

海通国际AI工业+能源
美国AI+数据中心能源解决最新机遇
**New Opportunities for AI+ Data Center Energy
Solutions in North America**

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2024年11月20日



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共和党执政对能源走势的影响



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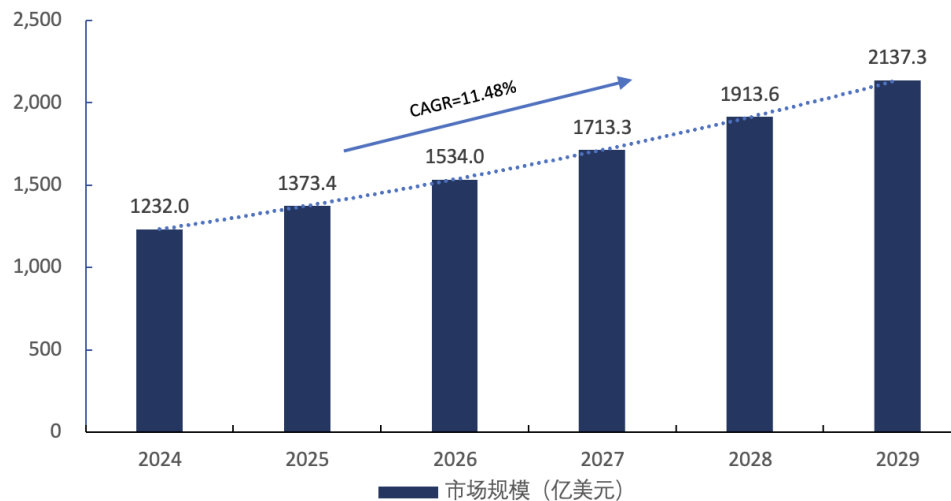


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数据中心市场规模：预计到2029年超2000亿，复合增速达11.5%

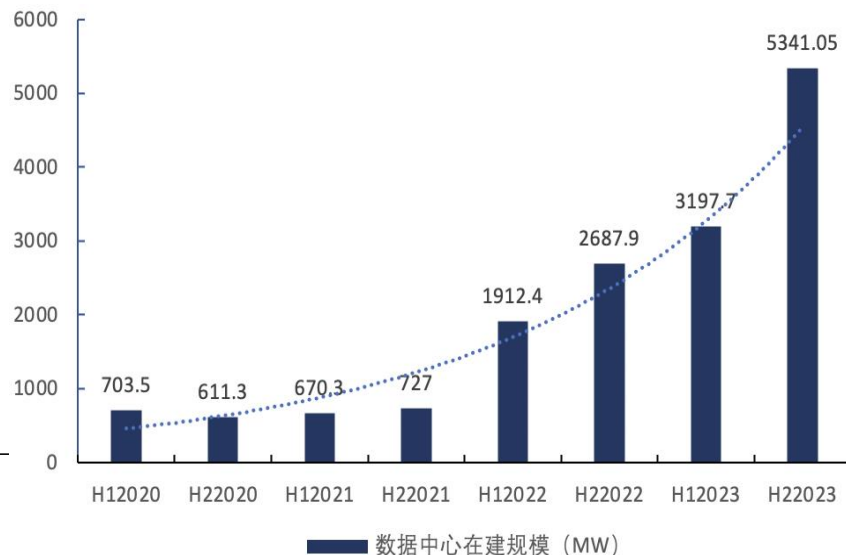
- 美国数据中心市场规模负荷增速达11.48%。
- 自2023年下半年开始美国数据中心在建规模快速攀升。

图：美国数据中心建设投资规模



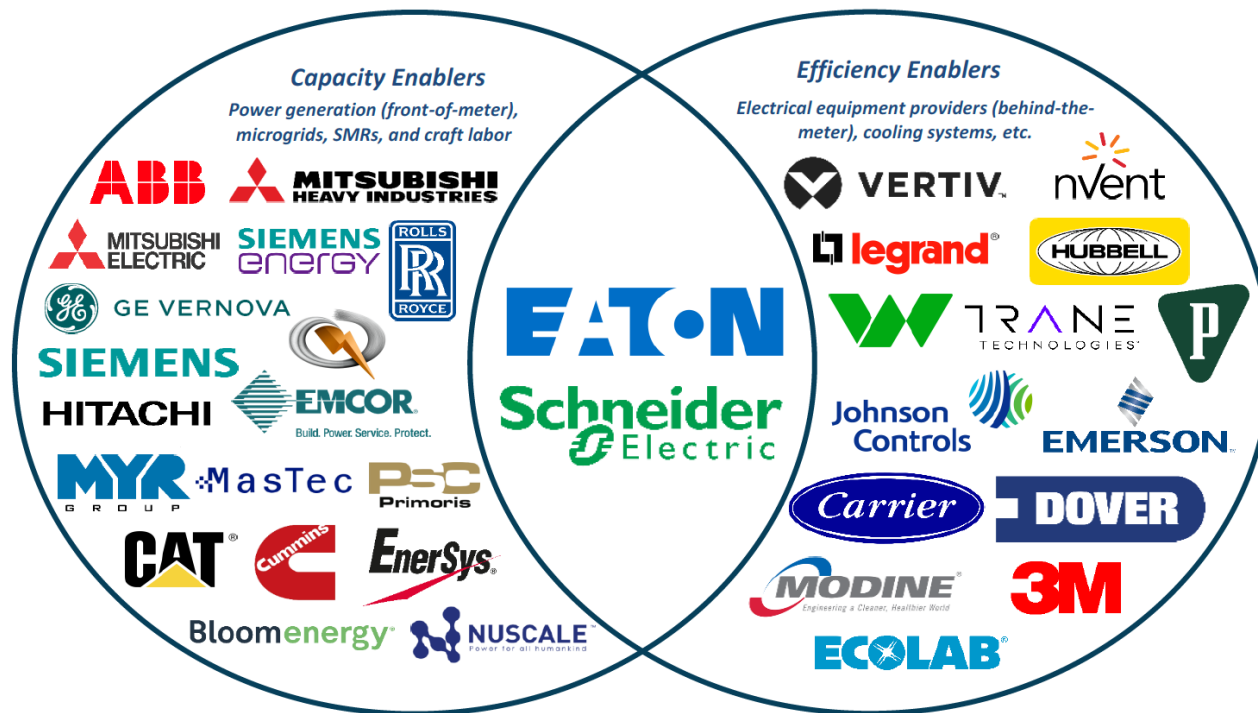
资料来源：Statista, HTI

图：美国在建数据中心情况



资料来源：JLL, HTI

图：我们了解资本货物公司如何以及哪些供应商为数据中心增值的框架：1) 谁在增加容量？ 2) 谁在提高生产力？

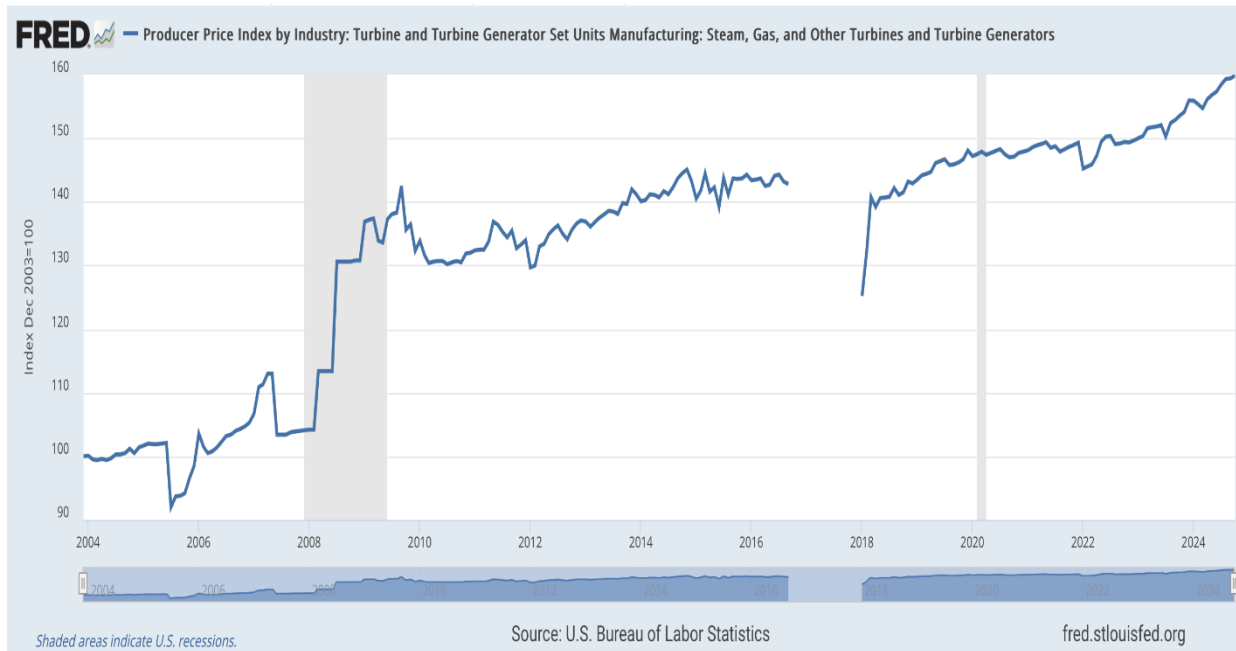


资料来源：Lawrence Berkeley National Laboratory, Edison Electric Institute, EIA, HTI

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- 蒸汽、燃气及其他汽轮机及汽轮发电机生产价格指数2024年10月为159.896，同比增长4.14%。

图：蒸汽、燃气及其他汽轮机及汽轮发电机生产价格指数



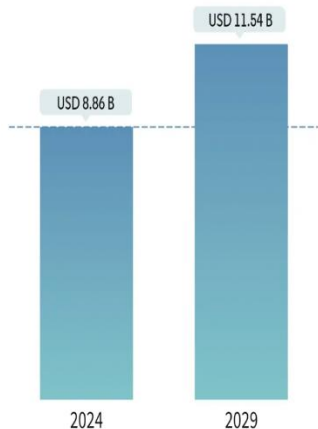
资料来源：FRED, HTI

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市场空间和竞争格局：到2029年有望达到115.4亿美元，CAGR为5.41%

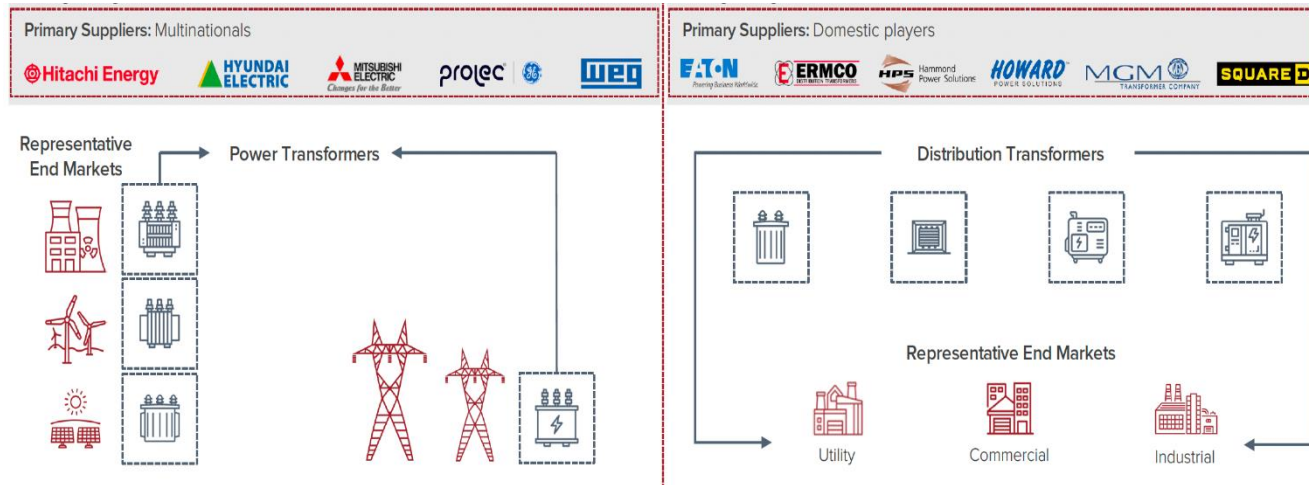
- 根据 Mordor Intelligence 数据，2024年北美变压器市场将达到88.6亿美元，到2029年预计达到115.4亿美元，2024-2029年年复合增速将达到5.41%。
- 北美变压器玩家主要为大型电气设备企业，如Hitachi、伊顿、ABB、西门子能源、GE等等。

图：北美变压器市场空间



资料来源：Mordor Intelligence, HTI

图：北美变压器主要公司



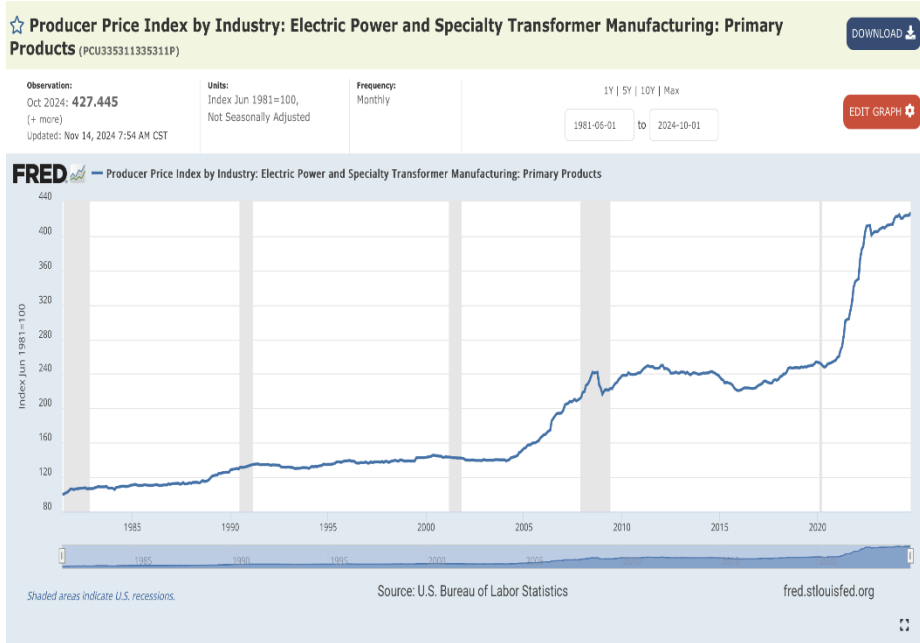
资料来源：Harris Williams, HTI

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美国变压器价格指数：10月份价格指数继续维持高位

➤ 10月份美国变压器一次产品价格指数为427.4，同比增长3.35%，变压器价格指数为433.3，同比增长3.32%。

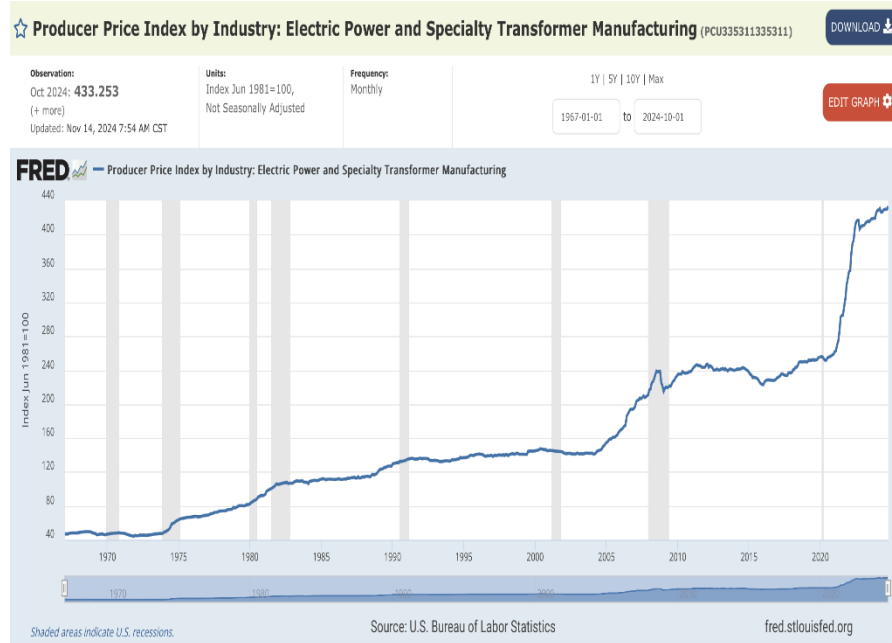
图：美国变压器一次产品价格指数



资料来源： U.S. Bureau of Labor Statistics, HTI

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图：美国变压器价格指数



资料来源： U.S. Bureau of Labor Statistics, HTI

美国解决电力短缺措施和落地项目成效

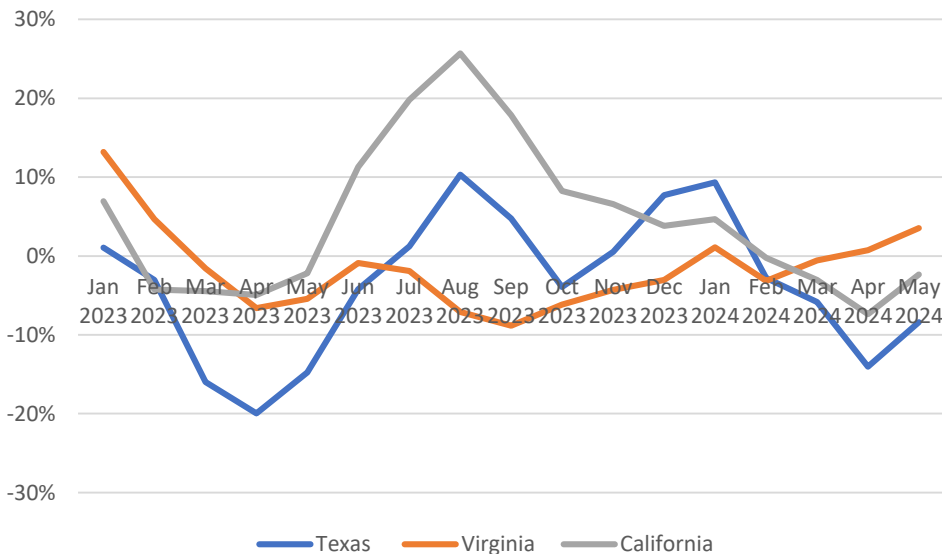


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美国电力短缺：电力需求增加带动现货及远期价格上涨

- 美国上半年整体现货电力需求稳定，夏季电价有季节性上升趋势。
- PJM在7月底的基础余量拍卖价格反映出未来电力供应趋紧。

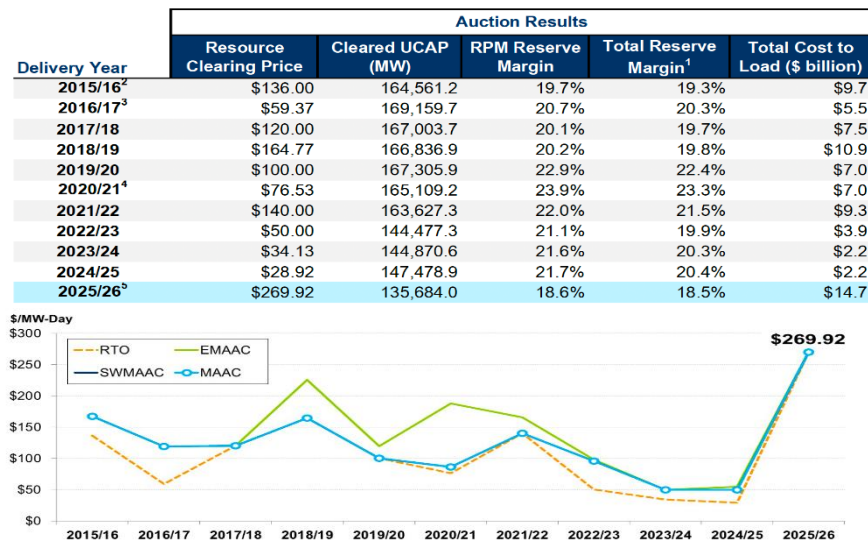
图：美国主要地区平均现货电价同比走势



资料来源：EIA, HTI

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图：美国PJM地区RPM基础余量拍卖历史清算价格（\$/MW-day）

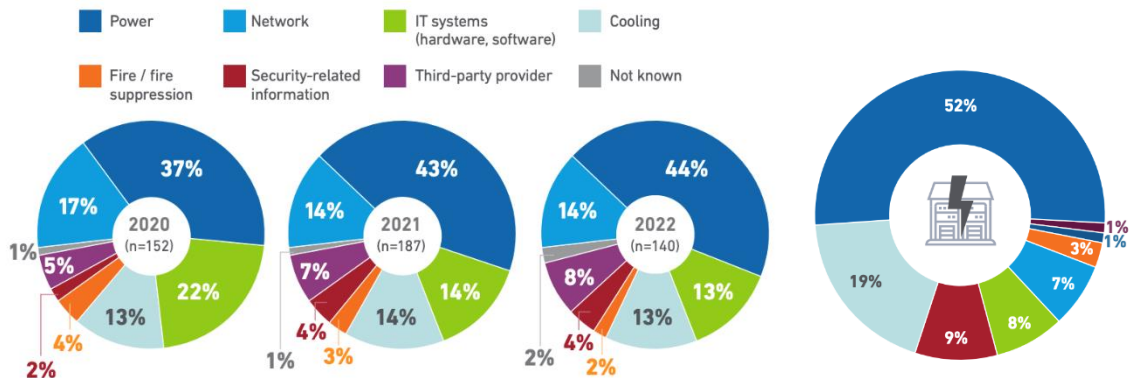


资料来源：PJM, HTI

美国电力短缺：电力对数据中心停机率影响增大

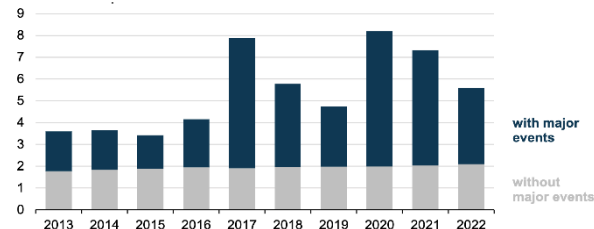
- 美国部分地区断电频发，极端天气是供电可靠性的主要挑战。
- 电力供给不足因素对数据中心供电可持续性影响越来越大。

图：美国数据中心停机原因（2020-2023）



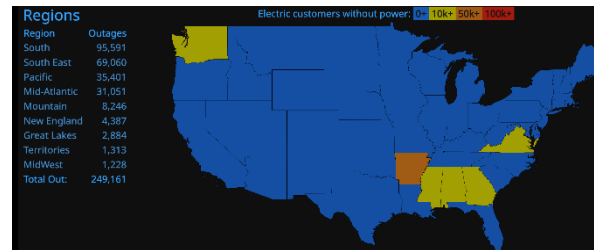
资料来源：Uptime, HTI

图：美国人均断电次数（2013-2022）



资料来源：EIA, HTI

图：美国近期各地区断电情况

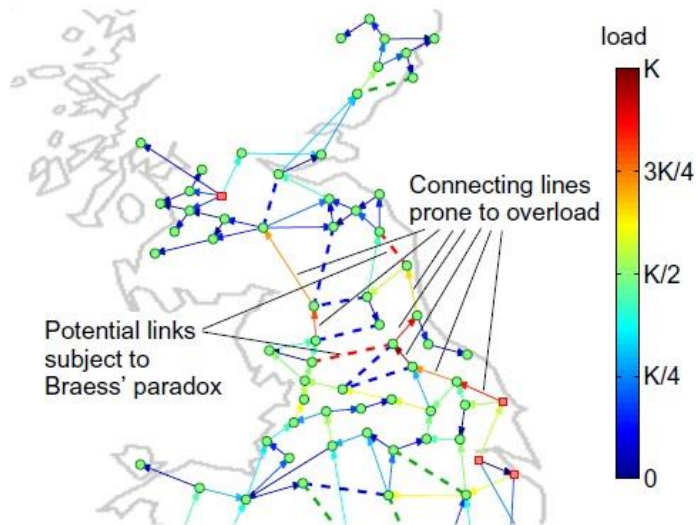


资料来源：Outage US, HTI

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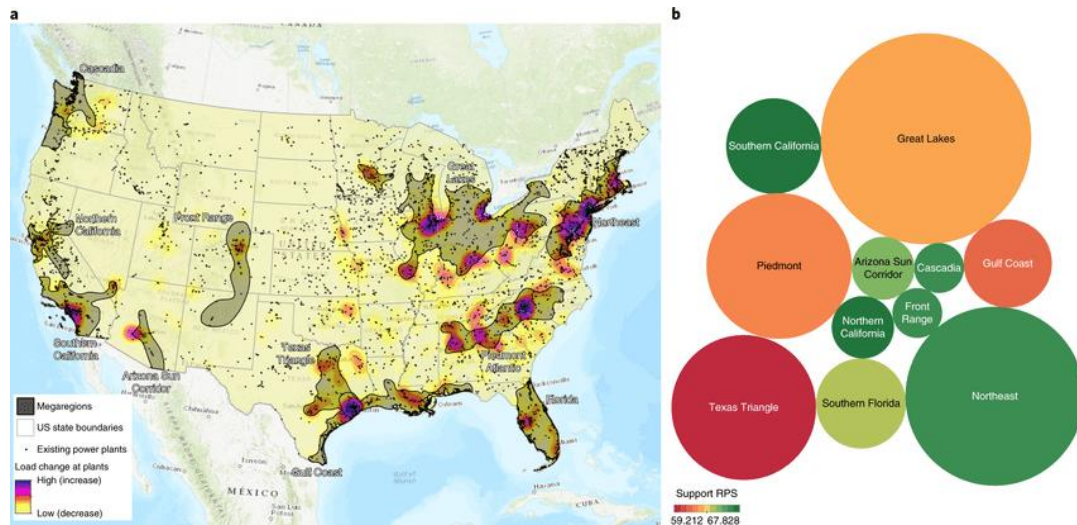
新能源：并网申请积压严重，需要更稳定电源满足电力需求

图：美国电网过载情况



资料来源：Phys, HTI

图：美国电网排队情况



资料来源：Climable, HTI

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新能源：高利率与全球经济放缓，新能源股价大幅下跌

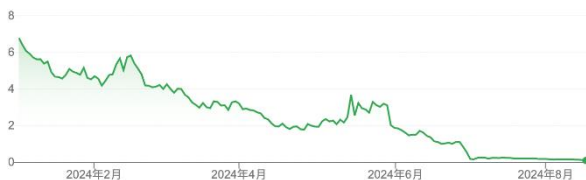
图：美股新能源年初至今股价走势

市场概况 > Maxeon Solar Technologies Ltd

0.12 USD
-6.68 (-98.29%) ↓ 年初至今

收盘时间: 8月16日 GMT-4 下午7:59 · 免责声明
盘后价 0.12 +0.0027 (2.32%)

1天 5天 1个月 6个月 YTD 1年 5年 最大

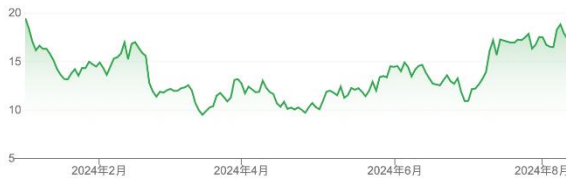


市场概况 > Sunrun Inc

19.40 USD
-0.06 (-0.31%) ↓ 年初至今

收盘时间: 8月16日 GMT-4 下午7:46 · 免责声明
盘后价 19.44 +0.040 (0.21%)

1天 5天 1个月 6个月 YTD 1年 5年 最大

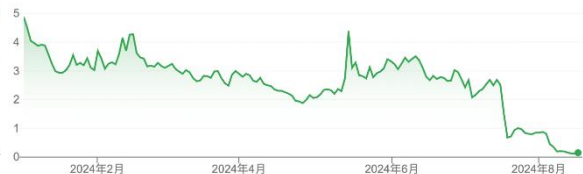


市场概况 > 太阳能

0.15 USD
-4.73 (-96.83%) ↓ 年初至今

收盘时间: 8月16日 GMT-4 下午4:15 · 免责声明
盘后价 0.15 0.00 (0.00%)

1天 5天 1个月 6个月 YTD 1年 5年 最大

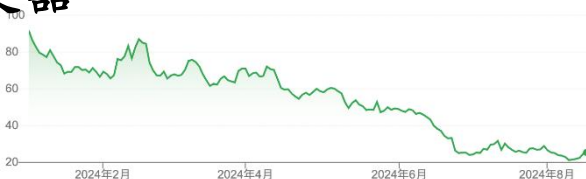


市场概况 > Solaredge Technologies Inc

25.29 USD
-66.41 (-72.42%) ↓ 年初至今

收盘时间: 8月16日 GMT-4 下午7:52 · 免责声明
盘后价 25.39 +0.100 (0.40%)

1天 5天 1个月 6个月 YTD 1年 5年 最大



市场概况 > Enphase Energy Inc

116.39 USD
-14.85 (-11.32%) ↓ 年初至今

收盘时间: 8月16日 GMT-4 下午8:00 · 免责声明
盘后价 116.17 -0.22 (0.19%)

1天 5天 1个月 6个月 YTD 1年 5年 最大

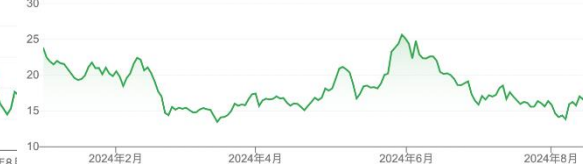


市场概况 > Fluence Energy Inc

17.24 USD
-6.61 (-27.71%) ↓ 年初至今

收盘时间: 8月16日 GMT-4 下午4:52 · 免责声明
盘后价 17.24 0.00 (0.00%)

1天 5天 1个月 6个月 YTD 1年 5年 最大



光伏

逆变器

储能

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AI数据中心能耗趋势及拉动的 工业投资规模



➤ AI数据中心带动的电力需求推演。

图：AI数据中心用电需求模型

假设条件		
2030年用户平均每天使用数据中心推理次数 (亿)	100	即平均每天进行100亿次 Google 搜索
每个推理生成的平均Token数	500	一个Token约为3/4文字
每个Token的FLOP (次)	7.1×10^{14}	对于 GPT 3, 每个Token 推理使用 7.1×10^{14} 次操作
每秒FP8 FLOPs H100服务器需求	3.2×10^{16}	
AI机架功耗 (kW)	60	8%
FLOP利用率	0.5	

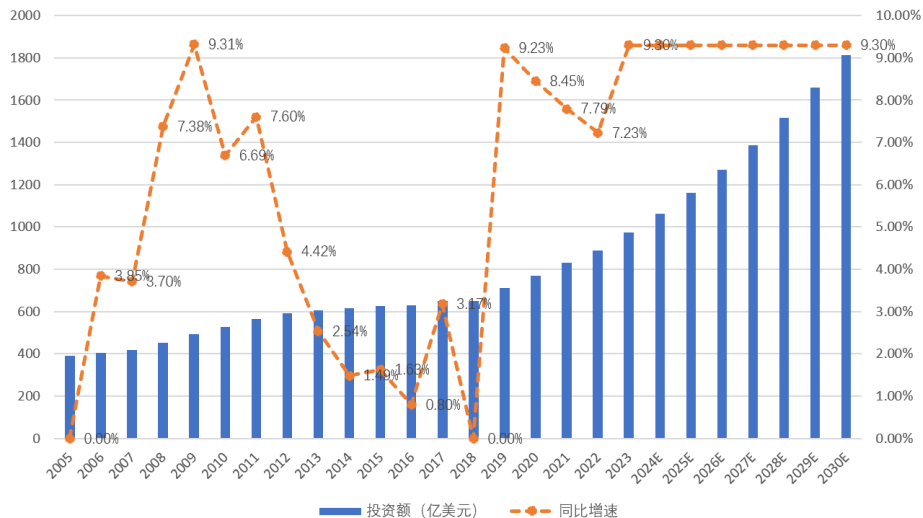
由假设条件推出的简单结论

每秒生成的Token数 (万个)	5800
每秒需要的FLOP	8.20×10^{22}
需要安装的H100等效服务器	2.60×10^6
需要 AI 服务器机架	5.20×10^5
AI 机架所需能耗 (GW) (服务器、存储、网络)	31
电源转换所需能耗 (GW)	9
照明所需能耗 (GW)	2
冷却所需能耗 (GW)	36
AI数据中心所需能源总量 (GW)	78
每年相应电力消耗 (TWh)	683

美国电网系统：老旧程度全球排名前列，电网投资复合增速达9.3%

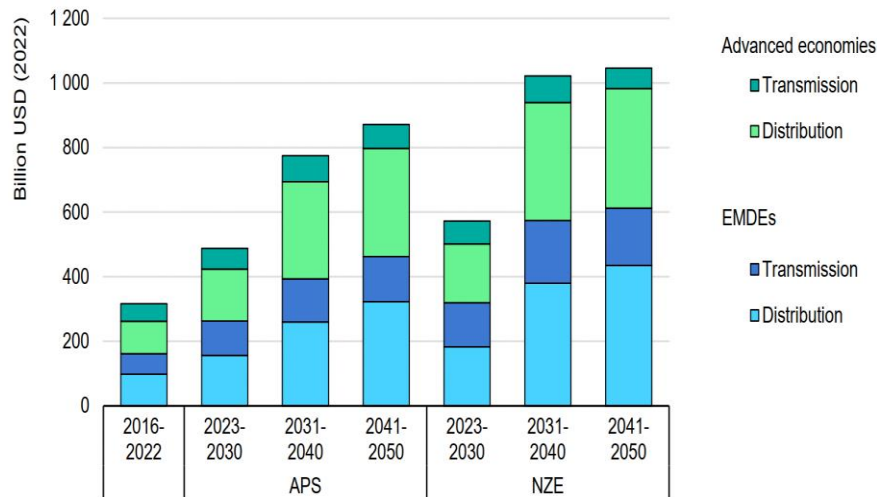
- 美国拥有电网公司500多家，截至2022年底，美国电网输电线路长度约为50万千米，配电线路长度约为1100万千米，美国目前的电网基本上是在20世纪60、70年代建设完成，70%的输电线路使用超过25年，处于典型50-80年生命周期的尾部。
- 2023年美国电网投资规模约970亿美元，在净零情景（NZS）下，2023-2030年美国电网投资复合增速预计为9.3%。

图：美国电网投资金额及展望



资料来源：IEA, HTI

图：全球电网投资展望

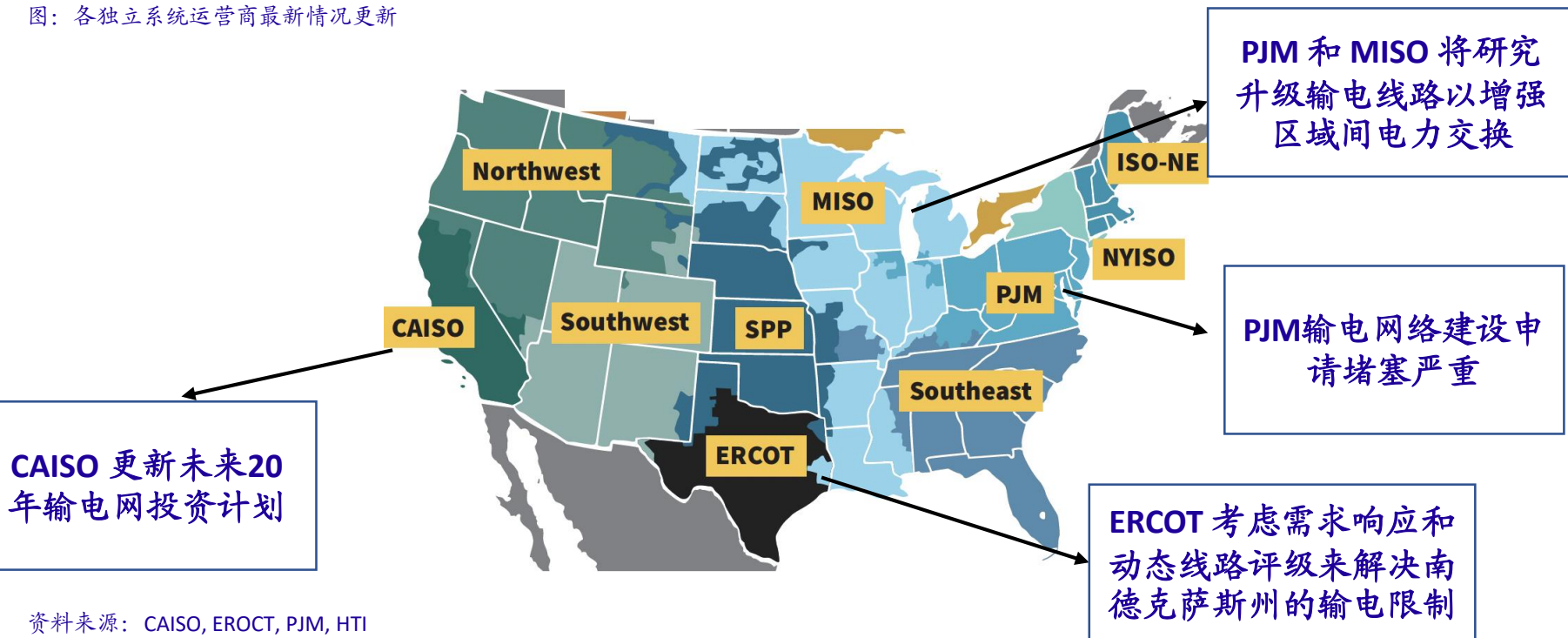


资料来源：BNEF, HTI

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各区域最新政策及研究更新。

图：各独立系统运营商最新情况更新



资料来源：CAISO, ERCOT, PJM, HTI

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美国电力短缺给设备公司带来多少 估值增长



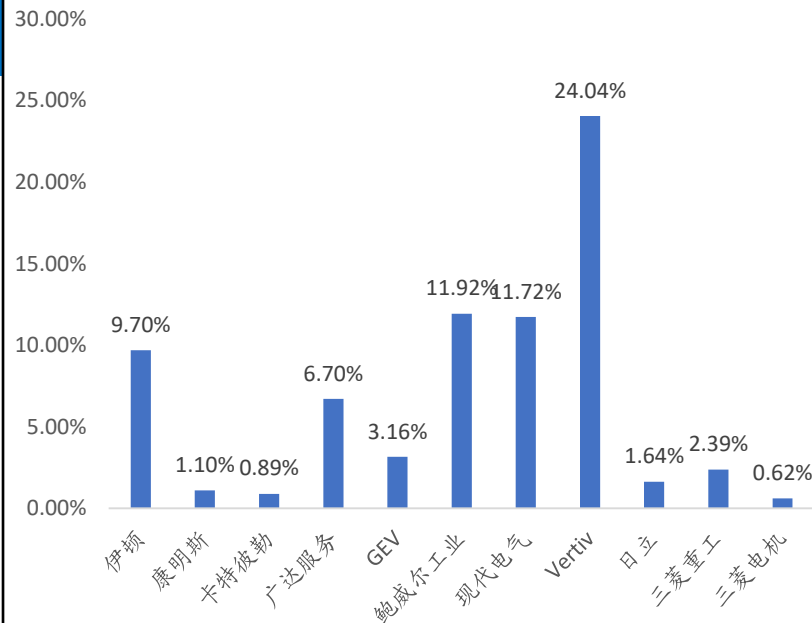
标的更新：AI数据中心电力需求带动的盈利增长预测

➤ AI数据中心电力需求将为相应产业链公司带来新的盈利增长动能，按照现有市场份额和业务比例不变，我们对仅AI数据中心电力需求带动的电网投资对重点关注公司盈利提升幅度。

图：至2030年AI数据中心贡献的营收增长

公司名称	受益板块	受益板块占主营业务比重2023	2024-2030市场规模预计 (亿美元)	市占率	年营收提升 (亿美元)	较2023年营收提升比例
伊顿	电气化及数据中心电力设备	25%	450	30%	22.50	9.70%
康明斯	自备电	10%	90	25%	3.75	1.10%
卡特彼勒	自备电	26%	90	40%	6.00	0.89%
广达服务	输配电及发电EPC	70%	280	30%	20.00	9.58%
GEV	发电及电气板块	68%	420	15%	15.00	4.51%
鲍威尔工业	电力管控及数据中心	34%	100	5%	0.83	11.92%
现代电气	高压电力设备	60%	98	15%	2.45	11.72%
Vertiv	冷却和数据中心电力设备	75%	450	25%	22.50	24.04%
日立	发电及电气板块	25%	420	15%	10.50	1.64%
三菱重工	发电板块	20%	220	20%	7.33	2.39%
三菱电机	电气设备板块	10%	260	5%	2.17	0.62%

图：至2030年AI数据中心贡献的营收年增长占2023年营收比重



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核电：美国主要核电发电公司核电售电业务利润及估值测算



表：美国主要核电发电公司核电售电业务利润及估值测算

公司	2023年核电发电量 (GWh)	传统核电售电业务经营利润测算 (亿美元)			SMR售电业务经营利润测算 (亿美元)	
		2023	2030E	2050E	2030E	2050E
Vistra	18893	9.45	10.75	20.01	0	6.67
Constellation Energy	174047	87.02	99.07	184.32	0	61.44
Talen Energy	17875	8.94	10.18	18.93	0	6.31
NuScale Power	0	-0.58	0	0	0.34	42.15
OKLO	0	0.12	0	0	0.11	14.05

公司	净资产 (亿美元)			PB估值		
	24H1	2030E	2050E	2023	2030E	2050E
Vistra	73	144	561	5.84	2.96	0.76
Constellation Energy	118	769	4611	7.01	1.07	0.18
Talen Energy	26	93	487	3.56	1	0.19
NuScale Power	0.93	2	427	49	23	0.11
OKLO	2.7	3	145	9	8	0.17

资料来源：NEA, Jefferies, IAEA, HTI

*注：基于Jefferies对于微软20年核电PPA的预测，假设PPA为120美元/MWh。基于大型科技公司对于核电的积极需求，我们假设未来美国核电的售电量以PPA为主，基于NEA的预测，假设核电LCOE为70美元/MWh。英国的一项研究表明在充分部署的情况下SMR LCOE可与大型核电厂持平，假设为70美元/MWh。2023年利润为PPA假设，用于后续推导，利润并非实际利润。

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Summary

TOC

- Market: Gold and copper lead the rise, trend likely to continue.
- Performance: Leading copper and aluminum corporations show great flexibility, gold sector profits improving.
- Sub-sectors: Emphasize on aluminum and copper, stick with gold.
- Risk warning.

重要信息披露

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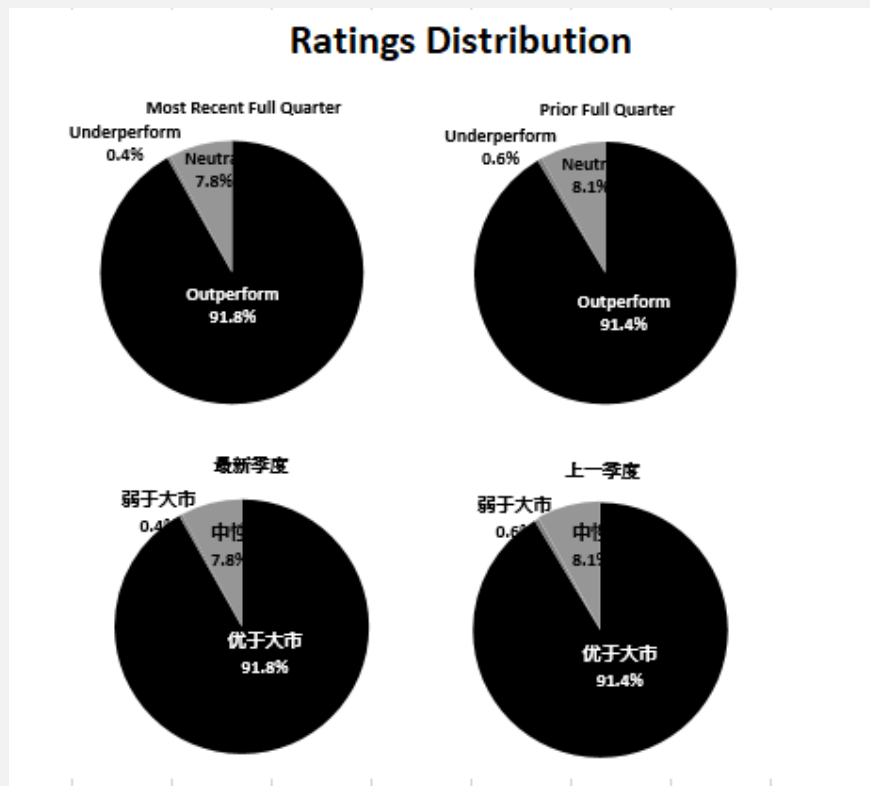
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