Cogeneration within ExxonMobil
Energy Efficiency Pays

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The Global Energy Mix Continues to Evolve to 2040

Average Growth / Yr. 2010 - 2040

- Oil: 0.8%
- Gas: 1.7%
- Coal: -0.1%
- Nuclear: 2.4%
- Biomass: 0.4%
- Solar/Wind/Biofuels: 5.8%
- Hydro/Geo: 1.8%

Source: ExxonMobil 2013 Outlook for Energy
Economic Growth Drives Energy Demand

**GDP**
Trillion 2005$

<table>
<thead>
<tr>
<th>Year</th>
<th>2010-2040 AAGR %</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>2.8%</td>
</tr>
<tr>
<td>China</td>
<td>5.6%</td>
</tr>
<tr>
<td>Other Non OECD</td>
<td>3.9%</td>
</tr>
<tr>
<td>Other OECD</td>
<td>1.8%</td>
</tr>
<tr>
<td>United States</td>
<td>2.3%</td>
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**Energy Demand**
Quadrillion BTUs

<table>
<thead>
<tr>
<th>Year</th>
<th>2010-2040 AAGR %</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>1.0%</td>
</tr>
<tr>
<td>Energy Saved</td>
<td>~500</td>
</tr>
</tbody>
</table>

Source: ExxonMobil 2013 Outlook for Energy
• 100+ cogen installations in 30+ locations
• 5,000+ MW installed and more under development
• ExxonMobil self-generates well over 50% of its total electricity demand
GHG Emissions Considerations

• Natural gas is the fuel of choice for reducing emissions in fossil fueled power
  • Gas Cogen produces up to 70% less carbon dioxide than coal based power

• ExxonMobil cogen reduces global CO$_2$ emissions by over 6 million tonnes per year

Source: ExxonMobil
Cogeneration in Europe

• At present ~100GW of installed capacity which represents ~11% of overall generation mix

• Member States individual regulations and support mechanisms encouraged the development of cogen

• CODE Project reported potential to double cogen capacity by 2020

Data Source: 2009 CODE Project
Cogen Investment & Market Enablers

**Typical Industrial Cogen**

- 4 – 6 years development
- 100s million
- 30+ years operation

**Market Enablers**

- Long term stability
- Rational dispatch providing high utilization
- Non-punitive balancing mechanism
- Use-based transmission / ancillary charges
- Reasonable cogen Reference Values
Suggestions

• CHP will play an important role in achieving the objectives of the Europe 2020 Strategy for an integrated industrial policy

• Energy Efficiency Directive development
  • Recognize cogeneration advantages and future potential

• Full implementation in Member States of all CHP articles in Energy Efficiency Directive 2012/27/EU
  • Not all states had fully implemented the original CHP directive
  • Provide priority or guaranteed access to the grid and priority despatch of electricity from high-efficiency cogeneration

• Cogen Reference Values
  • Actual values known at the time of investment decision
  • Develop using a transparent, agreed upon methodology
  • Timely completion of next Reference Value update
Summary

• Cogeneration:
  • Reduces emissions vs. separate power and heat production
  • Reduces purchased fuel demands
  • Enhances cost competitiveness
  • Increases reliability

• Enabling power market rules can drive cogeneration investments

• ExxonMobil continues to look for new, attractive cogen investment opportunities around the world