Cost Allocation Education
Reliability Baseline Upgrade

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PC Special Session
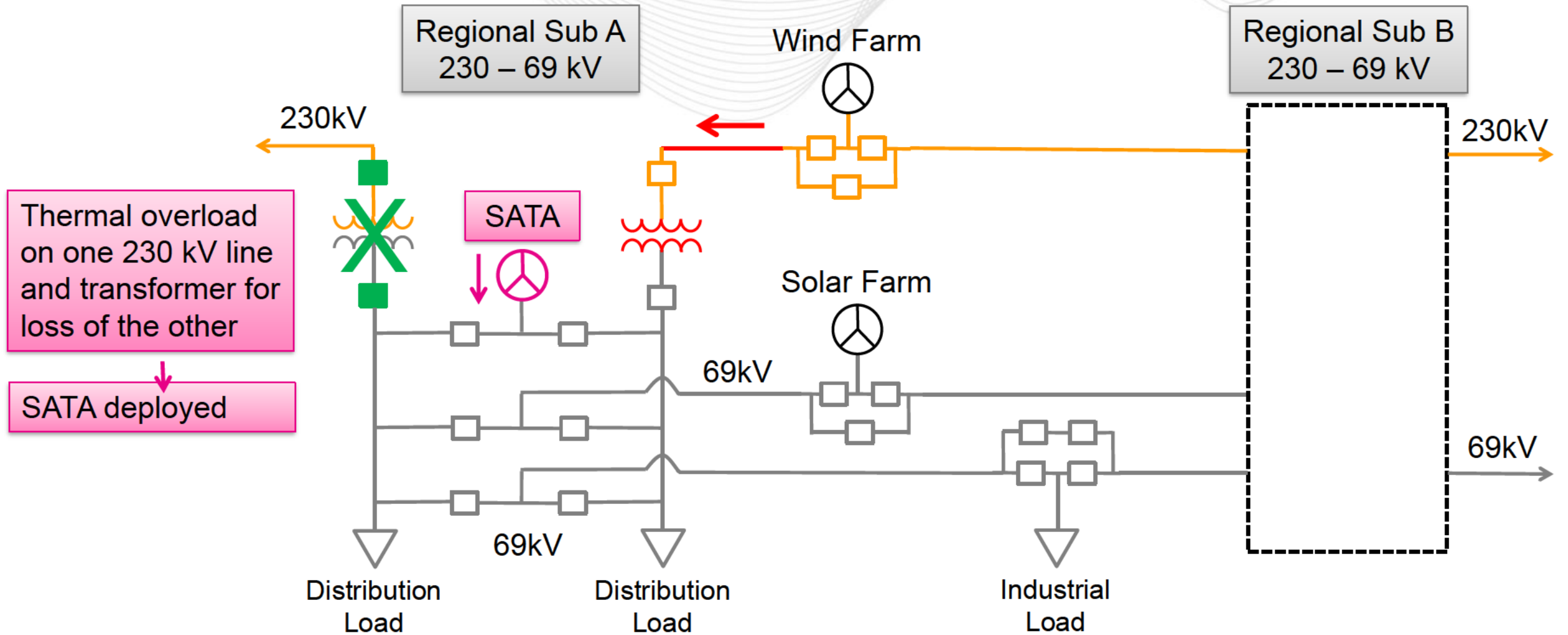
Storage as a Transmission Asset

September 25, 2020

- Background

- Cost allocation for reliability driven baseline upgrades

- Solution based DFAX method

- Cost allocation for SATA

- SATA Example

- Rules in PJM tariff Schedule 12 and Manual M14B

- Costs allocated to Responsible Customers
  - Customers, including Merchant Transmission Facilities, aggregated into zones

- General categories of transmission projects
  - Regional Facilities ≥ $ 5M
    - Generally AC facilities that are either ≥ 500 kV or double circuit 345 kV
    - Hybrid Allocation: 50% socialized based on load ratio shares and 50% Solution-Based DFAX (or 50% Stability Deviation Method)
  - Lower Voltage Facilities ≥ $5M
    - Generally AC facilities that are below 500 kV
    - Allocation 100% Solution-Based DFAX (or 100% Stability Deviation Method)
  - Local
    - Different types: <$5M, <200 kV driver, standalone breakers
    - Allocation 100% to zone in which project is constructed

- Solution-Based DFAX allocation
  - Applicable to all Regional & Lower Voltage Facilities
  - Based on relative contribution from each customer zone to the flows on new RTEP baseline upgrade
  - DFAX can only be calculated for lines and transformers
  - Zones contributing less than 1% per MW are not assigned cost responsibility
- Substitute Proxy
  - Schedule 12 allows a substitute proxy for Required Transmission Enhancements in conducting the DFAX analysis when the DFAX analysis can't be performed; examples include:
    - SVCs and other reactive devices
    - Substation upgrades without any line or transformer upgrades
  - PJM will create an interface comprised of lines and/or transformers to serve as a proxy
    - Engineering judgment based on driver for device
    - For local drivers (common) use a closed interface surrounding the part of the zone impacted
    - For broader drivers (rare) develop an open interface to calculate DFAX

- **Schedule 12 cost allocation rules**
  - Need substitute proxy if solution-based DFAX required because DFAX cannot be applied to SATA itself since the device is not a line or transformer

- **Cost allocation SATA example**
  - SATA deployed for N-1 loss of 230/69 kV transformer that overloads parallel 230/69 kV transformer and 230 kV line feeding transformer
  - Cost of SATA > $5M and subject to solution-based DFAX allocation
  - The substitute proxy would be the overloaded 230/69 kV transformer

Regional Sub A
230 – 69 kV

Wind Farm

Regional Sub B
230 – 69 kV

230kV

230kV

Thermal overload
on one 230 kV line
and transformer for
loss of the other

SATA

SATA deployed

Solar Farm

69kV

69kV

69kV

Distribution
Load

Distribution
Load

Industrial
Load

Cost Allocation Education
Market Efficiency

Nick Dumitriu, Market Simulation

- Cost allocation procedures
  - FERC set general cost allocation requirements for new economic based transmission enhancements in Order 1000
  - Commensurate with Market Efficiency benefits (see next slides)
  - All benefiting zones contribute to the cost sharing

- Market Efficiency cost allocation development and approval
  - PJM staff develops cost allocations at the time of the project approval
  - PJM Board approves allocations
  - PJM files allocations with FERC

- **Regional Projects (345 kV double circuit or above)**
  - Benefits calculation: 50% Change in Total Energy Production Cost + 50% Change in Net Load Energy Payment*
  - Cost > $5 million

- **Lower Voltage Projects (345 kV double circuit or below)**
  - Benefits calculation: 100% change in Net Load Energy Payment*
  - Cost > $5 million

- **Local Projects**
  - Cost <= $5 million
  - Benefits calculation: 100% change in Net Load Energy Payment*

* Only for zones with positive benefits (a decrease in Net Load Payments)

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- **Change in Total Energy Production Cost**
  - Calculated for the PJM Region
  - Adjusted for interchange with neighboring pools

- **Change in Net Load Energy Payments***
  - Net of ARRs (Auction Revenues Rights)
  - Determined for the first 15 years starting with the applicable RTEP Year
  - Net Present Value calculated for each transmission zone using PJM weighted average discount rate

* Only for zones with positive benefits (a decrease in Net Load Payments)

Item	Production Cost Benefits	Net Load Payment Benefits*
Granularity	PJM region	Benefitting Transmission Zones
Simulated years	Four years (RTEP-4, RTEP, RTEP+3, RTEP+6)	
Trend	Interpolated between the simulated years & Extrapolated after the last simulated years	
Benefits horizon	Calculated for 15 years starting with the RTEP year (Net Present Value)	

Only for zones with positive benefits (a decrease in Net Load Payments)

Market Efficiency Cost Allocation: Schedule 12

- Rules in PJM OATT Schedule 12

- Costs allocated to benefiting Customers according to the benefits

  - Customers, including Merchant Transmission Facilities, aggregated into zones

- Cost Allocation Procedure

  - Local Projects (Cost <=$5M)

    - Allocation 100% to zone in which project is constructed

  - Regional Projects with Cost >=$ 5M

    - Allocation 50% socialized based on load ratio shares and 50% based on changes in Net Load Energy Payment*

  - Lower Voltage and Cost >=$5M

    - Allocation 100% based on changes in load energy payment

    - Pro rata share among zones with positive benefits (a decrease in Net Load Payments)

Only for zones with positive benefits (a decrease in Net Load Payments)