

Developing Standardized Interconnection Rules in California

EPA Clean Energy-Environment Technical Forum



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Topics of Discussion

- Why standardize?
- Guiding Principals of Revised Rule
- Initial Issues Addressed
- Results and accomplishments
 - Revised Rule Structure
 - Certification
 - Educational Information and Tools
- Keys to Success

What Is Rule 21?

- A term commonly referred to as interconnection rules.
- Specific rule contained in the electricity tariff booklets of the utilities under CPUC jurisdiction.
- Provides technical and non-technical criteria for connecting generation equipment to the utility systems.
- Rule is technology and size neutral.

Why Did Rule 21 Need Refinement?

- Original 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.

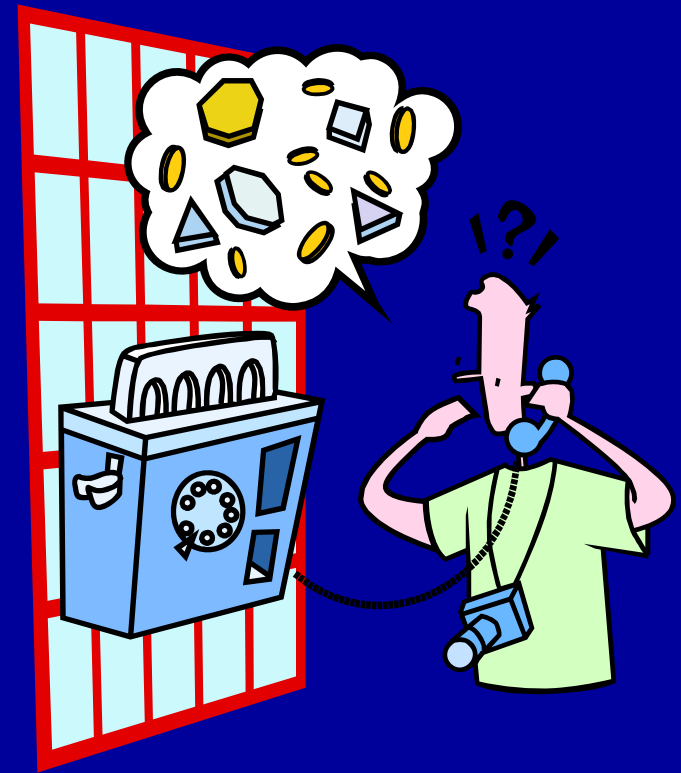


What Were the Guiding Principles?

- 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.

Issues Addressed by the Rule 21 Working Group

- Interconnection Fees
- Testing and Certification Procedures
- Clear Engineering Review Process
- Interconnection Agreements
- Application Forms (Paper and Electronic)
- Process for Continuing Refinement

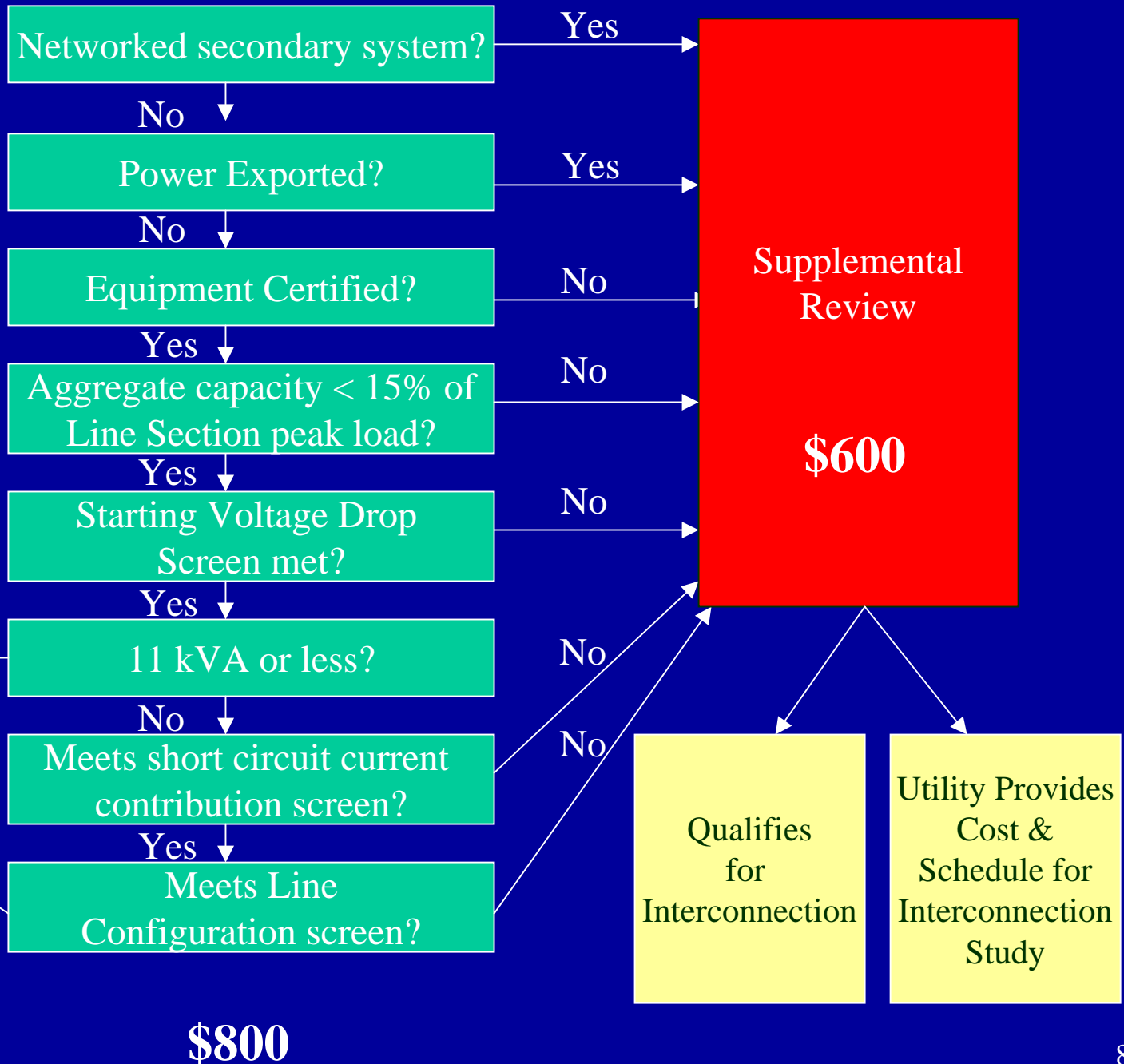


Accomplishments of Rule 21 Working Group

- Standardized rule language for PG&E, SCE, and SDG&E.
- Standardized application forms and agreements.
- Clear procedures for evaluating DG applications.
 - More certain time review.
 - Costs of review not prohibitive.
 - Equipment testing procedures identified.
- Tools continue to be developed to help understand and evaluate DG projects.



The Review Process



Qualifies for Interconnection

Supplemental Review

\$600

Qualifies for Interconnection

Utility Provides Cost & Schedule for Interconnection Study

\$800

Rule 21 Provides Streamlined Review for Certified Equipment

9 Items on Certification List

- **Capstone: 30 kW & 60 kW microturbines**
- **Fuel Cell Energy: 300 kW fuel cell system**
- **Plug Power: 2 - 5 kW fuel cell systems**
- **Tecogen: 60 kW & 75 kW induction generator systems (High and Low Voltage)**

Type Test	Reference	Inverter	Synchronous Machine	Induction Machine
Utility Interaction	UL 1741 - 39	X	X	X
DC Isolation	UL 1741 - 40.1	X	—	—
Simulated PV Array (Input) Requirements	UL 1741 - 41.2	X	—	—
Dielectric Voltage Withstand	UL 1741 - 44	X	X	X
Power Factor	UL 1741 - 45.2.2	X	X	X
Harmonic Distortion	UL 1741 - 45.4	X	X	X
DC Injection	UL 1741 - 45.5	X	—	—
Utility Voltage and Frequency Variation	UL 1741 - 46.2	X	X	X
Reset Delay	UL 1741 - 46.2.3	X	X	X
Loss of Control Circuit	UL 1741 - 46.4	X	X	X
Short Circuit	UL 1741 - 47.3	X	X	X
Load Transfer	UL 1741 - 47.7	X	X	X
Surge Withstand	J.3.a	X	X	X
Anti Islanding	J.3.b	(2)	(2)	(2)
Non-Export	J.3.c	(3)	(3)	(3)
In-Rush Current	J.3.d	(4)	(4)	(4)
Synchronization	J.3.e	(5)	X	—

Notes: X = Required; — = Not required;

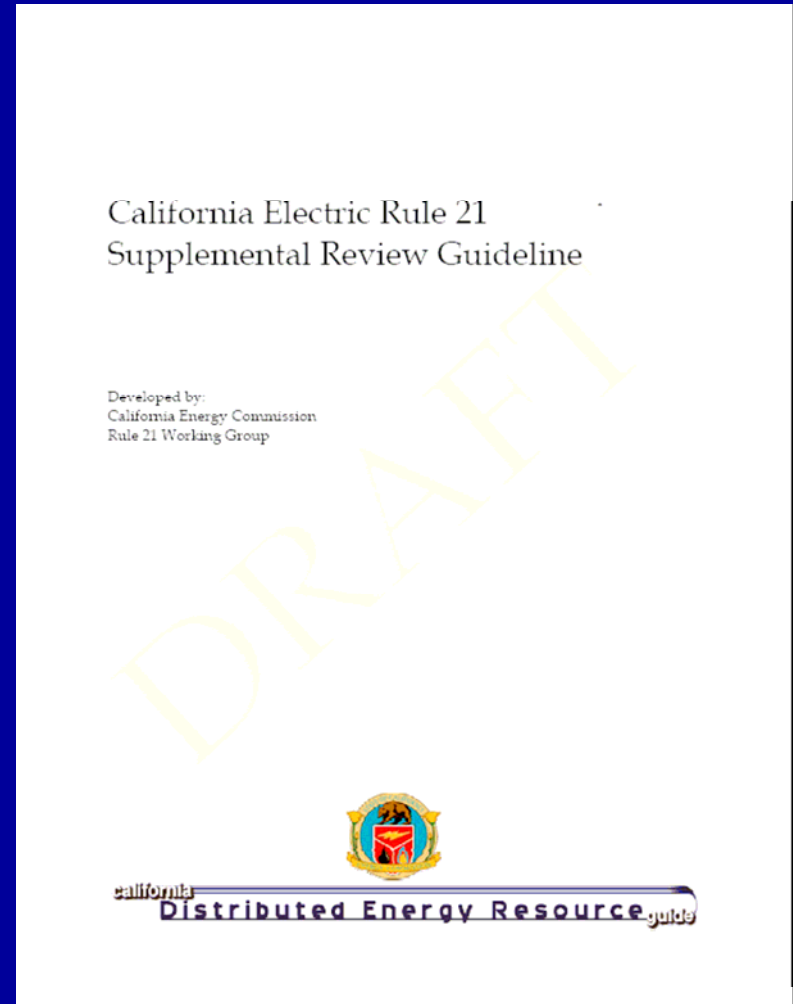
Equipment Certified by Certification Subcommittee

- Subcommittee includes five individuals:
 - One protection engineer from PG&E, SCE, and SDG&E.
 - Independent consultant serving as technical expert.
 - Rule 21 moderator
- Process takes about 2-4 months to complete.



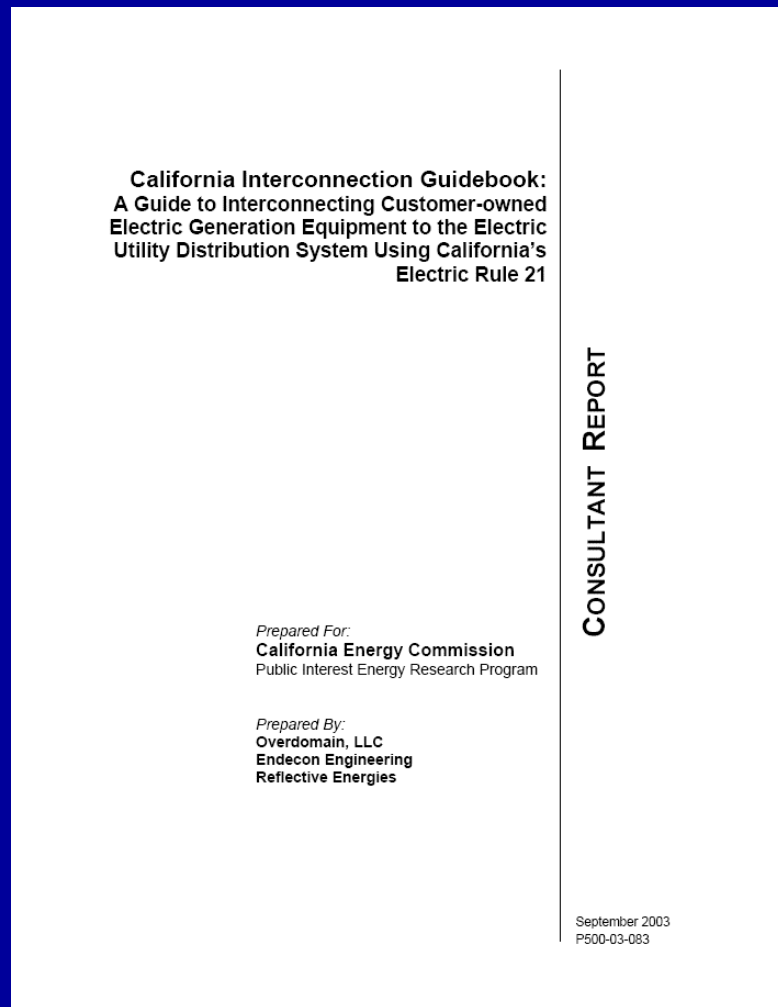
Tools Are Being Developed to Assist Protection Engineers with Project Evaluation

- Supplemental Guideline currently on Energy Commission website.
- Intent is to assist protection engineers with Rule 21 Supplemental Review.
- Guideline provides suggested approaches for resolving outstanding protection issues.
- Document is ever-changing as more information is developed.



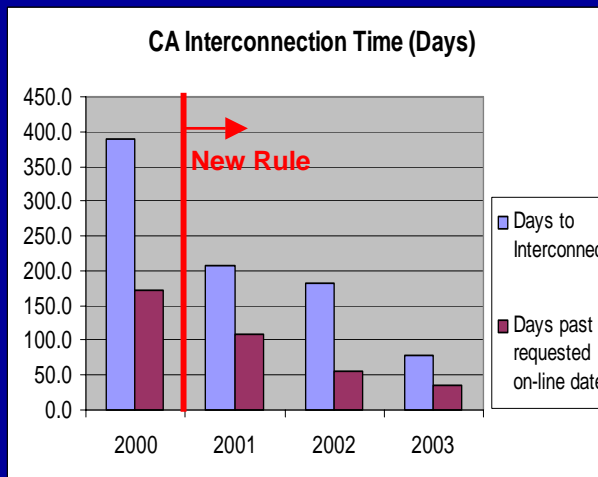
Tools Are Being Developed to Assist DG Customers with Getting Interconnected

- Interconnection Guidebook currently on Energy Commission website.
- Intent is to assist potential DG customers in getting interconnected.
- Guideline written to aid interconnection for three IOUs for which Rule 21 applies.
- May also be useful for some municipal utilities who have adopted Rule 21-type rules.

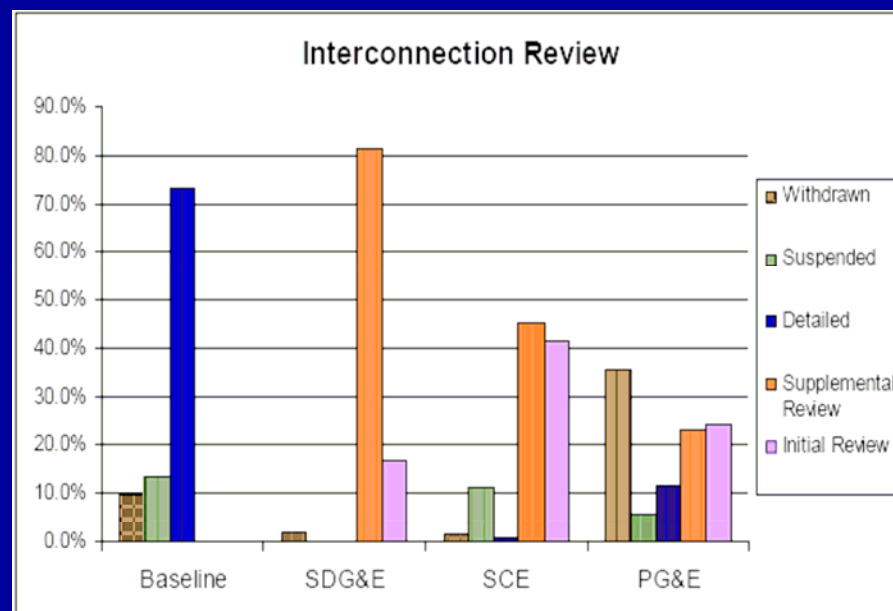


Standardization of Rules is Generating Benefits

- Standardization is yielding real results.
- Types of interconnection review changed resulting in time and cost savings to DG customers.
 - Now: 74% Initial or Supplemental Review, 14% withdrawn, 7% were suspended, and 5% Detailed Studies
 - Pre: 70% Detailed Study; the rest were withdrawn, suspended, or disconnected
- Time to interconnect has decreased by over factor of 5.
- Fees have dropped significantly also from over \$5,000 to \$800 - \$1,400 per application on average.

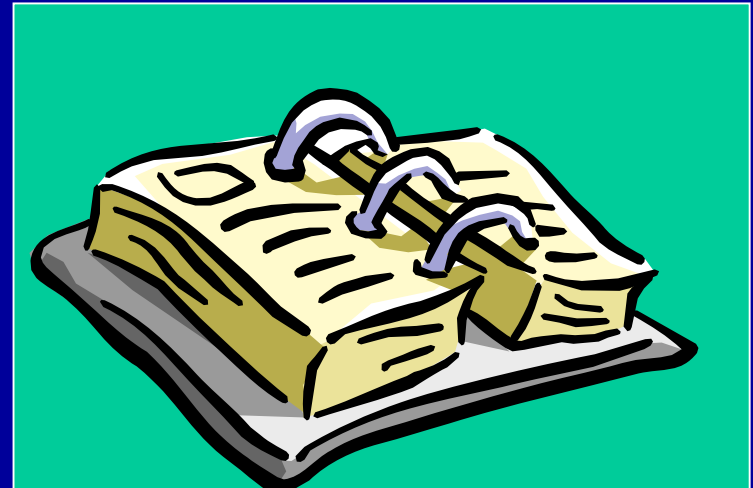


Savings Through New Rule 2001 – 2003	
< 1MW	> 1MW
\$ 8 Million	\$ 18 Million



What is the Rule 21 Working Group Currently Doing?

- Refining present rule language.
- Responding to policy directives of CPUC and Energy Commission.
- Facilitating utility responses to CPUC directives.
- Developing tools to help understand DG complexities.
- Providing forum to address new issues surrounding interconnection process.



Working Group has
held over 60
meetings!

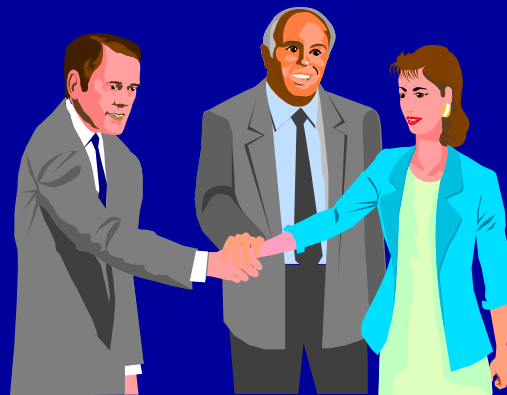
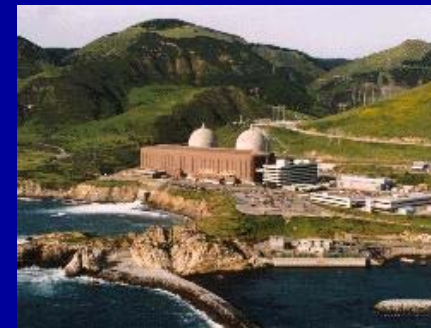
Key Observation of Working Group Process

Success Stems from Effective Collaboration Among Stakeholders, Utilities, Regulators, Vendors, and Manufacturers!

Regulators and Legislators



Utilities and Municipalities



Industry and Stakeholders

California Distributed Generation Information

Energy Commission Website for DG information and activities:

www.energy.ca.gov/distgen/index.html

Additional Information:

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California Distributed Energy Resources Guide - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://www.energy.ca.gov/distgen/index.html>

California Home Friday, February 3, 2006

Welcome to the *California Energy Commission*

California Distributed Energy Resource guide

Welcome!

The California Distributed Energy Resources Guide is a public benefit site containing a wealth of information regarding distributed energy resources (DER). Distributed energy resources are small-scale power generation technologies (typically in the range of 3 to 10,000 kW) located close to where electricity is used (e.g., a home or business) to provide an alternative to or an enhancement of the traditional electric power system.

ANNOUNCEMENTS

CONFERENCE
Combined Heat & Power (CHP)/Bio-Energy for Landfills, Wastewater Treatment Facilities, Hospitals, Hotels, Universities and Bio-Tech
January 18, 2006
Marriott Napa Valley, California
www.energetics.com/napavalleychpworkshop

DER Home
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[DER Equipment](#)
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[Installations](#)
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Related Proceedings

[Distributed Generation Oil](#) (#04-DIST-GEN-1)
[CRS Exemptions Rulemaking](#) (#03-CRS-01)
[CRS Megawatt Cap](#)

The DER information contained in this site will help you understand the current interest in DER, the various DER technologies, cost/performance issues, markets, and applications for DER. These topics are addressed in individual sections that can be accessed through the links listed in the column at the left.

[Click for more information regarding the California Energy Commission and distributed generation](#)

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