
MEP
GIANTS
2023
EATON
Powering Business Worldwide
CONSULTING - SPECIFYING
engineer®

EATON CONGRATULATES THE 2023 MEP GIANTS WINNERS

Chris M. Finen, P.E.
Manager
National Application Engineers

It brings us tremendous pride to recognize the best of the best across the engineering community. As a longtime supporter of the *Consulting-Specifying Engineer* MEP Giants program, we salute every engineering firm working to accelerate a stronger and safer future for communities everywhere.

Engineering has always been exciting, but this moment in history is exceptional. We're solving how to electrify, decarbonize and digitalize infrastructure – paving the way toward a far more resilient and sustainable tomorrow.

At Eaton, we're reinventing the way energy systems work through our industry expertise, pioneering solutions and collaboration with you. Our power management technologies are helping improve people's lives and the environment by making energy systems more reliable, efficient, safe, and sustainable. In particular, the electrification of transport is having major impact on the electrical grid. Eaton EV charging technologies and expertise are helping transform electrical systems into scalable, secure and resilient energy hubs that can charge/discharge EVs without overtaxing existing infrastructure.

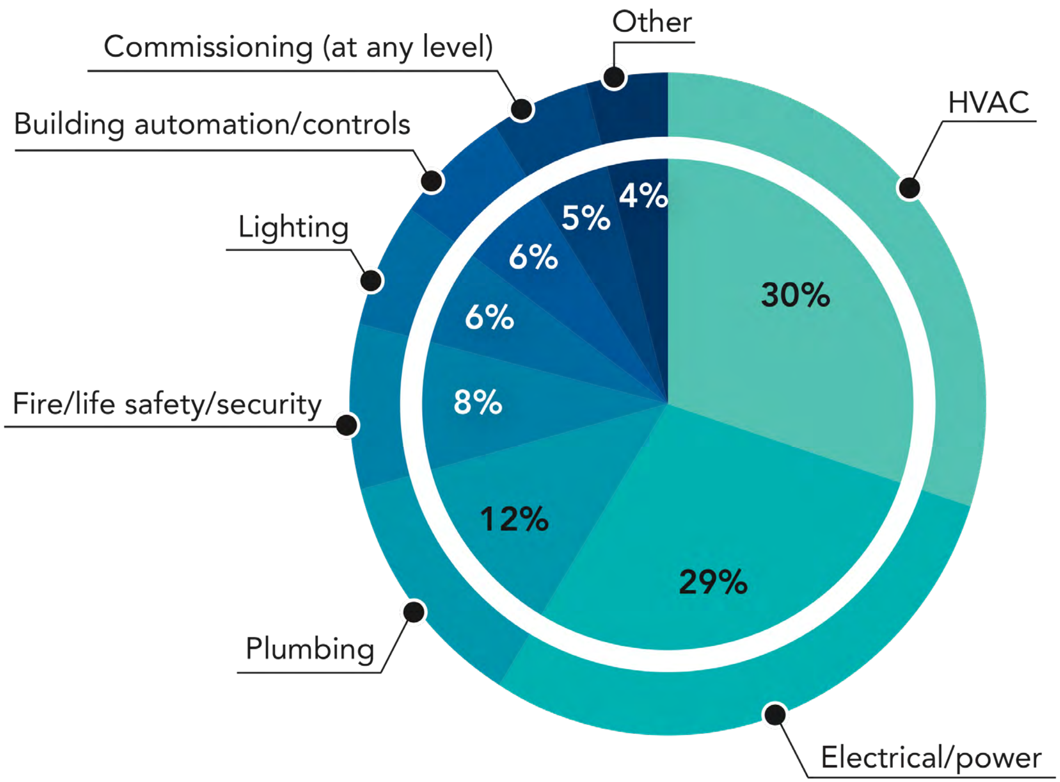
Our expansive training platforms will help you keep up with an industry that's rapidly changing, and we have hundreds of application experts ready to help you succeed. Together, we are your trusted partners to help your clients realize the full potential of their energy systems.

On behalf of everyone at Eaton, we congratulate you on all the work you are doing to build a more sustainable, resilient, and digitally enabled future. And, we thank *Consulting-Specifying Engineer* for the opportunity to help recognize all of you as 2023 MEP Giants.

Chris M. Finen, P.E.
Manager, National Application Engineers
Eaton

BY THE NUMBERS

PERCENTAGE OF MEP DESIGN BILLINGS



$67,668,209,517
Grand total gross revenue

$11,968,160,903
Grand total MEP design revenue

62,470
Total engineers employed

8,265
LEED APs on staff

89%
Of MEP design revenue came from projects within the U.S.

30%
Of expenditures are allocated to new tools, such as software or hardware, on average

26%
Cite "staffing: quality of young engineers" as their biggest corporate challenge

28%
Provided engineering services to the Carribean in 2022

19%
Of engineering staff are female

15%
Of 2022 MEP design revenue was earned from hospital or health care facility projects

2023 MEP GIANTS INDEX

RANK	FIRM NAME
15	Affiliated Engineers Inc.
37	AKF
4	Alfa Tech Consulting Engineers Inc.
43	AMA Group
55	Arora Engineers LLC
14	Arup Inc.
47	Bala Consulting Engineers
18	Bard, Rao + Athanas Consulting Engineers LLC
73	Bernhard
88	Bowman Consulting Group Ltd.
82	Bridgers & Paxton Consulting Engineers Inc.
68	BRPH Architects Engineers Inc.
94	BSA LifeStructures
90	Burdette, Koehler, Murphy & Associates Inc.
2	Burns & McDonnell
28	Burns Engineering Inc.
35	CannonDesign
57	CDM Smith Inc.
72	CJL Engineering
97	Cleary Zimmermann Engineers LLC
17	CMTA
76	Concord Engineering Group Inc
63	Core States Group
24	CRB
70	Cushing Terrell
30	Dewberry
39	DLR Group
58	Dunham Associates
89	EEA Consulting Engineers
22	ESD
42	EwingCole
10	EXP
45	Gannett Fleming
41	Ghafari Associates LLC

RANK	FIRM NAME
92	GHT Limited
78	GPI/Greenman-Pedersen Inc.
65	H.F. Lenz Co.
60	H2M architects + engineers
7	HDR Inc.
49	HEAPY
96	HED
16	Henderson Engineers
53	HGA
69	Highland Associates
29	I. C. Thomasson Associates Inc.
13	IMEG
33	Interface Engineering Inc.
12	IPS-Integrated Project Services LLC
1	Jacobs
23	Jaros, Baum & Bolles
8	Jensen Hughes
64	Johnson Mirmiran Thompson Inc
38	Jordan & Skala Engineers
79	Karpinski Engineering
71	Kimley-Horn
59	LaBella Associates
100	LEO A DALY
67	Lilker, an IMEG company
86	LiRo Engineers Inc.
98	Lizardos Engineering Associates
50	Loring Consulting Engineers Inc.
61	M/E Engineering P.C.
81	Matrix Technolgies Inc.
84	McKim & Creed
44	McKinstry
32	ME Engineers
48	MG Engineering D.P.C.

RANK	FIRM NAME
75	Michaud Cooley Erickson
56	Morrison Hershfield
5	Mott MacDonald
20	NV5 Global Inc.
77	Osborn Engineering
34	P2S Inc.
93	PBS Engineers
87	Peter Basso Associates Inc.
85	Pond
62	Power Design Inc.
52	RMF Engineering Inc.
51	RTM Engineering Consultants LLC
95	Rushing
11	Salas O'Brien
83	Sazan Group
80	SETTY
36	Smith Seckman Reid Inc.
31	SmithGroup
26	Southland Industries
66	Spectrum Engineers Inc.
27	SSOE Inc
46	Stanley Consultants
9	Stantec Inc.
73	STV
19	Syska Hennessy Group
6	Tetra Tech High Performance Buildings Group
99	The Engineering Enterprise
40	ThermalTech Engineering Inc.
25	TLC Engineering Solutions
21	Vanderweil Engineers
54	WB Engineers+Consultants
90	Wiley|Wilson
3	WSP

2023 MEP GIANTS

RANK	FIRM NAME	LOCATION	TOTAL GROSS REVENUE FOR FISCAL YEAR ($ US)	TOTAL MEP DESIGN REVENUE ($ US)	PERCENT MEP REVENUE	MEP REVENUE, U.S. PROJECTS
1	Jacobs	Dallas, TX, U.S.	$14,922,800,000	$2,478,000,000	17%	70%
2	Burns & McDonnell	Kansas City, MO, U.S.	$6,560,000,000	$945,790,244	14%	98%
3	WSP	New York, NY, U.S.	$8,916,899,550	$824,786,370	9%	38%
4	Alfa Tech Consulting Engineers Inc.	San Jose, CA, U.S.	$1,700,000,000	$700,000,000	41%	10%
5	Mott MacDonald	Iselin, NJ, U.S.	$2,517,244,000	$654,922,628	26%	26%
6	Tetra Tech High Performance Buildings Group	Pasadena, CA, U.S.	$3,504,048,000	$477,111,208	14%	39%
7	HDR Inc.	Omaha, NE, U.S.	$3,291,000,000	$388,375,488	12%	64%
8	Jensen Hughes	Baltimore, MD, U.S.	$330,000,000	$305,000,000	92%	68%
9	Stantec Inc.	Edmonton, AB, Canada	$4,361,312,008	$284,461,496	7%	34%
10	EXP	Brampton, ON, U.S.	$804,560,000	$260,426,000	32%	51%
11	Salas O'Brien	Irvine, CA, U.S.	$402,974,169	$246,991,995	61%	99%
12	IPS-Integrated Project Services LLC	Blue Bell, PA, U.S.	$1,351,865,148	$202,707,344	15%	75%
13	IMEG	Rock Island, IL, U.S.	$383,000,000	$201,160,000	53%	99%
14	Arup Inc.	New York, NY, U.S.	$539,591,635	$179,212,770	33%	33%
15	Affiliated Engineers Inc.	Madison, WI, U.S.	$181,344,000	$171,064,000	94%	100%
16	Henderson Engineers	Lenexa, KS, U.S.	$152,042,199	$152,042,199	100%	99%
17	CMTA	Prospect, KY, U.S.	$264,752,144	$129,246,806	49%	100%
18	Bard, Rao + Athanas Consulting Engineers LLC	Boston, MA, U.S.	$126,500,000	$126,500,000	100%	99%
19	Syska Hennessy Group	New York, NY, U.S.	$127,724,515	$121,290,883	95%	99%
20	NV5 Global Inc.	Hollywood, FL, U.S.	$905,905,000	$119,086,188	13%	84%
21	Vanderweil Engineers	Boston, MA, U.S.	$107,866,300	$92,335,500	86%	96%
22	ESD	Chicago, IL, U.S.	$106,447,213	$86,105,900	81%	99%
23	Jaros, Baum & Bolles	New York, NY, U.S.	$91,183,389	$84,687,259	93%	99%
24	CRB	Kansas City, MO, U.S.	$254,412,161	$79,881,480	31%	85%
25	TLC Engineering Solutions	Orlando, FL, U.S.	$94,079,662	$78,016,114	83%	98%
26	Southland Industries	Garden Grove, CA, U.S.	$1,423,325,930	$76,017,210	5%	100%
27	SSOE Inc	Toledo, OH, U.S.	$277,200,000	$75,351,239	27%	65%
28	Burns Engineering Inc.	Philadelphia, PA, U.S.	$77,061,602	$72,474,363	94%	100%
29	I. C. Thomasson Associates Inc.	Nashville, TN, U.S.	$75,774,000	$68,603,522	91%	100%
30	Dewberry	Fairfax, VA, U.S.	$602,700,000	$67,496,065	11%	95%
31	SmithGroup	Detroit, MI, U.S.	$354,084,386	$67,183,422	19%	18%
32	ME Engineers	Golden, CO, U.S.	$62,000,000	$62,000,000	100%	87%
33	Interface Engineering Inc.	Portland, OR, U.S.	$59,444,404	$57,323,596	96%	95%

2023 MEP GIANTS

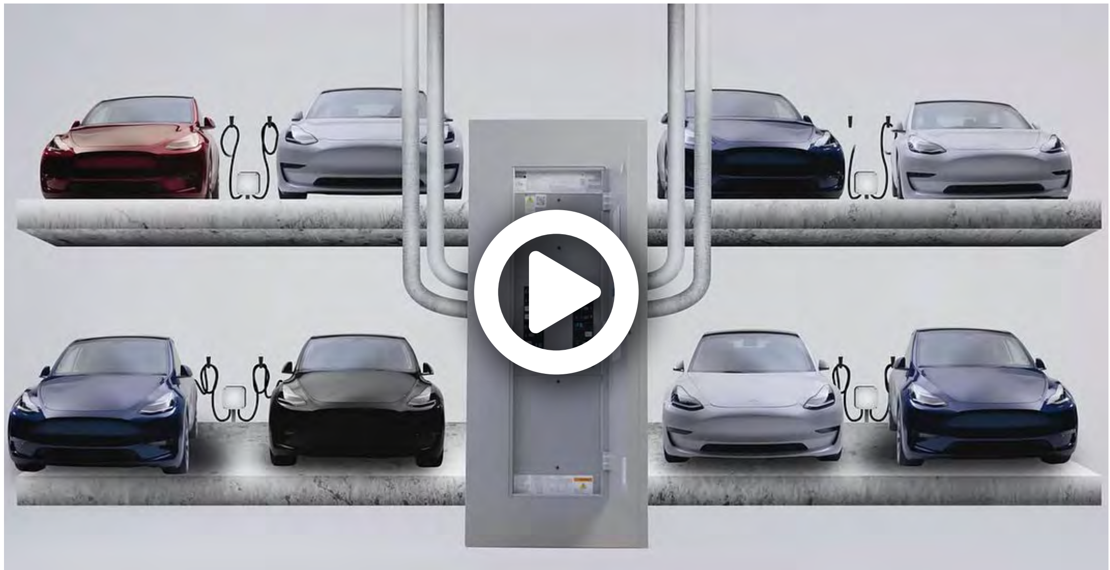
RANK	FIRM NAME	LOCATION	TOTAL GROSS REVENUE FOR FISCAL YEAR ($ US)	TOTAL MEP DESIGN REVENUE ($ US)	PERCENT MEP REVENUE	MEP REVENUE, U.S. PROJECTS
34	P2S Inc.	Long Beach, CA, U.S.	$63,134,229	$56,491,673	89%	100%
35	CannonDesign	New York, NY, U.S.	$326,000,000	$56,000,000	17%	100%
36	Smith Seckman Reid Inc.	Nashville, TN, U.S.	$104,261,252	$55,850,318	54%	100%
37	AKF	New York, NY, U.S.	$61,000,000	$55,000,000	90%	99%
38	Jordan & Skala Engineers	Norcross, GA, U.S.	$59,133,000	$54,807,000	93%	100%
39	DLR Group	Minneapolis, MN, U.S.	$334,360,000	$51,655,000	15%	15%
40	ThermalTech Engineering Inc.	Cincinnati, OH, U.S.	$168,000,000	$51,200,000	30%	99%
41	Ghafari Associates LLC	Dearborn, MI, U.S.	$163,344,000	$50,500,000	31%	92%
42	EwingCole	Philadelphia, PA, U.S.	$122,807,000	$49,122,800	40%	100%
43	AMA Group	New York, NY, U.S.	$90,000,000	$49,000,000	54%	100%
44	McKinstry	Seattle, WA, U.S.	$940,000,000	$47,000,000	5%	100%
45	Gannett Fleming	Camp Hill, PA, U.S.	$730,000,000	$45,000,000	6%	100%
46	Stanley Consultants	Muscatine, IA, U.S.	$191,720,256	$44,938,114	23%	95%
47	Bala Consulting Engineers	Wayne, PA, U.S.	$46,000,000	$42,200,000	92%	100%
48	MG Engineering D.P.C.	New York, NY, U.S.	$40,450,000	$40,450,000	100%	90%
49	HEAPY	Dayton, OH, U.S.	$62,794,000	$40,297,000	64%	100%
50	Loring Consulting Engineers Inc.	New York, NY, U.S.	$41,072,000	$40,000,000	97%	96%
51	RTM Engineering Consultants LLC	Schaumburg, IL, U.S.	$48,219,000	$39,888,000	83%	100%
52	RMF Engineering Inc.	Baltimore, MD, U.S.	$63,000,000	$39,363,339	62%	100%
53	HGA	Minneapolis, MN, U.S.	$272,563,173	$37,714,191	14%	99%
54	WB Engineers+Consultants	New York, NY, U.S.	$49,732,000	$37,570,000	76%	100%
55	Arora Engineers LLC	Chadds Ford, PA, U.S.	$52,490,835	$37,350,900	71%	100%
56	Morrison Hershfield	Markham, ON, Canada	$148,234,714	$36,878,094	25%	53%
57	CDM Smith Inc.	Boston, MA, U.S.	$1,420,600,000	$36,403,121	3%	3%
58	Dunham Associates	Minneapolis, MN, U.S.	$36,850,000	$36,140,000	98%	98%
59	LaBella Associates	Rochester, NY, U.S.	$245,271,570	$35,609,111	15%	100%
60	H2M architects + engineers	Melville, NY, U.S.	$93,438,503	$35,093,839	38%	100%
61	M/E Engineering P.C.	Rochester, NY, U.S.	$30,500,000	$30,500,000	100%	100%
62	Power Design Inc.	Saint Petersburg, FL, U.S.	$987,000,000	$29,425,554	3%	100%
63	Core States Group	Duluth, GA, U.S.	$154,970,036	$27,891,672	18%	99%
64	Johnson Mirmiran Thompson Inc	Hunt Valley, MD, U.S.	$362,100,000	$27,710,859	8%	100%
65	H.F. Lenz Co.	Johnstown, PA, U.S.	$32,229,434	$27,001,806	84%	100%
66	Spectrum Engineers Inc.	Salt Lake City, UT, U.S.	$26,500,000	$26,500,000	100%	100%

2023 MEP GIANTS

RANK	FIRM NAME	LOCATION	TOTAL GROSS REVENUE FOR FISCAL YEAR ($ US)	TOTAL MEP DESIGN REVENUE ($ US)	PERCENT MEP REVENUE	MEP REVENUE, U.S. PROJECTS
67	Lilker, an IMEG company	New York, NY, U.S.	$27,410,357	$26,160,000	95%	100%
68	BRPH Architects Engineers Inc.	Melbourne, FL, U.S.	$71,180,000	$25,625,000	36%	99%
69	Highland Associates	New York, NY, U.S.	$43,200,000	$25,400,000	59%	100%
70	Cushing Terrell	Billings, MT, U.S.	$91,726,196	$25,343,247	28%	99%
71	Kimley-Horn	Raleigh, NC, U.S.	$2,030,000,000	$24,400,000	1%	100%
72	CJL Engineering	Moon Township, PA, U.S.	$24,212,501	$24,212,501	100%	100%
73	Bernhard	Metairie, LA, U.S.	$45,000,000	$23,000,000	51%	100%
73	STV	New York, NY, U.S.	$696,026,000	$23,000,000	3%	100%
75	Michaud Cooley Erickson	Minneapolis, MN, U.S.	$22,790,000	$22,790,000	100%	100%
76	Concord Engineering Group Inc	Voorhees, NJ, U.S.	$25,000,000	$22,000,000	88%	100%
77	Osborn Engineering	Cleveland, OH, U.S.	$47,969,000	$21,859,564	46%	100%
78	GPI/Greenman-Pedersen Inc.	Babylon, NY, U.S.	$352,000,000	$21,500,000	6%	100%
79	Karpinski Engineering	Cleveland, OH, U.S.	$21,300,000	$20,700,000	97%	100%
80	SETTY	Washington, DC, U.S.	$21,467,723	$20,615,160	96%	100%
81	Matrix Technolgies Inc.	Maumee, OH, U.S.	$86,022,729	$20,211,076	23%	99%
82	Bridgers & Paxton Consulting Engineers Inc.	Albuquerque, NM, U.S.	$19,965,791	$19,965,791	100%	100%
83	Sazan Group	Seattle, WA, U.S.	$19,903,644	$19,377,353	97%	100%
84	McKim & Creed	Raleigh, NC, U.S.	$143,508,194	$19,245,045	13%	100%
85	Pond	Peachtree Corners, GA, U.S.	$167,653,773	$18,979,593	11%	98%
86	LiRo Engineers Inc.	Syosset, NY, U.S.	$502,000,000	$18,324,000	4%	100%
87	Peter Basso Associates Inc.	Troy, MI, U.S.	$18,500,000	$17,900,000	97%	100%
88	Bowman Consulting Group Ltd.	Reston, VA, U.S.	$260,200,000	$17,726,501	7%	100%
89	EEA Consulting Engineers	Austin, TX, U.S.	$22,925,177	$17,443,173	76%	100%
90	Burdette, Koehler, Murphy & Associates Inc.	Baltimore, MD, U.S.	$16,800,000	$16,800,000	100%	100%
90	Wiley|Wilson	Lynchburg, VA, U.S.	$36,500,000	$16,800,000	46%	100%
92	GHT Limited	Arlington, VA, U.S.	$16,013,000	$16,013,000	100%	100%
93	PBS Engineers	Glendora, CA, U.S.	$16,000,000	$16,000,000	100%	100%
94	BSA LifeStructures	Indianapolis, IN, U.S.	$50,382,134	$15,790,000	31%	100%
95	Rushing	Seattle, WA, U.S.	$15,659,887	$15,659,887	100%	100%
96	HED	Royal Oak, MI, U.S.	$113,100,000	$15,375,000	14%	100%
97	Cleary Zimmermann Engineers LLC	San Antonio, TX, U.S.	$14,800,000	$14,800,000	100%	100%
98	Lizardos Engineering Associates	Mineola, NY, U.S.	$13,100,000	$13,100,000	100%	100%
99	The Engineering Enterprise	Alameda, CA, U.S.	$13,000,000	$13,000,000	100%	100%
100	LEO A DALY	Omaha, NE, U.S.	$105,976,994	$12,841,333	12%	95%

FAST, CONVENIENT AND SUSTAINABLE EV CHARGING IS A MUST

Powering Business Worldwide



Fast, convenient and sustainable EV charging is a must

The future of transportation is electric. While that changes how vehicles are powered, it does not require you to adjust your driving habits or pay a premium on your electric bill. Instead, fast and cost-effective charging is a must. Enter Green Motion EV smart breaker chargers—fast AC charging, powered by smart breakers. Eaton chargers deliver real-time energy insights and enable integration with onsite renewable and energy storage systems to advance smart and sustainable energy systems to power today and tomorrow. Learn more at **Eaton.com/ev-charging**

Amara Rozgus, Editor-in-Chief, and Amanda McLeman, Director of Research, *Consulting-Specifying Engineer*

MEP Giants annual design revenue rises, bucking certain trends

While the economy sits at a slow burn, the 2023 MEP Giants firms continue to do well

The 2023 MEP Giants generated $11.96 billion in mechanical, electrical, plumbing (MEP) and fire protection engineering design revenue, an increase over last year's MEP Giants' revenue of $11.01 billion. This year, the 2023 MEP Giants earned approximately $67.66 billion in gross annual revenue during the previous fiscal year, a decrease of 4%. Gross revenue was down, however MEP design revenue rose 9% over last year's numbers. Figure 1 shows the various building specialties in which the 100 firms that make up the MEP Giants earned revenue.

Noticeably absent from the top 10 was AECOM, a regular to this list. There were also some newcomers to the total of 100 companies. Several companies either joined the list for the first time or returned after time away from reporting data (in alphabetical order): AMA Group; Bard, Rao + Athanas Consulting Engineers LLC; Burdette, Koehler, Murphy & Associates Inc.; Cleary Zimmermann Engineers

Figure 1: The top two areas in which 2023 MEP Giants earned revenue — HVAC and electrical/power projects — varies very little year over year. Courtesy: *Consulting-Specifying Engineer*

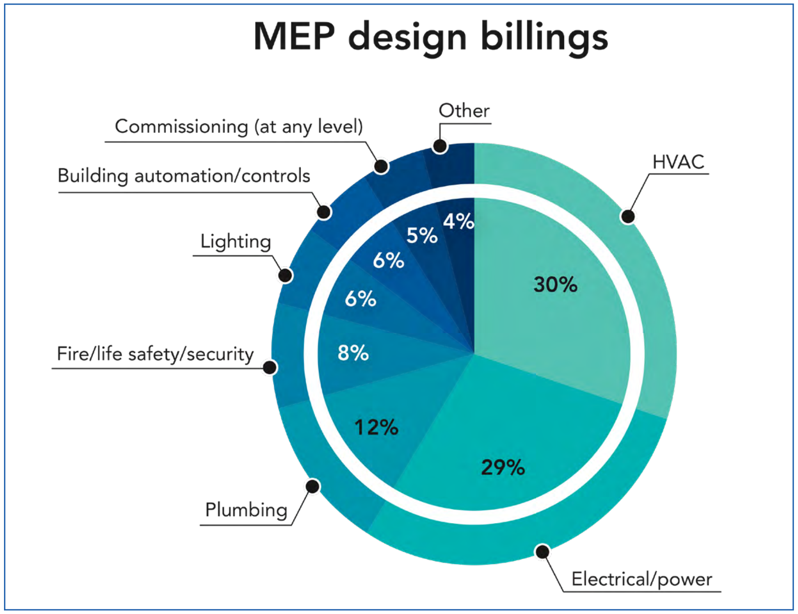


Table 1: Top 10 firms are listed by MEP design revenue. Jacobs topped the list yet again — as it has since 2013 — with $2.4 billion in MEP design revenue, a 33% increase from last year. Courtesy: *Consulting-Specifying Engineer*

Table 1: Top 10 firms by MEP design revenue

Rank	Firm	MEP design revenue
1	Jacobs	$2,478,000,000
2	Burns & McDonnell	$945,790,244
3	WSP	$824,786,370
4	Alfa Tech Consulting Engineers Inc.	$700,000,000
5	Mott MacDonald	$654,922,628
6	Tetra Tech High Performance Buildings Group	$477,111,208
7	HDR Inc.	$388,375,488
8	Jensen Hughes	$305,000,000
9	Stantec Inc.	$284,461,496
10	EXP	$260,426,000

LLC; The Engineering Enterprise; Interface Engineering Inc.; Kimley-Horn; LEO A DALY; and Lizardos Engineering Associates.

The list this year comprises 54% private companies (down from 59% in 2022), 28% employee-owned companies, 9% public companies and 9% limited-liability companies. The 2023 MEP Giants are made up of consulting engineering firms (63%, up from 60% last year) and architectural engineering firms (29%, even with last year).

Several mergers and acquisitions occurred in the past year; 26% of the firms reporting acquired another company, a slight dip from last year's 29% acquisition rate (**see page 22** for the article "What made for another strong year for the MEP Giants?").

Table 1 shows the top firms based on MEP design revenue, which is how the MEP Giants are ranked.

Human resources

The 2023 MEP Giants firms employ 26,606 MEP/FP engineers, with an average of 266 engineers at each firm. Last year, 32,871 MEP/FP engineers were employed by the MEP Giants. On average, each 2023 MEP Giants firm has 127 mechanical engineers (down from 155 in 2022), 108 electrical engineers (down from 139), 20 plumbing engineers (no change), 11 fire protection engineers (down from 15) and 40 environmental engineers (up from 35). This year's MEP Giants employ 178,168 people, including all types of administrative staff and job titles (a decrease from last year's staffing total of 210,866 people). For the 2023 MEP Giants, firms averaged 1,781 staff members, both engineering and nonengineering staff (a dramatic decrease from 2,109 in the previous reporting period). The engineering staffs of this year's firms are made up of 19% females, the same as the previous year. When asked "What percentage of your firm's nonengineering staff are female?" respondents indicated 44% were female.

On average, firms had 83 LEED Accredited Professionals (at any level; down from 87 last year) and 8 commissioning agents or professionals (CxAs or CxPs; down from 9 last year) on the team.

In 2022, the MEP Giants earned 89% of their MEP design revenue for U.S.-based projects, a small increase from last year (88%). Several opportunities are open to MEP Giants outside the United States. Engineering services are provided in North America (Mexico, Canada) 43% of the time. Other areas of international revenue include Asia (27%, drop from 33%), the European Union (27%, slight

Figure 2: Very small shifts occur between new construction and retrofit/renovation each year; the 2023 MEP Giants data remains consistent. Courtesy: *Consulting-Specifying Engineer*

decrease), the Middle East (27%, decrease from 31%) and the Caribbean (28%, level).

When it comes to sustainable engineering, the number of U.S. Green Building Council LEED projects decreased for this reporting period; 1,238 projects were submitted for LEED certification in the past fiscal year, whereas 1,423 projects were submitted for the previous reporting period.

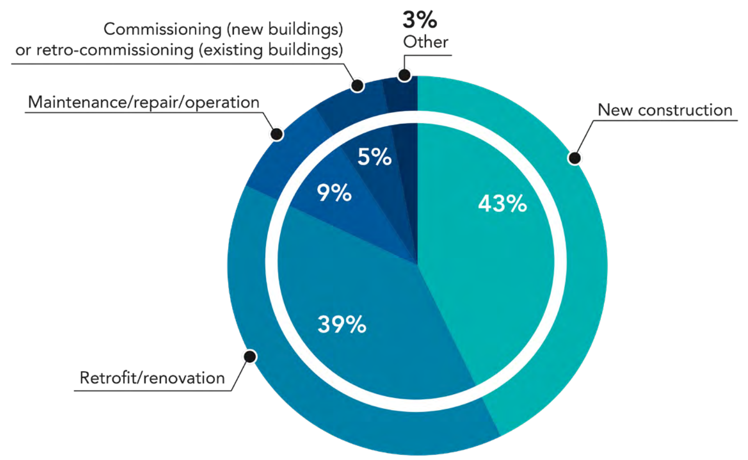
The number of projects submitted in the past fiscal year to the U.S. Environmental Protection Agency's Energy Star Buildings Label increased to 550 projects (533 last year), with an average of six projects completed by each of the 2023 MEP Giants, a slight uptick.

Project types

The 100 firms listed here do not handle all aspects of engineering. Many subcontract specialty services including acoustics (68%, down slightly from the previous year), computational fluid dynamics modeling (25%, down from 28%), construction management (22%, up from 21%) and fire/smoke systems design (17%, up from 14%) and commissioning (12%, down from 14%). Lighting controls, subcontract remained even at 10% (no change).

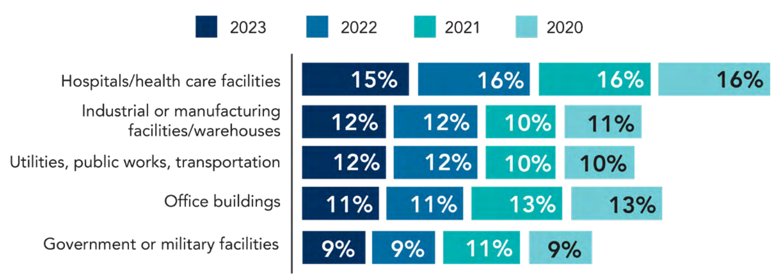
Figure 3: For the 2023 MEP Giants, the top five buildings in which the average firms earned revenue did not change from last year, and colleges/universities matched No. 5 with 9%, a slight uptick from 8%. For this reporting period, other building types included engineered multidwelling buildings (8%), K-12 schools (6%), data centers (5%) and research laboratories (5%). Courtesy: *Consulting-Specifying Engineer*

MEP design revenue



As shown in Figure 2, MEP Giants indicated that they split their time between new construction (43%, no change) and retrofit/renovation (39%, no change). These numbers have deviated only slightly year over year, with a percent or two of change each year based on economic conditions. Rounding out the projects are maintenance, repair and operations (9%); commissioning or retro-commissioning (5%); and "other" (3%). For a more in-depth report on commissioning, read the November 2023 article on the Commissioning Giants.

MEP design revenue by building type



The vast majority of MEP Giants indicated their clients included private owners (97%), architects (93%) and design/build projects (93%). Government/military (90%) and contractors (87%) round out the top five.

The average 2023 MEP Giants firm continues to work on several projects in hospitals and health care facilities, industrial or manufacturing facilities/warehouses and utilities, public works, transportation. Remaining in the fourth and fifth spots were office buildings and government or military facilities, respectively. Figure 3 breaks down the various building types in which the average MEP Giants firm works; the health care market was at the top for this reporting period, as it was the past seven years.

Read about several project profiles at www.csemag.com/giants.

Hiring and training

When asked about corporate challenge, two things rose to the top:

- Staffing: quality of young engineers: 26%
- The economy's impact on the construction market: 25%

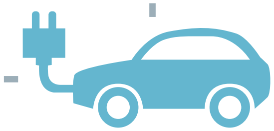
About a third of respondents also selected "other," which may have included construction or supply chain issues, COVID-19 and a variety of other challenges.

The Age Discrimination in Employment Act forbids age discrimination against people who are age 40 or older, which is why the MEP Giants uses that age as a cutoff. For this reporting year, an average of 52% of the 2023 MEP Giants staff is 40 years old or younger.

Survey methodology

At the beginning of 2023, the *Consulting-Specifying Engineer* staff collected and analyzed data from several consulting and engineering firms. Some of the top mechanical, electrical, plumbing and fire protection engineering firms submitted their firms' profiles to *Consulting-Specifying Engineer*; however, not all consulting firms were willing or able to participate in this year's MEP Giants survey. The smallest amount of MEP design revenue reported this year was more than $12.8 million. Some firms were unable to report final data.

In 2023, more than 100 engineering firms provided their information for the MEP Giants program, with some newcomers or firms reentering the program. Data and percentages are based on the top 100 companies that responded to the request for information; the results do not fully represent the construction and engineering market as a whole. However, with nearly identical questions asked in previous years and more than 100 engineering firms participating this year, we present a qualified portrait of where the top engineering firms stand in 2023.



Unpacking EV charging infrastructure system design

The acceleration of electric vehicle (EV) adoption is making an epic impact on energy systems everywhere—from the grid to homes and buildings. Every vehicle charger requires power distribution infrastructure to make it work properly. Additionally, energy habits are evolving as fueling needs change from driving to fill up at a gas station to charging your battery where you park.

By 2030, the U.S. is aiming for EVs to make up half of all vehicle sales and to build a national network of more than 500,000 installed EV chargers. That will create surging demand for electricity, with electrification efforts in transportation and building systems expected to increase electrical demand 50% by 2050.

Both new and existing infrastructure will need to be updated or designed to support EV charging. Already, some states and municipalities are requiring new building projects to include EV-ready systems. And, existing infrastructure will need to be updated to support electrification. **So, how do you design electrical systems for EV charging with the ability to scale and meet this increasing demand?**

Designing **EV Charging Infrastructure (EVCI)** is not just a simple matter of adding EV chargers. For existing energy infrastructure, intelligent EVCI is essential to maximize the existing system capacity without overloading. In new system designs, current and future charging needs must be carefully considered to avoid costly updates down the road.

Today's electric systems need to do much more than simply receive power from the grid to distribute to building loads and equipment. Instead, building infrastructure needs to act like an energy hub—effectively and affordably balancing supply and demand, while accelerating decarbonization. Furthermore, EVCI needs to not only power the vehicle's onboard batteries, but also enable V2X (vehicle-to-grid, vehicle-to-home, etc.) capability for optimizing electrical usage and maximizing system resilience.

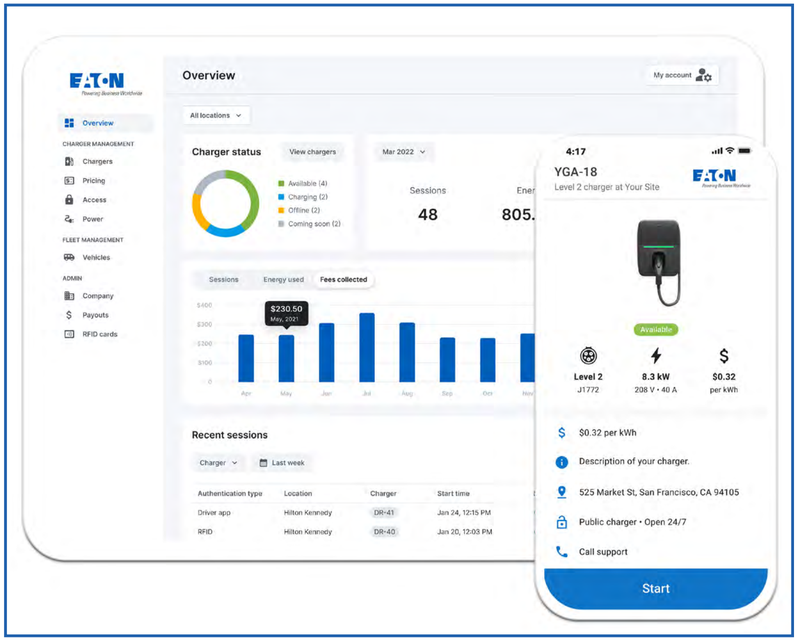
Let's dive into the design best practices enabling an efficient and sustainable approach to EV charging that offers the scalability, modularity and flexibility needed to support an all-electric future.

Intelligence is essential for the future of EV charging

As energy consumption skyrockets, the ability to closely monitor and strategically manage electrical systems becomes a major competitive edge. Intelligence from smart electrical devices is a game changer—enabling new insights, control and access needed to make the most of electrical capacity.

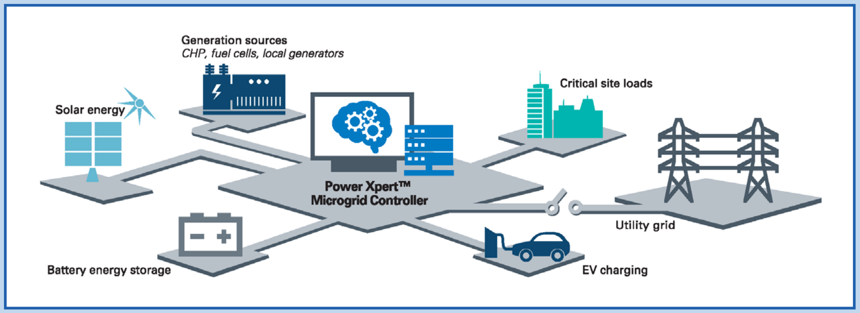
For example, merging EV charger technology and **smart breaker** technology into a single device break from tradition to offer greater flexibility and insights into optimizing energy use. Providing granular energy data, charge status, connectivity, protection and control, these smart breaker-based EV chargers can help your customers get the most out of infrastructure in the minimum amount of space.

With software like Charging Network Manager, you can install more chargers and electrify more areas of the parking lot without overloading the electrical system. Charging Network Manager software provides load management, enabling a creative and automated way to make the most of available energy and time-of-use utility rates. These types of platforms create a virtual twin of the electrical system with EV supply



Eaton's Charging Network Manager software helps optimize electrical capacity—maximizing the number of chargers and providing breakout capabilities to simplify deployment and management of networked EV charging stations from an intuitive dashboard. ***Learn more***

Microgrid design guide



Microgrids are a powerful tool to support electrification, decarbonization and energy resilience goals. They make it possible to power critical loads independently from the utility grid. By integrating onsite generation sources with energy storage and intelligent control, microgrids can balance where, when and how electricity is used to support resilience, efficiency and sustainability.

For example, adding a microgrid controller, solar and energy storage for EVCI can increase charging capacity (independent of the utility) and reduce operating costs by shifting demand to off-peak rates. These systems can also make the most out of existing energy assets such as generators by intelligently integrating and orchestrating all asset operations to reduce operating expense and maximize resilience.

However, there are many complexities when developing a site-specific microgrid plan, and no project is "one-size-fits-all." To get started, existing infrastructure and business goals need to be fully assessed to develop the right solution. This process, called a microgrid feasibility study, is essential to identify the configuration and components for specific power needs.

Download our ***comprehensive microgrid design guide*** *today to learn how you can design microgrid systems to achieve your clients' unique energy goals—whether adding capacity for EVCI, maximizing energy resilience, reducing carbon footprint or controlling rapidly rising energy costs.*

equipment and other loads, and automatically manages and adjusts the energy available for charging—enabling the fastest possible charge across networked chargers without overloading networks.

Further, Charging Network Manager provides essential capabilities to simplify deployment and management of EV charging stations beyond load management:

- Reporting on uptime to meet federal funding requirements
- Overseeing charging locations and stations
- Providing access control
- Monetizing charging infrastructure

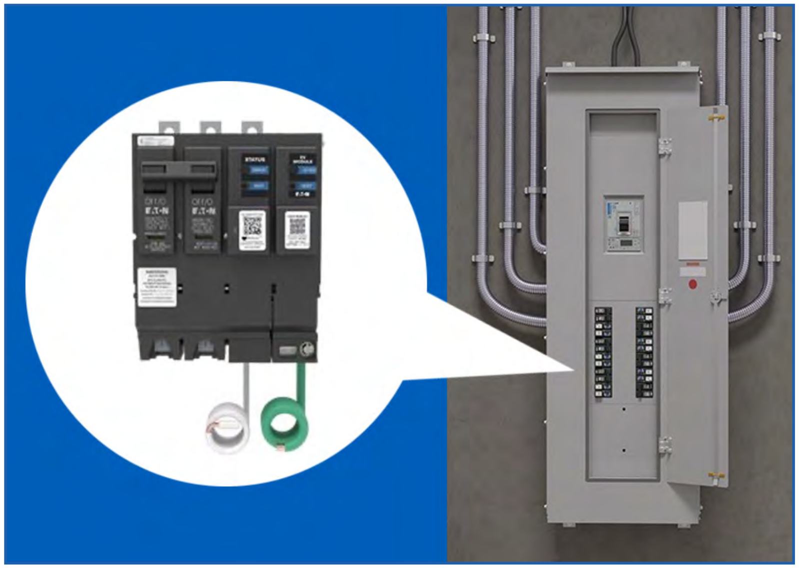
Customers looking for even greater resilience and flexibility can combine the control of all their energy assets into a **microgrid**, enabling even more capability, intelligence and control of their energy systems. Whether you're exceeding your electrical capacity, need to control energy costs, want to reduce your carbon footprint, **seek to ensure energy resilience** in the face of severe weather, or all of the above, a microgrid can help. A microgrid offers a flexible approach to scale your energy system over time as demand increases with clean, affordable energy that's generated onsite.

Interoperability and cybersecurity are foundational

With a future that is more electrified and connected than ever, interoperability and cybersecurity are essential. Electrical systems are becoming ever more complex, and everything needs to work together. At the same time, electrical systems including EVCI need to be connected—making cybersecurity a must.

Interoperability enables you to choose the best-in-breed technology and know it will work. At Eaton, we have a long-standing commitment to embracing interoperability and industry- standard open protocols. Our technology development processes address interoperability and cyber-security by design. We follow a strict Secure Development Lifecycle that is third-party certified to incorporate cybersecurity into multiple levels of the design of EV chargers. This all starts with the most stringent threat modeling and penetration testing for designs and communications protocols.

The networked EV charging solutions adhere to open standards (including **NACS**) and comply with the industry's Open Charge Point Protocol (OCPP), which is governed by the Open Charge Alliance (OCA) and formally certifies products for compliance. The cybersecurity aspect of OCPP defines an



By integrating Eaton's EVCI smart circuit breakers into traditional electrical infrastructure, Eaton is making it easier and more cost-effective to support electrification and decarbonization. ***Learn more*** end-to-end security design architecture and implementation guidelines for charging devices and management software. On the hardware side, cybersecurity is integrated at every level, including all communication interfaces and controllers. Additionally, the software element of the EV chargers is used to continuously monitor for potential vulnerabilities including malicious firmware, which will not be accepted by the chargers. To prevent intrusion, we integrate novel code that knows precisely how to decrypt, isolate and reject potentially harmful firmware uploads.

5 overarching considerations for EVCI design

Eaton's approach to EVCI integrates charging infrastructure into existing energy infrastructure to minimize the space and labor required while maximizing safety and security. This approach enables smart, cost-effective, seamless, space-saving deployment and operation while supporting modular and scalable infrastructure.

Whether you're designing EVCI for multi-family, commercial, workplace or fleet applications, there are common design considerations in the early planning process:

1. **Determine essential functionality.** What do you need the EVCI to support and where do you need it? From access control to collecting payments and load management, charging infrastructure typically needs to do a lot more than deliver power.

2. **Decide how many chargers are required—today and in the future.** Expanding electrical capacity is expensive and time intensive. While building the charging infrastructure needed today, electrical system design needs to be ready for whatever will come next.

A primer on EVCI connectivity

Here is a brief overview of available network connectivity options:

- *Cellular networks limit the cost and placement requirements of applying a network. This connectivity option is typically used for workplace or public charging where there's a small number of chargers; WiFi and wired Ethernet may be difficult to deploy in this use case or the site may not allow the EVCI to be on the network.*

- *WiFi uses existing building infrastructure to connect chargers to the available wireless network and requires a strong connection. This is often not possible in locations such as parking garages and campus environments due to the proximity to hotspots.*

- *Cellular and WiFi networks can be used together for a charging system. To reduce costs, multiple charge stations can use WiFi for the charger to communicate with a singular cellular router. This is ideal for larger installations where the EVCI is grouped and access to facility WiFi is not an option.*

- *Wired Ethernet is the most reliable communication platform and the most expensive to deploy because physical wire needs to run to each charging station. Fleet and indoor charging systems may have ready access to Ethernet.*

3. **Assess available electrical capacity.** This involves looking at what's available in the building infrastructure as well as the local utility grid constraints. It's important to note that the National Electrical Code (NEC) Article 625 requires EVCI to be considered a continuous load, which means the overcurrent protection should be sized for 125% (at minimum) of the maximum charging load and the power distribution has to be sized for 100% of the EVSE load. Using Charging Network Manager allows you to right-size your infrastructure and is allowable per the NEC.

4. **Engage with the local utility early.** Specific utility requirements for EVCI vary and it's important to understand and engage with the local utility at the beginning of the design process. For example, some utilities require new service and meters for EVCI. If your project requires additional service capacity, it will likely necessitate a utility interconnection study to determine if the existing infrastructure can support the additional load; this process takes time and working with the local utility upfront is essential.

5. **Plan how you'll connect chargers to a network.** A solid communication backbone is vital to charging system uptime and reliability. Robust network connectivity is necessary for centralized monitoring, access control, collecting payment and other important functions related to optimizing the EV charging infrastructure.

Designing EVCI for brownfield projects

With EV adoption surging, easily and cost-effectively adding chargers to existing infrastructure is crucial. Overall, the system design will hinge on the available capacity, location of the chargers, future needs and possibility of adding onsite energy assets to meet growing electrical needs.

Eaton EV Charging Busway is an industry-first technology providing overhead charging for fleets. Busway is commonly used for connecting electrical equipment to maximize power distribution system performance. Now it can deliver EV charging—providing a modular and scalable charging infrastructure. ***Learn more***

That said, for existing brownfield projects, concrete work is often one of the biggest costs to add EVCI. Thus, it's important to minimize or eliminate the need for trenching in concrete to power EV chargers.

Making the most of existing electrical capacity is a critical step. Where a power system study identifies a lack of available capacity to meet anticipated load requirements, battery storage systems can be incorporated.

Using onsite battery storage decreases the need for immediate utility upgrades, helping to expedite projects and storing energy for intelligent charging and demand response. Energy storage can also mitigate costly utility peak demand charges, which can account for upward of 70% of a site's electricity bill if not managed correctly. If renewable sources such as solar are being considered

Spotlight on the EVCI technologies enabling scalable, modular and flexible infrastructure across applications:

	Multi-family charging infrastructure	Commercial building / parking garage	Hospital and campus environments	Fleets (including campus and last-mile delivery)	On the go
Challenge	Expand and manage existing capacity with built-in flexibility for future expansion	Managing new electrical loads, access control and monetization	Balance EV charging demand with critical power needs and decarbonization goals	Develop a phased approach to EVCI while minimizing cost and required infrastructure upgrades	Charging network management, utility capacity for DC fast charging
Solution	Intelligent load management powered by smart breakers / panelboards and Charging Network Manager software	Expand electrical system capacity flexibility with energy storage and simplify monetization through secure connectivity and Charging Network Manager software	Focus on microgrid, DERs, and feasibility studies to help simplify EVCI	Simplify future scalability and accelerate deployment with overhead EV Charging Busway—allowing for additional capacity or reconfiguration Add energy storage to ensure power availability when needed and reduction of peak demand charges	Unify multi-location management and visibility with Charging Network Manager software Integrate onsite DER and energy storage to minimize reliance on utility infrastructure
Additional considerations	1. Safety and panel access 2. Indoor vs. outdoor equipment 3. Access control and tenant payment	1. Physical access and security 2. Microgrid feasibility study 3. Connectivity architecture	1. Mix of charging stations required for visitors, employees, fleet vehicles 2. Import to consider charging requirements for each type of stations 3. Connectivity architecture	Comprehensive approach to power system design – unify power system management for switchgear, transformer, charger and Charging Network Management software and energy storage	1. Service network to maintain required up time 2. Load management strategies for high volume charging

to help fill capacity gaps, onsite battery storage is often also necessary to ensure power availability without utility upgrades.

It is also critical to consider location when it comes to designing protection schemes for EVCI. Where will the chargers be located relative to the power supply? Placing chargers close to the power supply minimizes voltage drops. NEC Article 625 addresses conductor sizing, ground fault and disconnect requirements.

Further, location and physical design should be considered to comply with the Americans with Disabilities Act (ADA). Perform due diligence to ensure the charging system can be used by all and is designed in accordance with local building requirements.

Involving an electrical contractor early in the engineering process also helps support project success. They can provide valuable input, especially when it comes to distribution limitations, conduit routing, communications infrastructure and more.

Designing EVCI for greenfield sites

Many of the design considerations for brownfield projects apply to greenfield projects. The top priority should be on planning for future electricity needs to control construction costs. Size the system to accommodate the electricity requirements today and in the years to come. And create an EV-ready system to avoid costly upgrades and updates later.

Map out and plan for charging infrastructure at the start of the project to optimize power system design. Using a dedicated transformer for EVCI is a good design practice that simplifies load management. This may seem obvious, but it is important to strategically locate power distribution equipment close to charging stations to enable shorter cable runs as well as reduce costs and labor. Due diligence during these early stages is critical to avoid extra concrete work in the years to come if EVCI capacity becomes insufficient.

You also need to closely evaluate the local utility's capacity to support EV charging and overall energy needs. If the local capacity is limited, a microgrid incorporating DERs can provide the needed power.

More generally, greenfield projects present an opportunity to create solar-plus-storage-ready power systems and connections. Planning now will help simplify, expedite and reduce the cost of future investments in sustainability and energy resilience.

The Eaton Experience Centers in Pittsburgh and Houston provide a real-world, controlled demonstration environment where you can interact directly with EVCI including microgrid systems with multiple onsite power sources. ***Learn more***

Engineering is the key to an electrified future

It is an incredibly exciting time to be designing and building electrical systems. There are once-in-a-generation opportunities to transform our energy systems—building a foundation for a low-carbon, electrified future that's safe, affordable and resilient.

At Eaton, we're "all in" on electrification, and focused on simplifying the energy transition with our innovative, collaborative and holistic approach. Together, we are your trusted partner to help you realize the full potential of energy systems and accelerate a stronger future with more sustainable, resilient and intelligent energy systems.

Across North America, we have hundreds of application experts available to assist power system designers in deploying EVCI and microgrids while navigating local codes and standards.

Plus, we can help your teams navigate federal stimulus funding to make the most of recent initiatives propelling clean energy and electrical resilience projects.

Visit **Eaton.com/consultants** to explore our full range of valuable tools and resources for engineers, designers and consultants at every career stage.

EATON

Powering Business Worldwide

By Nick Belitz, CVA, Morrissey Goodale LLC, Denver

What made for another strong year for the MEP Giants?

After record M&A activity in 2021, the 2023 MEP Giants rode the momentum to another active year

With a continued focus on and investment in sustainability and energy efficiency, *Consulting-Specifying Engineer*'s 2023 MEP Giants' deal-making continued in 2022 at levels not seen before 2021. As a group, the largest mechanical, electrical, plumbing (MEP) and fire protection engineering firms completed 65 transactions in 2022 with more than one-quarter (26%) of the MEP Giants completing at least one acquisition.

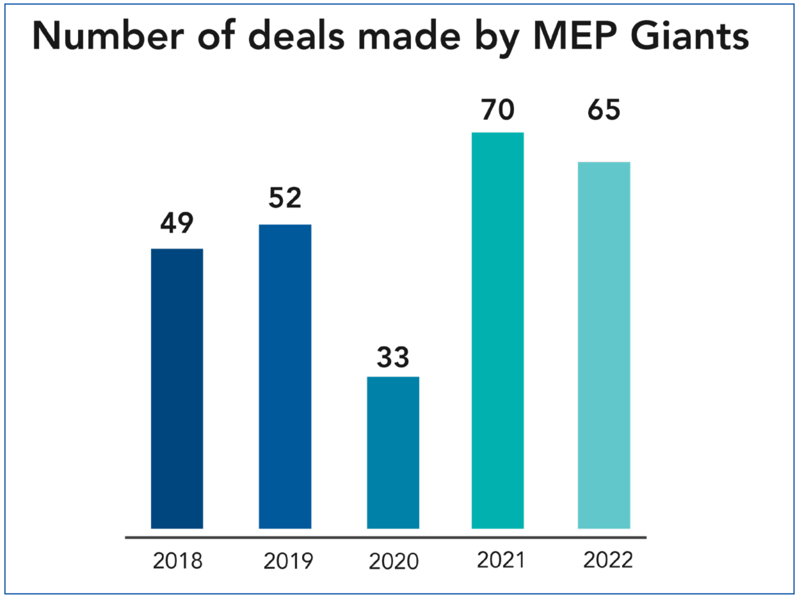


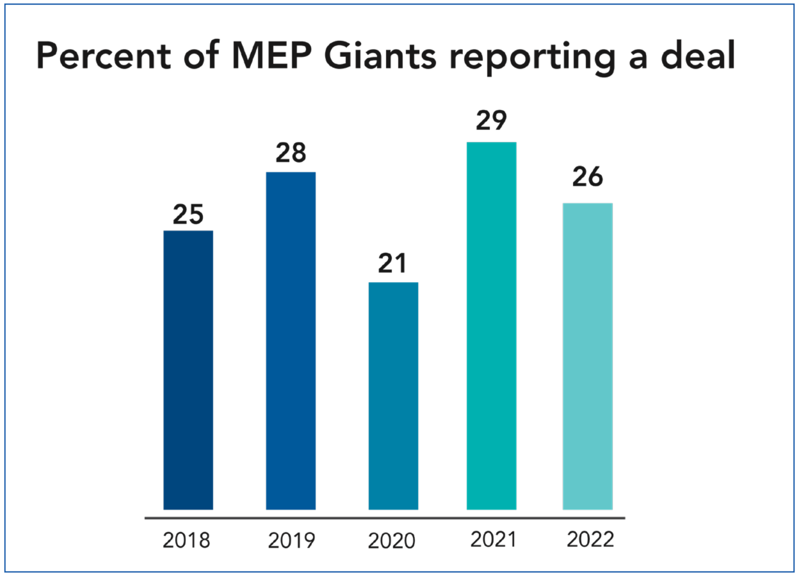
Figure 1: The number of deals made by the 2023 MEP Giants firms in 2022 was slightly down from the merger and acquisition activity by the group in 2021, with 2022 seeing five less transactions. Courtesy: Morrissey Goodale

This pace of deal-making is down slightly after 2021's record-setting year of 70 deals closed by the MEP Giants, but remains elevated compared to prior years. As companies seek to expand their capabilities, tap into new markets and gain a competitive edge in the ever-changing business landscape, the demand for MEP firms and their respective innovative and sustainable solutions will continue to drive merger and acquisition (M&A) activity.

Elevated M&A activity driven by public buyers

Fueled in part by publicly traded engineering firms' access to capital; private equity's increasing appetite

Figure 2: In 2022, 26% of the MEP Giants reported a transaction, slightly lower number compared to those who reported a transaction in the prior year. Courtesy: Morrissey Goodale



in the architecture, engineering (AE) and environmental industry; a strong economy with ample funding and need for services; and a fierce war for talent, interest in and valuations for engineering firms remain high.

M&A activity by MEP Giants mimics overall industry

Last year was yet another record-breaking year for M&A activity in the AE and environmental industry with 715 deals globally. This is the second year in a row the industry saw a new high-water mark for consolidation and the seventh year in the last nine that the industry concluded the year with a record number of deals.

In 2022, 36% of all transactions in the AE and environmental industry were made by either a private equity-backed or publicly traded engineering firm, up from 34% the prior year. Looking at the 2023 MEP Giants, publicly traded firms accounted for 49% of deals consummated in 2022, while their private equity-backed and employee-owned counterparts were neck-and-neck at 26% and 25% of all MEP Giants' acquisitions, respectively.

Why does this trend play out in the data year-over-year? First, publicly traded firms generally have even easier access to capital than private equity firms — that's why a firm goes public. Second, public buyers typically self-finance transactions without a need to borrow money or solicit third-party lenders or other stakeholders beyond the board of directors. Third, Morrissey Goodale data indicates that publicly traded firms, all else equal, pay more for deals than even private equity-backed firms, thus making offers more attractive to sellers.

Bringing things back stateside, the domestic M&A activity within the AE and environmental industry mirrors what is playing out on the global stage. In 2022, U.S. industry M&A activity increased by more than 7% to 476 transactions. For the first time in five years, U.S. industry M&A activity slowed during the COVID-19 pandemic in 2020 as the world was faced with lockdowns and supply chain crises. Despite these challenges, the domestic M&A saw a decline in deal-making of just 1% from 2019's record of 324 transactions, signifying the strength and resilience of the industry.

The 2023 MEP Giants have been on an acquisition spree for the better part of a decade and 2022 was no exception. Over the past five years, 26% of MEP Giants on average report making at least one acquisition. The slowdown in deal-making in 2020 in the broader AE and environmental industry did impact the MEP Giants as the number of transactions completed fell by 37% to just 33 from 52 the prior year.

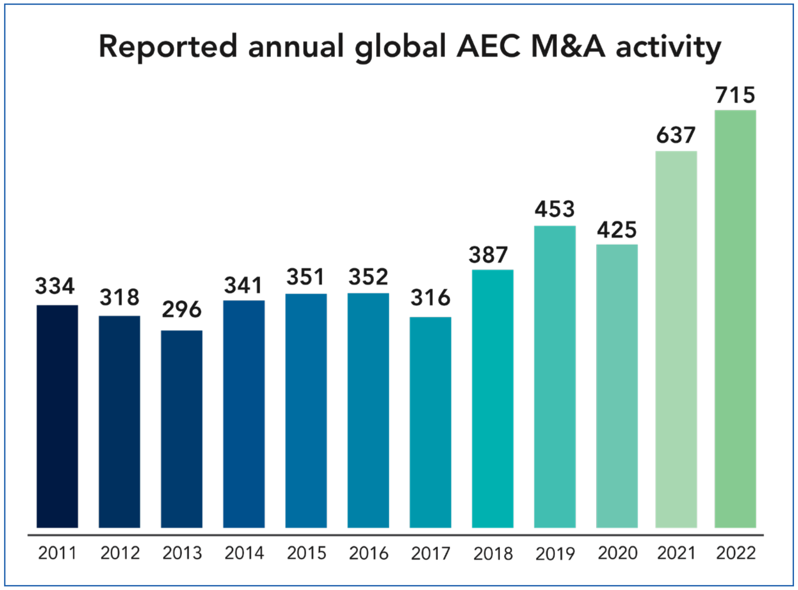


Figure 3: Global merger and acquisition activity in the engineering, architecture and environmental industry recognized a record-setting number of transactions in 2022. Courtesy: Morrissey Goodale

In years since, the MEP Giants resumed their hunt for acquisitions completing 70 and 65 transactions in 2021 and 2022, respectively. As for the where the MEP Giants made deals — California and Texas were tied for the No. 1 spot for where the industry leaders made deals, both states accounting for nine deals each in 2022. That was followed by Florida with five deals. These trends mimicked the larger industry as all three of these states tallied over 50 deals each by the larger industry in 2022.

Usual cast of characters

The most prolific acquirers of the MEP Giants in 2022 were as follows: IMEG (Rock Island, Illinois; nine deals), WSP (Montreal; nine deals), Bowman (Reston, Virginia; eight deals), Salas O'Brien (Santa Ana, California; seven deals) and NV5 (Hollywood, Florida; six deals). This looked very similar to the most frequent buyers in the 2021 as NV5 accounted for eight deals followed by Bowman (seven deals), Stantec (Edmonton, Alberta) (six deals), Salas O'Brien (six deals) and WSP (five deals).

IMEG was the firm that stepped up its M&A game as the firm accounted for nine deals in 2022, up from three deals in 2021. Other MEP Giants that made more than one deal in 2022 were Tetra Tech (Pasadena, California), Stantec, Jensen Hughes (Baltimore), Stanley Consultants (Muscatine, Iowa), CMTA (Louisville, Kentucky), RTM Engineering Consultants (Schaumburg, Illinois) and Johnson, Mirmiran & Thompson (Hunt Valley, Maryland).

In 2023, we expect MEP M&A activity to remain strong as the MEP Giants seek growth opportunities. That said, we expect the number of transactions to remain flat across the AE and environmental industry given the turmoil in the global economy. Rising interest rates across the globe may tip the scales further to publicly traded buyers as preferred partners as the cost of capital continues to climb and valuations from private equity-backed firms decline due to the increased cost of debt.

***Nick Belitz** is a principal with Morrissey Goodale LLC, a management consulting and research firm that exclusively serves the architecture, engineering and environmental consulting industries. Morrissey Goodale is a CFE Media content partner.*

Thank you for downloading the 2023 MEP Giants eBook!

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