POWER PLANTS’ FOCUS ON GAS

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Wind, solar and gas expected to grow strongly

MARKET FOR GAS AND LIQUID FUELED POWER PLANTS

Overall market size

H1 2013 Top 15 countries

Total 18.8 GW

Includes all Wärtsilä power plants and gas turbine manufacturers’ gas and liquid fuelled power plants with prime movers above 5 MW, as well as estimated output of steam turbines for combined cycles. The gas turbine data is gathered from the McCoy Power Report. Other combustion engines not included. In engine technology Wärtsilä has a leading position.
Market for gas and liquid fuelled power plants

**2012**
Total market 75.4 GW

- GE: 3.8%
- Siemens: 4.2%
- MHI: 28.8%
- Alstom: 20.6%
- Wärtsilä: 34.2%
- Other GTs: 4.8%

**H1 2013**
Total market 18.8 GW

- Siemens: 34.6%
- GE: 6.4%
- MHI: 12.8%
- Alstom: 26.1%
- Wärtsilä: 5.9%
- Other GTs: 5.9%
- Ansaldo: 8.0%

Includes all Wärtsilä power plants and gas turbine manufacturers’ gas and liquid fuelled power plants with prime movers above 5 MW, as well as estimated output of steam turbines for combined cycles. The gas turbine data is gathered from the McCoy Power Report. Other combustion engines not included. In engine technology Wärtsilä has a leading position.
Market for liquid and gas engines, >5MW units

Source: DGTWW Power Generation Survey & Wärtsilä
Power Plants strategy

• Maintain our leading position in HFO & dual-fuel power plants by enhancing our value proposition
• Grow strongly in large utility gas power plants by capturing market share from combustion turbines
• Grow in biofuel power plants by enabling a wide fuel range
• Grow in special applications - nuclear emergency power, CHP, oil & gas and LNG infrastructure - by introducing our value proposition to the selected customer segments

Strong growth focus on large gas plants in broad utility markets
Our customer segments

**Utilities**
Entities supplying electricity to residential, commercial & industrial end users

**IPPs**
Financial investors investing in power plants and selling power to utilities

**Industrial Customers**
Industries such as mining, cement and oil & gas investing in captive power plants.

- South Texas Electric Cooperative, USA
- Azerenerji, Azerbaijan
- GERA, Brazil
- Cakmaktepe Energy, Turkey
- Barrick Gold Corporation, Canada
- Sasol New Energy Holdings, South Africa

*) Independent Power Producers
Customer segments and fuel development

Oil by customer segment
2009 - Q3/2013
Total EUR 6,462 million

- 39%
- 37%
- 24%

NG and fuel oil share of Oil
2009 - Q3/2013

Utilities
IPP’s
Industrial

Oil
NG

MW
2500
2000
1500
1000
500
0

2009 2010 2011 2012 2013 (Q3)
Smart Power Generation is a new concept which enables an existing power system to operate at its maximum efficiency by most effectively absorbing current and future system load variations, hence providing dramatic savings.
SPG supports most energy infrastructure types

- Liquid fuel infrastructure only
- Transition to NG (LNG infrastructure)
- NG as mainstream energy
- NG as balancer for renewable energy
Transition to NG: Smart Power Generation meets LNG

Dual-fuel power plant

- Initial operation using HFO 15-16$/MMBtu
- Provides base gas consumption for NG, enabling investment for the LNG terminal
- NG cost using LNG 11-17$/MMBtu
- Plant feasibility typically improves with NG, which is a strong driver for investment

Medium scale LNG terminal

- Economic feasibility depends on scale
  - larger terminals can receive larger tankers which lowers LNG price
  - ship size is a key factor
- 50-1,000MW_th flow is typically considered Medium size
- 10,000-160,000 m³ tank sizes
- Tank size to match ship size
Wärtsilä Power Plants has developed capabilities to become an EPC supplier for medium scale LNG storage and regasification terminals.

Wärtsilä can support and enable transition to gas infrastructure by providing a one stop shop for the investments related to power generation and LNG infrastructure.

Wärtsilä’s offering is based on strong EPC capability for power plants combined with regasification solution from Wärtsilä Flow & Gas.
NG as balancer: changing business model

Traditional world

- Fossil fuels provide **baseload energy**
- **Business model** is based on producing energy (MWh) and getting a small margin sale
- Solution parameters:
  - Electrical efficiency
  - Investment cost
  - Long-term power purchase agreement
- Static world

World of renewable energy

- Wind and solar provide increasing share of energy
- **Business model** for fossil fuels is to generate power when renewable energy is not available
- Solution parameters:
  - Operational flexibility
  - Energy efficiency
  - Remuneration based on balancing services
- Dynamic world
NG as balancer: a need for balancing in the EU

- Large scale deployment of solar and wind truncates thermal plants to a narrow operating window
- CCGT load factors are consistently going down, but the day vs. night gap is increasing, causing technology to operate at its most suboptimal conditions, low load and cyclic operation
- System needs SPG – OFF at night, ON at peaks
- Energy only market does not support investment for balancing power
- EU is striving towards harmonic capacity/flexibility markets to support investment for balancing power

Energy Infrastructure Package: Implementation progress and expected outcome
Catharina Sikow-Magny
European Commission, Director General for Energy
23-24 May, 2013
California: Solar generation is effectively turning the daily peak to a daily low

Massive up/down ramps expected, up to 14GW in 4 hours in 2020
- Fossil generation more than doubled in 4 hours
- 14GW is the approximate peak load of Finland

Market opportunity is emerging as ISO’s are recognizing the value of flexibility
- STEC & Portland projects

California: Net load patterns changing rapidly due to wind & solar – 2020 expectation is 14GW in 4 hours during non summer months

**NET LOAD = LOAD – wind & solar generation**

Source: California ISO, Karl Meeusen
• Wärtsilä Power Plants has extensive experience in turnkey power solutions since early 90’s
• Approximately 25% of the projects are executed on an EPC basis
• The turnkey supplier role provides visibility on the overall economics of investments and the potential challenges that our customers have – key knowledge for solution development
Quisqueya I&II, Dominican Republic 430MW / dual-fuel flexicycle
Power supply to a gold mine and peaking power to the utility
Wärtsilä EPC delivery