



**Electricity, Resources,  
& Building Systems  
Integration**

# Updating Interconnection Screens for PV System Integration



**Solar Power International  
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NREL is a national laboratory of the U. S. Department of Energy,  
Office of Energy Efficiency and Renewable Energy, operated by  
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# Technical Report Goals

- Educate stakeholders
- Validate utility concerns for maintaining Safety, Reliability and Cost-Effectiveness
- Simplify and improve interconnection processes

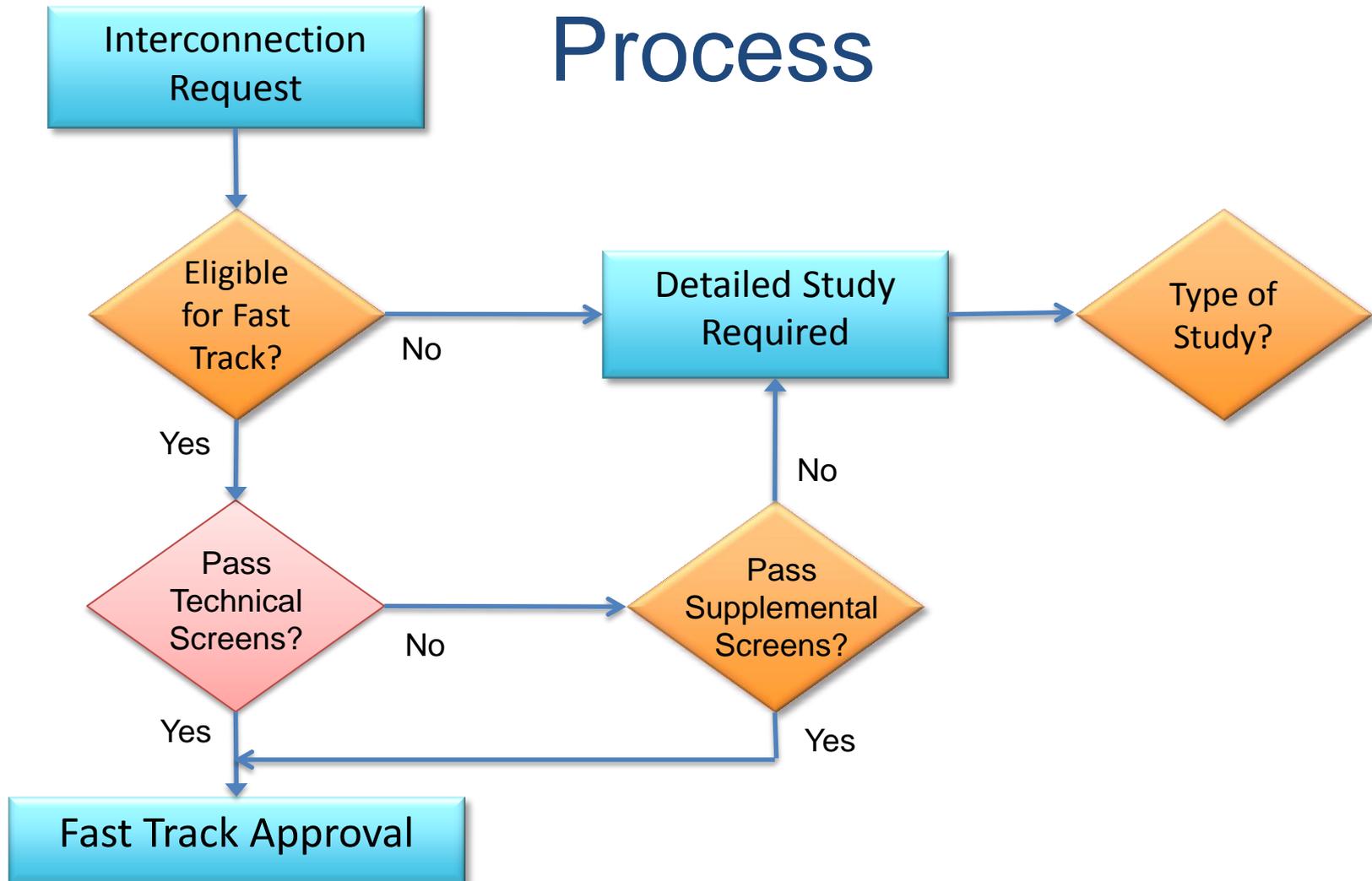
# Why are Technical Screens Utilized?

- To “catch” distributed generation systems that might cause problems on the utility distribution circuit
- Determine if a PV system qualifies for Fast Track interconnection

If ineligible for Fast Track, or if screens are failed, system will likely go through

- Supplemental Review Process, or;
- Detailed Study Process

# Example Interconnection Process



# Typical Technical Screens

- **15% penetration** (capacity penetration)
- Secondary Networks
- Short circuit current contribution
- Protective device coordination
- Grounding compatibility (TOV)
- Transformer secondary imbalance
- Transmission stability
- Need for system upgrades

# Why Focus on the 15% Screen?

- Directly relates to the amount of PV on a distribution feeder/circuit
- Shows up in the majority of state interconnection procedures
- Perceived as a barrier to PV deployment
- It is a limited metric not designed for higher penetration of PV
- Field experience challenges the rationale and significance of the 15% screen

# Origin of the 15% Screening Criterion

Quoting from CPUC Rule 21 Supplemental Review Guide:

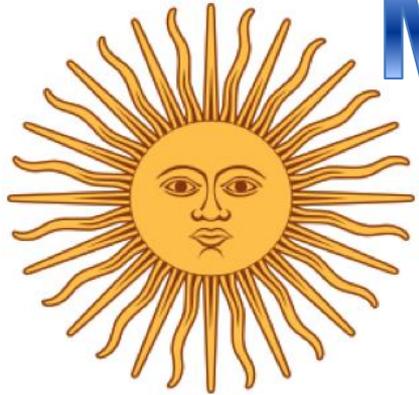
*The 15% line section peak load screen is meant as a catchall for a variety of potential problems that can occur as the level of penetration of generation within the distribution system increases.*

**“One-Size Fits-All Approach”**

# Short Term Solutions

Potential short-term “solutions” might improve the landscape for PV applications which fail the 15% Penetration screen

- Use minimum daytime load rather than 100% of peak load
- Apply supplemental screens
- Use “Zones of Penetration”



# Minimum Daytime Load

Base penetration screen on minimum daytime load data

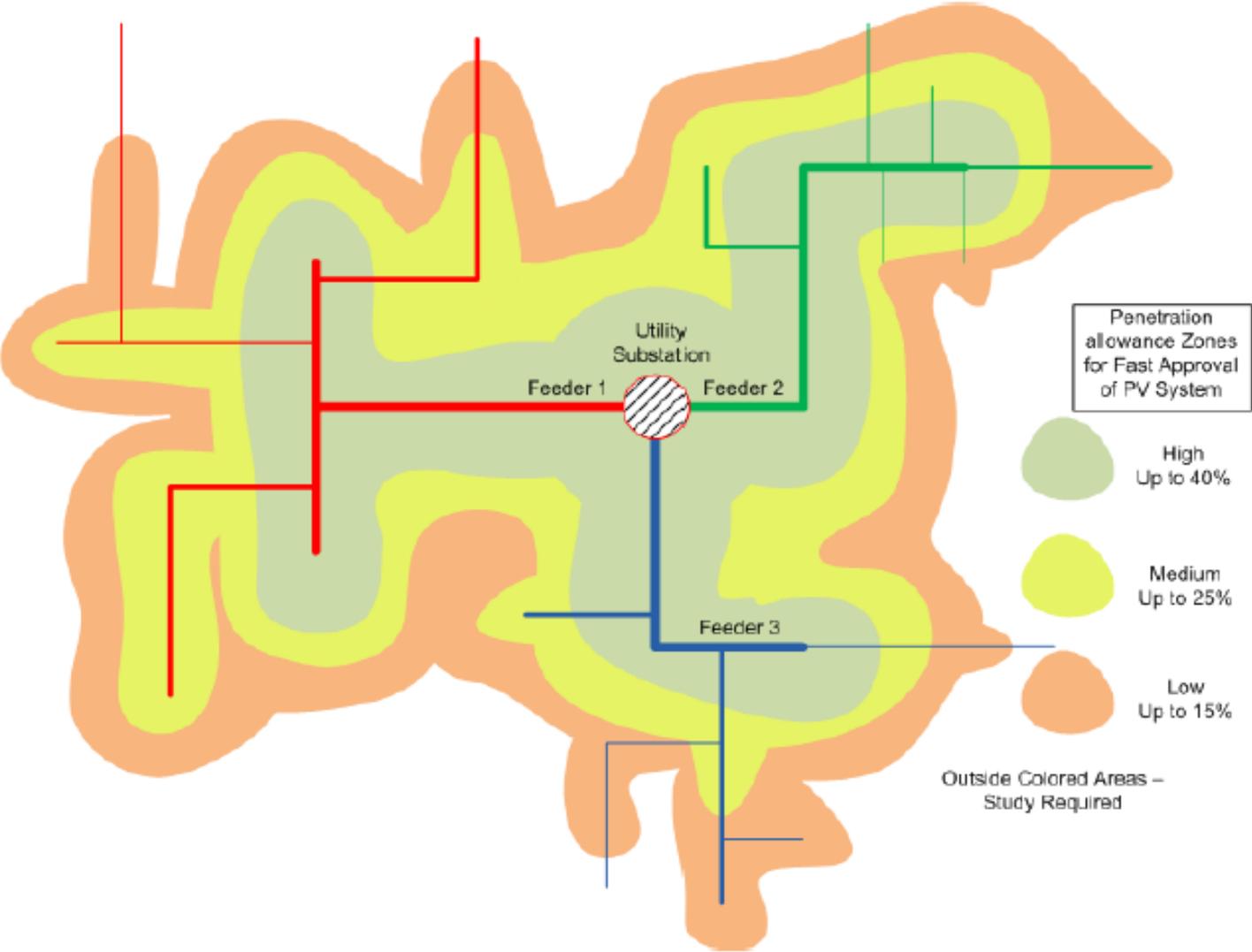
- Use actual data rather than a “rule of thumb” which uses half of 30% of peak load to estimate the minimum load
- Minimum load during 10 AM to 2 PM will capture the window of peak annual PV production (Solar Noon occurs during this time interval)
- Utilities may not have this data easily accessible

# Apply PV-Specific Screens

Apply these if initial screens Failed

- Is the proposed DG a PV system?
- Does the proposed PV pass the quick voltage regulation screen?
- Does the proposed PV pass the quick Anti-Islanding screen?
- Is the proposed PV in a utility-acceptable location?

# Zones of Penetration



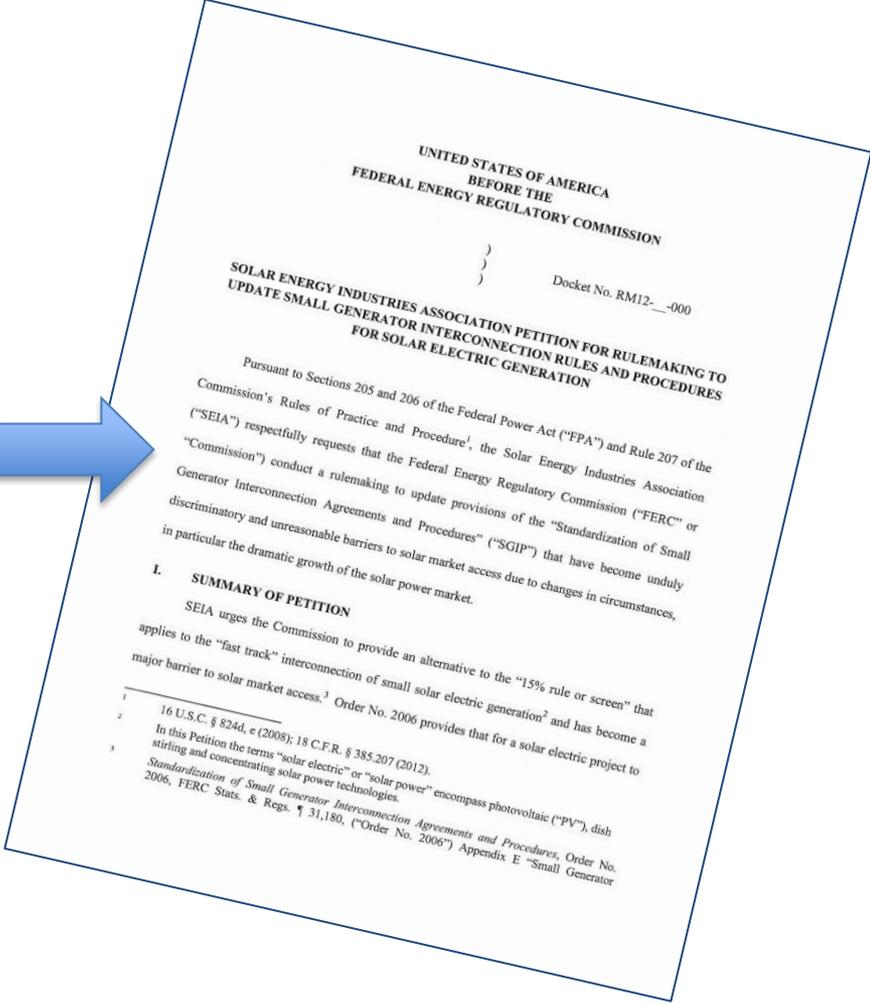
# Updating Interconnection Screens for PV System Integration

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# FERC Technical Conference Topics

- Fast Track Interconnection Process
  - Should the *pro forma* Fast Track Process be amended to include supplemental screens?
  - If amended, what should be included in those screens?
- Load Data Collection
  - Should minimum daytime load be published?
  - Methods to estimate MDL on line sections
- Independent Review of System Upgrades
  - Pros, Cons, Alternatives

# Longer-Term Solutions?

- Modify Distribution System designs
- Deploy advanced inverter technology
- Smart Grid Solutions & Communications
- Develop “*Screens 2.0*” based on measurements, modeling, analysis, and validation
- Simplified impact study procedures utilizing distribution modeling software

# The Future of Interconnection Screens and Studies?

