

Diesel & Gas Turbine WORLDWIDE

DEDICATED TO ENGINE ROOM PRODUCTS, TECHNOLOGIES & NEWS

38th

**POWER GENERATION
ORDER SURVEY**

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30TH

POWER GENERATION ORDER SURVEY

By Brent Haight

Growth For All Reported Driver Types

➤ Diesel & Gas Turbine Worldwide's Power Generation Order Survey is part one of three surveys designed to provide details on the markets of large horsepower reciprocating engines, steam turbines and gas turbines used in power generation, marine propulsion and mechanical drive applications.

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 Mechanical Drive Order Survey (to appear in the June issue) is devoted to engine orders for mechanical drive applications including pumps, compressors, oil exploration machinery, rail and other industrial applications. The Marine Propulsion Order Survey (to appear in the July/August issue) examines mechanical drive, auxiliary and diesel-electric marine propulsion systems.

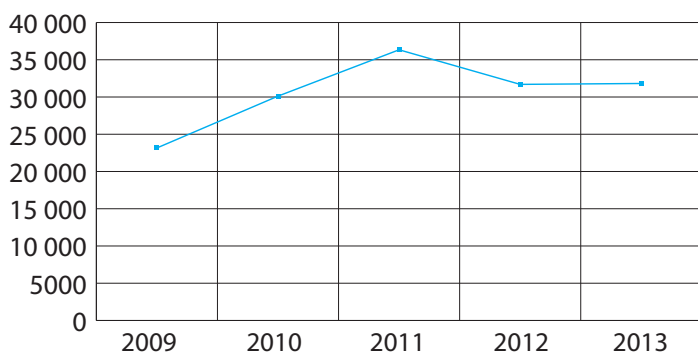
Procedures

The Power Generation Order Survey 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 — standby, peaking and continuous. Manufacturers provide their own distinction between peaking and standby service; however, standby service typically refers to power generation in backup or emergency service. Peaking service is associated with power generation used in conjunction with local utilities. The time that peak service operates is dependent on the condition of the local electrical grid. Continuous service typically refers to continuous power generation, stopping only for maintenance or unexpected outages.

An accompanying table identifies those companies that participated in the 2014 survey. Every effort is made to ensure that this survey is as complete and comprehensive as possible

Recip Engine Orders, Five-Year Data



RECIPROCATING ENGINE (DIESEL, DUAL-FUEL & GASEOUS-FUEL) POWER GENERATION ORDERS, January – December 2013																									
Output Range (MW)	Units Ordered	Total Engine Output (MWe)	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
			Standby	Peaking	Continuous	Below 300	300 - 600	720 - 1000	Above 1000	Diesel Fuel	Heavy Fuel	Dual Fuel	Liquid Biofuel	Natural Gas											
0.50 - 1.00	18 090	13 335	9316	477	8297	0	6	3	18 081	17 086	7	6	0	989	2358	1108	2895	2039	1257	2833	16	753	3389	457	985
1.01 - 2.00	10 635	15 407	5450	365	4820	0	0	151	10 484	9171	96	0	4	1325	1504	474	1145	2407	1649	680	0	289	1981	174	332
2.01 - 3.50	2485	6260	1482	143	860	0	0	35	2450	2137	12	0	1	334	396	52	194	385	256	39	1	46	994	38	84
3.51 - 5.00	196	834	13	0	183	0	0	102	94	22	87	0	4	83	15	13	53	13	16	8	0	61	10	3	4
5.01 - 7.50	142	863	39	0	103	0	0	92	32	56	42	6	0	44	43	19	31	28	6	1	0	4	4	0	6
7.51 - 10.00	179	1667	6	1	172	0	5	174	0	10	69	3	0	97	6	11	6	5	53	45	0	22	0	4	27
10.01 - 15.00	11	127	0	0	11	0	10	1	0	0	4	6	0	1	1	0	0	0	0	0	0	4	0	0	6
15.01 - 20.00	75	1330	0	0	75	0	75	0	0	0	5	39	0	31	0	6	30	0	16	0	0	10	12	1	0
20.01 - 30.00	3	63	0	0	3	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
30.01 and 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	31 816	39 886	16 306	986	14 524	0	99	558	31 141	28 482	325	60	9	2904	4323	1683	4354	4877	3253	3606	17	1189	6390	677	1447

GAS TURBINE POWER GENERATION ORDERS, January – December 2013																				
Output Range (MW)	Units Ordered	Total Engine Output (MWe)	Type Of Generating Service			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
			Standby	Peaking	Continuous	Diesel Fuel	Heavy Fuel	Dual Fuel	Natural Gas											
1.00 - 2.00	118	158	97	0	21	40	46	11	21	3	7	0	101	3	0	0	3	1	0	0
2.01 - 3.50	40	109	35	0	5	16	18	1	5	0	4	0	36	0	0	0	0	0	0	0
3.51 - 5.00	41	166	26	0	15	5	19	3	14	4	0	0	27	3	0	0	2	4	0	1
5.01 - 7.50	50	295	8	0	42	7	0	24	19	3	0	0	15	11	5	1	4	9	0	2
7.51 - 10.00	43	346	0	0	43	0	0	11	32	9	0	0	7	6	2	0	1	11	3	4
10.01 - 15.00	30	386	0	1	29	0	0	12	18	6	4	3	8	1	0	0	2	4	1	1
15.01 - 20.00	44	689	0	1	43	1	0	28	15	6	12	1	16	0	3	0	3	2	0	1
20.01 - 30.00	40	992	0	7	33	2	0	14	24	4	1	6	2	9	0	6	3	4	1	4
30.01 - 60.00	164	6901	2	14	133	22	0	29	113	2	23	30	20	34	3	0	18	4	3	27
60.01 - 120.00	19	1672	0	6	0	0	0	0	19	1	2	2	3	0	2	0	0	8	0	1
120.01 - 180.00	38	5588	0	0	12	0	6	16	16	0	9	6	12	1	2	1	6	1	0	0
180.01 and above	83	21 151	0	0	1	0	0	9	74	1	2	22	11	3	0	31	0	13	0	0
Totals	710	38 453	168	29	377	93	89	158	370	39	64	70	258	71	17	39	42	61	8	41

and would not have the level of detail it contains without the generous contributions of the participating companies.

Overview

The year 2013 revealed growth for all reported driver types in our annual Power Generation Order Survey. It is important to note that fluctuations in OEM participation beyond our control influence year-over-year comparisons. That being said, however, the 2014 Power Generation Order Survey (2013 reporting data) reveals continued strength in the prime mover, power generation marketplace.

Reciprocating engine orders total 31 816 units, beating last year's count by 0.4%.

Gas turbine orders rose by 58% compared to last year's report. The 2014 Survey reveals 710 gas turbine orders, while 447 orders were reported in the 2013 Survey.

Steam turbine orders set a new high-water mark for the Power Gen-

eration Order Survey this year, logging 163 units, a 27% increase compared to the 2013 Survey.

Total units ordered in 2013 (combined gas turbine, steam turbine and reciprocating engine order data) were 32 689, a 0.3% increase compared to 2012.

North America claimed the top geographic location for all reported driver types in 2013 with 6470 units ordered. The United States' shale fields once again played a prominent factor. The Far East beat out the Middle East and Western Europe for the number two spot.

The top five markets revealed in the 2014 Power Generation Order Survey are: North America (20%), Far East (16%), Middle East (14%), Western Europe (13%) and Central Asia (11%).

The 2014 Power Generation Order Survey reveals a 29% growth spike for the Far East compared to last year. Japan's use of fossil-fueled power

generation remains high following the Tohoku earthquake and related tsunami that led to the destruction of Tokyo Electric Power Co.'s Fukushima Daiichi nuclear power plant and subsequent outages at other plants. The decline in nuclear power has been compensated in large part by LNG, which analysts quantify accounts for 48% of Japan's energy mix. Now consider China, which is ranked as the largest energy consumer and producer in the world. China's rapidly increasing energy demand, especially for liquid fuels, will help keep the Far East as a top geographic destination in the Power Generation Order Survey for the foreseeable future.

Diesel, Dual-Fuel And Gas Engine Orders

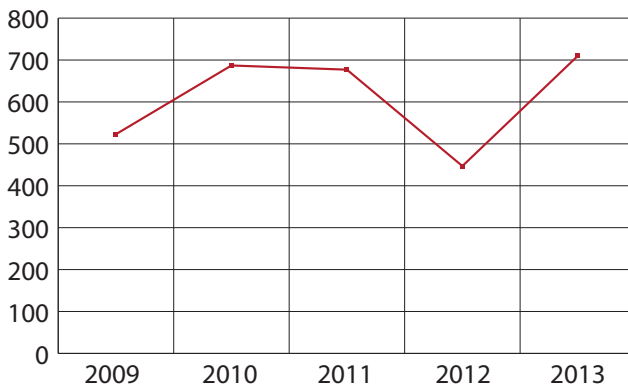
The number of diesel, dual-fuel and natural gas engines ordered in 2013 totaled 31 816, an increase of 0.4% compared to last year's survey. The majority of orders (56%) were once again in the power range of 500 kW to 1 MW, followed by the 1.01 to 2.00 MW range (33%).

The 2014 Survey reveals 51% of the orders received were destined for standby service, followed by continuous duty at 45%. Peaking service represented roughly 3% of the orders.

Engine operating speeds above 1000 r/min comprised 98% of the total units ordered in 2013.

Diesel fuel continued its domination as the preferred fuel for reciprocating engines in power generation applications, claiming 90% of the

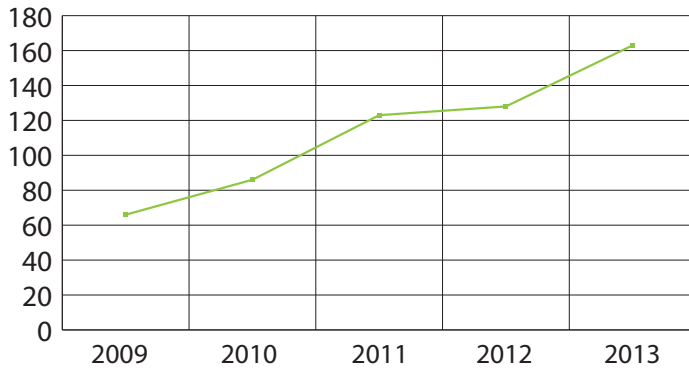
Gas Turbine Orders, Five-Year Data



STEAM TURBINE POWER GENERATION ORDERS, January – December 2013

Output Range (MW)	Units Ordered	Total Engine Output (MWe)	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	Condensing	Non-Condensing	Reheat	Extraction	Induction											
0.00 - 1.00	5	3	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	4	0	0
1.01 - 5.00	53	122	0	0	53	9	44	0	0	0	5	2	0	0	37	0	0	0	5	3	1
5.01 - 10.00	20	152	0	0	20	11	6	0	5	0	13	0	0	2	1	0	1	0	3	0	0
10.01 - 30.00	20	378	0	0	20	18	2	0	9	0	6	1	0	8	1	0	2	0	1	0	1
30.01 - 60.00	11	423	0	0	11	6	0	0	3	0	0	2	1	1	3	1	0	3	0	0	0
60.01 - 120.00	1	100	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
120.01 - 200.00	19	2821	0	0	19	4	0	7	1	0	0	4	0	1	6	1	1	2	4	0	0
200.01 - 300.00	29	8266	0	0	29	13	0	14	1	0	0	0	14	0	0	0	12	0	0	0	3
300.01 - 500.00	1	317	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
500.01 - 700.00	1	660	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
700.01 - 1000.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000.01 and above	3	3465	0	0	3	0	0	2	0	0	0	2	0	0	1	0	0	0	0	0	0
Totals	163	16 707	0	0	163	63	57	25	19	0	25	11	15	12	50	2	16	5	19	3	5

Steam Turbine Orders, Five-Year Data



reported engines fuel type. Natural gas represented 9%.

Top geographic locations for diesel, dual-fuel and gas engines were North America (20%), Far East (15%), Middle East (14%), Western Europe (13%) and Central Asia (11%).

The U.S. shale boom continued to keep North America atop the geographic destination list for recip, but unless the country gets serious in de-

veloping an export infrastructure, it won't hold the top spot for long.

The Far East's jump to second-highest geographic destination is evidence that China, which holds the title of world's most populous country, is making progress in developing its energy infrastructure.

China's electric generation is primarily controlled by state-owned holding companies. China is seeking to improve

system efficiency, facilitate investment in the power grids and alleviate power shortages. The Chinese government has prioritized the expansion of natural gas-fired and renewable power plants as well as the electricity transmission systems to connect more remote power sources to population centers.

Gas Turbines

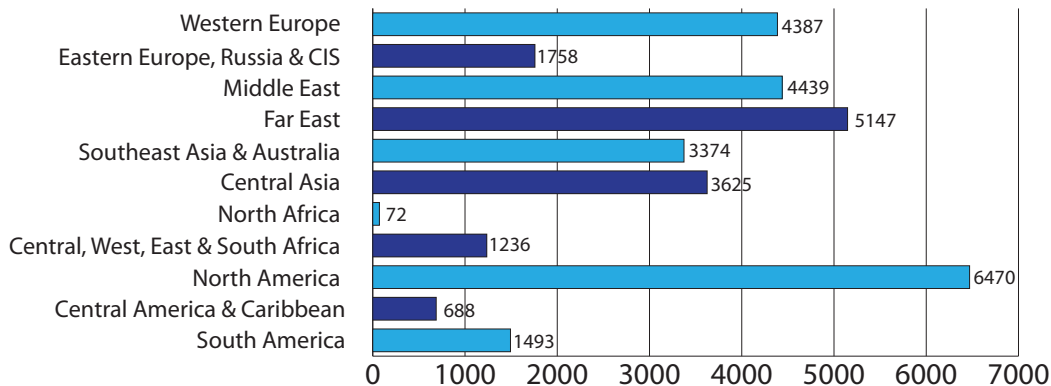
Gas turbine orders reported in the 2014 Survey totaled 710 units, up 58% compared to last year. Gas turbines rated 30.01 to 60.00 MW saw the most activity, accounting for 23% of the orders.

Natural gas was the dominant fuel type (52%), followed by dual fuel (22%), diesel fuel (13%) and heavy fuel (12%).

The Far East was the top geographic location for gas turbine orders (36%). Southeast Asia & Australia claimed

Combined Regional Total For All Reported Driver Types

January - December 2013



the number two spot (10%), followed by the Middle East (9%).

China's growing need for reliable energy, coupled with nuclear power's continued uncertainty, should keep the Far East atop the geographic destination for gas turbines for years to come.

Steam Turbines

Steam turbine orders totaled 163 units in the 2014 Survey, an increase of 27% compared to last year.

Units rated 1.01 to 5.00 MW saw the most demand, accounting for 33% of all steam turbine orders.

All units were classified as continuous duty.

Southern Asia & Australia was the top geographic location (31%), followed by Western Europe (15%) and North America (12%).

Annual Surveys

On behalf of *Diesel & Gas Turbine Worldwide*, thank you to all contributors for your continued participation in this 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, mechanical drive and marine propulsion. Electronic versions of past surveys are available at our website: www.diesलगasturbine.com. Questions, comments and suggestions should be directed to bhaight@diesलगasturbine.com.

Power Generation Order Survey Participants

Diesel, Dual-Fuel And Gas Engine Manufacturers

- Caterpillar Energy & Transportation
- Caterpillar Inc.
- Cummins Power Generation
- Dresser-Rand, Guascor
- Fairbanks Morse
- GE Power & Water
- Hyundai Heavy Industries Co. Ltd.
- MAN Diesel & Turbo (including license built engines)
- Mitsubishi Heavy Industries Ltd.
- MWM
- Niigata Power Systems Co. Ltd.
- PervomaiskDieselMash (PDM)
- Rolls-Royce
- Rolls-Royce Power Systems AG
- Wärtsilä Corp., Power Plants
- Yanmar Co. Ltd.

Gas Turbine Manufacturers

- Ansaldo Energia S.p.A.
- GE Oil & Gas
- GE Power & Water
- Kawasaki Heavy Industries Ltd.
- MAN Diesel & Turbo SE
- Mitsubishi Hitachi Power Systems Ltd.
- Niigata Power Systems Co. Ltd.
- OPRA Turbines
- Power Machines
- Rolls-Royce
- Siemens AG
- Siemens Industrial Turbomachinery Ltd.
- Solar Turbines Inc.
- UEC Gas Turbines (formerly NPO Saturn)
- Vericor Power Systems
- Zorya-Machproekt

Steam Turbine Manufacturers

- Ansaldo Energia S.p.A.
- Dresser-Rand Co.
- Elliott Group
- Fincantieri S.p.A. - Marine Systems and Components Business Unit
- GE Oil & Gas
- GE Power & Water
- MAN Diesel & Turbo SE
- Mitsubishi Heavy Industries Compressor Corp.
- Mitsubishi Hitachi Power Systems Ltd.
- Power Machines

Country Information For Regions/Regional Codes, D>W Annual Market Surveys

Western Europe	Belarus	Israel	Laos	Central, West, East & South Africa	Mauritania	Costa Rica
Andorra	Bosnia and Herzegovina	Jordan	Malaysia	Angola	Mauritius	Cuba
Austria	Bulgaria	Kuwait	Marshall Islands	Benin	Mozambique	Dominica
Belgium	Croatia	Lebanon	Micronesia	Botswana	Namibia	Domin. Republic
Denmark	Czech Republic	Oman	Palau	Burkina Faso	Niger	El Salvador
Finland	Estonia	Qatar	Papua New Guinea	Burundi	Nigeria	Guatemala
France	Georgia	Saudi Arabia	Philippines	Cameroon	Rwanda	Haiti
Germany	Hungary	Syria	Samoa	Cape Verde	Senegal	Honduras
Greece	Kazakhstan	Turkey	Singapore	Cent. African Rep.	Seychelles	Honduras
Iceland	Kyrgyzstan	United Arab Emirates	Solomon Islands	Chad	Sierra Leone	Jamaica
Liechtenstein	Latvia	Yemen	Tahiti	Comoros	Somalia	Mexico
Luxembourg	Lithuania	Far East	Tonga	Congo	South Africa	Nicaragua
Italy	Moldova	China	Thailand	Cote d'Ivoire	Sudan	Panama
Ireland	Poland	Hong Kong	Tuvalu	Djibouti	Swaziland	Puerto Rico
Malta	Republic of Macedonia	Japan	Tuvalu	Equatorial Guinea	Tanzania	Virgin Islands
Netherlands	Romania	Mongolia	Vanuatu	Eritrea	Togo	West Indies
Norway	Russia	North Korea	Vietnam	Ethiopia	Uganda	South America
Portugal	Serbia	South Korea	Central Asia	Gabon	Zaire	Argentina
San Marino	Slovak Republic	Taiwan	Afghanistan	Gambia	Zimbabwe	Bolivia
Slovenia	Tajikistan	Southeast Asia & Australia	Bangladesh	Ghana	North America	Brazil
Spain	Turkmenistan	Australia	India	Guinea	Canada	Chile
Sweden	Ukraine	Brunei	Maldives Islands	Guinea Bissau	U.S.A.	Colombia
Switzerland	Uzbekistan	Burma	Nepal	Ivory Coast	Central America & Caribbean	Ecuador
United Kingdom	Middle East	Cambodia	Pakistan	Kenya	Bahamas	Guyana
Eastern Europe, Russia & CIS	Bahrain	Fiji Islands	Sri Lanka	Lesotho	Bermuda	Paraguay
Albania	Cyprus	Indonesia	North Africa	Liberia	Belize	Peru
Armenia	Egypt	Kiribati	Algeria	Madagascar		Surinam
Azerbaijan	Iran		Libya	Malawi		Uruguay
	Iraq		Morocco	Mali		Venezuela
			Tunisia			