

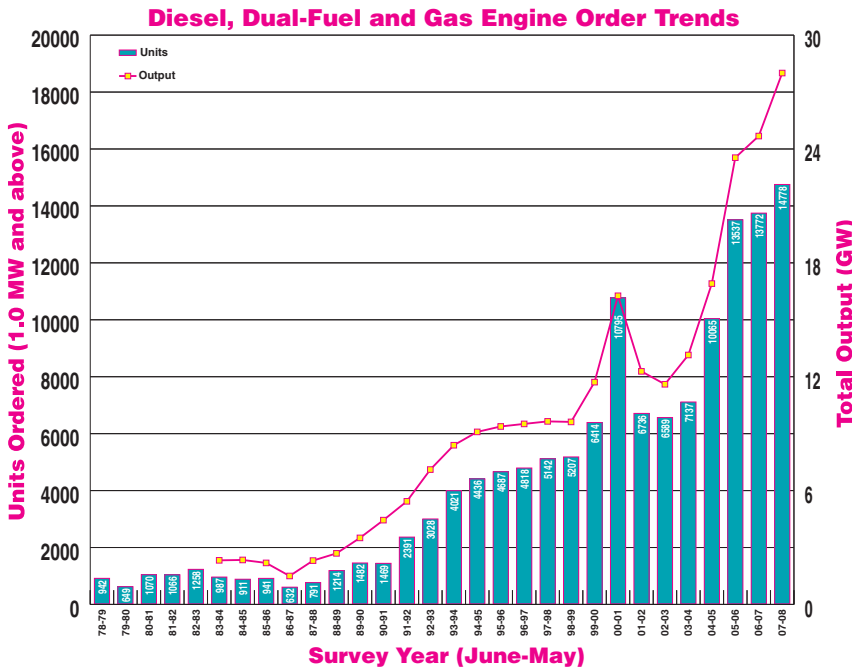
# 2008

## 32<sup>nd</sup> POWER GENERATION ORDER SURVEY



**DIESEL &  
GAS TURBINE  
WORLDWIDE**

The Marine and Stationary Power Authority



# Another Healthy Year, Another Record Broken

**Reciprocating engines top 36 000 units and 69 GW of gas turbines are ordered**

**Editors Note:** For the fourth year this annual survey reports data on a smaller category of engine (0.5 to 1.0 MW) — the range of reciprocating engines from 500 to 1000 kW. The next higher category, therefore, technically begins at 1.01 MW. The historical (graphic) representation of reciprocating engine orders and outputs will still begin at 1.0 MW.

There is no doubt that the large engine business in general has been healthy for the past few years, especially reciprocating engines for power generation applications above 500 kW. There has also been an ongoing resurgence in the industrial gas turbine marketplace, not the “explosive” growth that was experienced nearly 10 years ago, but rather this time a much more controlled, sustainable and reasonable growth pattern. Piston engines and gas turbines have both risen over last year’s levels and these are the general highlights in *Diesel & Gas Turbine Worldwide’s* 32<sup>nd</sup> Annual Power Generation Order Survey.

The volume of piston engines above 1.0 MW (14 778) surpassed last year’s record level (13 772). The order volume for the smaller engines, 500 to 1000 kW, rose to 21 376 engines this year over last year’s 19 339 units. Gas turbine engine orders (1054) showed another impressive increase over last year’s reported figures (916) and the aggregated output total increased to nearly 70 GW.

Diesel, dual-fuel and natural gas (including last year’s new fuel category “Liquid Biofuel”) reciprocating engine orders grew by about the same margin as they have in the previous two years — all at a record-setting pace. Of those engines greater than 500 kW, units ordered increased 9% over 2007 reports, while the total output increased a whopping 17%. The highlighted output category this year is again 0.50 to 1.0 MW, which showed a unit order increase of about 11% and an output increase of over 20%. Two other output ranges that showed large increases were 2.0 to 3.5

MW, with a 42% increase in units ordered and a 45% increase in power output and 7.5 to 10 MW, with increases of 90% and 93%, respectively.

Geographically, the two largest regions in the world by volume — North America and Western Europe — were relatively flat by units ordered. Major growth, however, can be seen in Eastern Europe & Russia (up 33%), South America (up over 200%), Central & Southern Africa (up 75%) and the combined regions from the Middle East to the Far East (up 14%). Central America & Caribbean engine orders decreased by 64%.

Gas turbine orders are up 15% this year to a total of 1054 units. Gas turbine output increased by 19% over 2007, to a total of 69 606 MW. Units ordered in several output categories showed positive gains this year, including the output categories from 2.0 to 5.0 MW (up 44%), 7.5 to 10 MW (up 207%), 30 to 60 MW (up 28%) and the two largest output categories from 120 to 180+ MW (up 16%). When taken geographically, gas turbine orders increased in Western Europe (up 30%), Eastern Europe & Russia (up 69%), Southeast Asia & Australia (up 54%) and in Africa (up 47%). Units ordered for the Middle East shrank this year by 40%.

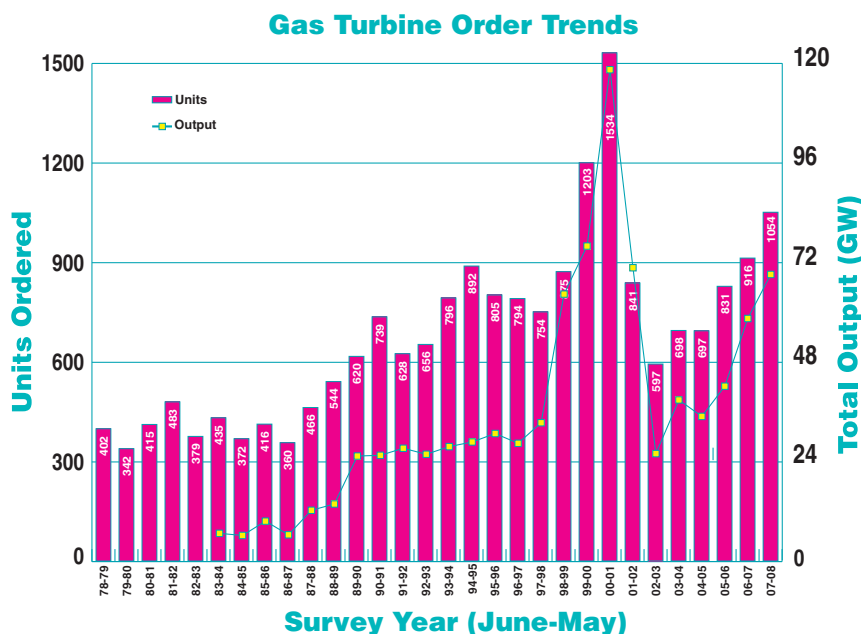
## Procedures

This survey’s coverage again includes reciprocating engines starting at 500 kW. Gas turbine orders received for power generation remain rated 1.0 MW and above. This survey encompasses a one-year period from June 1, 2007, through May 31, 2008. Also shown in the data tables are the previous year’s survey results for reference and comparison purposes.

As in previous years, our report on orders for marine mechanical propulsion, marine auxiliary generation and diesel-electric marine propulsion systems will be featured in our forthcoming November issue. Also, our 3<sup>rd</sup> Annual Mechanical Drive Order Survey will be featured in the December issue, as well as the December edition of our sister publication **COMPRESSORTech™**.







volume — Western Europe and North America — were relatively unchanged from the previous year, with Western Europe up by 5% and North America down by about 4%. There were mixed results from other regions, as highlighted earlier.

The overall picture is that the power generation market for reciprocating engines is continuing at a record-setting pace, which of course has positive consequences for all of the ancillary systems suppliers. Given the geographically dispersed nature of the engines reported, it is difficult to pinpoint one single indicator driving overall demand, although strong oil prices have certainly fueled part of the growth. And while this survey does not delineate fuel types by region, it can be proffered that Western Europe has slowed down in its development of biofuel and smaller natural gas projects.

### Gas Turbines Retain Momentum

Gas turbine orders continue to grow, which in turn results in a healthy industry within the industrial gas turbine supply chain. Units ordered reached 1054 in 2008, a 15% increase over last year's 916 units. Total output increased at a slower rate than last year, but still rose 19% to 69 606 MW. This represents a significant increase in orders for higher output machines.

This output increase puts the industry back over the first major jump in orders (64 000 MW) back in the 1998/99 timeframe.

With regard to the individual output categories, the results were mostly positive. One surge in orders was in the highly competitive 30 to 60 MW category, which increased in units ordered by 28% (162 vs. 126 units in 2007). Another significant increase, which accounts for much of the overall increase in output as well, occurred in the largest two output categories above 120 MW. Units ordered increased collectively by 16% and the output went from a combined 42 186 MW in 2007 to 47 471 MW in 2008, an output increase of about 13%. In the smaller output ranges, it was the 7.5 to 10 MW category that saw the largest increase (207%), going from 14 units in 2007 to 43 units in 2008. Two other small output categories — 2.0 to 3.5 and 3.5 to 5.0 MW — showed a combined increase of 44%. The remaining output ranges were virtually unchanged.

When analyzing the gas turbine orders by geographic location, the results reflect mostly increases with one exception. Eastern Europe & Russia's increase was the highest at 69% (145 vs. 86 units in 2007). This increase was accounted for by rising orders in

almost all of the output categories. Western Europe's reported orders increased by 30%, from 99 units in 2007 to 128 in 2008. Another high volume region this year is the Southeast Asia & Australia, which saw its orders increase by 54% (108 vs. 70 units in 2007). All of Africa also increased this year, with a combined 88 units representing an increase of 47%. Unit orders in the Far East also rose by 16%, but only in the smallest output categories. There was only one major decrease in a high volume region this year, with the Middle East dropping 40% from 183 engines in 2007 to 109 in 2008. Other regions, including North America, remained stable.

With regard to the type of service, orders for standby gas turbines rose 29% this year, with most of those units being smaller engines going into the Far East. Peaking units, which showed a large increase last year, decreased over 10% this year from 289 units to 258. Continuous-duty machines recorded a nice increase of 26%, going from 480 units in 2007 to 607 units in 2008. It is interesting to note that continuous-duty engines span the entire output range.

Examining the types of fuels, the most interesting category again is the dual-fuel machines. With an increase of 34% in 2007, dual-fuel engines increased this year by 55%, from 272 units in 2007 to 375 units in 2008. Natural gas fuel units did increase, but only by 4%. Heavy fuel units, which decreased last year, showed a rather large increase of 43% this year.

### Power Generation Trends

These order surveys try to convey an accurate count of engines destined for power generating applications. It is important to note that the gas compression industry continues on a healthy order pace, which adds to the gas turbine and gas engine manufacturers' total order volumes. As noted earlier, the 3<sup>rd</sup> Annual Mechanical Drive Order Survey will be published in the December issue of *Diesel & Gas Turbine Worldwide*, as well as the December issue of our sister publication **COMPRESSORTech™**. This Mechanical

Drive survey helps us provide comprehensive coverage of the large engine industry — Power Generation, Marine Propulsion and Mechanical Drive.

Reciprocating engine orders continue to be robust — especially in several key markets including marine propulsion, power generation, mechanical drivers and rail traction. Again, this year's record-setting power generation order figures for piston engines — on top of the records for the two previous years — reflect the demand for the reliability and availability of electricity, especially with ample dispersal throughout the major geographic regions. It is particularly interesting to note the increases in reciprocating engine orders in Eastern Europe & Russia, as well as Africa and South America. The Middle East and the Far East also posted significant increases. The drivers for this activity include oil and gas production, continued strong worldwide demand for raw materials and continued development of electrical infrastructures. Growth in natural gas engines seemed somewhat halted this year, with lower than normal figures being posted in the smallest output range.

This year's 19% growth in output for gas turbines, coupled with a 15% increase in units ordered, reflects a robust and growing market for gas turbines, especially with regard to infrastructure upgrades and new development. Growth in Eastern Europe & Russia, Southeast Asia and Africa also

serves as an indicator of the roles oil and natural gas are playing in development. High prices for producing/exporting countries mean more money for higher-value power plant projects. As more and more natural gas becomes available worldwide via the expansion of pipelines and LNG carriers, it is safe to expect that gas turbine orders will also likely expand accordingly as well.

Almost every major region in the world has benefited from this combined increase in reciprocating and gas turbine engine orders. Predicting 2009 is dicey this year. A limping U.S. economy will put downward pressures on the smaller reciprocating engine orders, but worldwide regulatory developments and continued infrastructure development could help offset any losses in North America. Gas turbine orders should remain strong, especially in 50 Hz markets, due to increased gas availability and the regulatory climate for exhaust emissions.

Once more, our most sincere thanks go to all of the engine manufacturers who invested time and energy to participate in this survey. We deeply appreciate the support of the engine industry and are grateful that power generation buying influences and customers throughout the world continue to find this annual power generation survey useful and informative.

Electronic versions of past surveys are available on our website at: [www.diesलगasturbine.com](http://www.diesलगasturbine.com).

### **Diesel, Dual-Fuel and Gas Engine Manufacturers Participating and Reporting Orders in this Power Generation Survey**

- Caterpillar Engine Div. (including Caterpillar Motoren)
- Cummins
- Deutz Power Systems
- Dresser Waukesha
- Electro-Motive Diesel
- GE Jenbacher
- GE Transportation
- Hyundai
- Isotta Fraschini
- MAN Diesel Group (including licensees)
- MTU Friedrichshafen/MTU Onsite Energy
- Mitsubishi Heavy Industries
- Niigata Power Systems
- Rolls-Royce Bergen
- RUMO
- Wärtsilä
- Yanmar Diesel Engine

### **Gas Turbine Manufacturers Participating and Reporting Orders in this Power Generation Survey**

- ALSTOM Power
- Ansaldo Energia
- Aviadvigatel
- Daihatsu Diesel Mfg.
- GE Energy (including GE Oil & Gas)
- Hitachi Ltd.
- Kawasaki Heavy Industries
- MAN Turbo
- Mitsubishi Heavy Industries
- Motor Sich
- NPO Saturn
- Niigata Power Systems
- OPRA
- Power Machines
- Pratt & Whitney Power Systems
- Rolls-Royce Energy
- Siemens Power Generation
- Solar Turbines
- Yanmar
- Zorya-Mashproekt