

# California Rule 21 Overview

*“Just another interconnection standard”  
or is it...?”*

**October 13-14, 2003**

Presented by:  
**Endecon Engineering**

# What Is Rule 21?

- ⚡ CPUC-approved set of utility DG interconnection requirements.
- ⚡ Specific rule contained in the electricity tariff booklets of the investor-owned utilities under CPUC jurisdiction (California only).
- ⚡ Provides technical and procedural criteria for connecting generation equipment to the utility distribution and sub-transmission systems.
- ⚡ Rule is technology and size neutral.



# Why Did Rule 21 Need Refinement?

- ⚡ Rule was not designed for small-scale DG interconnections.
- ⚡ It did not address the benefits of having a standardized rule in place.
  - Increased cost to DG manufacturers.
  - Larger degree of customization required.
- ⚡ It did not obligate utilities to review applications within a particular timeframe or provide any detailed cost estimate to applicant.



# What Were the Guiding Principles?

- ⚡ Rules, protocols, and processes should be clear and transparent.
- ⚡ Rules should be technology neutral, except when differences are fully justified.
- ⚡ A level playing field should be established for all DG providers.
- ⚡ Rules should be uniform throughout California.
- ⚡ Utilities should be fairly compensated for distribution services that support DG installations and customers.



# Rule 21 - Highlights

- ❖ Applicable: CPUC Jurisdictional Projects Only
- ❖ Application Process
  - ▲ Standard CPUC Form
  - ▲ Application Fee:
    - \$800: Initial Review Only
    - \$600 Additional: Supplemental Review
    - Cost Estimate for IC Study
  - ▲ Utilities to Complete Within 10/20 Days  
(Initial/Supplemental Reviews Only)



# Issues Addressed by the Rule 21 Working Group

- Standardized, technology/size-neutral technical requirements
- Clear Engineering Review Process
- Testing and Certification Procedures
- Interconnection Fees
- Interconnection Agreements
- Application Forms (Paper and Electronic)
- Process for Continued Refinement



# Technical Basis for Rule 21

- ❖ Safety Is First Priority
- ❖ Performance-Based Technical Requirements
- ❖ Identify Review Time and Potential Costs
- ❖ Technology-Neutral
- ❖ Recently Revised to Comply with IEEE 1547-2003



# Rule 21 Technical Requirements

## ❖ Section D - Design & Operating Requirements

### 1. General

- Protective Functions
- Momentary Paralleling
- Equipment Requirements
- Visible Disconnect
- Drawings Required





# Rule 21 Technical Requirements (cont.)

## ❖ Section D - Design & Operating Requirements

### 2. Prevention of Interference

- Voltage Regulation
- Operating Voltage Range
- Paralleling
- Flicker
- Integration with EC's Distribution System Grounding
- Frequency
- Harmonics
- DC Injection
- Power Factor

# Rule 21 Technical Requirements (cont.)

## ❖ Section D - Design & Operating Requirements

### 3. Technology Specific Requirements

- Three Phase Synchronous Generators
- Induction Generators
- Inverters
- Single-Phase Generators



# Rule 21 Technical Requirements (cont.)

## ❖ Section D - Design & Operating Requirements

### 4. Supplemental Generating Facility Requirements

- Fault Detection
- Transfer Trip
- Reclose Blocking



# Rule 21 Technical Requirements (cont.)

## ❖ California Interconnection Guidebook

Released on November 2003

- Provides basic guidance to a potential system owner on the process of interconnection



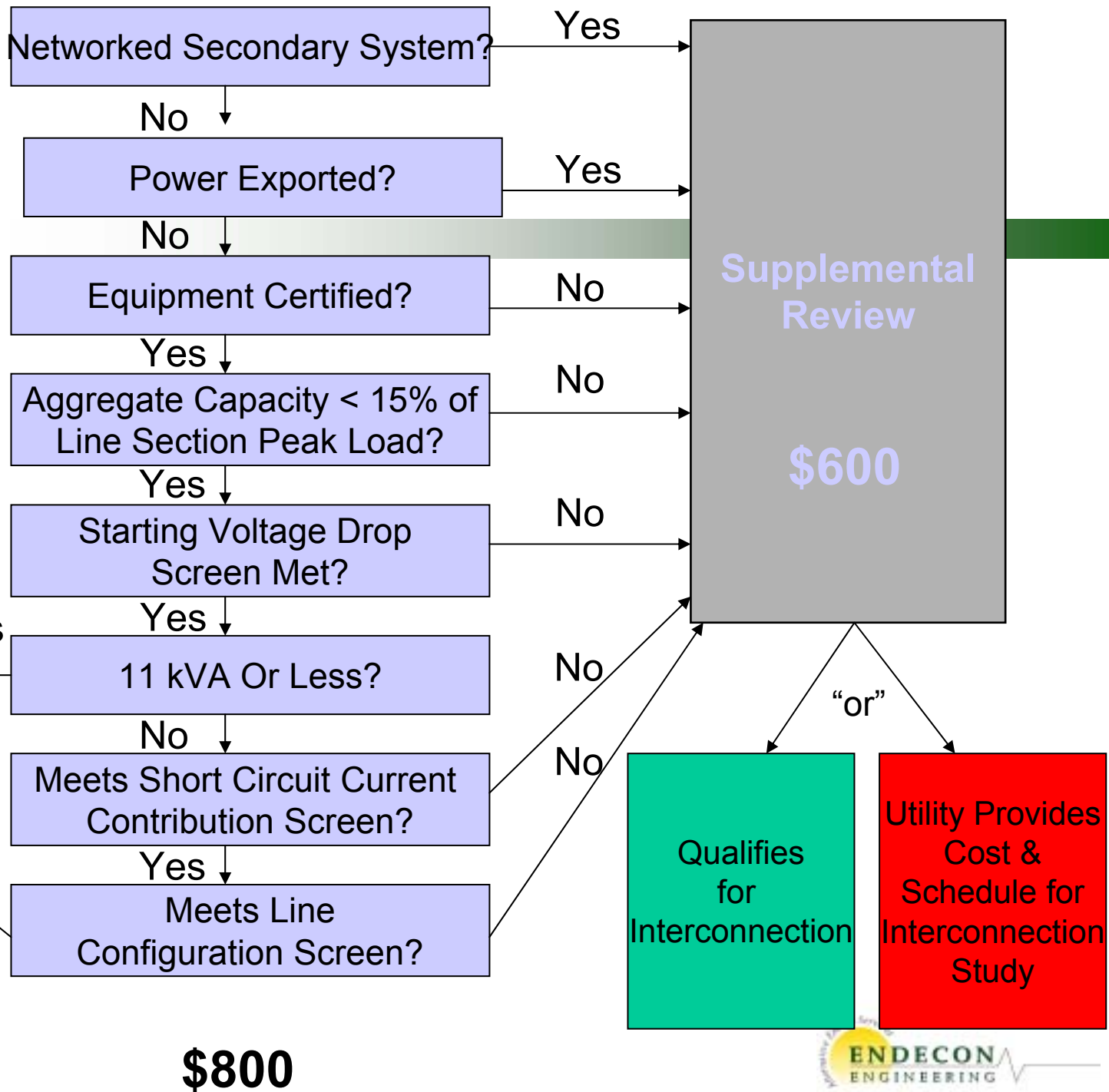
# Rule 21 Technical Requirements (cont.)

## ❖ Section I - Review Process

Determines:

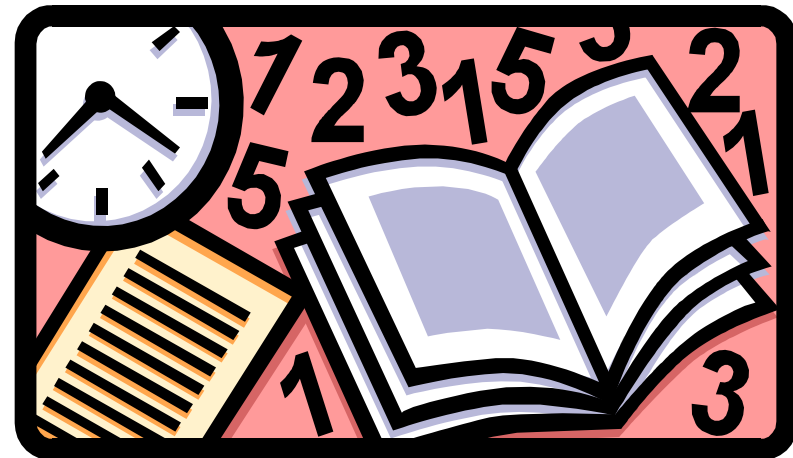
- Simplified Interconnection (via Initial Review)
- Supplemental Review Determines If There Are Additional Requirements for Interconnection or...
- If an Interconnection Study Is Required

# “The Review/ Screening Process”



# Rule 21 Technical Requirements (cont.)

- ❖ Section I - Supplemental Review
  - Guideline Developed in 2002 Through Rule 21 Working Group Process
  - Goals: Identify Review Criteria and Study Requirements
  - Draft Issued in December 2002



# Rule 21 Technical Requirements (cont.)

- ❖ Section J - Testing and Certification
  - Certification Criteria
  - Type Testing
    - Individual Tests - By Technology
    - UL 1741 Referenced
    - IEEE 1547-2003 Compliant





# Rule 21 Technical Requirements (cont.)

- ❖ Section J - Testing/Certification
  - Production Testing
  - Commissioning Testing
    - General Requirements
    - Protective Functions to Be Tested
    - Impact of Certification
    - Verification of Settings
    - Trip Test

# How has Rule 21 Impacted Installations?

- ❖ Developers and System owners
  - Process defined more clearly
  - Inverter-based technologies are clearly viewed by the utilities as safer and easier to interconnect



# What Changes and Additions have been made to Rule 21?

- ❖ Rule 21 updated to be in agreement with IEEE 1547-2003.
  - Much effort went into updating Rule 21 so that it agrees with IEEE 1547.
  - IEEE 1547 is not nearly as detailed in its coverage of some issues, so replacing Rule 21 technical section was not acceptable.
  - Rule 21 covers non-technical issues not covered in IEEE 1547.
  - Revised Rule is under final CPUC review

# What are the implications that Rule 21 changes hold for manufacturers?

- ❖ Changes that a manufacturer is already making to comply with IEEE 1547 will be acceptable for Rule 21.
  - UL 1741 is still the basis for the testing procedures.
  - Testing requirements were updated to be compatible with changes in UL 1741 and IEEE 1547-1.

# Update on California Inverter Installations

- ❖ CEC program has provided incentives for 10,000 systems, a total of nearly 40 MW of PV—most of which are systems less than 30 kW.
- ❖ CPUC Self-Gen program has funded many more MW of 30 kW and larger PV systems.
- ❖ Inverter interconnections are a slam-dunk in California, due in part to Rule 21, UL 1741, and IEEE 929.

# Is Rule 21 a Model for Other States/Utilities?

- ❖ Rule 21 addresses the entire interconnection process: from application through review and approval.
- ❖ The basic technical requirements were CMW1 designed to be standardized yet flexible--to bend with changes in IEEE 1547.
- ❖ Initial Review Process clearly and appropriately favors more benign projects—a major benefit for inverters.