Grid Modernization
From an Energy Policy Perspective In 2019

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About Newton-Evans Research Company

Business-to-business electric power market research with a focus on:
• Energy automation
• Control systems
• IT and infrastructure topics (i.e. Grid Modernization)

Bridge between what utilities need and want in control systems and infrastructure and what systems providers & equipment manufacturers need to know in order to develop solutions to meet utility requirements.
The U.S. Electric Power Industry

Over 3,000 electric power utilities

• Investor-Owned: Fewer, larger, more customers and assets (Entergy, PGE, FPL, ONCOR, Southern Co.)

• Public Power Utilities:
  o Federal (TVA, Bonneville Power, WAPA)
  o State (Public Utility Districts, Salt River Project)
  o Municipals (LADWP, San Antonio, Austin Energy) nearly 1,900

• Cooperatives: 64 G&Ts, 920 Distribution Cooperatives (SMECO, NOVEC, et al)
Federal Level Government Agencies Involved in Energy Policy Development

• U.S. Department of Energy
• U.S. Environmental Protection Agency
• U.S. Energy Information Administration
  U.S.  Department of Agriculture - RUS
• Official House Natural Resources Committee Page
• Official House Energy and Commerce Committee Page
• Official Senate Energy Committee Page
• NARUC
The Changing Energy World – Here at Home

Secretary of Energy – Rick Perry – Has NOT demolished the DOE. The EPA is still in Operation as well – but flagging in terms of environmental concerns.

United States becoming more self-reliant for energy resources
• With or without federal mandates or guidance
• However, fracking may prove to be not worth the effort nor the environmental consequences.

New in 2019
Imposition of Tariffs on Imports of Electro-Materials
Rapid growth of Energy Storage
Chinese companies continue entering the T&D market.

Nation moving ahead with grid-scale energy storage deployments and newer storage devices down the line to the electric power end-user/consumer communities.

Smartening the Grid Infrastructure – Ongoing Process
continues to expand bringing into play DER integration
Complexity Increases.

Moving Rapidly to Renewable Energy Sources
• Renewables Playing a more important role each year
• Overall, low-carbon sources (renewables and nuclear) accounted for 52.8% of total generation in 2018. ... Renewables share of generation accounted for 37.1% in Q4 2018, a 7% increase on the same period the year prior.
• 36.5% of grid electricity was zero carbon in June 2017 versus 31.7% a year earlier.
• Coal-fired generation is down to 30.4% of total.
Tariffs
U.S. Policy and The Tariff Regime on Selected Imports of Electrical Equipment

Sep. 06, 2018 – NEMA comments on tariffs:

• *NEMA does not dispute the findings of the Section 301 investigation into China’s acts, policies and practices related to technology transfer, intellectual property and innovation.*

• *Writ large, if 10 or 25 percent tariffs were to be implemented as proposed, they would represent an additional tax increase on U.S. electroindustry companies and their industrial, commercial and residential customers of approximately $2.2–5.4 billion.*

U.S. Policy and The Tariff Regime on Selected Imports of Electrical Equipment

Sep. 03, 2019 – USTR issues request for comment on proposed tariff increase:

*In accordance with the specific direction of the President, the U.S. Trade Representative proposes to modify the action being taken in this investigation by increasing the rate of additional duty from 25 percent to 30 percent on the products of China currently subject to tariff actions first taken in June, August, and September 2018, with an aggregate annual trade value of approximately $250 billion.*

DOE
Grid Modernization Initiative
DOE Grid Modernization Initiative

Sep. 12, 2017 – DOE announces awards of up to $50 million to its National Labs for R&D supporting infrastructure resilience:

• 7 Resilient Distribution Systems projects: Microgrids, DER, emerging grid technologies
• 20 Cybersecurity projects
• Partnering with companies like NRECA, SoCal Ed, Tesla, UC Berkeley, Vermont EC, Siemens, Duke, GE, and hundreds more.

https://www.energy.gov/grid-modernization-initiative-0/resilient-distribution-systems-lab-call-awards
DOE Grid Modernization Initiative

2018 Peer Review Highlights
3-day conference in Arlington (Sep. 5-7, 2018)
Topics include
2019 Lab Call

DOE, EIA on Coal Future
EIA Statistics on Coal Production

- EIA estimates that total 2018 U.S. coal production was 755 million short tons (MMst), 20 MMst less than in 2017 and 36% less than in the previous decade.
- In 2018, coal prices rose in three of the five major coal-producing regions, particularly the Northern and Central Appalachian regions.
- Although U.S. coal exports increased by about 10 MMst in 2018, volumes were not great enough to offset the decline in U.S. coal consumption, resulting in declining coal production.
Quarterly U.S. coal production, 2013-2019

Million short tons

Pros of Coal Use

- Coal has **three primary advantages** compared to other fuel sources, both non-renewable and renewable:
  - abundance,
  - affordability
  - low capital expense needed to build coal-powered generation plants.
- Coal deposits can be found in over 70 countries around the world, with estimates on global reserves of just under 1 trillion tons. If these estimates are correct, coal reserves will last about twice as long as oil and gas reserves at current rates of consumption.
- Abundance leads to low and stable prices, while the relative ease of converting coal to energy results in power generation plants that can be built using less capital than facilities powered by many competing fuel sources. These advantages make coal the fuel of choice, particularly in developing countries.
EIA Annual Energy Outlook 2019: Key Takeaways

• “Increasing energy efficiency across end-use sectors keeps U.S. energy consumption relatively flat, even as the U.S. economy continues to expand.”

• U.S. becomes a net energy exporter in 2020 due to large increases in crude oil and natural gas production

• Natural gas prices will remain low
EIA Annual Energy Outlook 2019: Key Takeaways

“...notable shift in fuels used to generate electricity, driven in part by historically low natural gas prices. Increased natural gas-fired electricity generation; larger shares of intermittent renewables; and additional retirements of less economic existing coal and nuclear plants occur during the projection period.”

https://www.eia.gov/outlooks/aeo/
Carbon Sequestration
WASHINGTON, D.C. - The U.S. Department of Energy (DOE) is announcing up to $30 million in federal funding for cost-shared research and development (R&D) under the second closing of the Office of Fossil Energy’s (FE’s) Novel and Enabling Carbon Capture Transformational Technologies funding opportunity announcement.

Selected projects will support the development of solvent, sorbent, and membrane technologies to address scientific challenges and knowledge gaps associated with reducing the cost of carbon capture, supporting DOE’s goal to develop technologies that can significantly reduce the cost of CO2 capture from coal fired power plants.
The **Petra Nova** facility – near Houston - captured carbon dioxide from the process of coal combustion for the first time in September 2018, and has now piped 100,000+ tons of it from the plant to the West Ranch oil field 80 miles away, where the carbon dioxide is used to force additional oil from the ground. The companies say that the plant can capture over 90 percent of the carbon dioxide released from the equivalent of a 240 megawatt, or million watt, coal unit, which translates into 5,000 tons of carbon dioxide per day or over 1 million tons per year. They’re calling it “the world’s largest post-combustion carbon capture system.”
But there was another coal plant that also planned to capture carbon dioxide — but using a very different approach. It’s the Kemper Plant, operated by Mississippi Power, and was operational for a few months. This plant had been designed to turn lignite, a type of coal, into a gas called syngas, stripping out some carbon dioxide in the process. The syngas is burned for electricity and the CO2 is then again shipped to an oil field to aid in additional oil recovery. This is called a “pre-combustion” clean coal facility. Mississippi regulators also recently told the utility that the Kemper plant should only burn natural gas, prompting Southern’s decision to suspend efforts to operate a coal “gasification” unit at the plant. The $7.5 billion plant was designed to convert cheap lignite coal into synthetic gas, but it has never run properly.
Energy Storage
Facts on Energy Storage

• According to IHS, **energy storage market is set to “explode”** from an annual installation size of 6 gigawatts (GW) in 2017 to more than 40 GW by 2022 — from an initial base of only 0.34 GW installed in 2012 and 2013.

• **Flywheel and battery energy storage systems are operating today in the competitive ancillary services power market** – providing a 10x faster and more accurate response to a power dispatcher’s signals compared to power turbine generators.

• PJM Interconnection projects that just a 10-20% reduction in its frequency regulation capacity procurement - made possible by additional storage projects - could result in **$25-50 million in savings to residential, commercial and industrial consumers.**
USA Energy Storage Deployments

• 2019 U.S. energy storage market: 148.8 MW deployed, 232% increase from Q1 2018, 6% jump from Q4 2018

• Behind-the-meter storage: 46% of Q1 2019 deployments, 138% growth from Q1 2018, 36% increase from Q4 2018.

• “California led in residential and non-residential storage market growth, but New Jersey, Arizona and Massachusetts dominated front-of-the-meter capacity.”

• Deployments expected to surpass 4.5 GW by 2024

Energy Storage Association Goals:

• Coordinating the introduction of bipartisan STORAGE Investment Tax Credit legislation introduced in both Senate and House.
• Ensuring that energy storage is included in the bipartisan Master Limited Partnership Parity Act in both Senate and House.
• Hosting expert and constituent briefings, meetings and receptions on Capitol Hill to educate Members of Congress and to raise community interest in energy storage.
• Joining forces with a growing alliance of trade associations across industrial sectors to open up R&D tax credits to pre-revenue small businesses.
• Supporting a requirement for the Department of Defense to include grid resilience metrics that include energy storage solutions.
• Recommending to rebuild from natural disasters, such as Hurricane Sandy, with grid-resilient energy technologies.
• Continuing support for Department of Energy research and development programs at the Office of Electricity and ARPA-E.
Smart Grid Development
Concerns with Current Approach to Smart Grid Development

**Pace:** The momentum of the migration to SG is directly tied to the health of the economy.

**Policy:** Migration to SG is highly dependent upon long-term energy policy development.

**Regulation:** Considered separately from policy, we need more uniformity in regulatory developments across the country.

**Investment:** Capital and human resource requirements are significant

**Transfer of Knowledge:** Do we need to re-invent the wheel? Or, can we learn and adopt technical innovations from other industries?
Electric Grid & Communications

Interdependencies – Mean that regulations and policies can, and do, affect both electricity and communications

For example

• .... November 30, 2018 -- Utility Communications and How the FCC Decisions Impact the Industry

"Some of the most impactful regulatory decisions affecting the industry are coming not from FERC but from the Federal Communications Commission (FCC)."

(Ms. Joy Ditto, President, UTC)
Other Policy Changes

EPA:

• Revocation of California’s ability to set its own auto emissions standards
  • 13 other states follow CA standards
  • California leads the country in shaping policies to reduce emissions
  • May impact development of electric vehicles and EV charging infrastructure
  • Move is hypocritical: states should control gun laws, but not emissions standards?

• Rollback of New Source Performance Standards (NSPS), lifting greenhouse gas restrictions on fossil fuel plants
  https://www.epa.gov/newsreleases/epa-proposes-111b-revisions-advance-clean-energy-technology
  • How will this impact the development of carbon sequestration? (Petra Nova, Kemper Plant)
Other Policy Changes

DOE:

• Petition to the DOE to develop new nuclear technologies with DOE, including Small Modular Reactors
2017 Tax Cuts and Jobs Act section 20001, Oil and Gas Program:

• “...2,000 surface acres of Federal land on the Coastal Plain to be covered by production and support facilities (including airstrips and any area covered by gravel berms or piers for support of pipelines) during the term of the leases under the oil and gas program under this section.”

• Opens ANWR* to crude oil drilling

• Major influencing factor in EIA’s Annual Energy Outlook

* ANWR = Arctic National Wildlife Refuge
Effect of recent regulatory activity and uncertainty on policy direction for grid modernization efforts

• Grid Modernization is picking up steam. Every phase of operations including generation, transmission and distribution is involved
• Recent Newton-Evans studies have found no slowdown in grid modernization efforts
• Increased investments in P&C, Substation Modernization and Control Systems
• Upgrades and replacements of key infrastructure equipment
FERC Issues Final Rule on Electric Storage Participation in Regional Markets

News Release: Feb. 15, 2018

“FERC today voted to remove barriers to the participation of electric storage resources in the capacity, energy and ancillary services markets operated by Regional Transmission Organizations and Independent System Operators. This order will enhance competition and promote greater efficiency in the nation’s electric wholesale markets, and will help support the resilience of the bulk power system.”

Grid operators file plans with FERC on integrating storage into wholesale markets

Utilitydive: Dec. 04, 2018

“Wholesale grid operators have completed their compliance filings for the Federal Energy Regulatory Commission's landmark energy storage order, setting the stage for wider participation of energy storage in wholesale markets.

FERC Streamlines Processes for Market-Based Rate Sellers (July 2019)

• The first final rule concerns the horizontal market power analysis required for market-based rate sellers. FERC is eliminating the obligation to submit indicative screens in order to obtain or retain market-based rate authority in certain organized wholesale power markets.

• Those sellers no longer will be required to submit the pivotal supplier screen and the wholesale market share screen in any organized wholesale power market that administers energy, ancillary services, and capacity markets subject to Commission-approved monitoring and mitigation.
FERC Streamlines Processes for Market-Based Rate Sellers (July 2019)

• FERC’s second final rule will improve FERC’s monitoring of wholesale power markets by streamlining the way it collects certain data for market-based rate purposes, specifically collecting this information in a database.

• The approved changes will eliminate duplication, minimize compliance burdens, modernize data collections, and make information collected through its programs more usable and accessible for the Commission, its staff and the public.
• Barbara Servatius will shortly be providing us with an update from FERC’s recent DLR Conference held earlier in September.

• This conference was held to boost knowledge of, and interest among, transmission owners to move ahead with Dynamic Line Rating applications.

• Also known as real-time thermal rating (RTTR), DLR is an electric power transmission operation philosophy aiming at maximizing load, when environmental conditions allow it, without compromising safety.

• DLR expansion is one major component of FERC’s Advanced Transmission Applications push to U.S. electric utilities.
Committee on Electricity
The Electricity Committee develops and advances policies that promote reliable, adequate, and affordable supply of electricity. Through strong collaboration with the Federal Energy Regulatory Commission and related Federal agencies, the Committee also seeks ways to improve the quality and effectiveness of regulation through education, cooperation, and exchange of information.

Staff Subcommittee on Electricity
Staff Subcommittee on Electric Reliability
Staff Subcommittee on Clean Coal and Carbon Management
Staff Subcommittee on Nuclear Issues-Waste Disposal
Subcommittee on Nuclear Issues-Waste Disposal
Subcommittee on Clean Coal and Carbon Management
European Union Rules Adopted in its “Clean Energy Package”

- The rules of the Clean Energy Package have now entered into force and Member States are in the process of implementing them. Smart Energy International is hosting a webinar on the new rules on September 25.

Electricity market design

The Clean Energy Package directives require updating existing electricity market rules to reflect the new market realities. The aim is to integrate the increased share of renewable energy sources and new technologies in a more flexible way – while continuing to supply reliable, secure power. The increasing role of consumers is also highlighted and the directives aims to enable their active participation in the electricity market.
European Union Rules Adopted in its “Clean Energy Package”

Electricity Regulation
The new Electricity Regulation sets out general principles for the operation of the electricity market, including market-based prices, more flexibility, customer participation and cross-border electricity flows.

DSOs, TSOs and national authorities

Through one of the Directives, new tasks are established for DSOs, in particular with regard to the procurement of non-frequency ancillary services, flexibility, data management and the integration of electro-mobility.

DSOs need to be incentivized to procure flexibility services, including distributed generation, demand response or energy storage. Additionally, DSOs should facilitate grid connection for electric mobility through the development, management or operation of recharging points for electric vehicles subject to narrow conditions.

Member States have until 31 December 2020 to incorporate the provisions of the Electricity Directive into national law.
DOE Analytical Reports

- **Clean Energy in City Codes: A Baseline Analysis of Municipal Codification across the United States**, National Renewable Energy Laboratory
- **Federal/State Jurisdictional Split: Implications for Emerging Electricity Technologies**, Lawrence Berkeley National Laboratory
- **Implementation of Partial-Capture Power Plants in NEMS**, National Energy Technology Laboratory
- **National Electricity Emergency Response Capabilities**, Argonne National Laboratory
- **Natural Gas Infrastructure Modernization Programs at Local Distribution Companies: Key Issues and Considerations**, U.S. Department of Energy
- **Principles for Increasing the Accessibility and Transparency of Power System Planning**, U.S. Department of Energy
- **States of Cybersecurity: Electricity Distribution System Discussions**, National Renewable Energy Laboratory
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Thanks for being here this morning!