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厄尔尼诺现象提高电网灵活性调节能力要求，虚拟电厂迎利好

El Nino Phenomenon Improves the Requirements of Grid Flexibility Regulation Capacity, and Virtual Power Plant Welcome Good News

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热点速评 Flash Analysis

(Please see APPENDIX 1 for English summary)

厄尔尼诺现象将带来持续高温，电力负荷高涨叠加新能源加速渗透，给电网系统稳定运行带来巨大挑战。7月4日世界气象组织宣布，热带太平洋地区7年来首次形成厄尔尼诺条件，厄尔尼诺现象是太平洋赤道大范围内海洋和大气相互作用失去平衡产生，通常持续9-12个月，最直接的影响是推动全球大部分地区气温将进一步升高。根据世界气象组织最新预测，厄尔尼诺现象在2023H2持续的可能性达到了90%。进入7月，全国高温天气持续，各地用电负荷飙升，7月3日浙江省电网用电负荷最高达到1.02亿千瓦，创历史新高，较2022年提前8天破亿，7月10日四川省电网用电负荷达5988.8万千瓦，较去年全网最高负荷高78.8万千瓦，今年迎峰度夏时间普遍提前，近年来我国新能源装机及发电量占比加速渗透，2022年风电累计装机占比达14.25%，光伏占比15.31%，合计29.56%，较2021年提升2.84%。发电量合计占比13.69%，较2021年提升1.96%，高比例新能源接入导致电力系统“双峰双高”和“双侧随机性”特征明显，电力系统从原来的源随荷动，变成了电源侧和负荷侧均随机波动。新能源与常规电源不同，等效转动惯量很小，风机叶片转动惯量小，光伏基本无转动惯量，缺乏相关频率调节功能，电压调节能力有限，频率、电压耐受不足。在中午新能源大发期间，为了消纳新能源，电网“净负荷”较低，鸭型曲线非常明显，用电负荷的增加给当前电力系统稳定运行带来巨大挑战。

虚拟电厂可以增强电网调节能力，作为重要的灵活性调节资源，调节成本仅为火电的1/8。虚拟电厂是利用先进的通信、控制技术和软件构成的虚拟联合体，实现对分布式电源、储能、可控负荷、电动汽车等资源的集群聚合与优化控制，作为整体参与电网调度运行与电力市场交易，当前虚拟电厂参与市场路径有需求侧响应，电力辅助服务市场和电力现货市场。传统的灵活性调节资源有火电、储能、气电等等，根据国家电网的测算，满足5%的峰值负荷如果通过火电厂实现电力系统的削峰填谷，需要投资4000亿元，而通过虚拟电厂实现这一目标，仅需投资500亿-600亿元，虚拟电厂的调节成本仅为火电的1/8，具备高性价比。

虚拟电厂当前处于从邀约型阶段向市场型阶段过渡。虚拟电厂发展分为三个阶段。第一阶段为邀约型阶段：在没有电力市场的情况下，由政府部门或者调度机构牵头组织，各个聚合商参与，共同完成邀约、响应和激励流程；第二个阶段为市场型阶段：在电能量现货市场、辅助服务市场和容量市场建成后，虚拟电厂聚合商以类似于实体电厂的模式，分别参与这些市场获得收益。在第二阶段，也会同时存在邀约型模式，其邀约发出的主体是系统运行机构；第三个阶段为跨时空自主调度型虚拟电厂。当前江苏、上海、广东等地纷纷开展虚拟电厂参与需求侧响应和现货市场交易试点，虚拟电厂正在从邀约型阶段向市场型阶段过渡。

国家政策大力推动虚拟电厂建设，2025年相关市场规模有望超800亿元。2023年2月份，国家标准化管理委员会分布消息《虚拟电厂管理规范》和《虚拟电厂资源配置与评估技术规范》两项国家标准获批立项，意味着我国虚拟电厂建设将有国家统一管理规范，2023年5月，国家发改委发布《电力需求侧管理办法（征求意见稿）》和《电力负荷管理办法（征求意见稿）》，意见稿提出到2025年，各省需求响应能力达到最大用电负荷的3%-5%，假设按照5%的调节能力，根据中电联预测，2025年全国最大用电负荷为16.3亿千瓦，按照虚拟电厂投资成本1000元/kW，虚拟电厂相关市场规模有望超过800亿元。

投资建议：建议关注厄尔尼诺现象导致用电需求增加，关注绿电运营商【龙源电力】、【华润电力】等，同时关注布局虚拟电厂业务的软硬件企业【国能日新】、【国网信通】等。

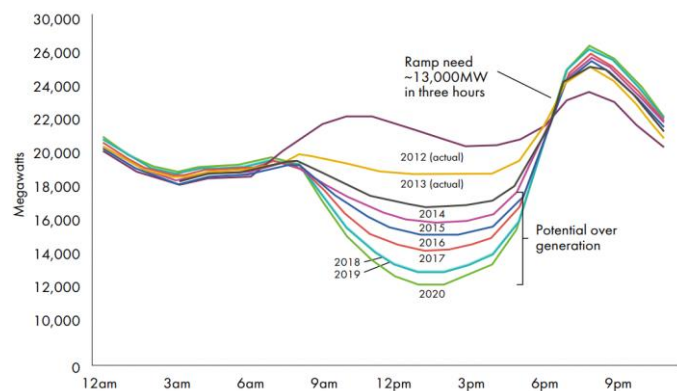
风险：政策和需求不及预期，降雨降温因素导致用电负荷不及预期。

图 1:全球平均气温与厄尔尼诺现象



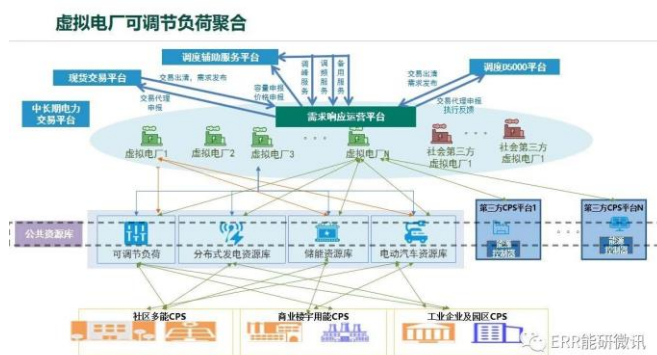
资料来源：中国天气网，HTI

图 2:加州电网鸭型曲线



资料来源：CAISO，HTI

图 3:虚拟电厂应用模式



资料来源：国网电科院，HTI

APPENDIX 1

El Nino phenomenon improves the requirements of grid flexibility regulation capacity, and virtual power plant welcome good news.

The El Nino phenomenon will bring sustained high temperatures and high power loads. the accelerated penetration of new energy poses a huge challenge to the stable operation of the power grid system.

Virtual power plants can enhance the power grid regulation capability. As an important flexible regulation resource, the regulation cost is only 1/8 of thermal power.

At present, the virtual power plant is in transition from invitation type to market type.

National policies vigorously promote the construction of virtual power plant, and the scale of the relevant market is expected to exceed 80 billion yuan in 2025.

Investment suggestion: It is suggested to pay attention to the power operators [Longyuan Power], [China Resources Power], etc., and Virtual power plant hardware and software enterprises [State Power Rixin Tech], [State Grid Information & Communication], etc.

Risks: less-than-expected growth in demand and policies, and less-than-expected demand in electricity.

附录 APPENDIX

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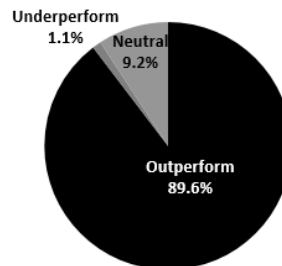
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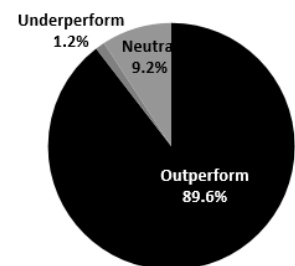
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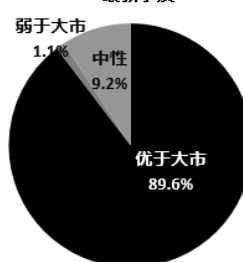
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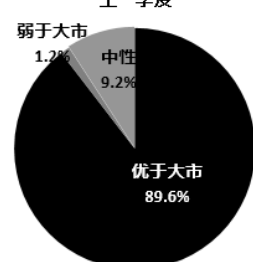
Prior Full Quarter



最新季度



上一季度



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