Combined Cycle Quarterly, 2Q'19

The "Report"

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Introduction

NOMENCLATURE:
A combined cycle (CC) project requires a gas turbine (GT), a heat recovery steam generator (HRSG), and a steam turbine (ST). Each GT requires an HRSG but there can be multiple GTs/HRSGs per ST for a given configuration (or Block). The most popular Blocks feature either a single GT/HRSG paired with a single ST (1x1) or two GTs/HRSGs paired with a single ST (2x1), though 3x1, 4x1, 3x2 and other configurations are also utilized regularly.

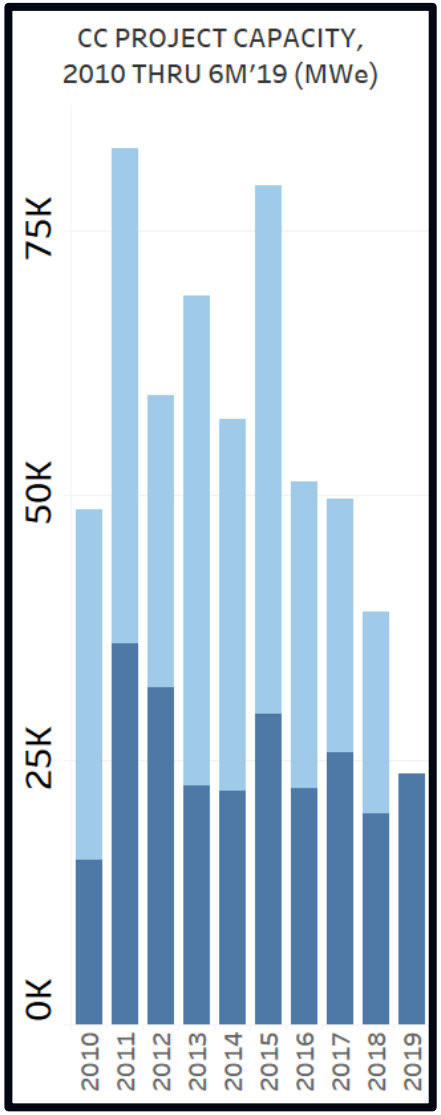
PURPOSE OF THE REPORT:
Capturing the exact size, scope and development of the CC markets is challenging given (i) they cross the different equipment markets of GTs, HRSGs, and STs, (ii) the timing of the gas cycle development (represented by the GT award date) and the steam cycle development (represented by the HRSG and/or ST award date) for the same Block can vary by years or even decades, and (iii) Block capacity is not specifically captured by any single piece of equipment. The Report and the Data overcome these considerations by presenting CC technology activity at the point in time when the intention to construct a Block is realized, and at that time, reflecting the entire capacity of the Block which is referred to as project capacity.

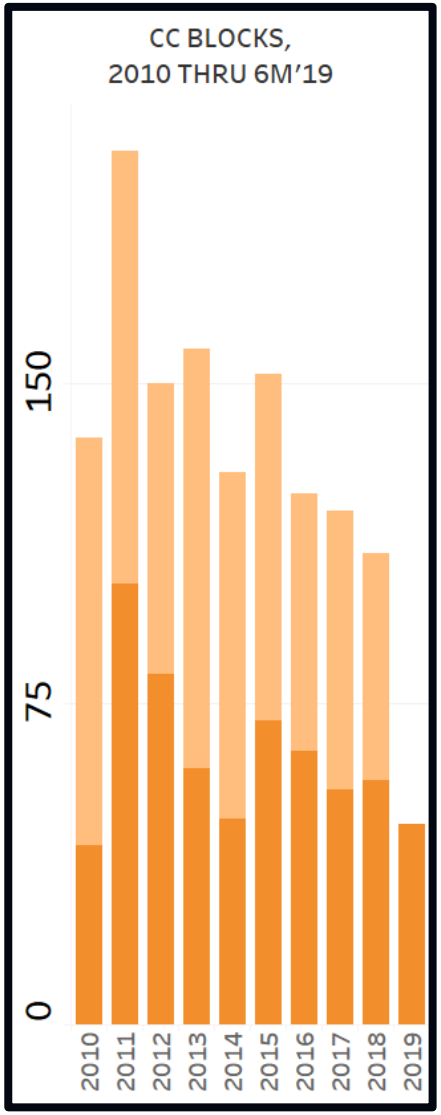
The methodology used to derive the Data is described in more detail in the End Notes found on the last page of this Report. Please let us know if you have issues or question on any of this.

Global Market Summary

Combined cycle (CC) project activity for the 6M'19 period amounted to 47 blocks and 23.7 GWe of project capacity, an 18% decline on-year and a 19% gain on-year respectively (images right images).

On the pages that follow, we present market share trends for each of the combined cycle equipment segments (gas turbine, HRSG and steam turbine).





1H (CAPACITY)
2H (CAPACITY)
1H (UNITS)
2H (UNITS)

CC technology performance derived from McCoy's CC Quarterly Data, 2Q'19. See End Notes for a description of how this data set was derived.

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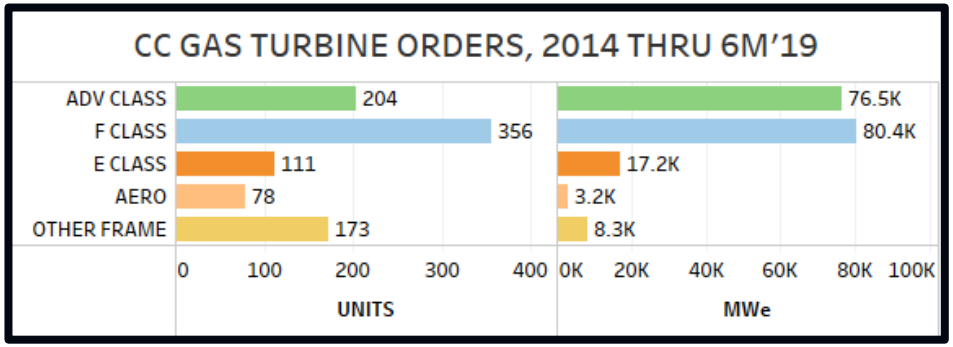
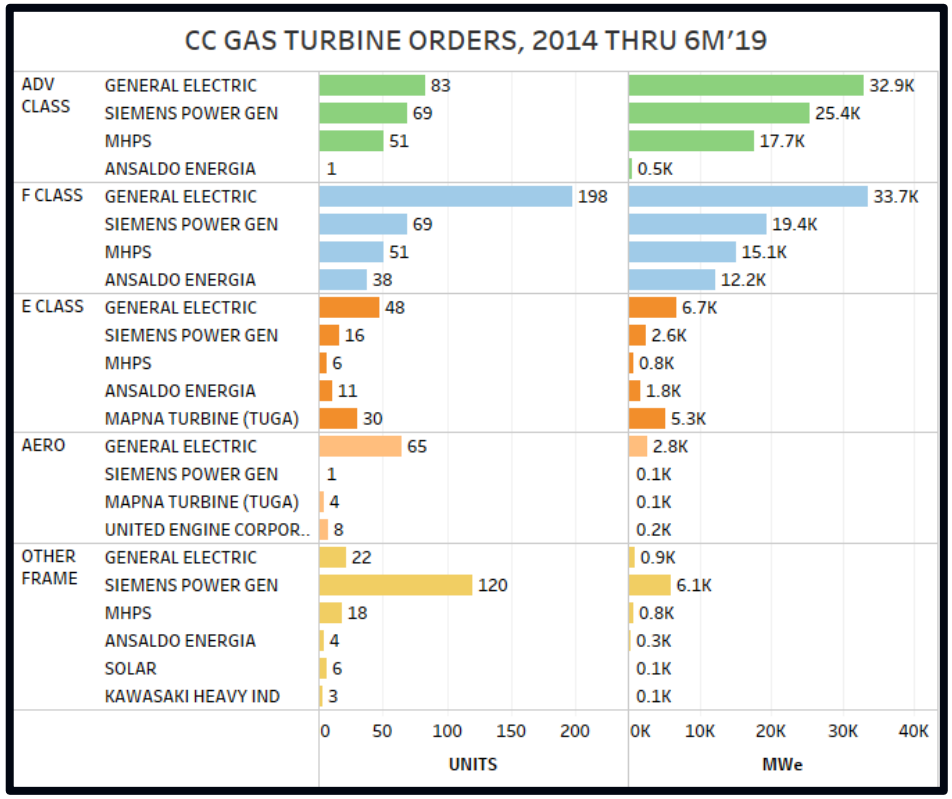
Market Share Discussion – Gas Turbines

The top right image shows CC gas turbine selections for the 2014 through 6M'19 period segmented by class of gas turbine. F class units were chosen for 356 CC deployments or 40% of all deployments for 80.4 GWe of total capacity. Demand for Advanced class gas turbines amounted to 204 units and 76.5 GWe of capacity, 22% and 41% of CC activity respectively.

GE was the leading technology owner for both F class and Advanced class gas turbines, capturing 56% and 41% of segment unit flow, respectively. GE also was the overall CC fleet leader for the period with 416 units and 77 GWe; Siemens was second with 275 units and 54 GWe.

The largest fleet by class is GE's F class fleet: 198 units strong; the second largest was Siemens' Other class fleet which had 120 units, 110 of which were SGT-800s.





ADV CLASS
F CLASS
E CLASS
AERO
OTHER FRAME

Visualizations presented were derived from McCoy's GT Order Data, 12M' 80 thru 12M'18 and GT Order Data, 6M'19. Units of 10 MWe and up; source: McCoy surveys and other public sources.

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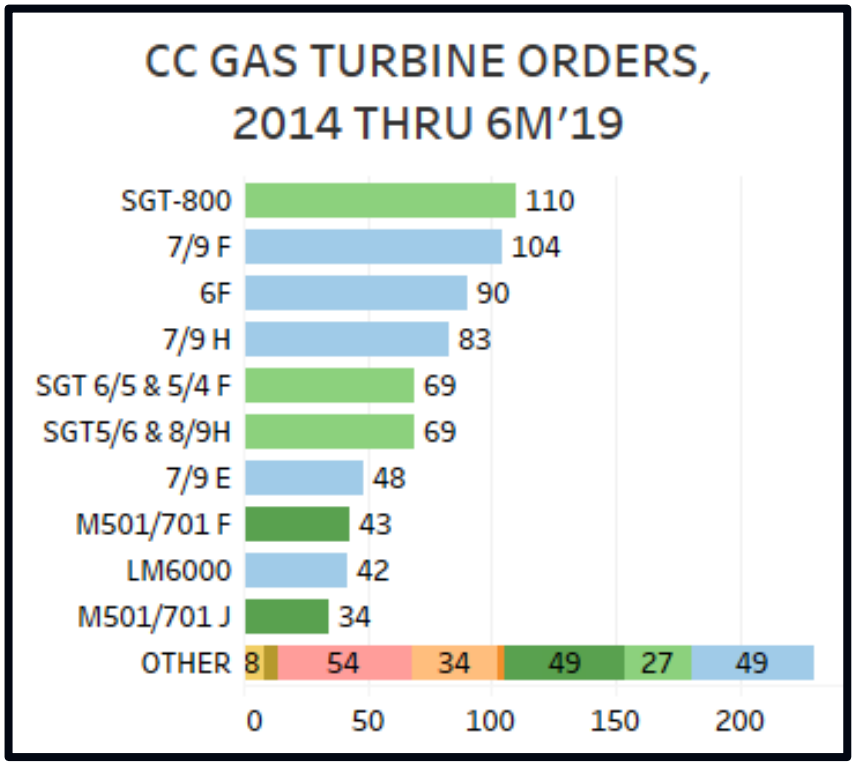
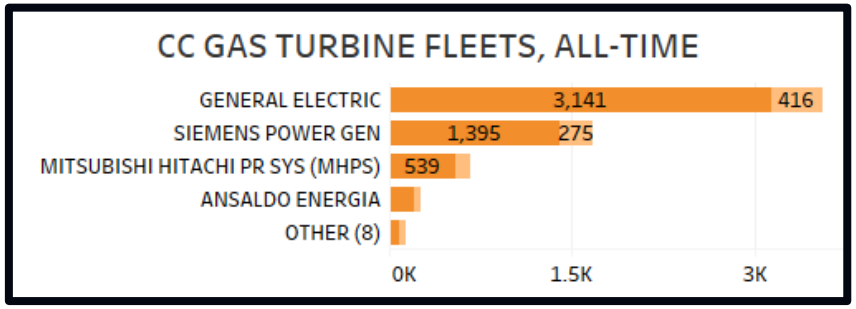
Market Share Discussion – Gas Turbines

Of the 922 CC gas turbines ordered since 2014 through 6M'19, Siemens' SGT-800 was the most popular model (image top right) accounting for 12% of CC gas turbine selections. The second through fourth most popular models were all GE platforms: 7/9F, 6F and 7/9H.

All-time, GE has the largest CC fleet: 3,557 units or 57% of the entire CC gas turbine fleet. Siemens' 1,670 units accounted for 27% of the CC gas turbine fleet, MHPS' 665 was 11%, and Ansaldo's 253 was 4% (image bottom right).





Visualizations presented were derived from McCoy's GT Order Data, 12M' 80 thru 12M'18 and GT Order Data, 6M'19. Units of 10 MWe and up; source: McCoy surveys and other public sources.

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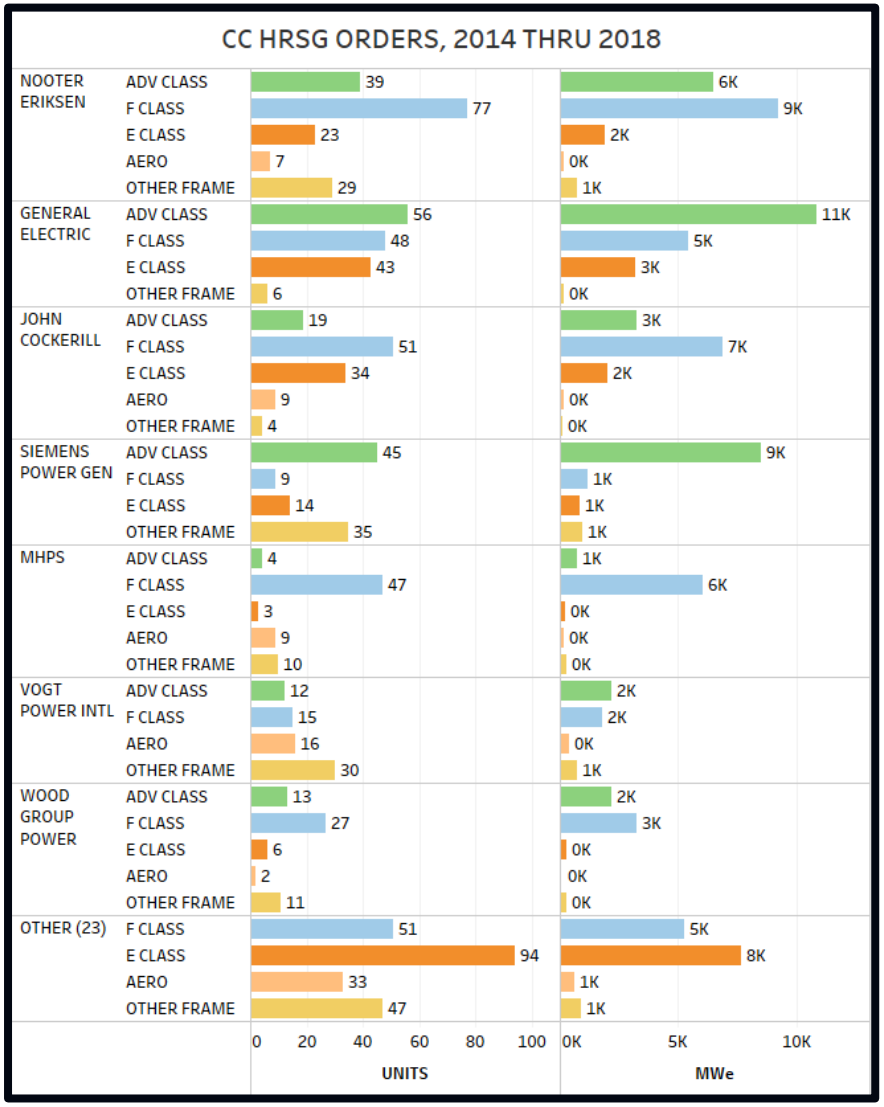
Market Share Discussion - HRSGs

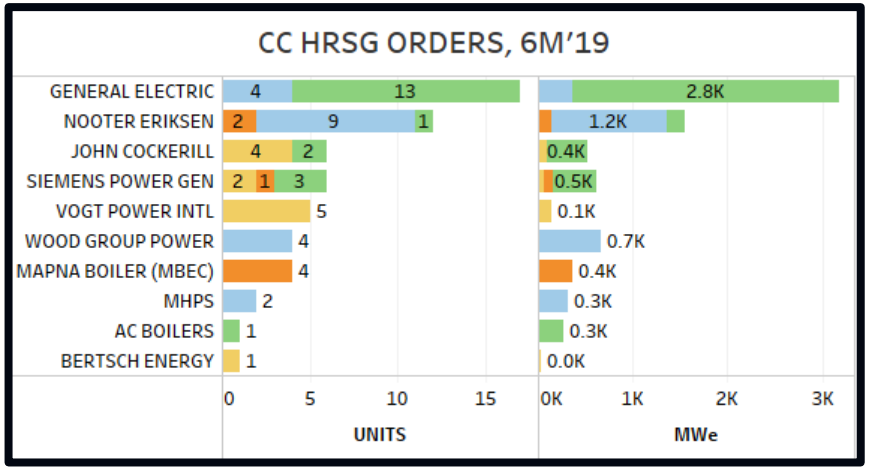


Turning to HRSGs, presented in the image to the left are the leading HRSG technology owners ranked by units for the five-year period through 2018. Enumerated are the associated gas turbine classes for each HRSG. Nooter led the market with 175 units of 18.6 GWe of total capacity, GE finished second by units with 153 but first by capacity with 19.6 GWe. John Cockerill was third by both measures: 117 units and 12.5 GWe.

For the 6M'19 period, GE led the markets with 13 Advanced class units, four F Class units and 3.2 GWe of total capacity. Nooter was second with 12 units, and John Cockerill and Siemens tied for third with six units each.

ADV CLASS
F CLASS
E CLASS
AERO
OTHER FRAME

Visualizations presented were derived from McCoy's HRSG Order Data, 12M'80 thru 12M'18 and HRSG Order Data, 6M'19. All units reported; source: McCoy surveys and other public sources.



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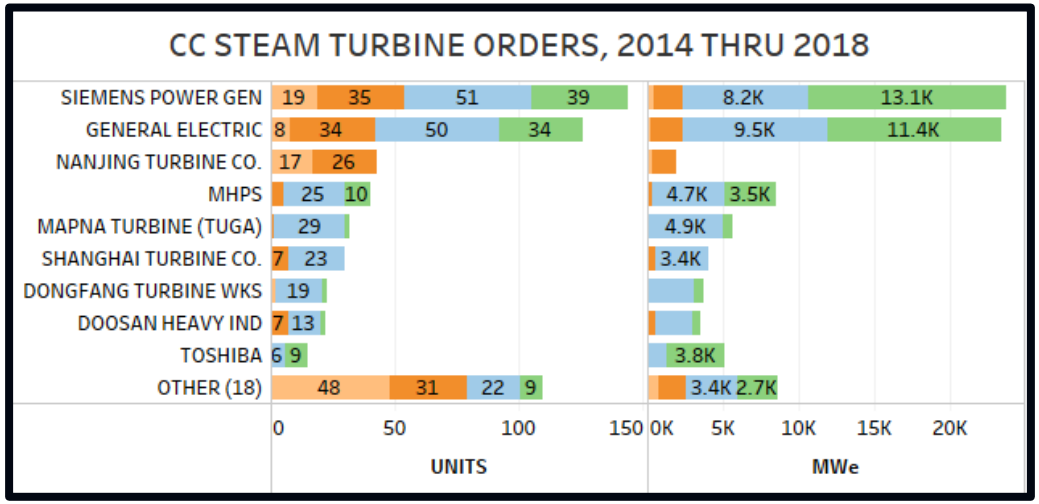
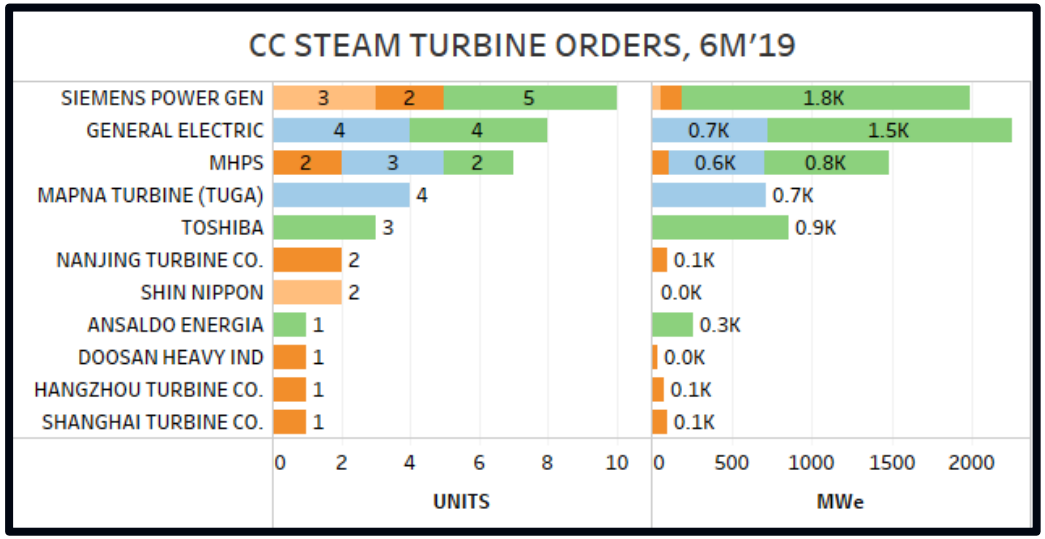
Market Share Discussion – Steam Turbines

Siemens led the CC steam turbine markets for the five-year period through 2018 with unit leadership positions in each of the five size categories. GE was second overall and second within each size segment except the smallest. These two technology owners captured 46% of all units and 54% of all capacity awarded during the period.

For the 6M'19 period, Siemens and GE finished one and two by units, but GE posted 2.2 GWe of orders while Siemens posted just 2.0 GWe. MHPS finished third by both counts with seven units and 1.5 GWe.



Visualizations presented were derived from McCoy's ST Order Data, 12M'80 thru 12M'18 and ST Order Data, 6M'19. Units of 5 MWe and up; source: McCoy surveys and other public sources.



Official CC League Tables – CC Gas Turbines [(i)]

GT'TECHNOLOGY OWNER	MWe 6M'19	MARKET SHARE
GENERAL ELECTRIC	7,341	41.9%
SIEMENS POWER GEN	3,892	22.2%
MHPS	3,400	19.4%
MAPNA TURBINE (TUGA)	1,464	8.4%
ANSALDO ENERGIA	1,408	8.0%
TOTAL ORDERED CAPACITY	17,505	100.0%

GT'TECHNOLOGY OWNER	UNITS 6M'19	MARKET SHARE
GENERAL ELECTRIC	22	32.4%
SIEMENS POWER GEN	19	27.9%
MHPS	15	22.1%
MAPNA TURBINE (TUGA)	8	11.8%
ANSALDO ENERGIA	4	5.9%
TOTAL ORDERED UNITS	68	100.0%

GT TECHNOLOGY OWNER	MWe, 5YR THRU 12M'18	SHARE
GENERAL ELECTRIC	69,647	41.5%
SIEMENS POWER GEN	49,664	29.6%
MHPS	30,890	18.4%
ANSALDO ENERGIA	13,429	8.0%
MAPNA TURBINE (TUGA)	3,977	2.4%
UNITED ENGINE CORPORATION	205	0.1%
SOLAR	100	0.1%
KAWASAKI HEAVY IND	90	0.1%
TOTAL ORDERED CAPACITY	168,002	100.0%

GT TECHNOLOGY OWNER	UNITS, 5 YR THRU 12M'18	SHARE
GENERAL ELECTRIC	394	46.1%
SIEMENS POWER GEN	256	30.0%
MHPS	111	13.0%
ANSALDO ENERGIA	50	5.9%
MAPNA TURBINE (TUGA)	26	3.0%
UNITED ENGINE CORPORATION	8	0.9%
SOLAR	6	0.7%
KAWASAKI HEAVY IND	3	0.4%
TOTAL ORDERED UNITS	854	100.0%

(i) 10 MWe and up; source: McCoy surveys and other public sources; table derived from McCoy's GT Order Data, 12M' 80 thru 12M'18 and GT Order Data, 6M'19. All capacities reflected are equipment capacities.

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Official CC League Tables – CC HRSGs[(i)]

HRSG TECHNOLOGY OWNER	MWe 6M'19	%
GENERAL ELECTRIC	3,178	41.5%
NOOTER ERIKSEN	1,557	20.3%
WOOD GROUP POWER	658	8.6%
SIEMENS POWER GEN	616	8.0%
JOHN COCKERILL	514	6.7%
MAPNA BOILER (MBEC)	366	4.8%
MHPS	324	4.2%
AC BOILERS	269	3.5%
VOGT POWER INTL	143	1.9%
BERTSCH ENERGY	29	0.4%
TOTAL	7,652	100.0%

HRSG TECHNOLOGY OWNER	UNITS 6M'19	%
GENERAL ELECTRIC	17	29.3%
NOOTER ERIKSEN	12	20.7%
JOHN COCKERILL	6	10.3%
SIEMENS POWER GEN	6	10.3%
VOGT POWER INTL	5	8.6%
MAPNA BOILER (MBEC)	4	6.9%
WOOD GROUP POWER	4	6.9%
MHPS	2	3.4%
AC BOILERS	1	1.7%
BERTSCH ENERGY	1	1.7%
TOTAL	58	100.0%

(i) All CC HRSGs reported. Source: McCoy surveys and other public sources; table derived from McCoy's HRSG Order Data, 12M'80 thru 12M'18 and HRSG Order Data, 6M'19. All capacities reflected are equipment capacities.

HRSG 'TECHNOLOGY OWNER	MWe, 5YR THRU 12M'18	%
GENERAL ELECTRIC	19,638	20.6%
NOOTER ERIKSEN	18,583	19.5%
JOHN COCKERILL	12,472	13.1%
SIEMENS POWER GEN	11,486	12.1%
MHPS	7,461	7.8%
WOOD GROUP POWER	5,978	6.3%
VOGT POWER INTL	5,091	5.3%
MAPNA BOILER (MBEC)	4,789	5.0%
SHANGHAI BOILER CO.	2,338	2.5%
AC BOILERS	2,265	2.4%
OTHER (20)	5,057	5.3%
TOTAL	95,157	100.0%

HRSG 'TECHNOLOGY OWNER	MWe, 5YR THRU 12M'18	%
NOOTER ERIKSEN	175	17.9%
GENERAL ELECTRIC	153	15.6%
JOHN COCKERILL	117	12.0%
SIEMENS POWER GEN	103	10.5%
MHPS	73	7.5%
VOGT POWER INTL	73	7.5%
WOOD GROUP POWER	59	6.0%
MAPNA BOILER (MBEC)	55	5.6%
AC BOILERS	24	2.5%
703 INSTITUTE	22	2.2%
OTHER (20)	124	12.7%
TOTAL	978	100.0%

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Official CC League Tables – CC Steam Turbines (i)

ST TECHNOLOGY OWNER	MWe 6M'19	MARKET SHARE
GENERAL ELECTRIC	2,248	28.5%
SIEMENS POWER GEN	1,984	25.2%
MHPS	1,482	18.8%
TOSHIBA	855	10.8%
MAPNA TURBINE (TUGA)	720	9.1%
ANSALDO ENERGIA	260	3.3%
NANJING TURBINE CO.	105	1.3%
SHANGHAI TURBINE CO.	100	1.3%
HANGZHOU TURBINE CO.	84	1.1%
DOOSAN HEAVY IND	36	0.5%
SHIN NIPPON	12	0.2%
TOTAL AWARDED CAPACITY	7,886	100.0%

ST TECHNOLOGY OWNER	MWe 6M'19	MARKET SHARE
SIEMENS POWER GEN	10	25.0%
GENERAL ELECTRIC	8	20.0%
MHPS	7	17.5%
MAPNA TURBINE (TUGA)	4	10.0%
TOSHIBA	3	7.5%
NANJING TURBINE CO.	2	5.0%
SHIN NIPPON	2	5.0%
ANSALDO ENERGIA	1	2.5%
DOOSAN HEAVY IND	1	2.5%
HANGZHOU TURBINE CO.	1	2.5%
SHANGHAI TURBINE CO.	1	2.5%
TOTAL AWARDED UNITS	40	100.0%

(i) Steam Turbines of 5 MWe and up. Source: McCoy surveys and other public sources; table derived from McCoy's ST Order Data, 12M'80 thru 12M'18 and ST Order Data, 6M'19. All capacities reflected are equipment capacities.

TOP 10 ST TECHNOLOGY OWNER	MWe, 5 YR THRU 2018	MARKET SHARE
SIEMENS POWER GEN	23,706	26.9%
GENERAL ELECTRIC	23,368	26.5%
MITSUBISHI HITACHI PR SYS (MHPS)	8,551	9.7%
MAPNA TURBINE (TUGA)	5,610	6.4%
TOSHIBA	5,090	5.8%
SHANGHAI TURBINE CO.	3,992	4.5%
DONGFANG TURBINE WKS	3,752	4.3%
DOOSAN HEAVY IND	3,516	4.0%
ANSALDO ENERGIA	2,374	2.7%
HARBIN TURBINE CO.	2,113	2.4%
OTHER (18)	5,987	6.8%
TOTAL AWARDED CAPACITY	88,058	100.0%

TOP 10 ST TECHNOLOGY OWNER	UNITS, 5 YR THRU 2018	MARKET SHARE
SIEMENS POWER GEN	144	24.6%
GENERAL ELECTRIC	126	21.5%
NANJING TURBINE CO.	43	7.4%
MITSUBISHI HITACHI PR SYS (MHPS)	40	6.8%
MAPNA TURBINE (TUGA)	32	5.5%
SHANGHAI TURBINE CO.	30	5.1%
DONGFANG TURBINE WKS	23	3.9%
DOOSAN HEAVY IND	22	3.8%
POWER MACHINES	17	2.9%
TOSHIBA	15	2.6%
OTHER (18)	93	15.9%
TOTAL AWARDED UNITS	585	100.0%

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End Notes

HOW WE COMPILE OUR CC DATA

- AWARD DATE: A Block is assigned the award date of the first equipment piece awarded among the GT(s), HRSG(s), or ST(s) of an associated Block, so long as the GT(s) and either of the HRSG(s) or ST(s) are awarded within five years. If the gap between gas and steam cycle award dates is greater than five years, the Block is deemed an Independent Steam Cycle Development and Block award date is assigned the earlier award date of the steam cycle components. Replacement equipment is not considered for this analysis.
- CAPACITY: The capacity of a Block (project capacity) is estimated at 150% of GT capacity (for Blocks of which the GT award date is used) and 300% of HRSG or ST capacity (for Blocks of which ST or HRSG award dates are used) which is based upon generally accepted Block thermal dynamics whereby 50% of the GT capacity is recaptured by the steam cycle.
- PROJECT CAPACITY V. CAPACITY: Please note that project capacity is different from “capacity” when the latter appears in the Official League Tables (pp 9, 10, and 11) and other places. This capacity is the same capacity used in each of our GT, HRSG and ST reports. See the footnotes on each page for clarifications.
- OTHER CONSIDERATIONS: Many CC Blocks do not conform to the above methodology of data compilation. These exceptions, for which there are several dozen, are still subject to a method which we would be happy to share with anyone interested, but the details are too unique and specific to present on this page.