

Diesel & Gas Turbine **WORLDWIDE**

DEDICATED TO ENGINE ROOM PRODUCTS, TECHNOLOGIES & NEWS

2010 Power Generation Order Survey



Power Generation • Marine Propulsion • Oil & Gas • Rail Traction

DIESEL, DUAL-FUEL & GAS ENGINE ORDERS, January – December 2009

Output Range (MW)	Units Ordered	Total Engine Output (MW)	Type of Generating Service			Engine Operating Speed Ranges (r/min)				Fuel					Western Europe	Eastern Europe, Russia & CIS	Middle East	Far East	Southeast Asia & Australia	Central Asia	North Africa	Central West, East & South Africa	North America	Central America & Caribbean	South America
			Stand-by	Peak-ing	Contin-uous	Below 300	300 to 600	720 to 1000	Above 1000	Diesel Fuel	Heavy Fuel	Dual-Fuel	Liquid Biofuel	Nat. Gas											
0.5 to 1.0	13 733	10 519	7323	3393	3017	0	0	69	13 664	13 023	9	133	0	568	2340	535	2304	1069	712	2427	44	629	2781	298	594
1.01 to 2.0	7065	10 018	3653	1777	1635	0	0	24	7041	6285	13	200	0	567	1457	229	837	929	600	728	9	214	1609	129	324
2.01 to 3.5	1925	4597	1256	331	338	0	0	23	1902	1592	9	57	3	264	365	53	178	153	134	78	1	599	249	68	47
3.51 to 5.0	94	381	16	11	67	0	0	29	65	31	16	3	0	44	20	4	12	7	9	15	2	14	5	6	0
5.01 to 7.5	103	619	20	54	29	0	1	31	75	79	14	0	0	10	7	18	13	18	20	3	0	7	15	0	2
7.51 to 10	129	1141	0	45	84	0	6	119	0	14	37	0	0	78	3	0	48	5	8	8	1	11	18	2	25
10.01 to 15	25	287	0	1	24	2	23	0	0	8	14	1	2	0	4	0	10	8	1	0	0	0	0	2	0
15.01 to 20	86	1524	1	0	85	0	86	0	0	1	71	7	2	5	33	0	14	0	3	11	0	10	0	14	1
20.01 to 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30.01 & above	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23 160	29 086	12 269	5612	5279	2	116	295	22 747	21 033	183	401	7	1536	4229	839	3416	2189	1487	3270	57	1484	4677	519	993

34th Power Generation Order Survey

Big changes for annual reciprocating engine, steam turbine and gas turbine orders for power generation service

➤ This 34th installment of *Diesel & Gas Turbine Worldwide's* annual Power Generation Order Survey introduces a major change to the structure, analysis

and reporting of our annual survey. Responding to strong input from many of the companies that provide the data that makes up Power Generation Order

Survey, beginning in 2010 we will now provide regular calendar-year reporting, January through December, versus the previous June to May reports.

Country Information for Regions/Regional Codes *D>W* Annual Market Surveys

#1 – Western Europe (Without Eastern Europe) Andorra Austria Belgium Denmark Finland France Germany Greece Iceland Liechtenstein Luxembourg Italy Ireland Netherlands Malta Norway Portugal San Marino Slovenia Spain Sweden Switzerland United Kingdom	Estonia Georgia Hungary Kazakhstan Kyrgyzstan Latvia Lithuania Moldova Poland Republic of Macedonia Romania Russia Serbia Slovak Republic Tajikistan Turkmenistan Ukraine Uzbekistan	#4 – Far East China Hong Kong Japan Mongolia North Korea South Korea Taiwan	#6 – Central Asia Afghanistan Bangladesh India Maldives Islands Nepal Pakistan Sri Lanka	Ghana Guinea Guinea Bissau Ivory Coast Kenya Lesotho Liberia Madagascar Malawi Mali Mauritania Mauritius Mozambique Namibia Niger Nigeria Rwanda Senegal Seychelles Sierra Leone Somalia South Africa Sudan Swaziland Tanzania Togo Uganda Zaire Zambia Zimbabwe	#10 – Central America & Caribbean Bahamas Bermuda Belize Costa Rica Cuba Dominica Domin. Republic El Salvador Guatemala Haiti Honduras Jamaica Mexico Nicaragua Panama Puerto Rico Virgin Islands West Indies
#2 – Eastern Europe, Russia & CIS Albania Armenia Azerbaijan Belarus Bosnia and Herzegovina Bulgaria Croatia Czech Republic	#3 – Middle East Bahrain Cyprus Egypt Iran Iraq Israel Jordan Kuwait Lebanon Oman Qatar Saudi Arabia Syria Turkey United Arab Emirates Yemen	#5 – Southeast Asia & Australia Australia Brunei Burma Cambodia Fiji Islands Indonesia Kiribati Laos Malaysia Marshall Islands Micronesia Palau Papua New Guinea Philippines Samoa Singapore Solomon Islands Tahiti Tonga Thailand Tuvalu Vanuatu Vietnam	#7 – North Africa Algeria Libya Morocco Tunisia	#8 – Central, West, East & South Africa Angola Benin Botswana Burkina Faso Burundi Cameroon Cape Verde Cen. African Rep. Chad Comoros Congo Cote d'Ivoire Djibouti Equatorial Guinea Eritrea Ethiopia Gabon Gambia	#11 – South America Argentina Bolivia Brazil Chile Colombia Ecuador Guyana Paraguay Peru Surinam Uruguay Venezuela
				#9 – North America Canada U.S.A.	

GAS TURBINE POWER GENERATION ORDERS, January – December 2009

Output Range (MW)	Units Ordered	Total Engine Output (MW)	Type of Generating Service			Fuel (Units)				Western Europe	Eastern Europe, Russia & CIS	Middle East	Far East	Southeast Asia & Australia	Central Asia	North Africa	Central West East & South Africa	North America	Central America & Caribbean	South America
			Stand-by	Peak-ing	Contin-uous	Diesel Fuel	Heavy Fuel	Dual-Fuel	Nat. Gas											
1.0 to 2.0	114	137	98	0	16	54	46	7	7	2	6	6	98	2	0	0	0	0	0	0
2.01 to 3.5	51	132	44	0	7	24	19	5	3	0	2	0	44	2	3	0	0	0	0	0
3.51 to 5.0	33	145	14	0	19	7	7	1	18	4	0	0	16	0	0	0	0	13	0	0
5.01 to 7.5	36	216	0	0	36	1	0	11	24	3	9	2	4	8	5	0	4	1	0	0
7.51 to 10	44	336	0	0	44	0	0	27	17	2	2	7	1	6	0	12	6	8	0	0
10.01 to 15	38	534	0	0	38	3	0	19	16	4	5	2	5	3	7	4	2	4	0	2
15.01 to 20	1	17	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
20.01 to 30	62	1552	0	7	55	0	0	9	53	0	5	49	0	0	3	1	4	0	0	0
30.01 to 60	44	1878	0	13	22	1	0	12	31	3	9	19	3	0	0	4	6	0	0	0
60.01 to 120	20	1388	0	13	7	0	0	17	3	1	0	2	0	2	0	0	15	0	0	0
120.01 to 180	55	7345	0	44	7	15	0	17	23	0	3	34	2	5	4	0	0	5	2	0
180.01 & above	25	6409	0	2	23	0	0	11	14	1	2	12	3	0	0	0	0	7	0	0
Totals	523	20 089	156	79	275	105	72	136	210	21	43	133	176	28	22	21	22	53	2	2

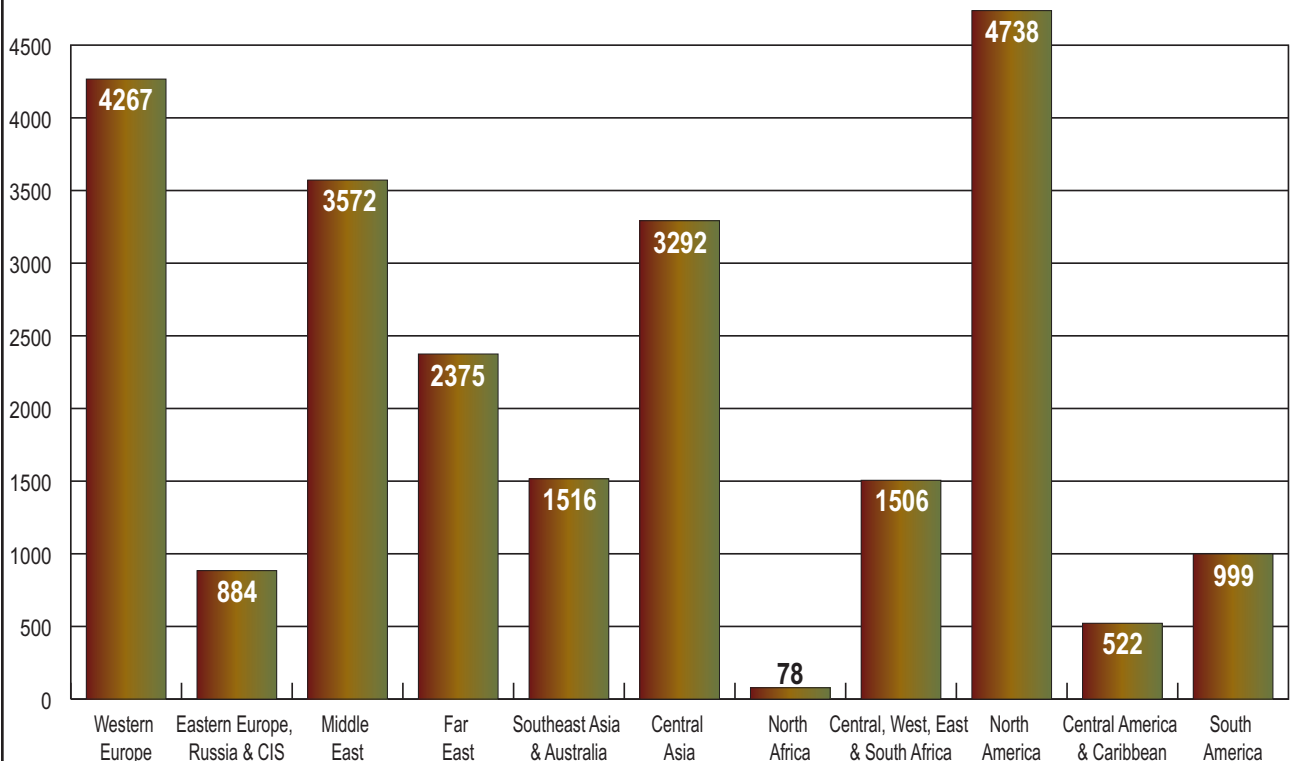
Diesel & Gas Turbine Worldwide will change to calendar-year reporting structure of all our annual surveys including the Marine Propulsion Order Survey in the June issue and the Mechanical Drive Order Survey that will appear in the July-August issue, again in response to input from the manufacturers, and many read-

ers as well. In doing so, the hope is the data will align with typical reporting sources for a more accurate reflection of year-over-year sales. As much reporting like this is done on an annual basis throughout the world, our three surveys now reflect that as well.

As mentioned, Diesel & Gas Turbine

Worldwide's Power Generation Order Survey is part one of three surveys designed to provide details on the markets of larger reciprocating engines, gas turbines and more recently steam turbines used in power generation, marine propulsion and mechanical drive applications.

Region Totals For All Reported Driver Types
(Steam Turbine Orders, Gas Turbine Orders, Reciprocating Engine Orders)
January – December 2009



STEAM TURBINE POWER GENERATION ORDERS, January – December 2009

Output Range (MW)	Units Ordered	Total Engine Output (MW)	Type of Generating Service			Steam Turbine Types					Western Europe	Eastern Europe, Russia & CIS	Middle East	Far East	Southeast Asia & Australia	Central Asia	North Africa	Central West East & South Africa	North America	Central America & Caribbean	South America
			Standby	Peaking	Continuous Duty	Condensing	Non-Condensing	Reheat	Extraction	Induction											
0.0 to 1.0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
1.01 to 5.0	5	14	0	0	5	5	0	0	0	0	1	0	0	2	0	0	0	0	1	0	1
5.01 to 10	7	57	0	0	7	7	0	0	0	0	5	0	1	0	1	0	0	0	0	0	0
10.01 to 30	19	307	0	0	19	16	3	0	1	0	7	0	4	3	0	0	0	0	3	1	1
30.01 to 60	4	175	0	0	4	2	1	0	3	0	2	0	0	0	0	0	0	0	2	0	0
60.01 to 120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120.01 to 200	8	1251	0	0	8	6	0	1	1	0	1	2	2	1	0	0	0	0	0	0	2
200.01 to 300	14	3632	0	0	14	14	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0
300.01 to 500	1	320	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
500.01 to 700	2	1300	0	0	2	2	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0
700.01 to 1000	1	790	0	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0
1000.01 & above	4	5820	0	0	4	4	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Totals	66	13 667	0	0	66	59	4	4	6	0	17	2	23	10	1	0	0	0	8	1	4

We divide the data into three reports in order to provide a more in-depth look at each market segment. The Power Generation Order Survey examines reciprocating engines, steam turbines and gas turbines for power generation service. The Marine Propulsion Order Survey examines mechanical drive, auxiliary and diesel-electric marine propulsion systems. The Mechanical Drive Order Survey is devoted to engine orders for mechanical drive applications including pumps, compressors, oil exploration machinery and other industrial applications.

Procedures

The Power Generation Order Survey once again includes reciprocating engines starting at 500 kW; gas turbines rated 1.0 MW and above; and steam turbines.

New orders are broken into types of generating service as defined by the manufacturer — standby, peaking or continuous duty. Changes being considered for future surveys may attempt to specifically determine hours of operation/application for more distinction between standby and peaking service distinction, but to date, definition parameters beyond category titles have not been established.

An accompanying table identifies those companies that participated in the 2010 survey. Every effort is made to make this survey as complete and comprehensive as possible and would not have the level of detail it contains with-

out the generous support of the participating companies.

It is important to note that the data in this survey does not represent units shipped, but only the total orders received during calendar year 2009.

Overview

The change in reporting period makes year-to-year comparison impossible, but certain observations can be made. It will come as no surprise that markets were down across the board in 2009. Myriad factors, including economical, political and environmental, had a direct effect on the global power generation market. But some indicators suggest that perhaps the bottom has been reached and recovery is on the horizon. History will reveal when indeed the “recovery” begins. In the meantime, optimists and pessimists will agree that the bar has been reset. The definition of success is being redefined. Three years ago no one would have predicted that “breaking even” would be considered a banner year.

Total orders received in 2009 were 23 749 units (all reported driver types). Top markets were North America (20%), Western Europe (18%), Middle East (15%) and Central Asia (14%), respectively.

The Middle East showed signs of increased growth and promise when compared to the previous 12-month reporting cycle of June 2008 to May 2009 (see *D>W*, October 2009, p. 32), moving from third place to second

place in total units ordered. Again, the true results will be revealed in next year’s survey when year-to-year data can be compared. Reports show that demand for electricity in Abu Dhabi alone is expected to grow at an annual rate of 6.7% through 2030 and that Abu Dhabi Water & Electricity Authority (ADWEA) is working to address a forecasted 774 MW shortfall in power capacity by 2012, which may lend reason for what seems to be increased orders from that region.

North America led the world in total units ordered — a trend that will likely continue for the foreseeable future. It’s interesting to note that according to the Energy Information Association (EIA), slightly more than one-third of delivered energy consumption in the United States occurs in the industrial sector. The largest users of energy in this sector are the bulk chemical, refining, mining, and paper industries. Those four industries together, according to the EIA, account for more than 60% of total industrial delivered energy consumption.

The July-August Mechanical Drive Order Survey will dissect the industrial landscape in more detail, but as consumption is predicted to increase in the coming years, the need for reciprocating engine and turbine drivers in power generation service will remain strong.

Diesel, Dual-Fuel and Gas Engine Orders

The number of diesel, dual-fuel and gas engines ordered during the survey

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

- Caterpillar
- Caterpillar Electric Power Division
- Cummins
- Dresser Waukesha
- Electro-Motive Diesel Inc.
- GE Energy - Jenbacher
- Hyundai Heavy Industries
- MAN Diesel & Turbo
- MWM
- Niigata Power Systems Co. Ltd.
- Rolls-Royce
- SEMT Pielstick
- Tognum AG
- Wärtsilä
- Yanmar

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

- GE Energy
- GE Oil & Gas
- Hitachi Ltd.
- Kawasaki Heavy Industries Ltd.
- MAN Diesel & Turbo
- Mitsubishi Heavy Industries
- Niigata Power Systems
- NPO Saturn
- OPRA Turbines
- Rolls-Royce
- Siemens
- Solar Turbines Inc.
- Vericor Power Systems
- Yanmar
- Zorya-Mashproekt

Steam Turbine Manufacturers Participating and Reporting Orders in this Power Generation Survey

- Doosan Heavy Industries & Construction
- Dresser-Rand Steam Turbine Business Unit
- Fincantieri S.p.A.
- GE Oil & Gas
- Hitachi
- Mitsubishi Heavy Industries Ltd.
- MTU Friedrichshafen

period totaled 23 160. The majority of the orders (59%) were in the power range of 500 kW to 1.00 MW, followed by the 1.01 to 2.00 MW power range at 30%.

As has been typical, standby power dominated generating service, which represented 52% of the total units ordered. Peaking service and continuous duty represented 24% and 23%, respectively. In last year's Power Generation Order Survey, which offered June 2008 to May 2009 data, continuous duty usage showed two-years worth of in-

crease. Comparisons next year will allow better analyses on a possible trend.

Engines operating at speeds above 1000 r/min comprised 98% of the total units ordered in 2009. Diesel-fueled engines represented 91% of all engines ordered. Natural gas powered slightly more than 6% of the total engines. It will be interesting to note the percentage of engines operating as dual-fuel next year. Roughly 2% were classified with this fuel type in this survey. In our previous survey, dual-fuel represented less than 1% in the 12-month report (June to May).

The geographic breakdown of diesel, dual-fuel and gas engine orders shows an uptick in engines destined for the Middle East. Top markets were North America (20%), Western Europe (18%), Middle East (15%) and Central Asia (14%), respectively.

Gas Turbine Orders

Gas turbine orders totaled 523 units, according to the manufacturers' reports to us. In 2009, the 1.0 to 2.0 MW range made up 21% of the total orders. The output ranges of 2.01 to 3.5, 20.1 to 30 and 120.1 to 180 saw the second highest orders received — 9%, 11% and 10%, respectively. The output range of 15.01 to 20.00 saw the least activity.

Fuel type was 40% natural gas, 26% dual fuel, 20% diesel fuel and 14% heavy fuel.

Geographically, the Far East received the majority of orders (32%), followed by the Middle East (25%) and North America (10%).

Steam Turbine Orders

Steam Turbine orders accounted for 66 units, with 30% falling into the 10.01 to 30.00 MW output range. 100% of the units were in continuous-duty service. Condensing steam turbines made up 87% of the total units ordered. The Middle East received 34% of the steam turbines ordered in 2009, followed by Western Europe 25%, the Far East (15%) and North America (10%).

Annual Surveys

On behalf of *Diesel & Gas Turbine Worldwide*, thank you to all contributors for your continued participation in the annual survey process. It is our hope that the three surveys combined will provide an accurate snapshot of the entire large engine landscape, with fine-tuned detail provided for three market segments through each individual report — power generation, marine propulsion and mechanical drive. Electronic versions of past surveys are available on our website at: www.dieselturbine.com. Questions, comments, suggestions, etc., should be directed to bhaight@dieselpub.com. 📧