>Year</th>
<th>Data Quality Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greases</td>
<td>ecoinvent 3.2: Diesel (RoW) market for</td>
<td>Global</td>
<td>2015</td>
<td>Technology: very good Process models average global technology</td>
</tr>
<tr>
<td></td>
<td>Alloc Def, U</td>
<td></td>
<td></td>
<td>Time: good Data is &lt; 5 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Geography: very good Data is representative of global conditions.</td>
</tr>
<tr>
<td>Waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel Coproducts</td>
<td>Excluded from product system as per PCR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel Production</td>
<td>ecoinvent 3.2: Process-specific burden, sanitary landfill (RoW)</td>
<td>Global</td>
<td>2015</td>
<td>Technology: very good Process models average global technology</td>
</tr>
<tr>
<td>Waste</td>
<td>Processing</td>
<td>Alloc Def, U Packaging</td>
<td></td>
<td>Time: good Data is &lt; 5 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Geography: very good Data is representative of global conditions.</td>
</tr>
<tr>
<td>Secondary Processing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling Mill</td>
<td>ecoinvent 3: Hot rolling, steel (RER)</td>
<td>Global</td>
<td>2015</td>
<td>Technology: very good Process models average global technology</td>
</tr>
<tr>
<td></td>
<td>processing</td>
<td>Alloc Def, U</td>
<td></td>
<td>Time: good Data is &lt; 5 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Geography: very good Data is representative of global conditions.</td>
</tr>
</tbody>
</table>

3.7 Period under Review:
Data was gathered for the primary material inputs used in the production of the hot rolled steel for the period 01.12.2016 to 30.11.2017.
3.8 Allocation:
SULB Company B.S.C.(c) produces several valuable coproducts from the unit processes that were included in the scope of the study. The IBU PCR requires economic allocation but, in this case, the overall value of the various coproducts was less than 5% of total revenue. Thus, in accordance with the PCR’s principle of making conservative estimations, we did not allocate any of the environmental burden to the coproducts and instead allocated 100% to the primary product output. As per the PCR, all the loads from secondary processing and transportation of coproducts are attributed to 100% to the coproducts.

Recycling processes were treated as closed loop recycling because the scrap is recycled in the same facility. No credits were given to the product system for the value of the recyclable materials and the burden to recycle the scrap was incorporated within the modeled unit processes.

3.9 Comparability:
This LCA was created using industry average data for upstream materials. Data variation can result from differences in supplier locations, manufacturing processes, manufacturing efficiency and fuel types used.

4: LCA: Scenarios and additional technical information
The scope of this EPD is limited to modules A1-A3 and thus no additional scenario or technical information is applicable.
5. LCA: Results

Life cycle impact assessment (LCIA) is the phase in which the set of results of the inventory analysis – the inventory flow table – is further processed and interpreted in terms of environmental impacts and resource use inventory metrics. As specified in the IBU PCR, Table 3 below summarizes the LCA results for the cradle-to-gate (A1-A3) product system.

Table 3: LCA Results

Description of the System Boundary
(x : included in LCA; mnd: module not declared)

<table>
<thead>
<tr>
<th>Product</th>
<th>Construction/Installation</th>
<th>Use</th>
<th>End-of-life</th>
<th>Benefits of Loads Beyond the System Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Material supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>Construction/Installation</td>
<td>A4</td>
<td>A5</td>
<td>B1 B2 B3 B4 B5 B6 B7 C1 C2 C3 C4 D D D</td>
<td></td>
</tr>
<tr>
<td>Use</td>
<td>mnd</td>
<td>mnd</td>
<td>mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd</td>
<td></td>
</tr>
</tbody>
</table>

A3
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd

mnd
mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd mnd
## Table 3 Continued: Impact Assessment Results for 1 ton Hot Rolled Steel

<table>
<thead>
<tr>
<th>LCIA Indicators</th>
<th>Unit</th>
<th>A1-A3 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GWP</strong> Global Warming Potential (climate change)</td>
<td>kg CO2-eq</td>
<td>2.67E+03</td>
</tr>
<tr>
<td><strong>ODP</strong> Ozone Depletion Potential</td>
<td>kg CFC-11-eq</td>
<td>1.10E+04</td>
</tr>
<tr>
<td><strong>AP</strong> Acidification Potential</td>
<td>kg SO2-eq</td>
<td>1.03E+01</td>
</tr>
<tr>
<td><strong>EP</strong> Eutrophication Potential</td>
<td>kg PO4-eq</td>
<td>9.00E+01</td>
</tr>
<tr>
<td><strong>POCP</strong> Photochemical Ozone Creation/Smog Potential</td>
<td>kg C2H4 eq</td>
<td>6.08E-01</td>
</tr>
<tr>
<td><strong>ADPE</strong> Abiotic Depletion Potential for Non-Fossil Resources</td>
<td>kg Sb eq</td>
<td>1.31E+03</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inventory Metrics – Resources</th>
<th>Unit</th>
<th>A1-A3 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERE</strong> Use of renewable primary energy as energy</td>
<td>MJ</td>
<td>9.11E+01</td>
</tr>
<tr>
<td><strong>PERM</strong> Use of renewable primary energy as a material</td>
<td>MJ</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>PERT</strong> Total use of renewable primary energy</td>
<td>MJ</td>
<td>9.11E+01</td>
</tr>
<tr>
<td><strong>PENRE</strong> Use of non-renewable primary energy as energy</td>
<td>MJ</td>
<td>3.34E+04</td>
</tr>
<tr>
<td><strong>PENRNM</strong> Use of non-renewable primary energy as a material</td>
<td>MJ</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>PENRT</strong> Total use of non-renewable primary energy</td>
<td>MJ</td>
<td>3.34E+04</td>
</tr>
<tr>
<td><strong>SM</strong> Use of secondary materials</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>RSF</strong> Use of renewable secondary fuels</td>
<td>MJ</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>NRSF</strong> Use of non-renewable secondary fuels</td>
<td>MJ</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>FW</strong> Use of freshwater resources</td>
<td>m3</td>
<td>4.36E+00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inventory Metrics – Waste and Outputs</th>
<th>Unit</th>
<th>A1-A3 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HWD</strong> Disposed of Hazardous Waste</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>NHWD</strong> Disposed of Non-Hazardous Waste</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>RWD</strong> Disposed of Radioactive Waste</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>CRU</strong> Components for Reuse</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>MFR</strong> Materials for Recycling</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>MER</strong> Materials for Energy Recovery</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>EEE</strong> Exported Electrical Energy (Waste to Energy)</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
<tr>
<td><strong>ETE</strong> Exported Thermal Energy (Waste to Energy)</td>
<td>kg</td>
<td>0.00E+00</td>
</tr>
</tbody>
</table>
6. Interpretation
Figure 1 shows the relative contribution to the cumulative impacts of the A1 through A3 phases of the cradle-to-gate life cycle. The impact categories abiotic depletion potential, eutrophication potential, and acidification potential are dominated by Module A1. This is due to the fact this module incorporates all the upstream extraction of the primary material inputs to the steel product. Module A2 causes very little impacts because the primary material input (iron oxide pellets) are sourced from a facility that is next door to the SULB Company B.S.C.(c) Bahrain operation. The manufacturing Module A3 causes the highest proportion of global warming potential and ozone depletion potential due to the emissions from the steel production processes and the electricity consumed at the facility.

7. Requisite Evidence
No environmental claims beyond the LCA results are made in this EPD and thus no additional evidence is required.
8. References

6. ISO 14025:2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.