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Increasing the Use of Clean Energy Supply:
Removing Key Policy Barriers and Creating New Opportunities

Katrina Pielli
Clean Energy Program Manager
US Environmental Protection Agency
ASERTTI
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Overview of Presentation

- Introduction
- Standardized Interconnection Rules
- Utility Rates
- Renewable Portfolio Standards
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What is Clean Energy?

- **Energy Efficiency**
  - ✧ Reduces demand for energy and peak electricity system loads.
- **Renewable Energy**
  - ✧ Partially or entirely generated from non-fossil energy sources.
- **Combined Heat & Power**
  - ✧ Clean & efficient approach to generating electric and thermal energy from a single fuel source. Inherently an energy efficiency measure.

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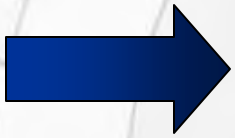
Clean Energy Benefits

State Energy Challenges
Electricity demand continues to rise
Electricity transmission systems are overburdened
Many base-load plants are aging
Volatile natural gas prices and financial risk as well as high energy prices
Reducing emissions to improve air quality and comply with clean air rules.



Primary Clean Energy Benefits
Reduce energy demand
Meet load growth with fewer environmental consequences

Additional Clean Energy Benefits
Reduced energy-related air emissions
Increased power reliability
Increased fuel diversity
Efficient use of natural resources
Increased state economic development

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State Approaches to Encourage Clean Energy

Five state approaches with significant potential to increase clean energy supply. Discuss two primary barriers and one of three incentives.

	State Approaches to Encourage Clean Energy Supply
Renewable Portfolio Standard (RPS)	Establish requirements for electric utilities and other retail electric providers to serve a specified minimum percentage (or absolute amount) of customer load with eligible sources of renewable electricity.
Standardized Interconnection Rules	Establish clear application processes and technical requirements that apply to utilities within the state which reduce uncertainty and prevent time delays that clean distributed generation systems can encounter in obtaining approval for grid connection.
Public Benefit Funds (PBF) for State Clean Energy Programs	Are a pool of resources used by states to invest in clean energy supply projects and are typically created by levying a small fee on customers' electricity rates.
Utility Rates	Electric and natural gas rates, set by Public Utility Commissions, can be designed to support clean distributed generation projects and avoid unintended barriers, while also providing appropriate cost recovery for utility services on which consumers depend.
Output Based Environmental Regulations (OBR)	Establish emissions limits per unit of productive energy output of a process (i.e., electricity, thermal energy, or shaft power), with the goal of encouraging the use of efficient fuel conversion (through CHP) and renewable energy as air pollution control measures.

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Standard Interconnection Encourages Clean Energy

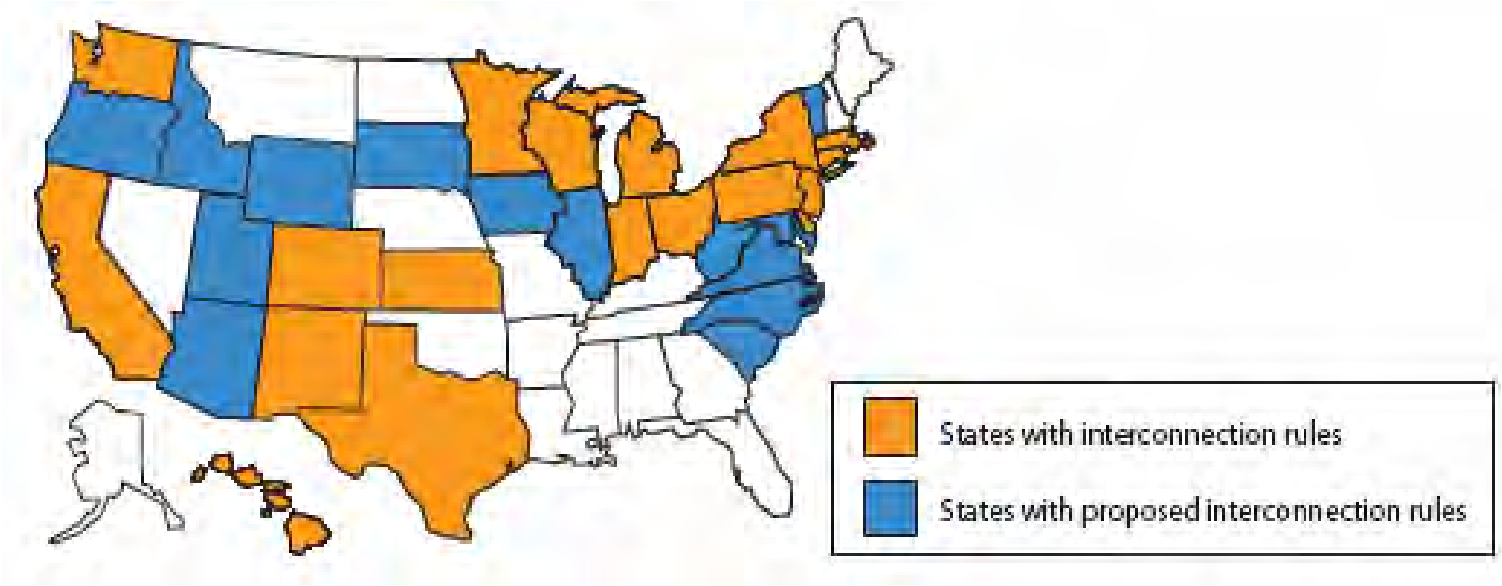
- **Objective**: Establish clear and uniform application processes and technical requirements for connecting distributed generation (DG) systems to the electrical grid.

- **Advantages**: Improves the market condition for clean DG by:
  - Ensuring costs of interconnection are standardized and commensurate with the nature, size, and scope of the project.
  - Helping DG project developers predict the time and costs involved in the application process and the technical requirements for interconnection.
  - Ensuring that the project interconnection meets the safety and reliability needs of both the energy user and the utility.

States With Standard Interconnection Rules

As of December 2006, 18 states have adopted standard interconnection rules; 14 more are in the process.

States with Standard Interconnection Rules



Source: EPA Standardized Interconnection Rules An Effective Policy to Encourage Distributed Generation.
http://www.epa.gov/chp/pdf/interconnection_fs_123006.pdf

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Key Features of Standard Interconnection Rules

	Key design features
Application Process	• Includes all phases of the application process • Specifies: application forms, timelines, fees, dispute resolution process, insurance requirements and interconnection agreements (contractual documents)
Technical Interconnection Requirements	• Includes technical protocols and standards that govern how generators must interconnect with the electrical grid • Standard may conform to industry or national standards (such as IEEE 1547 and UL 1741) • Specifies: type of permissible technology and system size, electrical grid attributes at point of interconnect, and equipment and protocols required at point of interconnect

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Elements of Successful Implementation

- Work collaboratively with stakeholders to develop interconnection rules applicable to all potential DG technologies.
- Consider using existing rules and models as templates, including the NARUC, MidAtlantic Distributed Resources Initiative, and rules of other states.
- Maximize consistency between the RTO and the state standards for large generators.
- Address all components of the interconnection process, including application process and technical requirements.

Elements of Successful Implementation (2)

- Consider making the application process and related fees commensurate with generator size.
- Create a streamlined process for small systems that are certified compliant to IEEE 1547 and UL Standard 1741.
- Develop standards that cover the scope of the DG technologies, sizes, and distribution system types.
- After adopting a standard, monitor effectiveness and update as needed based on rule effectiveness.

Leading State Examples

- Massachusetts initiated a rulemaking in 2002 to develop interconnection standards for DG. Established a DG Collaborative to engage stakeholders to jointly develop a Model Interconnection Tariff which established a clear, transparent, and standard process for DG interconnection applications.

- Oregon initiated a collaborative process in 2006 to develop interconnection standards for DG. Process began with MADRI model rule and made key improvements. Draft rule (up to 10MW) released Dec 2006.

- Texas adopted substantive rules in 1999 for systems up to 10 MW. Applies to both radial and secondary network systems. Require that Texas utilities evaluate applications based on pre-specified screening criteria, including equipment size and the relative size of the DG system to feeder load.

EPA Interconnection Resources

- EPA Clean Energy-Environment Guide to Action
  - Chapter 5.4 – Interconnection Standards
  - http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm
- EPA Fact Sheet: Standardized Interconnection Rules An Effective Policy to Encourage Distributed Generation
  - http://www.epa.gov/chp/state_resources/interconnection.htm
- Survey of Interconnection Rules
  - Prepared by the Regulatory Assistance Project
  - http://www.epa.gov/chp/pdf/survey_interconnection_rules121806.pdf

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Utility Rates and Clean Energy

	Utility Rate Issues Related to Clean Energy
Exit Fees	Charged by utilities to departing loads to recover the fixed costs of capital assets without shifting these cost to other customers.
Standby Rates	Utilities assess these rates based on the costs of providing intermittent service (i.e., the capability to provide grid power when needed).
Buyback Rates	Utilities often buyback electricity from DG projects. The rate for the power can be a critical component of project economics.

Utility Rates and Clean Energy (2)

	Rate Strategies to Encourage DG Clean Energy
Exit Fee Exemptions	Exit fee exemptions for existing loads that leave a utility's distribution system that are replaced with clean DG. (e.g. IL, MA, NY)
Standby Rates	Exploring approaches to standby rates that more accurately reflect utility cost of providing standby service. (e.g. OR, CA, NY, RI)
Buyback Rates	Net-metering regulation that provide small generators a guaranteed purchase price for excess generation. (41 states and DC)
Decoupling	Evaluating rate designs to decouple utility profits from sales volume -- removing a utility disincentive to support DG. (e.g. CA, OR, MD)
Quantifying DG Benefits	Explore ways to quantify the benefits of clean DG that can accrue to the electricity grid. (e.g. RI)
Natural Gas Rates	Establish favorable natural gas rates for CHP facilities. (e.g. CT, CA, NY)

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Elements of Successful Implementation

- Ensure that state PUC's have current and accurate information regarding the rate issues for clean DG and their potential benefits for the electric system.
- Open a PUC docket to explore actual costs and system benefits of clean DG and the appropriateness of related rates.
- Establish a working group of interested stakeholders to consider design issues and develop recommendations for revised rates.
- Identify existing or pending Renewable/Energy Efficiency Portfolio Standards or other policies, which may generate a need for rate evaluations.
- Whenever new rates are adopted, monitor utility compliance, pace of new clean energy installations, and impact on ratepayers.

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Leading State Examples

- California and New York have established revised **standby rate** structures that ensure fair and reasonable treatment of clean DG.
- In 2004, the Oregon PUC approved a settlement regarding Portland General Electric Company's tariffs for **partial requirements customers**.
  - The load served by the on-site generation is treated in the same manner as any other load on the system.
  - The partial requirements customer must pay or contract for contingency reserves equal to 7.0% (3.5% each for spinning and supplemental reserves) of the "reserve capacity"
  - A similar pricing package has been adopted by PacifiCorp.
- Illinois, Massachusetts, and New York allow certain levels of exemption from **exit fees** for loads that are replaced by clean DG, specifically CHP and renewables.
- Three states have established special **natural gas rates** for electric generators, including CHP projects.
  - California has special gas tariffs for all electric generators.
  - In 2003, the New York PSC ordered natural gas companies to create a rate class specifically for DG users and certify that they had removed rate-related barriers to DG.
  - In 2005, the Connecticut Energy Independence Act included a provision that the natural gas delivery charges for customer-sited DG be waived and those costs recovered by the electric distribution company.

EPA Rates Resources

- EPA Clean Energy-Environment Guide to Action
  - Chapter 6.3 – Emerging Approaches: Removing Unintended Utility Rate Barriers to Distributed Generation
  - http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm
- EPA Fact Sheet: Utility Rates - Designing Rates to Level the Playing Field for Clean Energy Supply
  - http://www.epa.gov/chp/state_resources/utility.htm

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Introduction

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Renewable Portfolio Standards (RPS) and Clean Energy

- **Objective**: RPS requirements create market demand for clean energy supply by mandating that utilities and electricity providers serve load with a minimum requirement of clean energy.

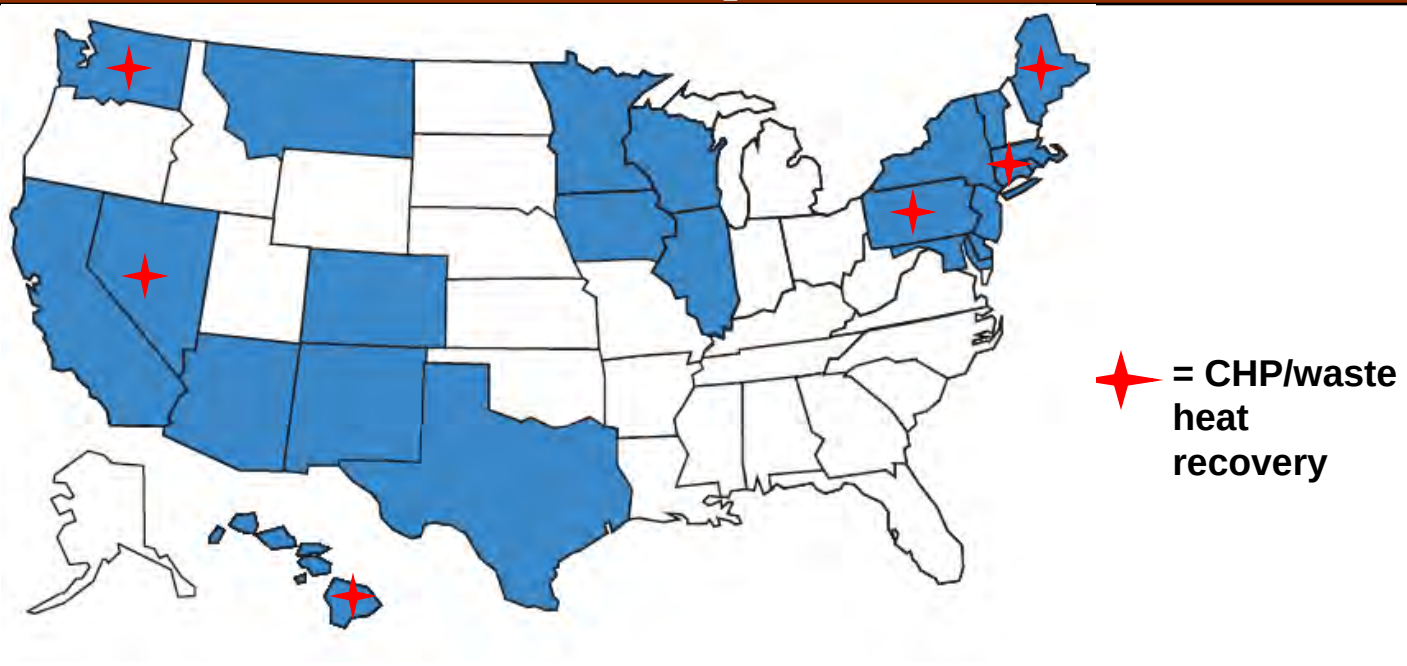
- **Advantages**:
  - Has potential to achieve policy objectives efficiently and at relatively modest cost.
  - Spreads compliance costs among all customers.
  - Functions in both regulated and unregulated state electricity markets.
  - Provides a clear and long-term target for clean energy generation
    - Can increase investors' and developers' confidence in the prospects for renewable energy.[1]

1. Provided the state sends strong signals that this is a policy that will last.

States With RPS Requirements

As of January 2007, RPS requirements have been established in 22 states plus the District of Columbia. Six of these states include CHP or waste heat recovery as an eligible resource.

States with RPS Requirements



Source: Navigant Consulting, Inc., Database of State Incentives for Renewable Energy (DSIRE) and California Energy Commission.

Notes: In **Minnesota** the RPS is mandatory for the largest utility, Xcel, however, for the rest of the utilities and service providers it is a "good faith effort". Under a separate agreement, and in addition to the RPS requirements, Xcel is required to build or contract for 125 MW of biomass electricity, and must build or contract for 1,125 MW of wind by 2010. In addition, **Illinois** has established a non-mandatory state goal for renewable energy. **Arizona** explicitly includes renewably fueled CHP systems

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States With RPS Requirements (2)

	Target
AZ	1.1% by 2007
CA	20% by 2017
CO	10% by 2015
CT	10% by 2010 (7% tier 1)
DC	11% by 2022
DE	10% by 2019
HI	8% by 2005, 20% by 2020
IA	105 MW (2% by 1999)
IL*	8% by 2013
MA	4% by 2009 (+1%/year after)
MD	7.5% by 2019
ME	RE30% by 2000 incl. some non-RE
MN	10% by 2015 (1% biomass)

	Target
MT	15% by 2015
NJ	6.5% by 2008 (4% tier 1)
NM	5% by 2006, 10% by 2011
NV	20% by 2015
NY	24% by 2013
PA	18% by 2020 (8% is RE)
RI	16% by 2019
TX	by 20152,280 MW by 2007; 5,880 MW
VT	Total incremental energy 2012 to growth between 2005 (cap 10% of 2005 sales)renewablesbe met with new renewables (cap 10% of 2005 sales)
WA	3% of utility load by 2012-2015; 9% by 2016-2019; 20% by 2020-on
WI	2.2% by 2011

Note:

1. Higher percentages are typically for states that already have a relatively large amount of RE, like NY, CA and ME

Source: Navigant Consulting, Inc, Database of State Incentives for Renewable Energy (DSIRE) and California Energy Commission.

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Key Features of RPS Design

	Key features of effective RPS design
Goals and Objectives	It is important to articulate goals and objectives early in the process that serve as a guide for design choices and avoid protracted rule implementation debate.
Applicability	Most commonly applied to IOU's and electric service providers. It is unusual for mandatory RPS requirements to extend to municipal utilities and cooperatives, as these entities are predominately self-regulated.
Eligibility	What fuel sources and technologies are eligible? Do existing renewable sources count toward compliance? What geographic areas are eligible (e.g., generation within the state boundary or within a regional power pool)? Are central and customer-sited systems treated differently?
Compliance	Generally three ways that electricity suppliers may comply with the RPS requirements; 1) Own a renewable energy facility, 2) Purchase Renewable Energy Certificates, 3) Purchase electricity from a renewable facility inclusive of all renewable attributes.

Key Features of RPS Design (2)

Eligibility of technologies varies by state and depends on whether an energy resource or technology supports state goals.

	AZ	CA	CO	CT	DE	DC	HI	IA	IL	MA	MD	ME	MN	MT	NJ	NM	NV	NY	PA	RI	TX	VT	WA	WI
Biomass	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CHP/Waste Heat	●[5]			●			●		●			●					●		●					
Energy Efficiency							●										●		●					
Fuel Cells[6]				●								●	●		●	●			●					
Geothermal	●	●	●		●	●	●				●	●		●	●	●	●		●	●	●		●	●
Hydro		●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Landfill Gas	●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●
Municipal Waste		●		●		●	●	●			●	●	●	●	●		●		●			●		
Ocean Thermal		●		●	●	●	●			●	●							●		●	●		●	
PV	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Solar Thermal Electric	●	●		●	●	●	●		●	●	●	●	●	●		●	●		●		●	●	●	●
Tidal		●		●	●	●				●	●	●			●			●		●	●		●	●
Transportation Fuels							●																	
Waste Tire		●										●												
Wave		●		●	●	●	●			●	●				●			●		●	●		●	●
Wind	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

5. Renewable CHP systems are eligible; fossil-fueled CHP systems are not eligible.

6. Includes only those states that allow fuel cells using nonrenewable energy sources of hydrogen. Some states allow only renewable fuel cells (California, Colorado, Delaware, Massachusetts, Maryland, New York, Rhode Island, Wisconsin) as eligible technologies.

Source: Navigant Consulting, Inc. 2005; Database of State Incentives for Renewable Energy (DSIRE).

Key Features of RPS Design (3)

- Accounting methods *(e.g., energy production versus installed capacity requirements; RECs or bundled energy only).*
- Time horizons for compliance periods
- Mandatory or voluntary participation
- Flexible compliance mechanisms to guard against high prices or the lack of supply of renewable energy
- Coordination with Federal and State energy policies
- Cost recovery mechanisms for utilities
- Enforcement mechanisms for non-compliance
- Incorporate “technology tiers” and/or “credit multipliers” to encourage particular technologies.

Elements of Successful Implementation

- Develop broad support, including top-level support of the Governor and/or legislature and hold facilitated discussions among key stakeholders.
- Determine mix and amount of clean energy desired.
- Establish a long timeline to encourage private investment.
- Establish cost caps on the price to comply with RPS requirements, high enough to encourage use of a range of eligible technologies but low enough to protect electricity suppliers.
- Make sure a credible non-compliance mechanism is in place in the form of penalties; however, provide flexibility in compliance.

Leading State Examples

- Massachusetts created the outline for a RPS in 1997. In April 2002, Massachusetts released its final regulations for the RPS.
  - Requires all retail electricity providers in the state to utilize new renewable energy sources for at least 1% of their power supply in 2003, increasing to 4% by 2009, after which the RPS requirements will increase 1% each year until the DOER determines that additional requirements are no longer necessary.
  - Electricity suppliers can alternatively meet compliance by submitting Alternative Compliance Payment (ACP)
  - The ACP is announced yearly and rises according to inflation. The adjusted rate for the 2006 ACP is $55.13/MWh.
- The Connecticut RPS was originally promulgated in 1998 and took effect July 1, 2000, establishing requirements for two classes of renewable generating resources. In June 2005, Connecticut passed "An Act Concerning Energy Independence," establishing a new RPS Class III that must be fulfilled with CHP and electricity savings from Conservation and Load Management programs.
  - The new standard requires electric suppliers and distribution companies to obtain 1% of their generation from Class III resources beginning in 2007 and increasing by 1% per year until leveling out at 4% in 2010 and thereafter.
  - The total RPS requirement started at 4% in 2004 and will rise to and remain at 14% in 2010 and thereafter (including the new Class III).

EPA RPS Resources

- EPA Clean Energy-Environment Guide to Action
  - Chapter 5.1 – Renewable Portfolio Standards
  - http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm
- EPA Fact Sheet: Renewable Portfolio Standards An Effective Policy to Support Clean Energy Supply
  - http://www.epa.gov/chp/state_resources/rps.htm
- EPA White Paper: Energy Portfolio Standards and the Promotion of Combined Heat and Power
  - Spring 2007

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EPA Initiatives

- Several initiatives focused on assisting state policy makers with promoting clean energy
  - EPA Utility Commission Assistance
  - EPA Clean Energy-Environment State Partnership Program
  - State Energy Efficiency and Renewable Energy Projects (EE/RE Projects)
  - National Action Plan for Energy Efficiency

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Summary

- Numerous opportunities for states to increase use of clean energy.
- EPA can provide assistance to address:
  - Interconnection rules
  - Standby rates
  - CHP as a portfolio standard resource
  - Output-based environmental regulations
  - Best practice CHP program design

www.epa.gov/cleanenergy

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For More Information

Katrina Pielli

Clean Energy Program Manager

US Environmental Protection Agency

(202) 343-9610

Pielli.Katrina@epa.gov

www.epa.gov/cleanenergy

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