Global Distributed Power Markets: What is the outlook for gas engines?

9th April 2015

DistribuGen Conference

John Murray
John.Murray@delta-ee.com, +44 7515 020630

www.delta-ee.com
A consultancy and research provider specialising in decentralised energy

Delta-ee Core Expertise

Demand
- Energy Efficiency
- Energy Services
- Heat Pumps
- Photovoltaics
- Electric Vehicles
- Micro-CHP
- Fuel cell
- Electricity Storage
- Smart Demand
- HEM

Generation
- CHP

Networks

Delta-ee provides:
- Market insight & forecasts
- Techno-economic analysis
- Competitor analysis
- Strategy & tactics

Clients:
- Energy companies
- Manufacturers
- Finance sector
- Policy makers

What Delta-ee offer to clients:
- Research Services
- Multi-client Studies
- Consultancy
- Specialist Summits
Some past and existing Delta-ee clients
1. Context setting

2. Germany: a case study

3. USA trends

4. Global trends
Gas engines used in stationary power applications

Gas engines

Gas turbines

All fuel types

Non-stationary power applications
Germany – a case study

**Gas engines (400 kWe and above)**

Annual installed capacity (MWe)

- Gas engines (400 kWe and above)
- Germany
Germany - biogas

Biogas-led market

Annual Installed Capacity (MWe)

- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

© Delta Energy & Environment Ltd, 2015
USA gas engine market
Spark spreads by state

Commercial end-users (2013)

Industrial end-users (2013)

- Spark spread > 4
- Spark spread between 3 & 4

Experts in heat and distributed energy © Delta Energy & Environment Ltd, 2015
## USA Summary

<table>
<thead>
<tr>
<th></th>
<th>CA</th>
<th>CT</th>
<th>IL</th>
<th>MA</th>
<th>NJ</th>
<th>NY</th>
<th>OH</th>
<th>OR</th>
<th>PA</th>
<th>TX</th>
<th>WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future spark spreads (&gt;3 ratio)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Supportive CHP policy</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Prone to black outs</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>High penetration of intermittent renewables</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

**Likely Top States:**
USA – historic & future gas engine sales

Gas engines (400 kWe and above)
Global Gas Engine Market Trends

Global Gas Engine Market: Annual Installed Capacity

- **Total Global Market**
- **9 Focus Markets**

**Focus Markets:** Brazil | China | Germany | India | Japan | Russia | Turkey | UK | USA

- **Annual Installed Capacity (MWe)**
  - 2014: 4,000
  - 2015: 3,000
  - 2016: 2,000
  - 2017: 5,000
  - 2018: 6,000
  - 2019: 7,000
  - 2020: 8,000

© Delta Energy & Environment Ltd, 2015
Global market trends to 2020

   - Stuttering global economy
   - Uncertainty around future German CHP policy
   - Sanctions in Russia
   But...

2. Medium to long-term trends look promising
   - Increased natural gas for power generation
   - Increased renewables
   - Increased policy support for energy efficiency & renewables
   - Increased market push & market awareness
Research taken from Delta-ee’s Distributed Power Service

Strong growth forecasts for gas engines, underpinned by several key drivers

Come see me afterwards for a free white paper!

Contact:
John Murray, Distributed Power Service Manager
John.Murray@delta-ee.com

+44 (0) 131 625 1007