

Renewable Energy 101

National Renewable Energy Marketing Conference
Portland, Oregon
October 20, 2010

Agenda

1. Introductions
2. Green Power Basics
3. Purchasing Green Power
4. Green Power Markets
5. Question and Answer Session

Presenters

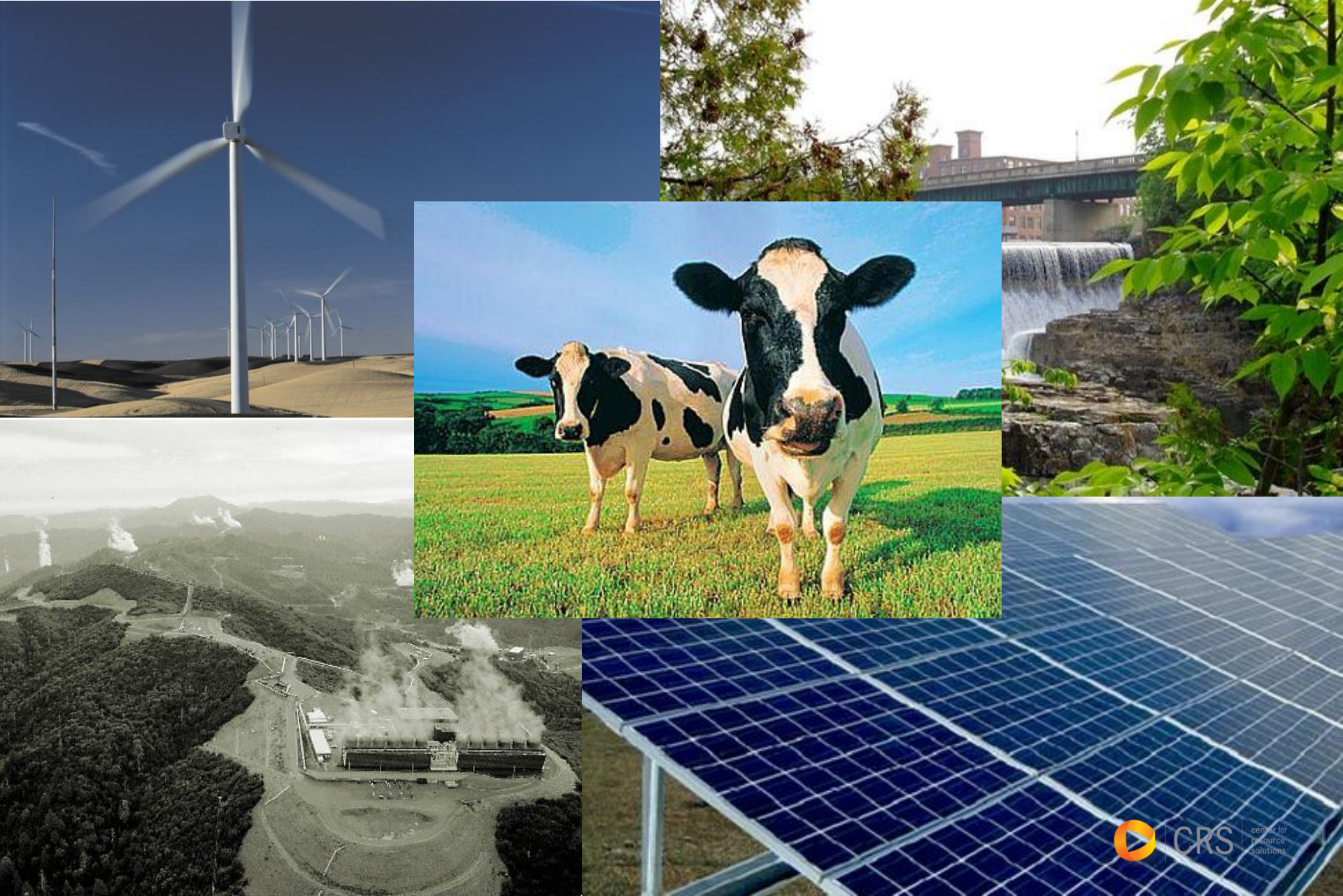
- **Blaine Collison** - U.S. Environmental Protection Agency, Green Power Partnership
- **Lori Bird** - National Renewable Energy Laboratory
- **Jennifer Martin** - Center for Resource Solutions

Outline

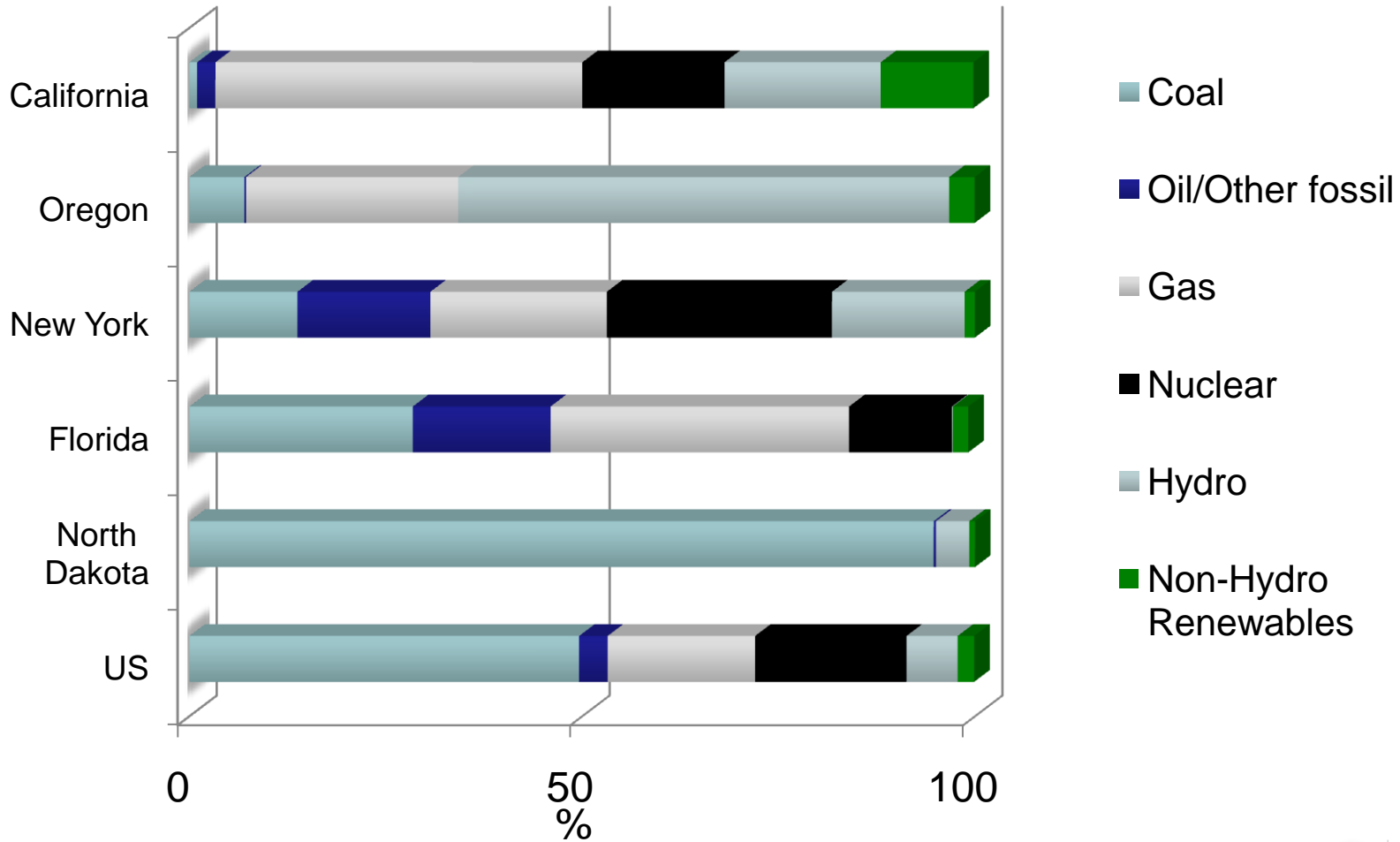
Green Power Basics

- Renewable resources
- Costs
- Market Drivers
- The Grid and Delivering Renewable Energy
- Renewable Energy Certificates (RECs)
- REC Tracking Systems
- Market Oversight

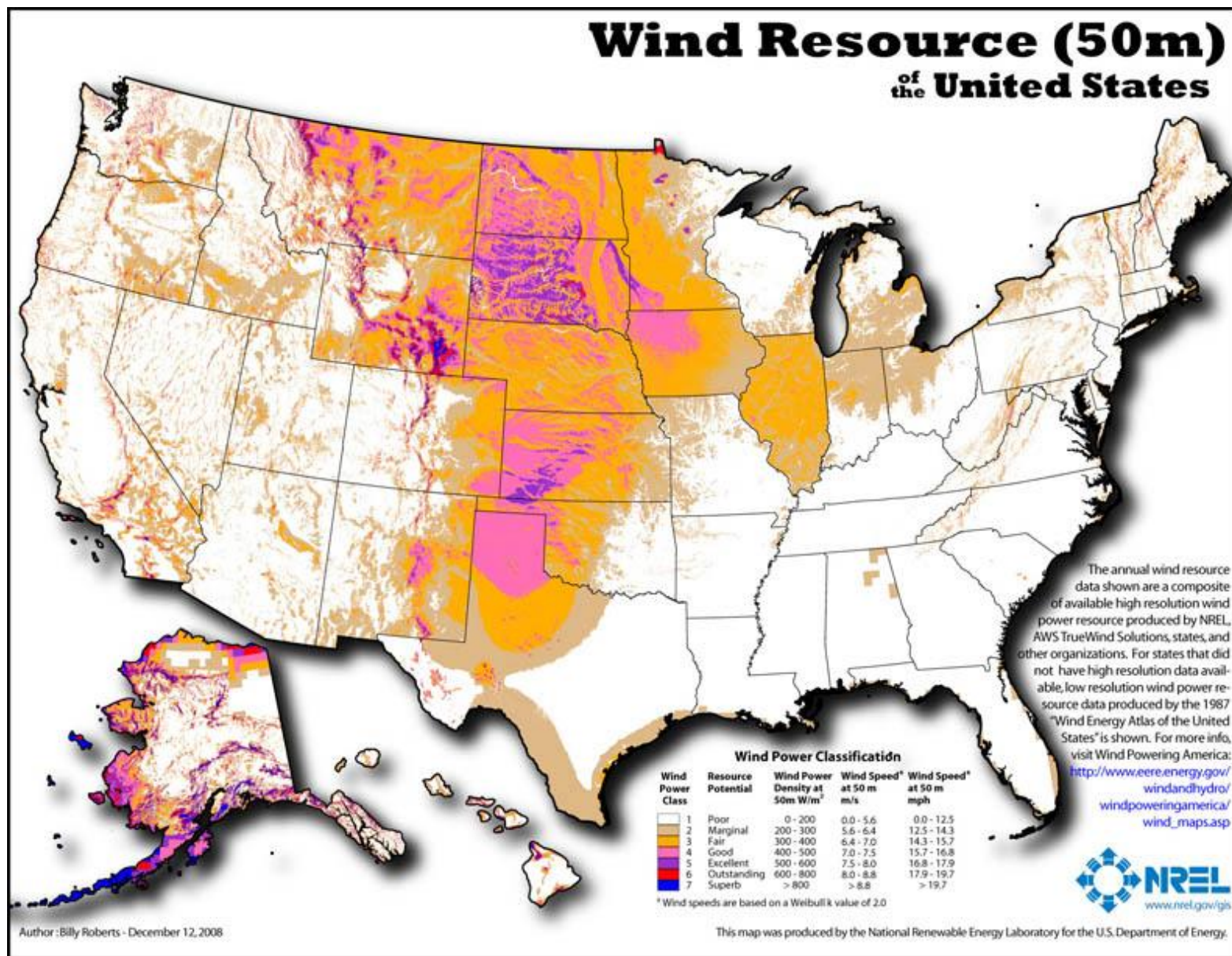
What is Renewable Energy?



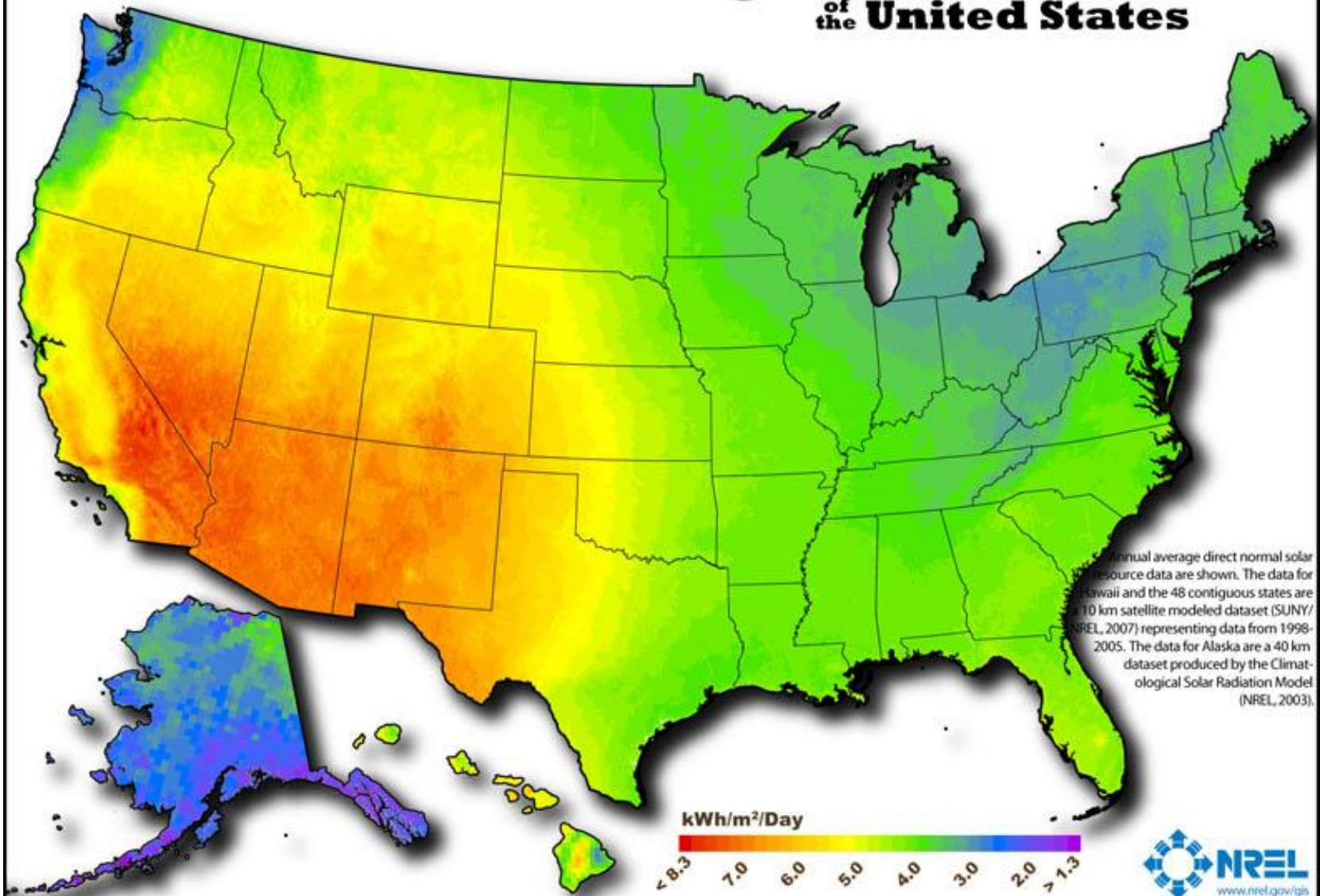
Electricity Mix Varies by Region



Renewable Energy Resource Locations



Concentrating Solar Resource of the United States



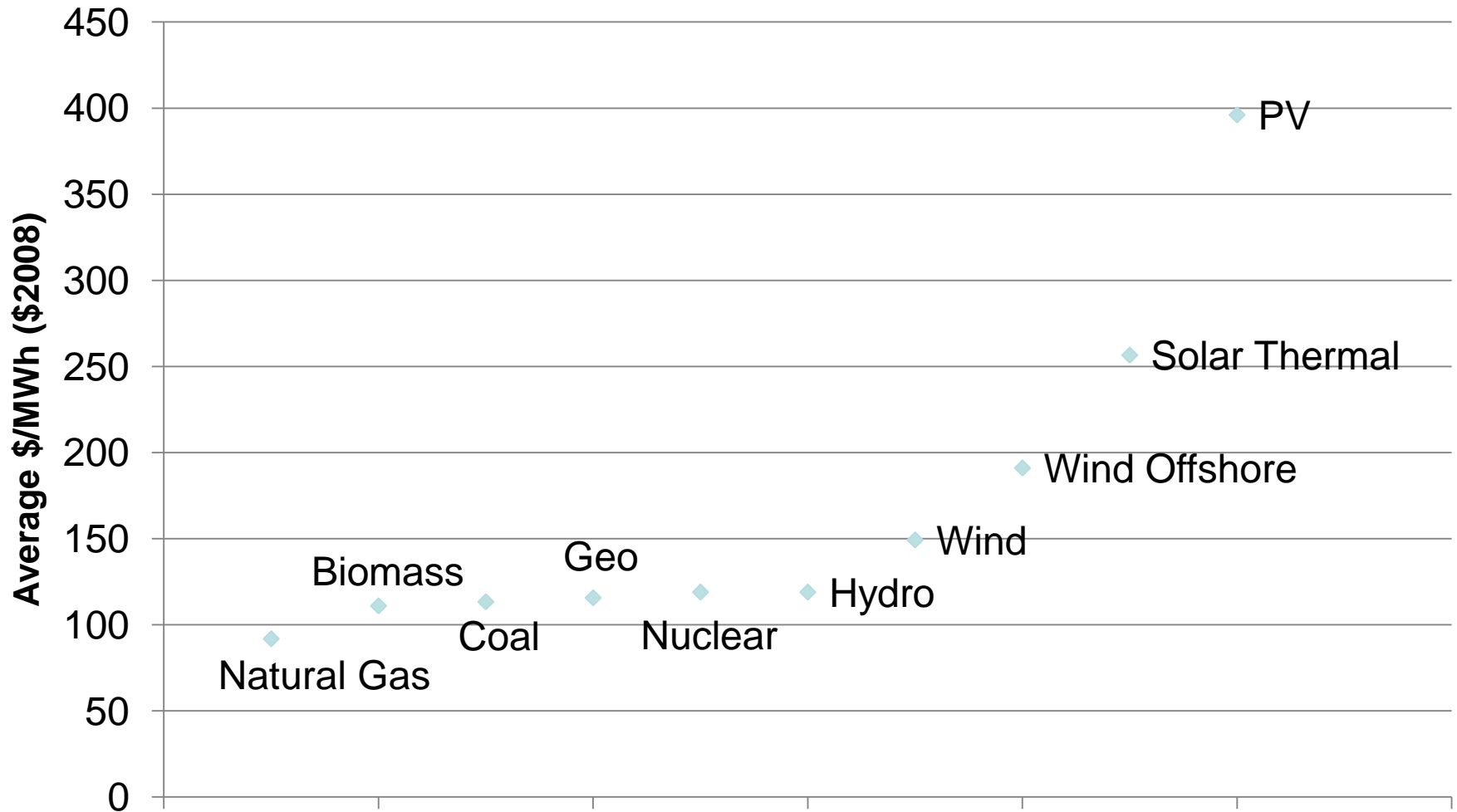
Author : Billy Roberts - October 20, 2008

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy.



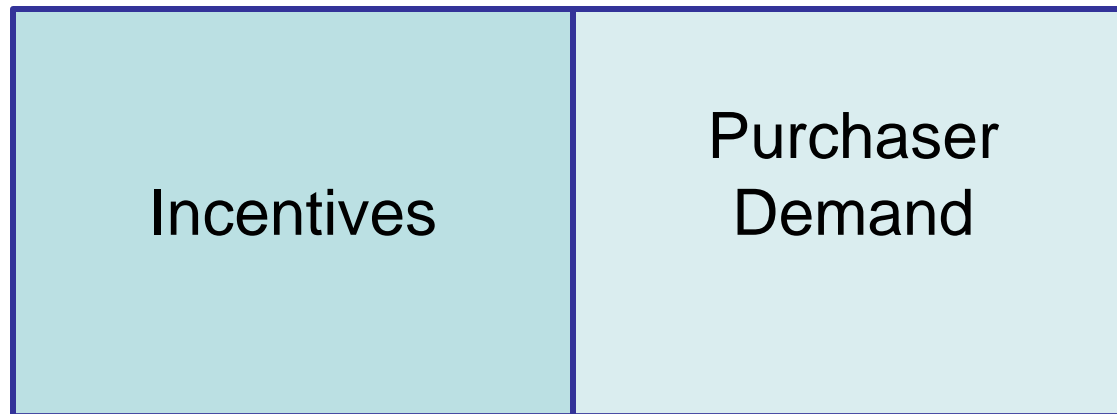
Renewable Energy Costs

2016 Forecast by Technology



Data Source: *Estimated Levelized Cost of New Generation Resources, 2016 EIA, Annual Energy Outlook 2010, December 2009, DOE/EIA-0383(2009),*

Renewable Energy Drivers

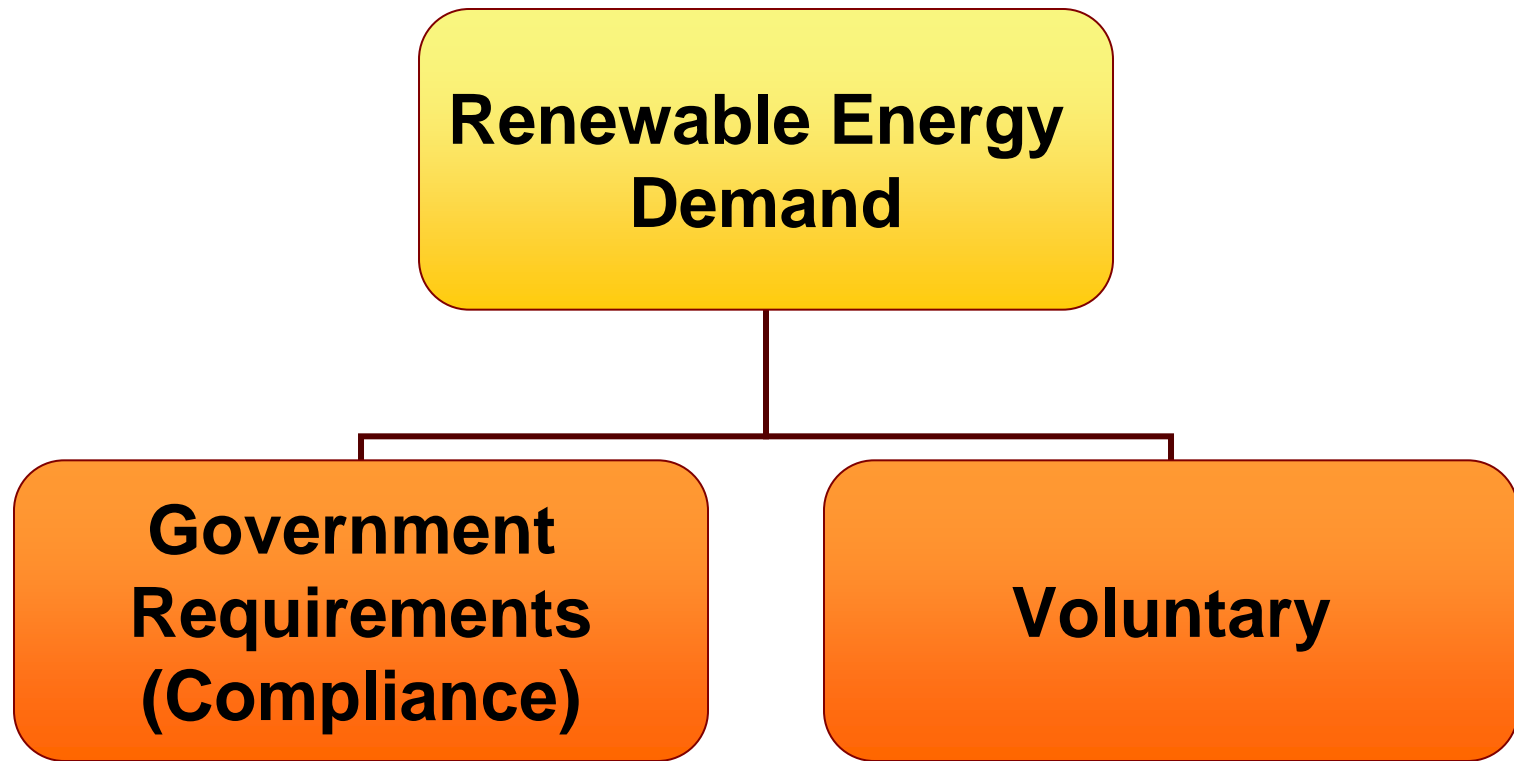


Incentives – State and Federal

- Tax Incentives (personal and corporate)
- Rebates
- Grants
- Loans
- Regulatory Incentives
- Other targeted programs

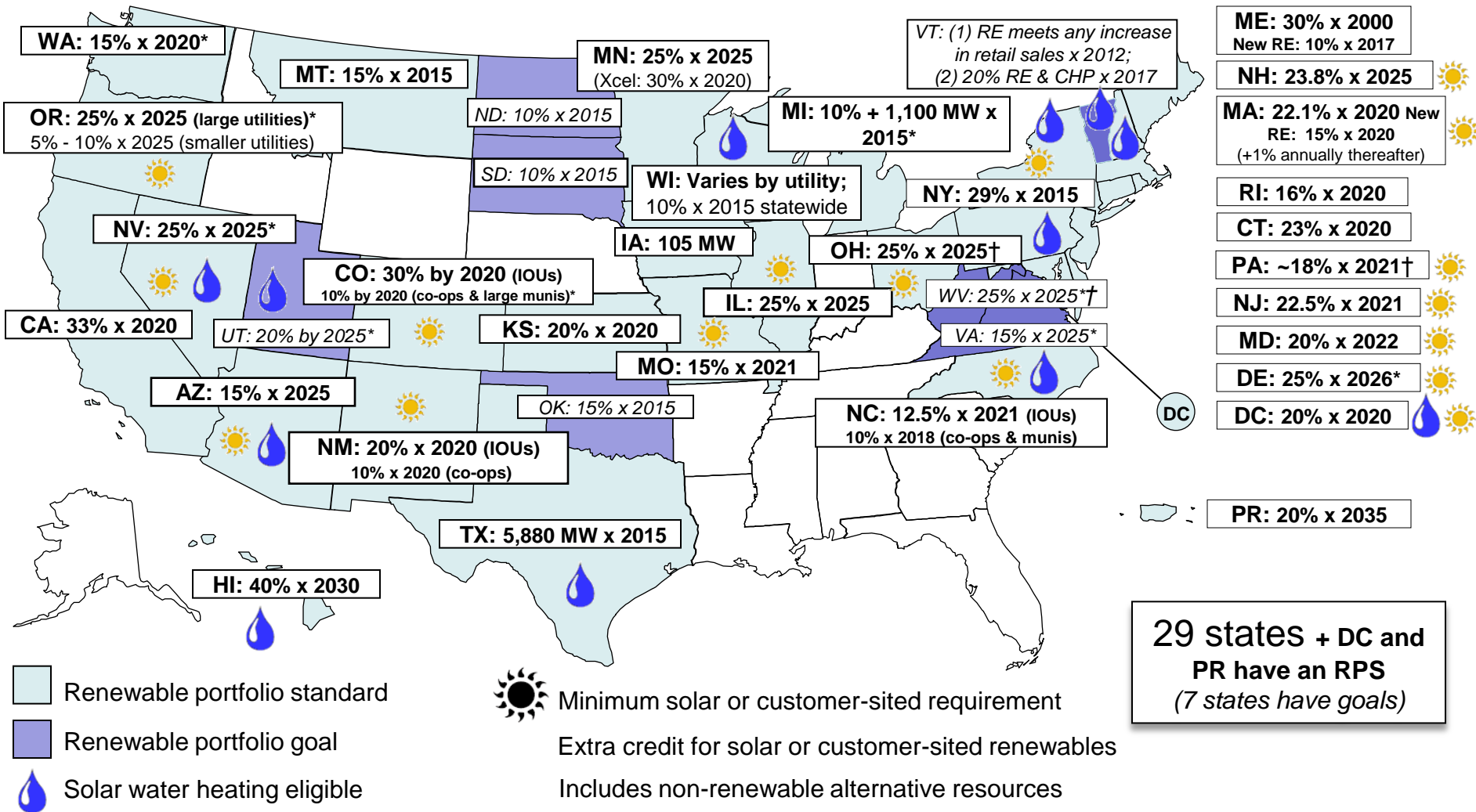
Resource - Database of State Incentives for Renewables and Efficiency, www.dsireusa.org

Purchasers



Since 1997, energy from new facilities has been split roughly evenly between Compliance and Voluntary markets

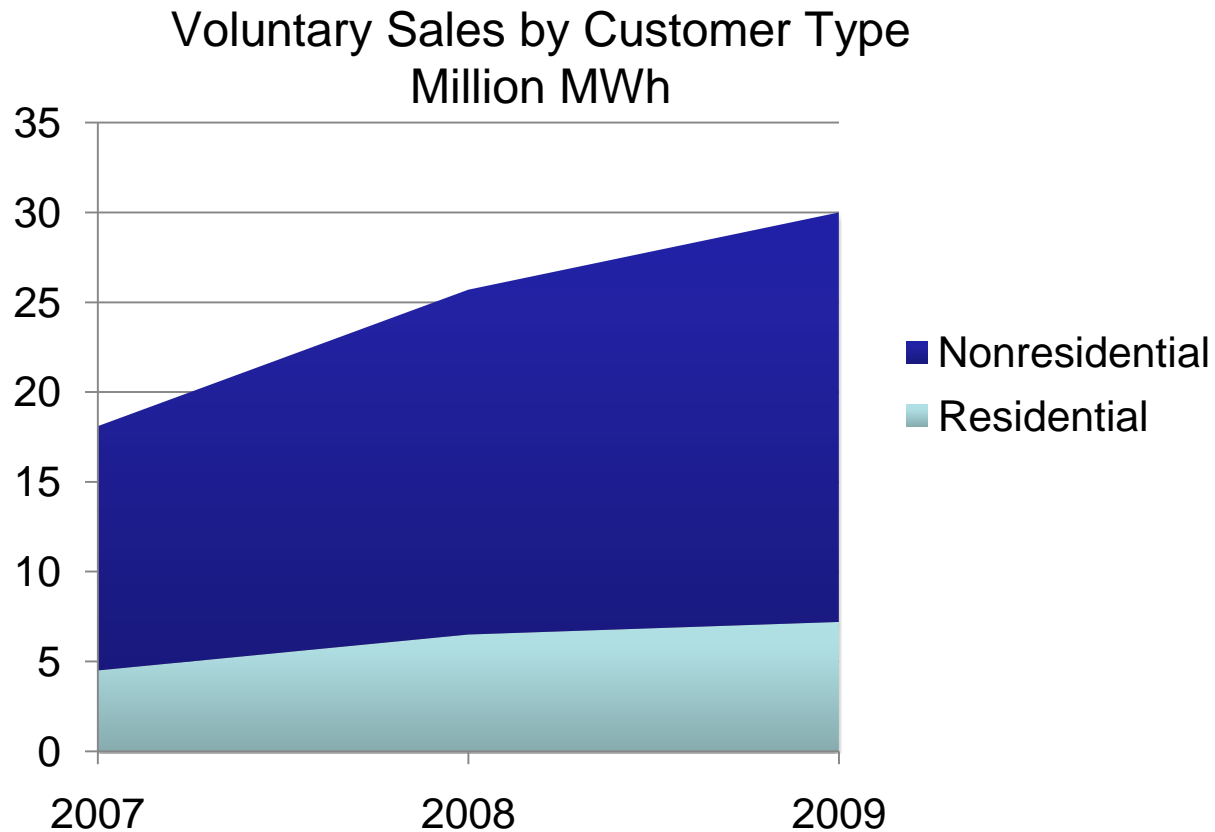
State Renewable Portfolio Standards



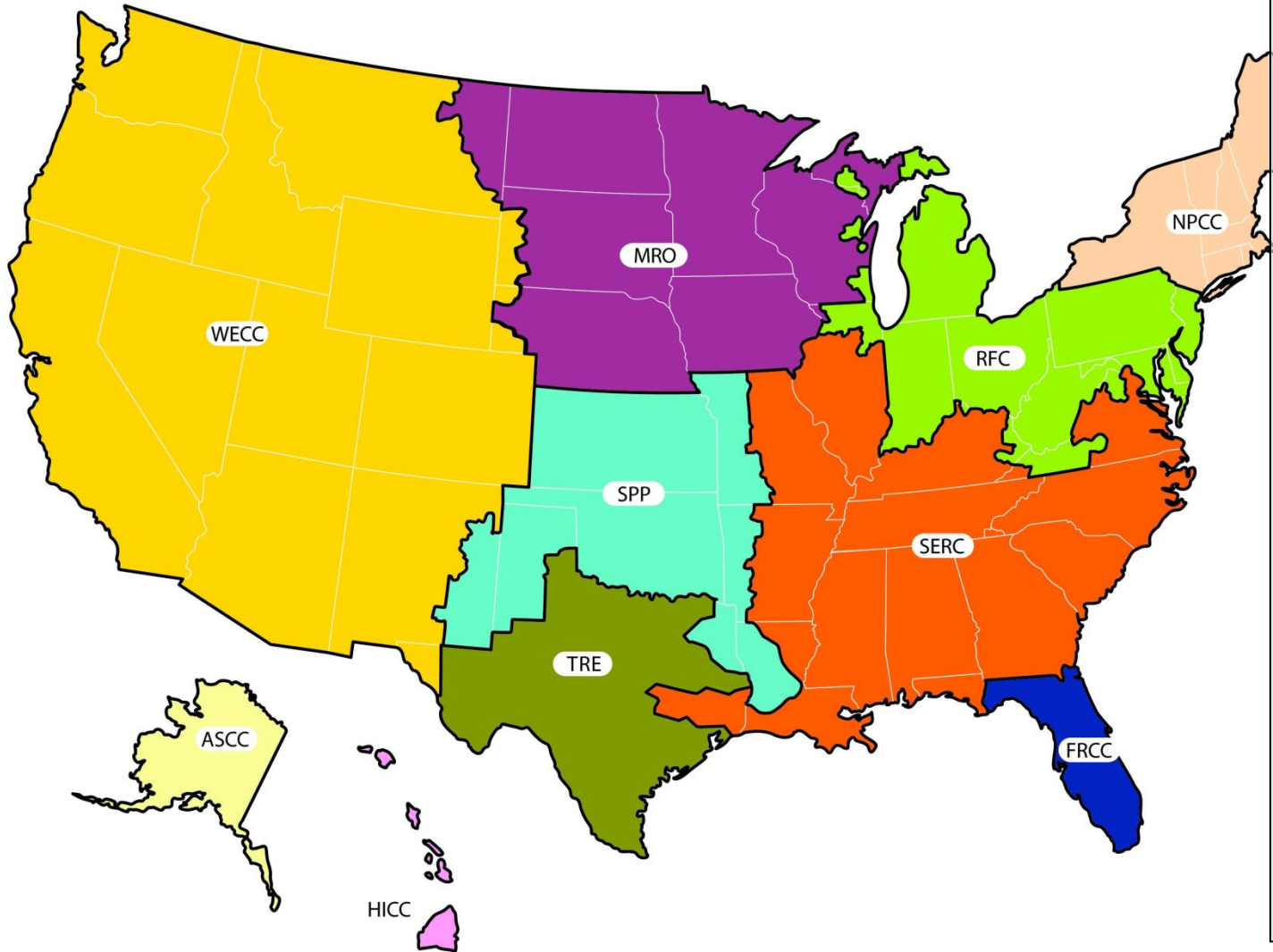
29 states + DC and PR have an RPS
(7 states have goals)

Source: www.dsireusa.org

Voluntary Markets



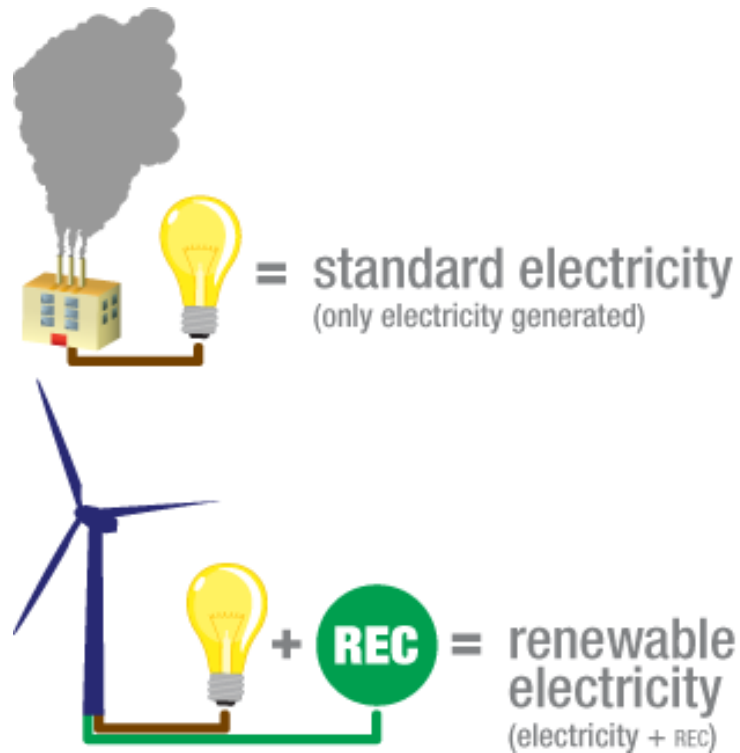
The Grid



- ASCC**- Alaska Systems Coordinating Council
- HICC** – Hawaiian Islands Coordinating Council
- FRCC** - Florida Reliability Coordinating Council
- MRO** - Midwest Reliability Organization
- NPCC** - Northeast Power Coordinating Council
- RFC** - ReliabilityFirst Corporation
- SERC** - SERC Reliability Corporation
- SPP** - Southwest Power Pool, RE
- TRE** - Texas Regional Entity
- WECC** - Western Electricity Coordinating Council

What is a REC?

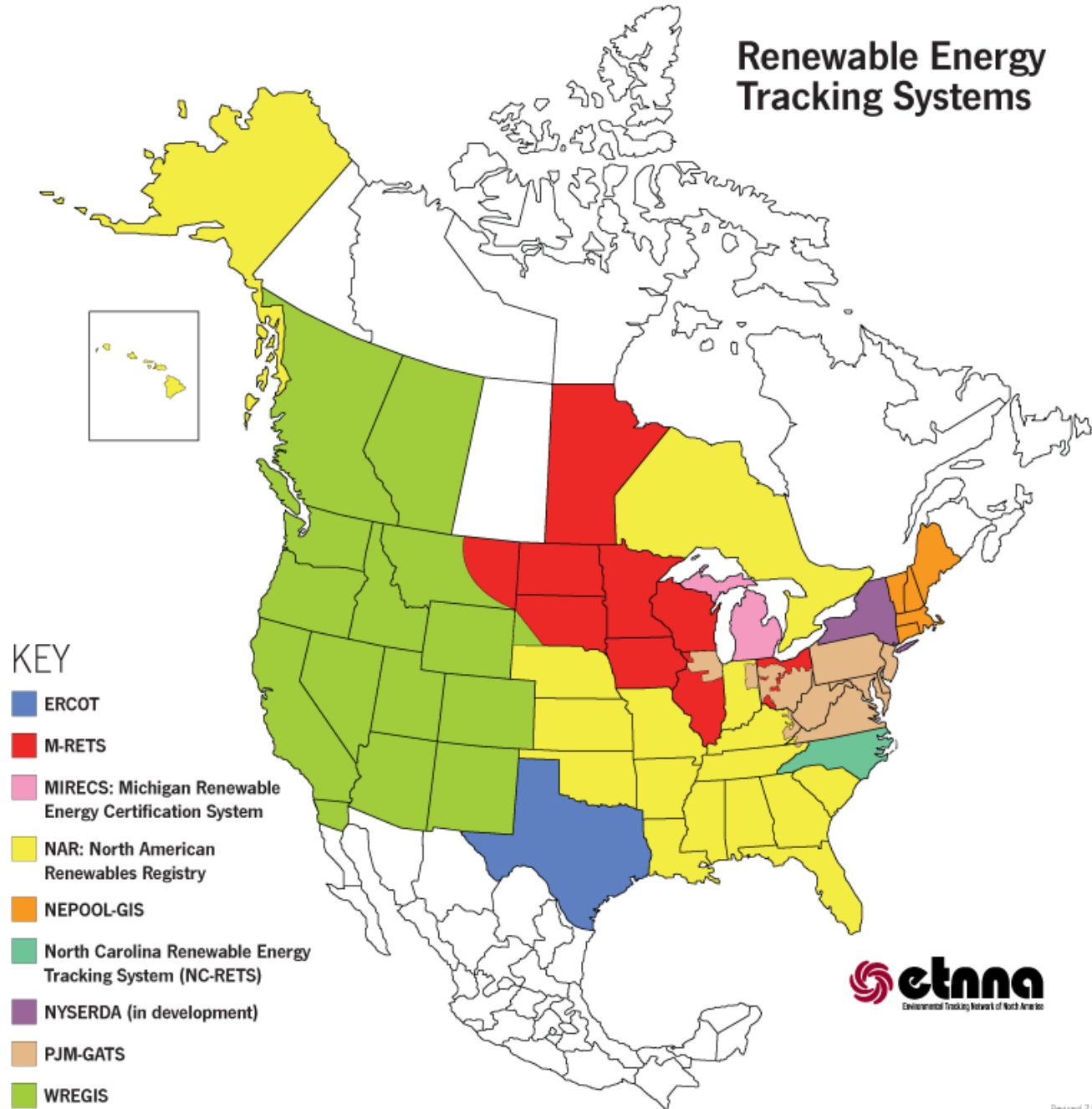
Non-energy attributes, including environmental attributes, of renewable energy generation












Names for RECs

- Green Tags
- Green Tickets
- Renewable Credits
- Renewable Certificates
- Tradable Renewable Certificates (TRC)
- T-RECS
- **Renewable Energy Certificates (RECs)**

Renewable Energy Tracking Systems



KEY

-  ERCOT
-  M-RETS
-  MIRECS: Michigan Renewable Energy Certification System
-  NAR: North American Renewables Registry
-  NEPOOL-GIS
-  North Carolina Renewable Energy Tracking System (NC-RETS)
-  NYSERDA (in development)
-  PJM-GATS
-  WREGIS



Market Oversight

- Compliance – State regulators
- Voluntary
 - State power source disclosure
 - Voluntary certification

Consumer protection and certification for voluntary renewable energy purchases



Energy

Functions Provided by Green-e Energy

- Sets Standard for voluntary renewable energy
- Consumer protection
 - Requires certified products meet standard
 - Consumers get what they pay for – products are as advertised
 - Ensures clear ownership, no double counting
 - Independent verification audits of sales and supply
 - Chain of custody through attestations and tracking systems
 - Reviews customer disclosure and marketing language
 - Required Product Content Label and product disclosures
 - Marketing material reviews

PRODUCT CONTENT LABEL

GREEN CHOICE (Block and Percent-of-Use options only)

Green Choice is sold in 100 kWh blocks or it can match 10% (non-residential only), 35%, 50%, or 100% of your estimated electricity usage. Both options are made up of the resources below.

Green-e Energy Certified New ^{1,2} Renewables in Green Choice		Generation Location
Biomass	18%	National
Geothermal	12%	National
Landfill/Biogas	1%	National
Solar	1%	National
Wind	68%	National
TOTAL	100%	National

For comparison, the current average mix of resources supplying Arizona Public Service Company includes: Coal (40%), Nuclear (26%), Gas/Oil (19%), Renewable (2%), and Purchased Power (13%).

1. These figures reflect the power that we have contracted to provide. Actual figures may vary according to resource availability.

2. APS renewable resources first began commercial operation on or after 1/1/97.

For specific information about this electricity product, contact the Arizona Public Service Co. Green Team at (602) 216-0318 or visit www.aps.com.

The Green-e Energy Program certifies that **Green Choice** meets the minimum environmental and consumer protection standards established by the non-profit Center for Resource Solutions. For more information on Green-e Energy certification requirements, call 1-888-63-GREEN or visit www.green-e.org.



Governance

- Independent Governance Board
 - Natural Resources Defense Council
 - Union of Concerned Scientists
 - National Renewable Energy Laboratory
 - Several other environmental and industry leaders
- All standards and policies developed through open stakeholder consultations
- Associate Member of the International Social and Environmental Accreditation and Labeling (ISEAL) Alliance



Promoting Green Power Purchases

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