Industrial Gas Demand in the U.S. - How much will it be?

CEE Industrial Projects Database
CEE developed a comprehensive inventory of 144 projects (2013-2020) in gas-intensive industries such as ethylene, methanol, ammonia, urea, nitrogen fertilizer, and gas-to-liquids (GTL) among others (see chart).

CEE Reference Case
Includes projects that are completed, in FEED, obtaining permits, under construction or otherwise in progress.
- Number of projects: 103
- Total investment: $83 billion
- Total gas consumption: 23.5 BCFD, an increase of 3.7 BCFD from 2012, or ~19%

CEE High Case
Includes all projects in CEE Reference case, and ones that are under consideration or planning.
- Number of projects: 144
- Total investment: $121 billion
- Total gas consumption: 26 BCFD

EIA AEO2014 Reference
- Demand increases from 21 BCFD in 2013 to 22.2 BCFD in 2020.
- Does not include any large-scale GTL facilities.

EIA AEO2014 High Oil & Gas Resource
- Demand reaches 22.5 BCFD in 2020.
- Largest growth in food, paper, bulk chemicals and glass sectors.

IHS Monthly Gas Briefing Outlook (May 2014)
- Demand continues growing over the next few years and peaks at 22.8 BCFD in 2019-2020

CEE database covers a subset of industries, but our bottom-up approach to gas-intensive sectors captures the expected growth as predicted in top-down macro models of EIA and IHS; and yields much higher growth in the unlikely case of all projects going forward. Watch for updates of our industrial projects database.

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### CEE Reference Case: Project types and capacity in major gas-intensive industries

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Expansion (Capacity Counts)</th>
<th>New (Capacity Counts)</th>
<th>Relocation (Capacity Counts)</th>
<th>Restart (Capacity Counts)</th>
<th>Total (Capacity Counts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene Crackers (mt/yr)</td>
<td>3,096,000 (9)</td>
<td>6,244,000 (5)</td>
<td></td>
<td></td>
<td>9,340,000 (14)</td>
</tr>
<tr>
<td>Methanol (mt/yr)</td>
<td>3,190,000 (3)</td>
<td>1,907,000 (2)</td>
<td>780,000 (1)</td>
<td>5,877,000 (6)</td>
<td></td>
</tr>
<tr>
<td>Ammonia-urea-fertilizer (mt/yr)</td>
<td>5,599,010 (5)</td>
<td>7,540,480 (10)</td>
<td>500,000 (1)</td>
<td>13,639,490 (16)</td>
<td></td>
</tr>
<tr>
<td>GTL (bpd)</td>
<td>103,300 (5)</td>
<td>103,300 (5)</td>
<td></td>
<td></td>
<td>103,300 (5)</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>14</td>
<td>23</td>
<td>2</td>
<td>2</td>
<td>41</td>
</tr>
</tbody>
</table>

**Ethylene** represents a total of $26 billion worth of investment across 14 facilities. The total incremental capacity of these projects is 9.3 million metric tons per year (mt/yr).
- 5 are planned to be new builds, online by 2017; 9 are plant expansions, online by 2015.
- 3 projects are completed ($1.9 billion).
- 8 projects are in progress (equipment procurement and/or construction), which represent $11 billion investment and 5.4 million mt/yr of capacity.
- 3 are in FEED or permit stages ($13 billion).
- 8 other projects are in various stages of planning with a total announced capacity of 6 million mt/yr (not included in the reference case).

Among all 7 GTL projects, 2 of them are in planning, 5 are in either FEED or permits status, including the large-scale GTL plant at Lake Charles by SASOL (96,000 bpd, 93% of total GTL capacity). No project is under construction at the time of writing.
- 5 GTL plants beyond planning stages would entail $14.7 billion in investment for a production capacity of 103,300 bpd of diesel and jet fuel.
- We are cautious on the large-scale project. Shell abandoned plans to build a similar GTL plant in Louisiana because of high costs and gas price uncertainty among other reasons. EIA does not include large-scale GTL.

22 **methanol and ammonia** plants are expected for a total investment of $18 billion and a production increase of 20 million mt/yr.
- 6 methanol plants with 5.9 million mt/yr of capacity are expected ($3.5 billion). All of the projects are either completed or already in progress, expected to be online between 2014 and 2016.
- The remaining roughly $14 billion encompasses 16 ammonia, urea, and fertilizer plants. Many of the larger plants will be multipurpose, producing product mixes of ammonia, urea, UAN and methanol.
- 3 of these projects are completed ($4 billion); 10 are currently in progress ($5.5 billion); and 3 are in FEED and permits ($4.8 billion).
- 7 other projects are in planning stages (not included in the reference case).

### Project Status and Investment ($ million)

<table>
<thead>
<tr>
<th>Project Type</th>
<th>FEED</th>
<th>Permits</th>
<th>In Progress</th>
<th>Completed</th>
<th>Total</th>
<th>Consideration &amp; Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene Crackers</td>
<td>8,000</td>
<td>2</td>
<td>5,123</td>
<td>11,113</td>
<td>26,131</td>
<td>13,817</td>
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<tr>
<td>Methanol</td>
<td>3,355</td>
<td>5</td>
<td>150</td>
<td>3,505</td>
<td>6,250</td>
<td>2,500</td>
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<tr>
<td>Ammonia-urea-fertilizer</td>
<td>2,442</td>
<td>2</td>
<td>2,400</td>
<td>5,485</td>
<td>14,387</td>
<td>7,070</td>
</tr>
<tr>
<td>GTL</td>
<td>14,230</td>
<td>3</td>
<td>500</td>
<td>14,730</td>
<td>25,387</td>
<td>3,000</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>24,672</td>
<td>7</td>
<td>8,023</td>
<td>19,953</td>
<td>58,753</td>
<td>25,387</td>
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