

Infrastructure Challenge in United States

美国基础设施的挑战

Beijing Arbitration Commission

北京仲裁委员会

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New England: Background 新英格兰地区：背景

- 1999: FERC encourages voluntary formation of RTOs
 - New England deregulated since 2000
 - Independent System Operator – New England (ISO-NE)
 - Wholesale Energy Market System since 2003
 - Six States
- 1999年：联邦能源监管委员会（FERC）鼓励自愿成立区域输电组织（RTO）
 - 新英格兰地区从2000年开始解除了管制
 - 独立系统运营机构（ISO）—新英格兰ISO-NE
 - 从2003年开始启动批发能源市场系统
 - 新英格兰地区包括6个州



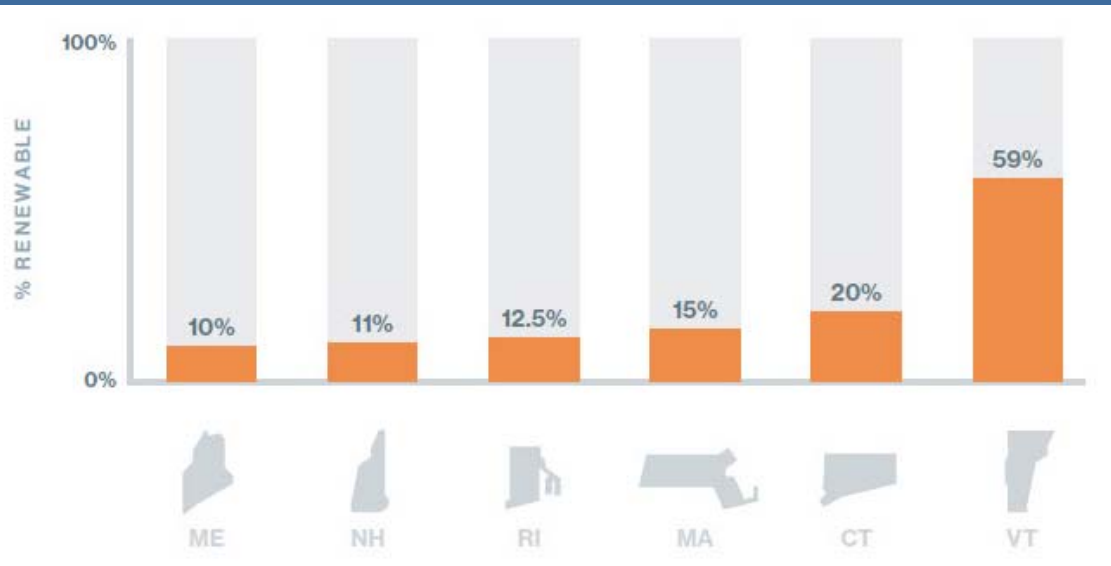
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Ambitious Multi-level Policy Goals 宏伟的多层级政策目标

State Renewable Portfolio Standards for New Renewable Energy by 2020 2020年（新英格兰地区）各州新能源的可再生能源配额标准



Source: ISO New England, 2016 Regional Electricity Outlook

Connecticut

- GWSA (1998)
- RPS
- RGGI and EEF

康涅狄格州

- 全球变暖对策法（GWSA）（1998）
- 可再生能源配额标准（RPS）
- 区域温室气体减排行动（RGGI）和能效基金（EEF）

New England

- NEG/ECP Interim Target

新英格兰地区

- 新英格兰地区州长（NEG）/ 东加拿大地区省长（ECP）暂定目标

United States

- Clean Power Plan

美国

- 清洁电力计划

International

- COP21 – Paris

国际

- 巴黎协定



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Current Regulatory Landscape 当前监管概览

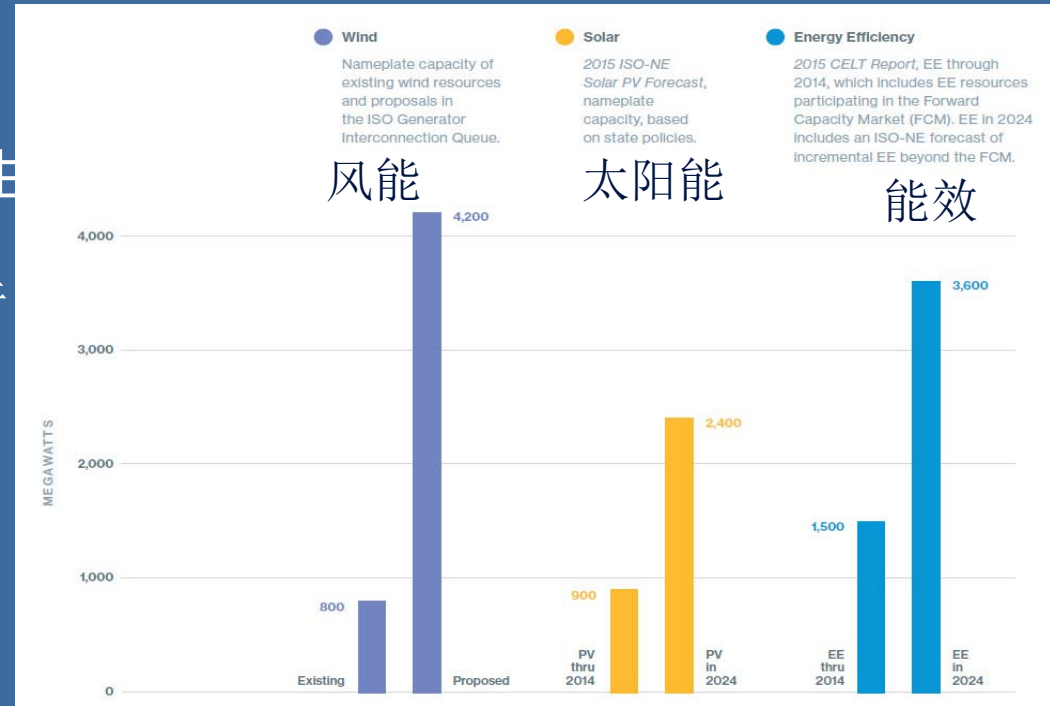
“Cleaner, Cheaper and More Reliable”
“更清洁、更低廉、更可靠”

Connecticut 康涅狄格州

- Microgrids 微网
- LREC/ZREC 低排放和零排放可再生能源信用计划
- Connecticut Green Bank 绿色银行
- Net Metering 净计量
- Shared Solar 共享太阳能

New England 新英格兰地区

- Three State Procurement 三个州收购



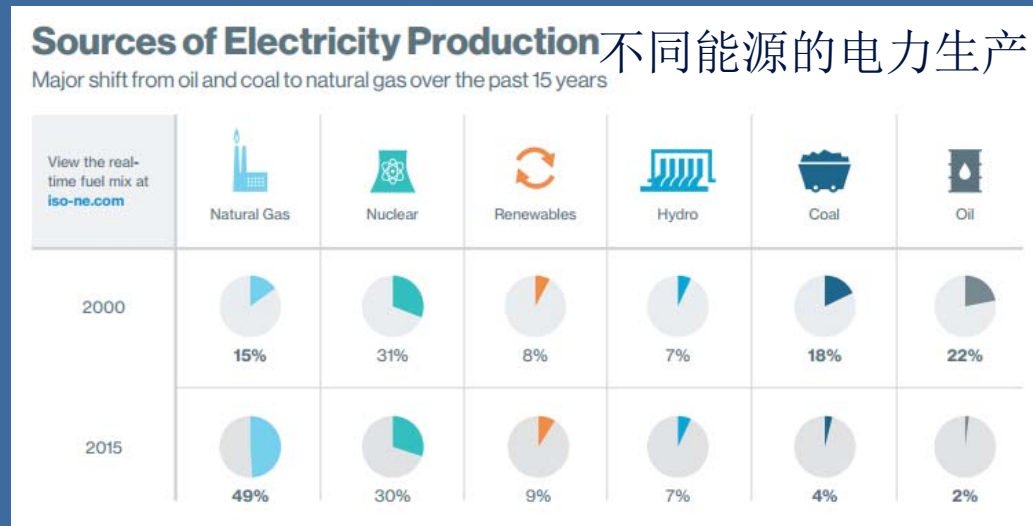
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Grid in Transition: Challenges 变化中的电网：挑战

- Inadequate natural gas pipeline infrastructure
- Significant retirements
- Integration of intermittent resources while maintaining reliability
- Expensive transmission infrastructure upgrades
- 天然气管道基础设施不足
- 机组退役不可忽视
- 间歇性能源并网的同时保持电网可靠
- 输电设施升级费用巨大



Source: ISO New England, New England Power Grid 2015–2016 Profile



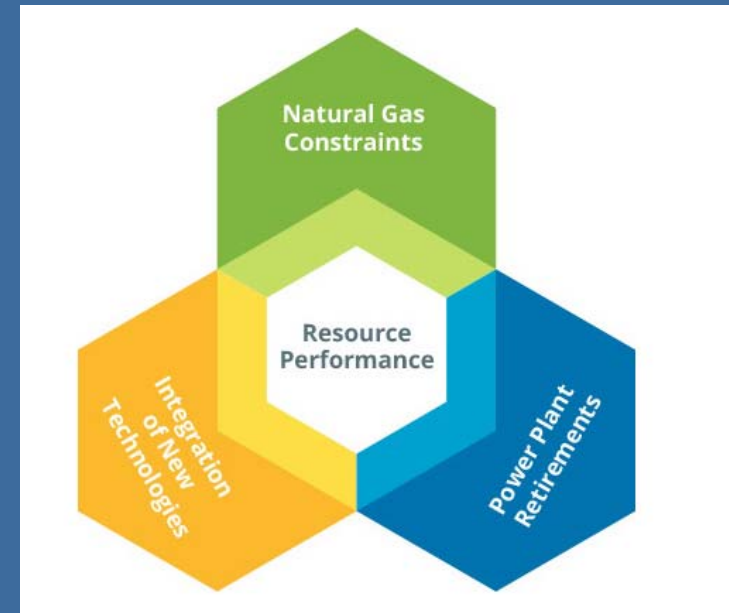
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Grid in Transition: Opportunities 变化中的电网：机会

- Nuclear – low carbon
- States procuring small tranches of renewables in long-term contracts
- Natural gas as a bridge
- Coal/Oil Gone in CT as of 2019
- 核能—低碳
- 州通过长期合同采购一小部分可再生能源
- 天然气作为一种过渡
- 2019年煤炭和石油在康涅狄格州（的电力结构中）消失



Source: ISO New England, 2016 Regional Electricity Outlook



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Intermittent Resources in Wholesale Markets

批发市场中的间歇性能源

ISO-NE Market Refinements:

- Flexibility to Offer Negative Prices
- Updated Elective Transmission Upgrade (ETU) Rules
- Flexibility to Operate Up to a Certain Level
 - “Do-not-Exceed Dispatch Order”

新英格兰ISO-NE市场改进经验:

- （电价）灵活性：提供负电价
- 更新的可选输电升级（ETU）规则
- （调度）灵活性：在一定水平内操作
 - “不要超过调度命令”（只要不超过极限就可以）



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Conclusion 结论

- The New England system is decreasing traditional resources (coal, oil, nuclear) and increasing amounts of renewable energy
- Transmission investments will be required
- Improved access to data is needed for operations and operations forecasting
- Enhanced interconnection standards are needed
- Deliberate and methodical implementation is key to a stable and gradual transition
- 新英格兰地区电力系统正在减少传统能源（煤、油、核），增加可再生能源
- 需要进行输电投资
- 为更好地运行和预测，数据获得需要提升
- 需要提升互连标准
- 周详、依规的执行是稳定、渐进过渡的关键



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