

Reducing Barriers to New Technologies and Promoting the Grid of the Future



Karen Onaran
Vice President
ELCON

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We promote affordable, reliable, abundant and environmentally responsible energy resources for American industry.

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Transmission Necessary for the Clean Energy Transition

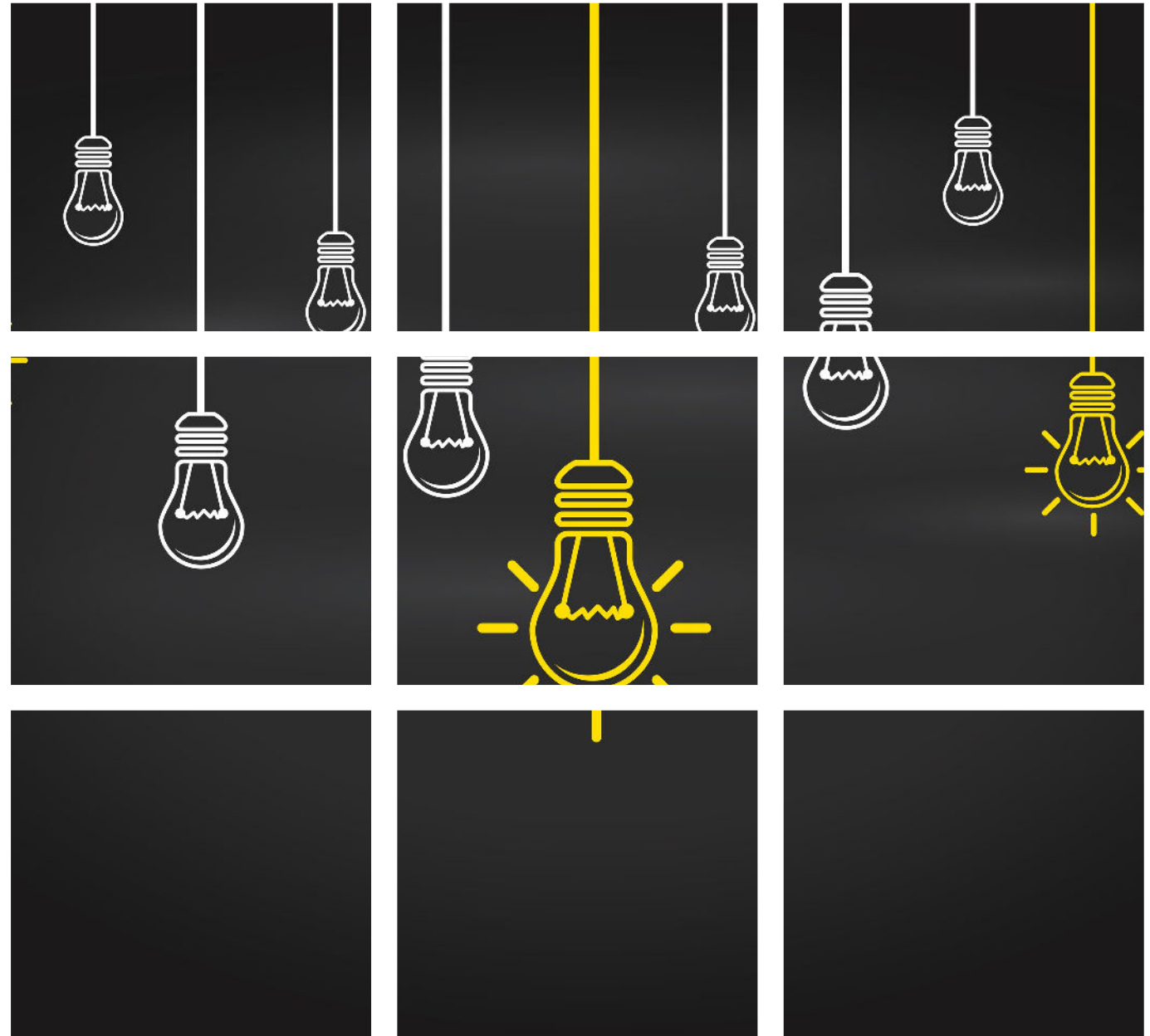
- President Biden – Zero Carbon Electricity Goal by 2050
- To achieve this goal:
 - Electric transmission must be tripled
 - \$2.4 trillion



Expanding existing
infrastructure capacity could
save customers billions of
dollars

How?

Advanced technologies



Transmission Line Ratings



Ambient-adjusted ratings (AARs)

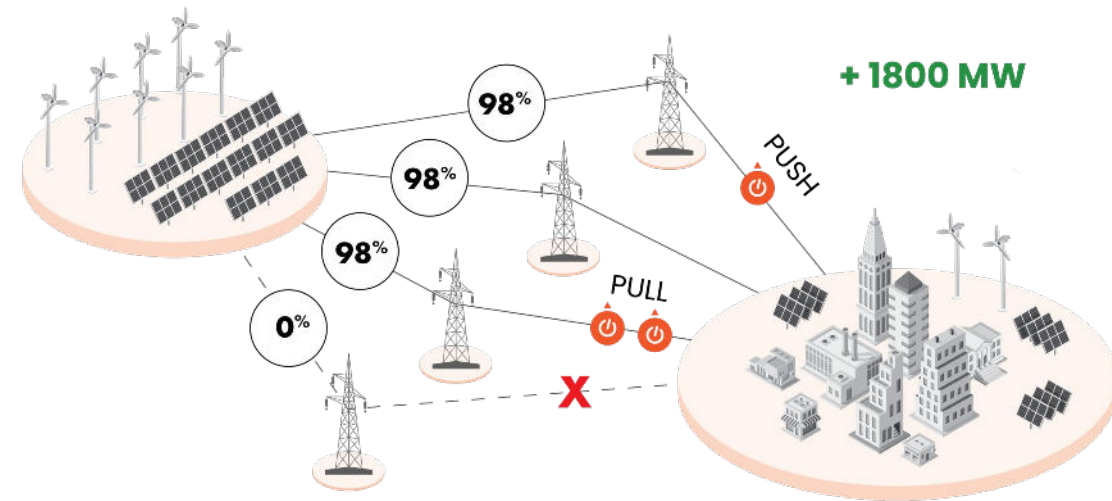
- air temperature



Dynamic line ratings (DLRs)

- air temperature
- cloud coverage
- wind speed
- wind direction
- precipitation
- solar intensity

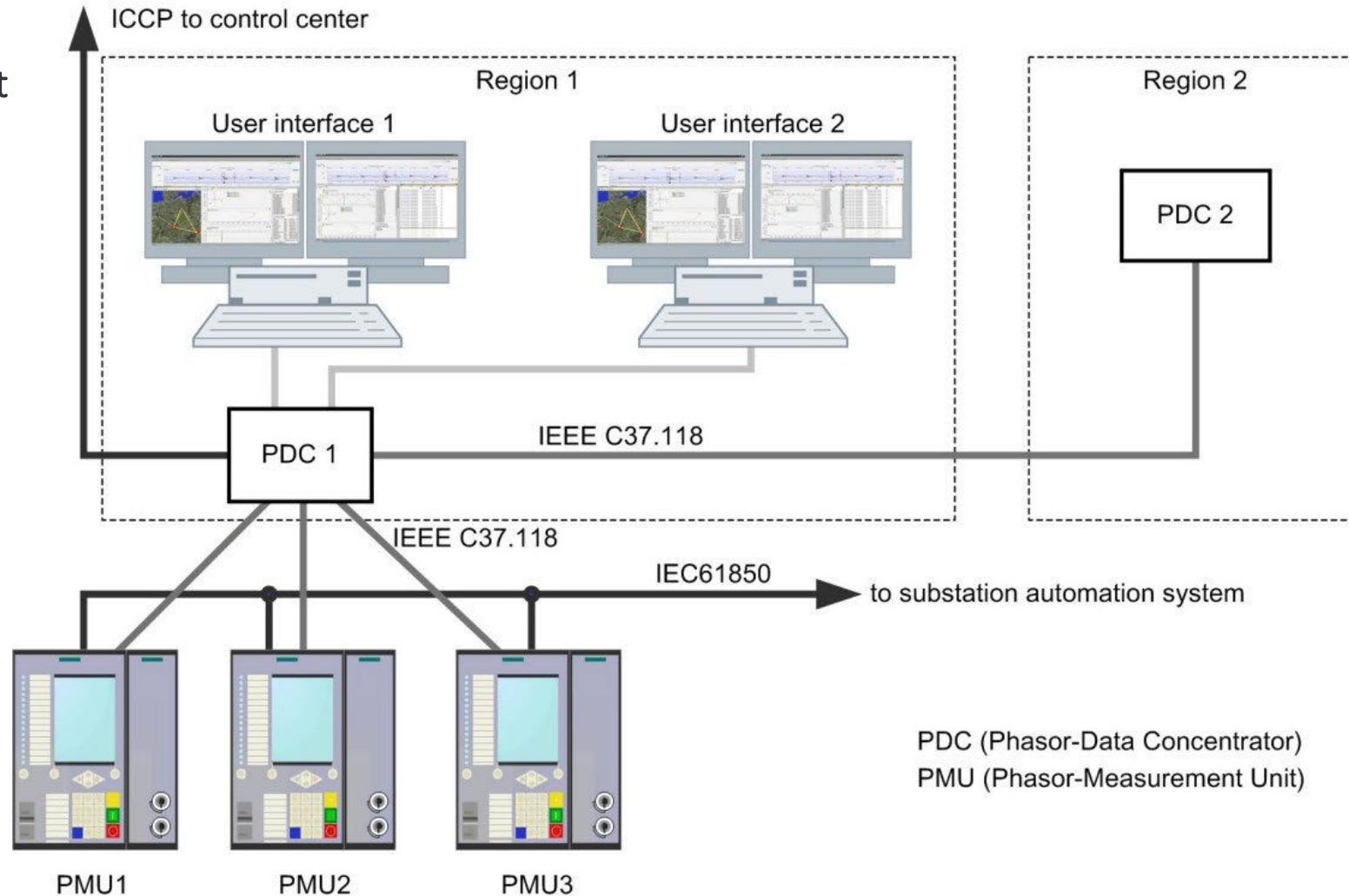
Grid Optimization



SMART  WIRES
REIMAGINE THE GRID

Data and Asset Monitoring

Phasor Measurement Unit (PMU)

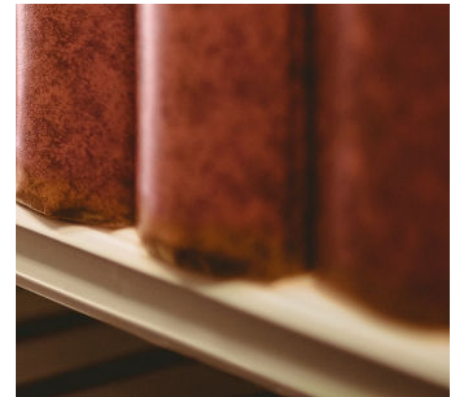
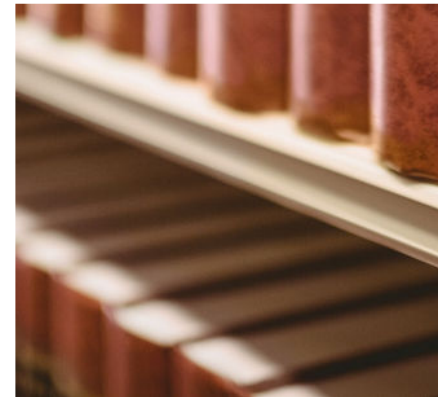
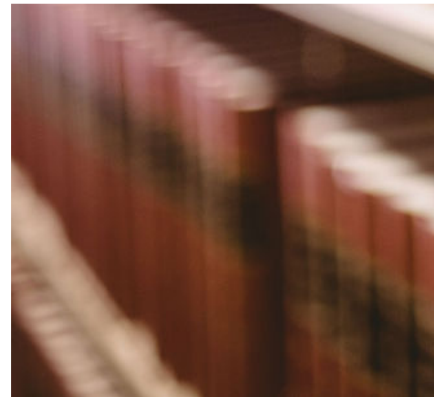
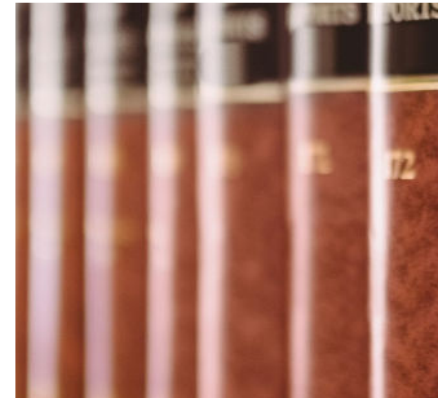


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Fault Annunciating Self-Inspecting Transmission Vaults



Regulations for implementation



Federal Energy Regulatory Commission (FERC)



- Order No. 841 – Storage
- Order No. 881 – AARs
- DLRs Notice of Inquiry
- Transmission Rulemaking
- Interconnection Reforms

Order No. 841

- Issued February 2018
- Participation of Storage Resources in RTO/ISO Markets
- Establish participation model
- Provide capacity, energy, and ancillary services
- Can be dispatched and set the wholesale clearing price
- Account for operational characteristics through bidding parameters
- Minimum size requirement not to exceed 100 kW



Impacts of Order No. 841



33.6 GW

Total Queue: 160 GW

21%



32.3 GW

Total Queue: 170.8 GW

19%



51.2 GW

Total Queue: 165.7 GW

30.9%



13.9 GW

Total Queue: 94.8 GW

14.7%



Order No. 881: Ambient-adjusted Transmission Line Ratings

Transmission operators use most conservative estimate of capacity

Inaccurate line ratings can lead to overestimating capacity

Static line ratings updated annually or seasonally (winter/summer)

AARs determined by near-term forecasts

Updated day/night solar heating values

RTO/ISOs to allow hourly line rating updates

AARs and methodologies must be accessible (OASIS or password protected website)

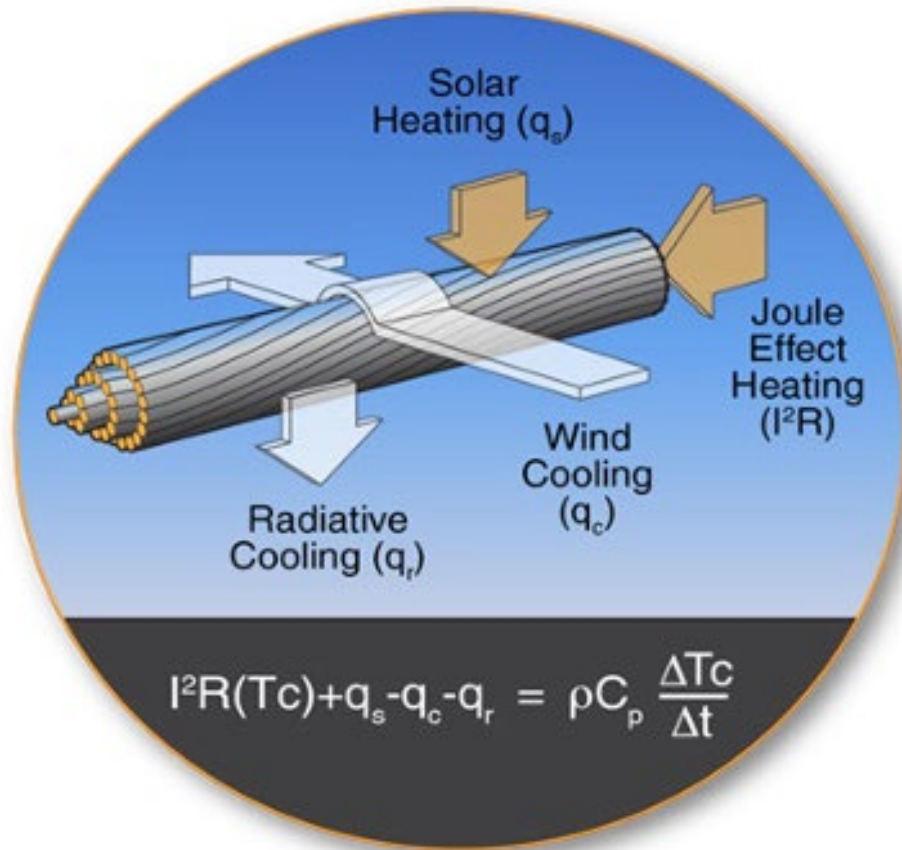


Figure 1: Heat-transfer model for a conductor.

DLRs Notice of Inquiry

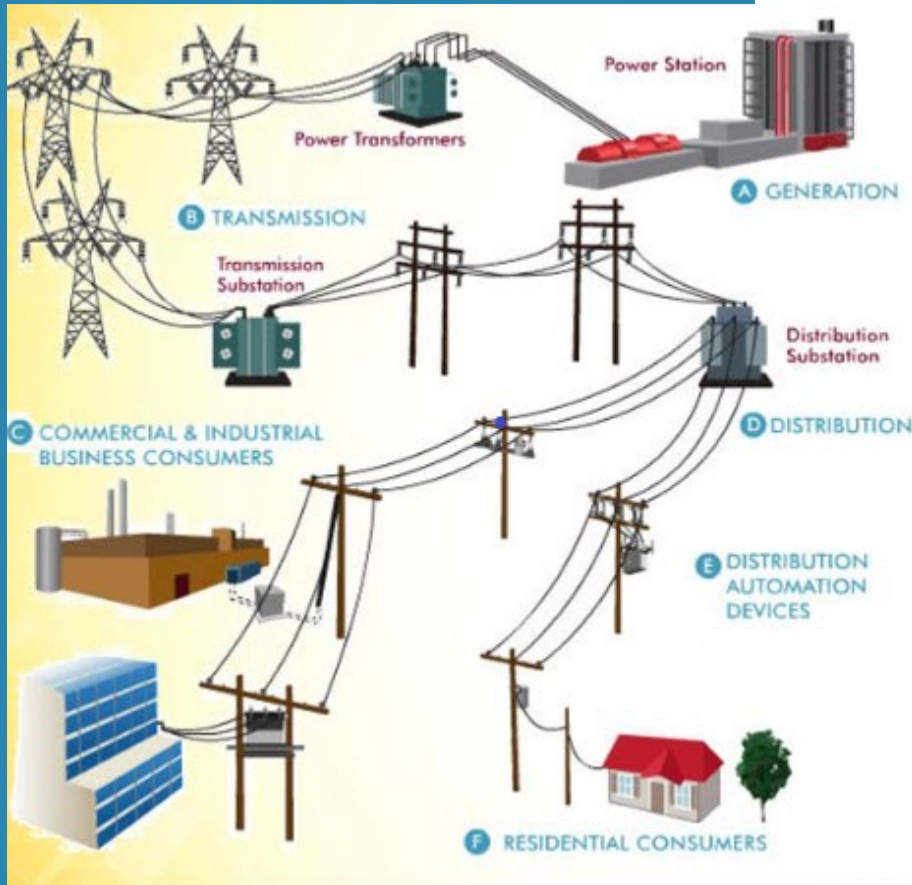
- Does lack of DLRs render rates un-J&R
- Potential criteria for DLR requirements
- Benefits, costs, and challenges
- Nature of potential DLR requirements
- Timeframes for implementation

Transmission Planning Proposed Rule

- Long-term transmission planning
- State participation
- Enhanced transparency
- Limited ROFR



“we propose to require that public utility transmission providers in each transmission planning region more fully consider in regional transmission planning and cost allocation processes two specific technologies: **the incorporation into transmission facilities of dynamic line ratings and advanced power flow control devices.**”



Generator Interconnection Reforms

“we propose...to require transmission providers to consider the following technologies... upon request of the interconnection customer: **advanced power flow control, transmission switching, dynamic line ratings, static synchronous compensators, and static VAR compensators.**”

