AFX 2025.ai

The New Era of Energy and Electrification

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Traditionalist | Hedge-Bettor | Futurist

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"You can't possibly know where you are going, if you don't know where you are, and where you have been"

Benj. Franklin

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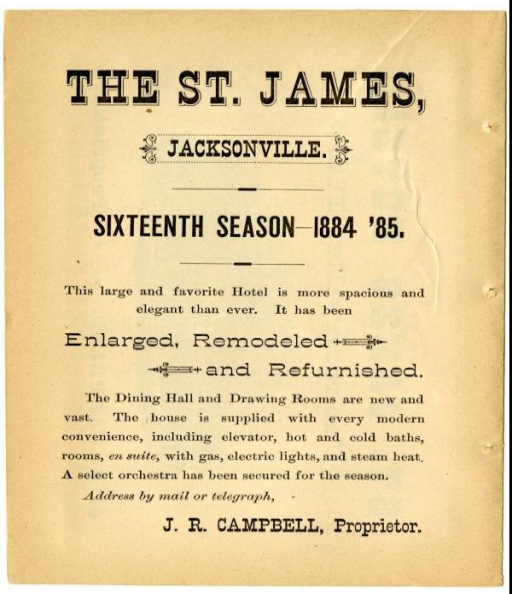
Florida Electrical History

Buildings

- 1883: St. James Hotel in Jacksonville
- 1886: Royal Palm Hotel in Miami
- 1887: Hotel Ponce de Leon in St. Augustine
- 1887: Edison's Winter Estates in Fort Myers
- 1891: Tampa Bay Hotel in Tampa
- 1897: Belleview Inn in Clearwater

Streetcars/Trolleys

- 1893: Tampa Street Railway and Power Co.
- 1893: Jacksonville Street Railway



THE ST. JAMES,

JACKSONVILLE.

SIXTEENTH SEASON—1884 '85.

This large and favorite Hotel is more spacious and elegant than ever. It has been

Enlarged, Remodeled and Refurnished.

The Dining Hall and Drawing Rooms are new and vast. The house is supplied with every modern convenience, including elevator, hot and cold baths, rooms, *en suite*, with gas, electric lights, and steam heat. A select orchestra has been secured for the season.

Address by mail or telegraph,

J. R. CAMPBELL, Proprietor.

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IN WHAT YEAR WILL THE FOLLOWING OCCUR?

- **90%** of buildings and other electrical infrastructure are fully supplied by DC Microgrids
- **Most** communities and buildings incorporate Distributed Energy Resources (DER), including Energy Storage Systems
- **85%** of vehicles and public transportation systems are fully electric

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2030 (5-years)
2050 (25-years)
2125 (100-years)

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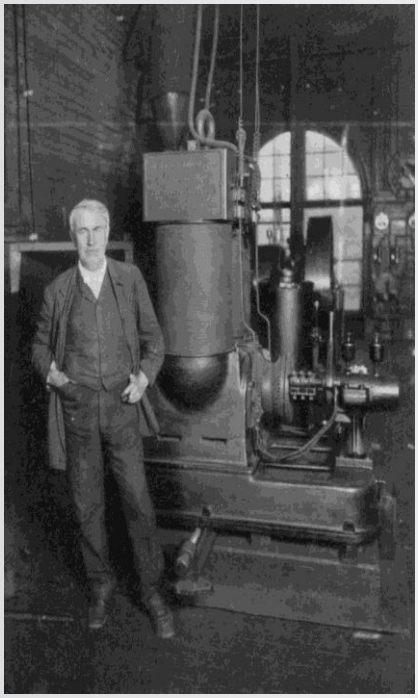

BACK TO THE FUTURE

1900!

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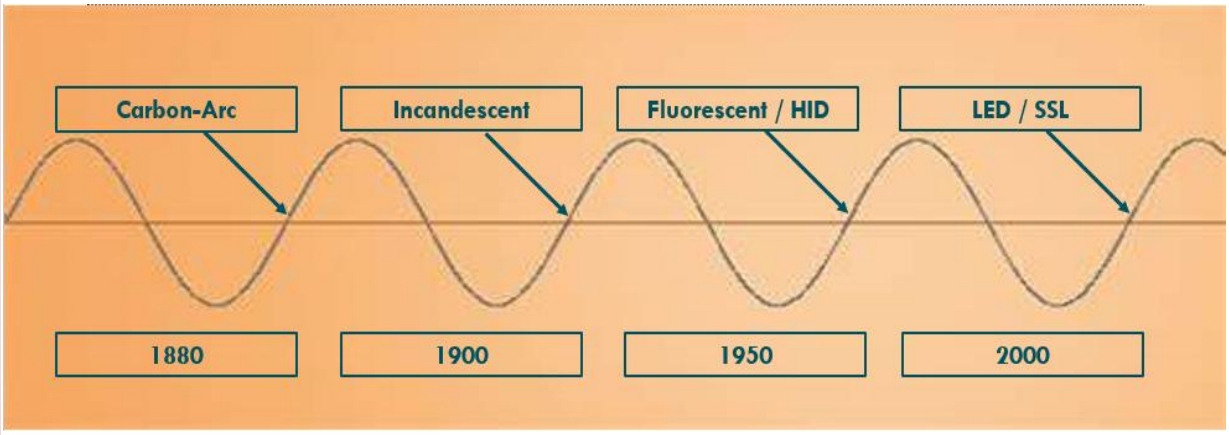
What Goes Up – Must Come Down



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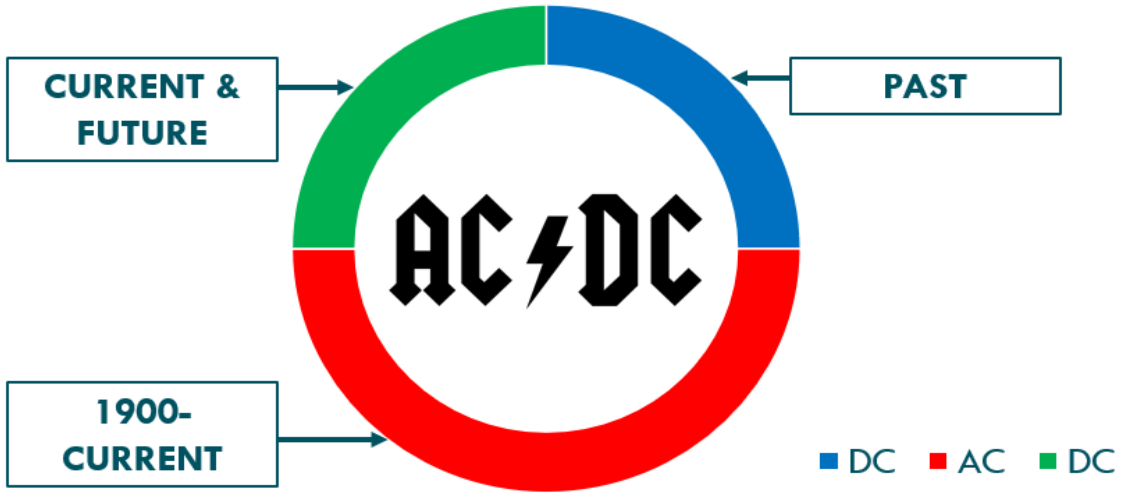
What Goes Around – Comes Around



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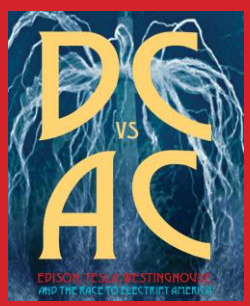
The Four Eras of "Electrification"

War of Currents 1896



Rural Electrification Act of 1936

Post WWII Suburban Expansion

Energy Resiliency

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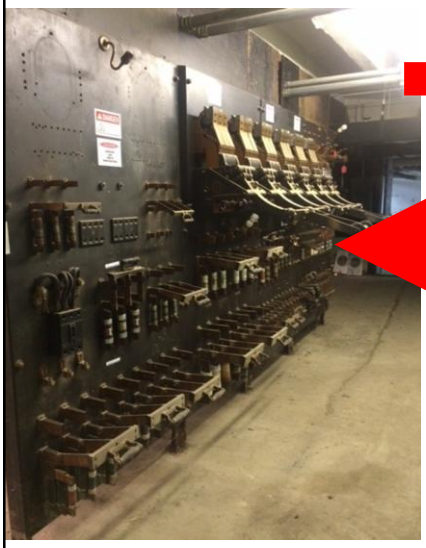
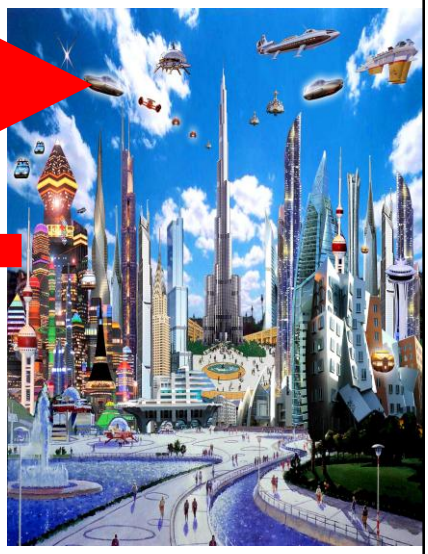
Energy & Electrification



Automated, Connected, Intelligent, Digital…

Efficient, Renewable, Resilient, Sustainable…



PAST

FUTURE

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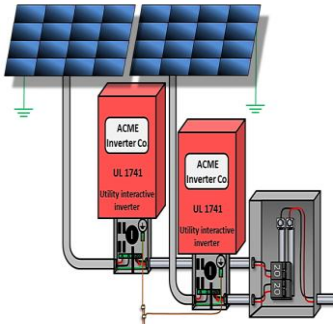
VS.



VS.

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VS.

VS.

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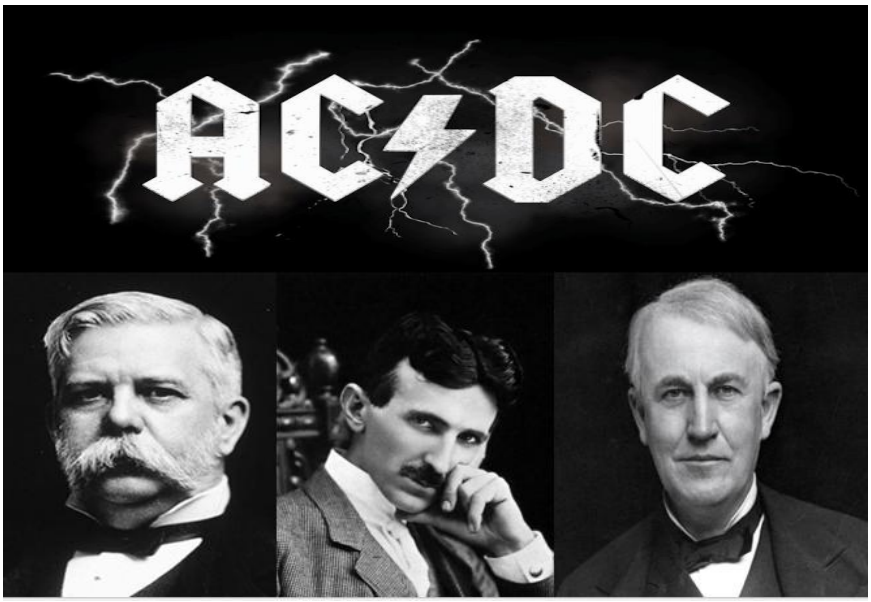

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Societal Demands Drive Energy Trends

URBANIZATION

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Societal Demands Drive Energy Trends

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Case Study Analysis

Hurricane Irma (2017)

- 6.7 million power outages
- $77.2 billion in damage
- 134 fatalities*
- **14** nursing home patients died as result of the power outage and lack of air conditioning

*A 2020 report titled "Association Between Exposure to Hurricane Irma and Mortality and Hospitalization in Florida Nursing Home Residents" concluded that **700** additional nursing home fatalities may have been directly related to the impacts of Hurricane Irma

Case Study Analysis

The power outages that followed Hurricane Irma affected 28,000 residents of Florida's nursing homes and led to a 25% increase in deaths a week after the storm made landfall.

Positive Outcomes

- Governor signs executive order requiring all **696** nursing homes and **3,131** assisted living facilities to be retrofitted with onsite emergency power source
- Agency for Healthcare Administration (AHCA), in cooperation with Department of Elderly Affairs, develop and implement emergency rules to comply with Governor's executive order
- 7th Edition (2020) Florida Building Code incorporates "Emergency Power Plan" rules for all new construction

Missed Opportunities

- Required emergency power systems are treated as an "optional standby system" in lieu of a "legally required standby system" or "emergency system" as defined in NEC
- Florida Building Commission rejected a proposal to add lightning and surge protection requirements to assisted living facilities similar to what is required for nursing homes
- Nursing homes and assisted living facilities are still permitted to be built and located in a FEMA special flood hazard area

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Societal Demands Drive Energy Trends

GREEN WASHING

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Funding

Infrastructure Investment and Jobs Act

- **$5 billion** for National Electric Vehicle Infrastructure (NEVI) Program
- **$500 million** for State Energy Programs (SEP)
- **$550 million** for Energy Efficiency and Conservation Block Grant (EECBG) Program
- **$250 million** for Energy Conservation and Production Act (ECPA) enforcement

Inflation Reduction Act

- **$330 million** for states to adopt the 2021 IECC and ASHRAE 90.1-2019
- **$670 million** for states to adopt zero energy provisions
- **$150 million** for states to replace or repair roughly 4,500 existing charging stations

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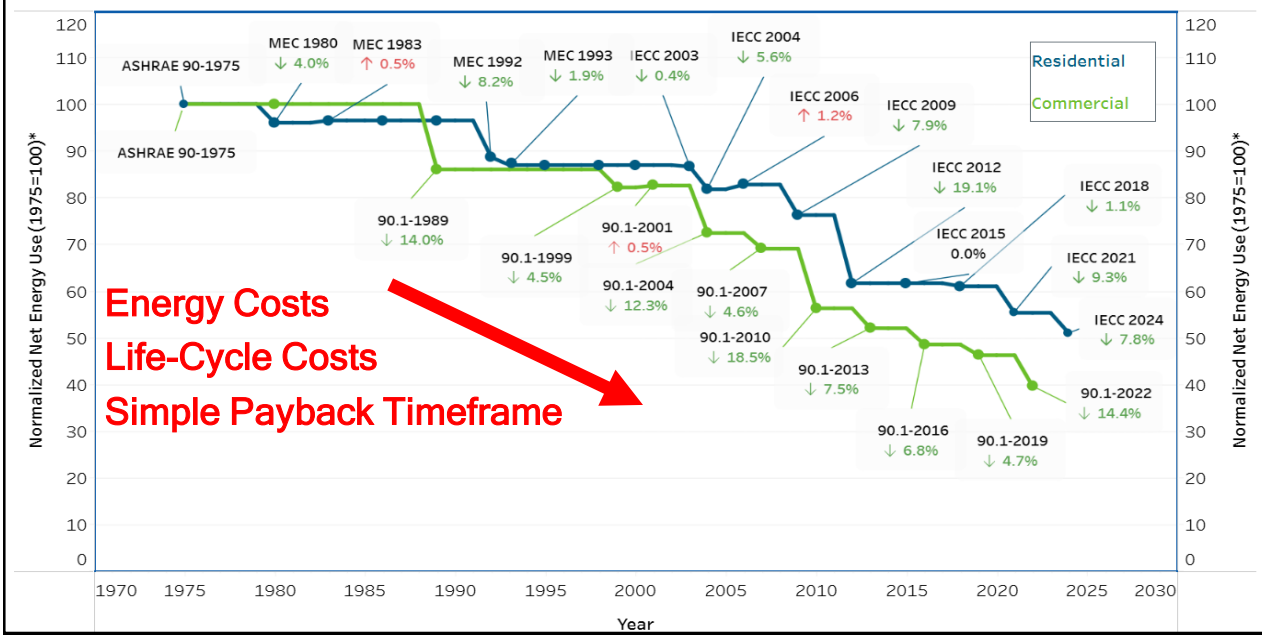
U.S. DEPARTMENT OF ENERGY

Estimated Improvement in Residential & Commercial Energy Codes (1975 - 2024)

Pacific Northwest NATIONAL LABORATORY



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Societal Demands Drive Energy Trends

SMART PHONE EFFECT

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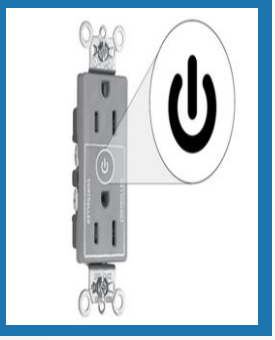
Energy Code Examples

Lighting & Lighting Control Technology

Automatic Receptacle Controls



FDD, Energy Monitoring & Management

EV, Electric, ESS, & Renewable Energy Source-Ready

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Industry Demands Drive Energy Trends

Workforce Development

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Safety Enhancements

Energy Efficiency

Reduction in electrical energy utilization equates to a decrease to:

- service/fe pacity to supply bu
- overcurre ection and conducto s
- available rrent and incident e atings
- emerge andby power ca eeded

Energy Resiliency

Premises wiring system resiliency improvements provide ability to:

Energy Sustainability

Premises wiring systems that incorporate sustainable practices:

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ENERGY RESILIENCE

Generation	Distribution	Utilization
▪ Renewables	▪ Demand/Response	▪ Electrification
▪ Modular Nuclear	▪ Machine Learning	▪ Energy Management
▪ Energy Storage	▪ Microgrids	▪ Detection & Diagnostics
▪ Carbon-Capture	▪ Sensor Technology	▪ Bidirectional Current

ELECTRICFICATION

HVAC & Appliances

- Increases energy demand and system capacity
- May require load management with utility
- Increases device compatibility issues

DER & OPPS

- Expands risk of shock, electrocution, fire, and arc-flash
- Requires coordination with utility and first responders
- Highly vulnerable to natural disasters

EVPTSE

- Increases energy demand and system capacity
- May require load management with utility
- Highly vulnerable to natural disasters

Potentially Installed After Construction

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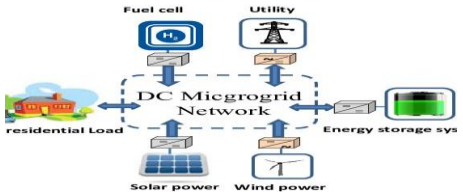
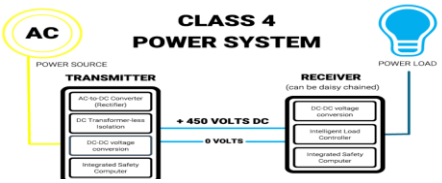
Emerging Technology

- **Interconnected Electric Power Production Sources**
  - NEC Article 705
- **Power-Limited Circuits and Fault-Managed Power Circuits**
  - NEC Articles 722-726 (Class 2, 3, 4)
- **Energy Management and Efficiency**
  - NEC Article 750 and National Energy Codes (IECC, ASHRAE)





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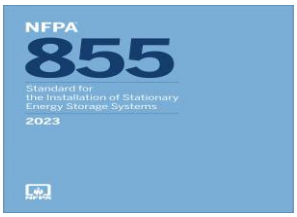
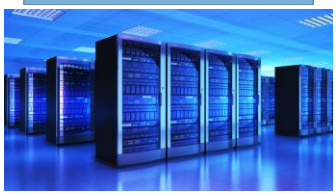
Emerging Technology

- Distributed Energy Resources and Energy Storage Systems
  - NEC Articles 445, 480, 690, 691, 692, 694, 706

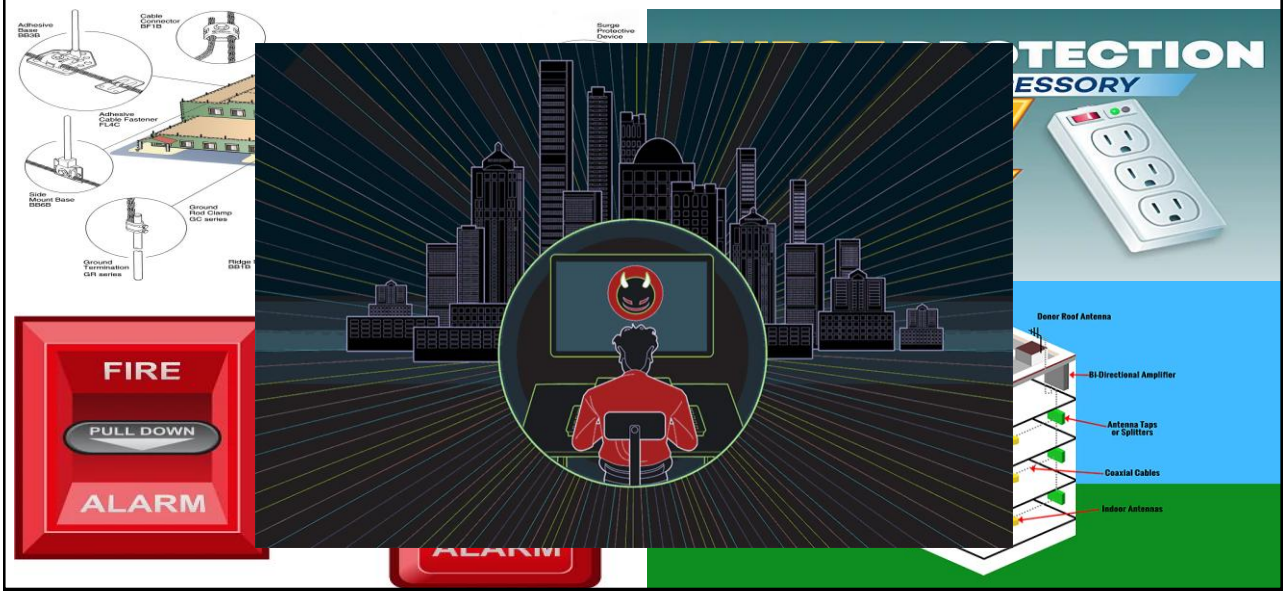


- Information Technology, Data Centers, Communication Systems, Software, Programming, Cybersecurity
  - NEC Articles 640, 645, 646, 647, 770, Chapter 8



- Electric Vehicle Power Transfer Systems
  - NEC Articles 625, 626

Supporting Technologies



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OPPORTUNITIES & CHALLENGES

- Risk of potential hazards will be a trade-off – not a reduction
- Simplicity on the surface means more complexity underneath
- Safety protocols, techniques, practices, products, equipment, and systems will need to evolve and adapt

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SUMMARY AND FINAL THOUGHTS

- The New Era of Energy and Electrification is the greatest opportunity for the electroindustry in the last 125 years – but needs to keep one foot in the past, our minds on the present, and a foot pointing to the future
- Equal consideration needs to be given to safety, efficiency, resiliency, reliability, and sustainability
- Celebrate successes, acknowledge and learn from failures
- None of this matters if the next generations are not inspired

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Questions

THANK YOU FOR YOUR ATTENDANCE!

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