State of the Gasification Industry: Worldwide Gasification and Syngas Databases 2016 Update

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Overview

• Introduction
• Updated evaluations
• Biomass data
• New SMR database
• Conclusions
Introduction

• First edition 1999

• Updated regularly since then

• 2015 Update
  – Total 959 projects, 2559 gasifiers, of which:
  – Active commercial operating and planned 340 projects, 833 gasifiers
  – $148 \text{ GW}_\text{th}$ operating, $97 \text{ GW}_\text{th}$ under construction and $113 \text{ GW}_\text{th}$ planned.
What’s New in 2016 Database - Content

• Content

  – Total 1014 projects, 2559 gasifiers not counting spares, of which:

<table>
<thead>
<tr>
<th>Commercial</th>
<th>Projects</th>
<th>Gasifiers</th>
<th>GWth Syngas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>356</td>
<td>863</td>
<td>154</td>
</tr>
<tr>
<td>Construction</td>
<td>108</td>
<td>322</td>
<td>96</td>
</tr>
<tr>
<td>Planned</td>
<td>134</td>
<td>685</td>
<td>250</td>
</tr>
<tr>
<td>Total</td>
<td>598</td>
<td>1,870</td>
<td>370</td>
</tr>
</tbody>
</table>

Note: Total database includes shutdown gasifiers, gasifiers never built or only in pre-planning stage, as well as pilot and demonstration gasifiers.
Cumulative Capacity with Probable Increase

Source: GSTC Database, 2016
Gasification by Region

Source: GSTC Database, 2016
End Use Applications of Syngas

Source: GSTC Database, 2016
Primary Feedstocks for Gasification

Source: GSTC Database, 2016
Number of Gasifiers by Primary Feedstocks

Source: GSTC Database, 2016
Gasification by Technology

Source: GSTC Database, 2016
Numbers of Gasifiers by Technology

Source: GTC Database, 2016
Biomass Gasification

*Planned/under construction (8)

Source: GSTC Database, 2016
Numbers of Biomass Gasifiers

Source: GSTC Database, 2016
Biomass Gasifiers by Size

Planned (2020)
Construction (2017)
Operating (2015)

Source: GSTC Database, 2016
New Syngas Database for SMR and ATR Technologies

- Methodology basically same as for Gasification Database
  - But some classifications need to be harmonized
- All data is public domain
- Data coverage
  - Ammonia, methanol, DRI, FT liquids > 95% of plants
  - Refining hydrogen > 85% of plants
  - With these five applications coverage is about 85% of total market by volume
- Other applications
  - Other hydrogen (off-site) and chemicals estimated from 2011 data by others¹
  - No attempt to cover small plants (<5,000 Nm³/h)

Reformer Syngas Database - Content

- **981 Projects**

<table>
<thead>
<tr>
<th>Commercial</th>
<th>Projects</th>
<th>Units</th>
<th>GWth Syngas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>774</td>
<td>878</td>
<td>227</td>
</tr>
<tr>
<td>Construction</td>
<td>34</td>
<td>35</td>
<td>19</td>
</tr>
<tr>
<td>Planned</td>
<td>27</td>
<td>31</td>
<td>9</td>
</tr>
<tr>
<td>Total Active-Real and Planned</td>
<td>835</td>
<td>944</td>
<td>256</td>
</tr>
</tbody>
</table>

Note: Total database includes shutdown reformers, reformers never built or only in pre-planning stage, as well as pilot and demonstration reformers.

Source: GSTC Database, 2016
Syngas from SMR and ATR Technologies

Data in MM Nm³/h

Source: GSTC Database, 2016
Syngas from Gasifiers

Data in MM Nm³/h

Source: GSTC Database, 2016
Total Syngas Market

Data in MM Nm³/h

Source: GTC Database, 2016
Market Share by Technology Type

![Bar chart showing market share by technology type for Ammonia and Methanol production.](chart.png)

- **Ammonia**
  - SMR/ATR
  - Gasification

- **Methanol**
  - SMR/ATR
  - Gasification

Source: GSTC Database, 2016
SMR/ATR Syngas by Application

Source: GSTC Database, 2016
SMR/ATR Syngas by Region

Source: GSTC Database, 2016
Conclusions

- No major changes since last year.
- Wide size variation in biomass gasifiers.
- New reformer syngas database including nearly 1000 projects.
Acknowledgements

• Gasification Technologies Council.
• Technology licensors, plant owners and others for contribution of project data.
• Steve Jenkins for help on biomass and waste gasifiers.

• Any additions/corrections are always welcome
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