We can make the Earth of ours a little better

Green Manufacturing

<Terry Qin>
A new step to take

ISO/TC67/AHG 01

Future expectation
1. A new step to take
# New focuses of ISO

<table>
<thead>
<tr>
<th>No.</th>
<th>Committee</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ISO/TC 207 <em>Environmental management</em></td>
<td>Standardization in the field of environmental management systems and tools in support of sustainable development. <strong>Excluded:</strong> test methods of pollutants, setting limit values and levels of environmental performance, and standardization of products.</td>
</tr>
<tr>
<td>2</td>
<td>ISO/TC 301 <em>Energy management and energy savings</em></td>
<td>Standardization in the field of energy management and energy savings</td>
</tr>
<tr>
<td>3</td>
<td>ISO/TC 323 <em>Circular economy</em></td>
<td>Standardization in the field of Circular Economy to develop frameworks, guidance, supporting tools and requirements for the implementation of activities of all involved organizations, to maximize the contribution to Sustainable Development.</td>
</tr>
<tr>
<td>4</td>
<td>ISO/TC 59/SC 17 <em>Sustainability in buildings and civil engineering works</em></td>
<td>Standardization in the field of sustainability of the built environment. The environmental, economic, and social aspects of sustainability are included as appropriate.</td>
</tr>
<tr>
<td>5</td>
<td>ISO/TC 205 <em>Building environment design</em></td>
<td>Standardization in the design of new buildings and retrofit of existing buildings for acceptable indoor environment and practicable energy conservation and efficiency.</td>
</tr>
<tr>
<td>6</td>
<td>ISO/TC 110 (Industrial trucks)/SC 5 <em>Sustainability</em></td>
<td>Standardization and observations in the field of sustainability aspects related to machines within the scope of ISO/TC 110, industrial trucks.</td>
</tr>
</tbody>
</table>
The oil and gas industry need to make contribution
Our vision and responsibilities

"Caring for Energy, Caring for You"

Honesty, integrity and respect for people

Fit for the future

To become the responsible energy major

Our planet, Our business

Conduct the business in a socially and environmentally responsible manner

Continuously work to manage environmental impacts
We are the main players

- Serious problems of environmental pollution
- Mass consumption of resource
- Widespread concerns
- Need for energy saving
- Need for low carbon emission
- Inevitable trend of the manufacturing of equipment and materials
- Main players: Oil companies with full social responsibility, Suppliers to the oil industry
We need to take a step now

It is indicated by ISO that each TC needs to prepared a strategic business plan to address climate change challenges specified in ISO Guide 84 - Guidelines for addressing climate change in standards.

If we waited, we might not be able to first benefit from the changes bringing forward by the spreading application of the green manufacturing.
ISO/TC67/AHG 01
Green Manufacturing
AHG 01 establishment

Resolution 2018/46 (Perth, 2018) – Chinese proposal for green manufacturing
ISO/TC 67
— thanks the Chinese delegation for the proposal of including green manufacturing into the ISO/TC 67 portfolio;
— requests the Chinese delegation to develop a proposal to be discussed in the Management Committee.

1. ISO/TC67 Plenary (Perth)
   • Proposal

2. ISO/TC67/MC (Brussels)
   • Formal report

3. ISO/TC67 CIB Ballot
   • AHG01 established

For the MC meeting of ISO/TC67

A new SC to be established on “Green Manufacturing” of the oilfield equipment and materials

Brussels
March 27, 2019
China National Petroleum Corporation

Result of voting

<table>
<thead>
<tr>
<th>Ballot Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballot reference</td>
</tr>
<tr>
<td>Ballot type</td>
</tr>
<tr>
<td>Ballot title</td>
</tr>
<tr>
<td>Opening date</td>
</tr>
<tr>
<td>Closing date</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

ISO/TC67/AGH01
Green Manufacturing
## AHG 01 members

18 members from 12 countries

<table>
<thead>
<tr>
<th>No.</th>
<th>Role</th>
<th>Country</th>
<th>Last name, First name</th>
<th>E-Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Convenor</td>
<td>China</td>
<td>Qin, Changyi</td>
<td><a href="mailto:qincy@cnpc.com.cn">qincy@cnpc.com.cn</a></td>
</tr>
<tr>
<td>2</td>
<td>Committee member</td>
<td>France</td>
<td>Dumas, Jean-Luc</td>
<td><a href="mailto:jean-luc.dumas@bnpetrole.net">jean-luc.dumas@bnpetrole.net</a></td>
</tr>
<tr>
<td>3</td>
<td>Committee member</td>
<td>United States</td>
<td>Burr, Alexa</td>
<td><a href="mailto:burra@api.org">burra@api.org</a></td>
</tr>
<tr>
<td>4</td>
<td>Committee member</td>
<td>United Kingdom</td>
<td>Rothwell, Jackie</td>
<td><a href="mailto:Jackeline.Rothwell@uk.bp.com">Jackeline.Rothwell@uk.bp.com</a></td>
</tr>
<tr>
<td>5</td>
<td>Committee member</td>
<td>United Kingdom</td>
<td>Smedley, Philip</td>
<td><a href="mailto:philip.smedley@uk.bp.com">philip.smedley@uk.bp.com</a></td>
</tr>
<tr>
<td>6</td>
<td>Committee member</td>
<td>Germany</td>
<td>Plack, Heiko</td>
<td><a href="mailto:heiko.plack@dyckerhoff.com">heiko.plack@dyckerhoff.com</a></td>
</tr>
<tr>
<td>7</td>
<td>Committee member</td>
<td>Ukraine</td>
<td>Karpash, Maksym</td>
<td><a href="mailto:tc146@nung.edu.ua">tc146@nung.edu.ua</a></td>
</tr>
<tr>
<td>8</td>
<td>Committee member</td>
<td>Russian Federation</td>
<td>Pimenova, Irina</td>
<td><a href="mailto:I_Pimenova@vniigaz.gazprom.ru">I_Pimenova@vniigaz.gazprom.ru</a></td>
</tr>
<tr>
<td>9</td>
<td>Committee member</td>
<td>Russian Federation</td>
<td>Pystina, Evgenia</td>
<td><a href="mailto:E_Pystina@vniigaz.gazprom.ru">E_Pystina@vniigaz.gazprom.ru</a></td>
</tr>
<tr>
<td>10</td>
<td>Committee member</td>
<td>-</td>
<td>Mortimer, Richard</td>
<td><a href="mailto:richard.mortimer@bp.com">richard.mortimer@bp.com</a></td>
</tr>
<tr>
<td>11</td>
<td>Committee member</td>
<td>Netherlands</td>
<td>Dakhorst, Jarno</td>
<td><a href="mailto:jarno.dakhorst@nen.nl">jarno.dakhorst@nen.nl</a></td>
</tr>
<tr>
<td>12</td>
<td>Committee member</td>
<td>Netherlands</td>
<td>van den Brink, Françoise</td>
<td><a href="mailto:francoise.vandenbrink@nen.nl">francoise.vandenbrink@nen.nl</a></td>
</tr>
<tr>
<td>13</td>
<td>Committee member</td>
<td>China</td>
<td>Ding, Fei</td>
<td><a href="mailto:dingfei@petrochina.com.cn">dingfei@petrochina.com.cn</a></td>
</tr>
<tr>
<td>14</td>
<td>Committee member</td>
<td>China</td>
<td>XU, Xiaofeng</td>
<td><a href="mailto:xuxiaofeng009@cnpc.com.cn">xuxiaofeng009@cnpc.com.cn</a></td>
</tr>
<tr>
<td>15</td>
<td>Committee member</td>
<td>Canada</td>
<td>Nowinka, Jaroslav (Jarek)</td>
<td><a href="mailto:jaroslaw.nowinka@gmail.com">jaroslaw.nowinka@gmail.com</a></td>
</tr>
<tr>
<td>16</td>
<td>Committee member</td>
<td>Nigeria</td>
<td>Orngudwem, Tersoo</td>
<td><a href="mailto:tersoo.orngudwem@son.gov.ng">tersoo.orngudwem@son.gov.ng</a></td>
</tr>
<tr>
<td>17</td>
<td>Committee member</td>
<td>Italy</td>
<td>Zorloni, Matteo</td>
<td><a href="mailto:matteo.zorloni@technipfmc.com">matteo.zorloni@technipfmc.com</a></td>
</tr>
<tr>
<td>18</td>
<td>Document monitor</td>
<td>Brazil</td>
<td>Guedes, Hélio</td>
<td><a href="mailto:cb-050@abnt.org.br">cb-050@abnt.org.br</a></td>
</tr>
</tbody>
</table>
AHG 01 meetings

2019.09

- 1st Zoom meeting
  - Position Paper (N 1)
  - Key issues (N 2)

2020.01

- 2nd Zoom meeting
  - Position Paper (N 7)
  - General requirements (N 8)
AHG 01 documents

Documents of TC67/AHG 01

N1. Proposed Position Paper on Green Manufacturing
N2. Questions, Reply and Comments
N3. Draft Agenda for the 1st Zoom Meeting of AHG01
N4. Minutes of the 1st meeting
N5. Position Paper on Green Manufacturing
N6. Position Paper on Green Manufacturing - updated
N7. Position Paper on Green Manufacturing - updated
N8. PNGI - General requirements for green manufacturing of oilfield equipment and materials
N9. Agenda for the 2nd Zoom Meeting of AHG01
N10. Minutes of the 2nd meeting
N11. AHG01 N11 Position Paper on Green Manufacturing (cancelled)
Position paper of TC67/AHG 01

Position paper on green manufacturing drafted and updated. Detailed discussions on the comments from members.

0. Introduction
1. Challenges
2. Way to forward
3. Rationalization
4. Standardization work expected

- CIB ballot was carried out from 2020-04-21 to 2020-05-26
- 15 members are in favor

A consensus is reached on our position of the green manufacturing and intention to reduce GHG emissions.
AHG 01 drafts a new proposal

- A NWI proposal was drafted by Mr. Xu Xiaofeng from China
- General requirements for green manufacturing of oilfield equipment and materials.

It’s agreed that this draft is a good start, giving us a picture of what a green manufacturing standard looks like.
AHG 01 discussion on the new proposal

- Comments are noted and are helpful to reach a consensus on a NWI.
Petroleum, petrochemical and natural gas industries – Guidelines for green manufacturing of materials, equipment and offshore structures

To get more input from all of our TC 67 member bodies

A NWI is needed to address:

• Basic definitions
• Green design
• Material passport
• Green evaluation
• Green management
• …
3. Future expectation
Notes by Professor David A. Dornfeld from the Laboratory for Manufacturing and Sustainability in his Book: *Green Manufacturing-Fundamentals and Applications*
**Introduction:** the pressure for change, the themes of the transitions taking place, and the steps suggested for moving forward in the social, economic, and policy environment in which a call for green manufacturing is sounded.
Environmental Impact of Manufacturing

Toxic Chemical Releases
- Air emissions: 30%
- Land releases: 62%
- Surface water discharges: 4%
- Underground injections: 4%

Waste
The amount of waste generated from manufacturing is even larger than the sum of all other seven industries combined.

Energy Consumption
- Transportation: 28%
- Manufacturing: 23%
- Fossil fuels: 71.4%
- Clean energy: 2.11%

Carbon emissions
- Petroleum
- Primary metals
- Chemicals
- Plastics and Rubber

Related to oil & gas exploitation and production, we consume a large quantities of equipment and materials which are manufactured using energy we produced.
Principals of Green Manufacture

First Principal
A comprehensive systems approach must be used to evaluate and improve manufacturing processes from a green perspective.

Second Principal
The system should be wholly viewed across both the vertical and horizontal directions.

Third Principal
Harmful inputs and outputs of the system to the environment and humans should be reduced or removed.

Forth Principal
Net resource use should be lowered.

Fifth Principal
Temporal effects on the system should always be considered.

To apply the stated definition for green manufacturing and effectively use strategies such as technology wedges to real systems and solutions, a framework of principles must be established.
Green Supply Chain

Participate in a global chain network from raw materials to delivery, to the production, distribution of products and use of the products, taking into account environmental impacts and working to reduce those impacts.
Looking forward from the perspective of ISO/TC67/AHG01

Basic and general guideline

• Specifying the common terms, methods and procedures to guide the green design, manufacturing, evaluation, recycling and remanufacturing practice
• Suitable for existing subcommittees

Standards for new green products and materials

• Having significant green characteristics
• Not suitable for integration into the existing SCs, if
Green manufacturing **scope**

ISO/TC 67

**Scope**
Standardization of the **materials, equipment and offshore structures** used in the drilling, production, transport by pipelines and processing of liquid and gaseous hydrocarbons within the petroleum, petrochemical and natural gas industries.

We propose the standardization of green manufacturing because we know it works well for our industry.
Thanks for attention

<qincy@cnpc.com.cn>