



# **Green Power 101**

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# The Next Few Minutes

- **What is green power?**
- **Green power product options**
- **National electricity market infrastructure & issues**
- **Communications**
- **The importance of Renewable Energy Certificates**
- **The green power value proposition**
- **A brief but shameless plug for the EPA Green Power Partnership**

# 2009 Market Context

- **Renewed federal interest in climate change**
  - Executive/legislative action is expected
- **Electricity supply issues focus of attention**
  - Supply stability, diversification, T&D infrastructure
- **Energy and climate are both large-scale, economy-wide issues**
  - They will remain in play for a considerable time
  - Multi-element solutions
  - Will require engagement from stakeholders at all levels

# What Is Green Power?

- **Green power is an “environmentally-differentiated” electricity product from:**
  - solar
  - wind
  - geothermal
  - biomass
  - biogas
  - small hydro



# What Is Green Power - 2

**Green Power definitions & standards are published by EPA and Green-e.**

**Additional key elements include:**

- **Vintage of facility: post January 1,1997**
- **Life span (freshness) of RECs**
- **No use of Renewable Portfolio Standard (RPS) or otherwise mandated renewables**
- **Renewables must be fully aggregated**





# Buying Green Power

## What Are My Product Options?

### 1. Bundled Green Electricity Products

- Buy electricity from utility green pricing programs or green power retail marketers that is all or partially generated from renewable sources – includes both actual kWh and green attributes



### 2. Renewable Energy Certificates (REC)

- Buy only the environmental attributes associated with the electricity generated (1 REC = 1MWh) – electrons sourced separately

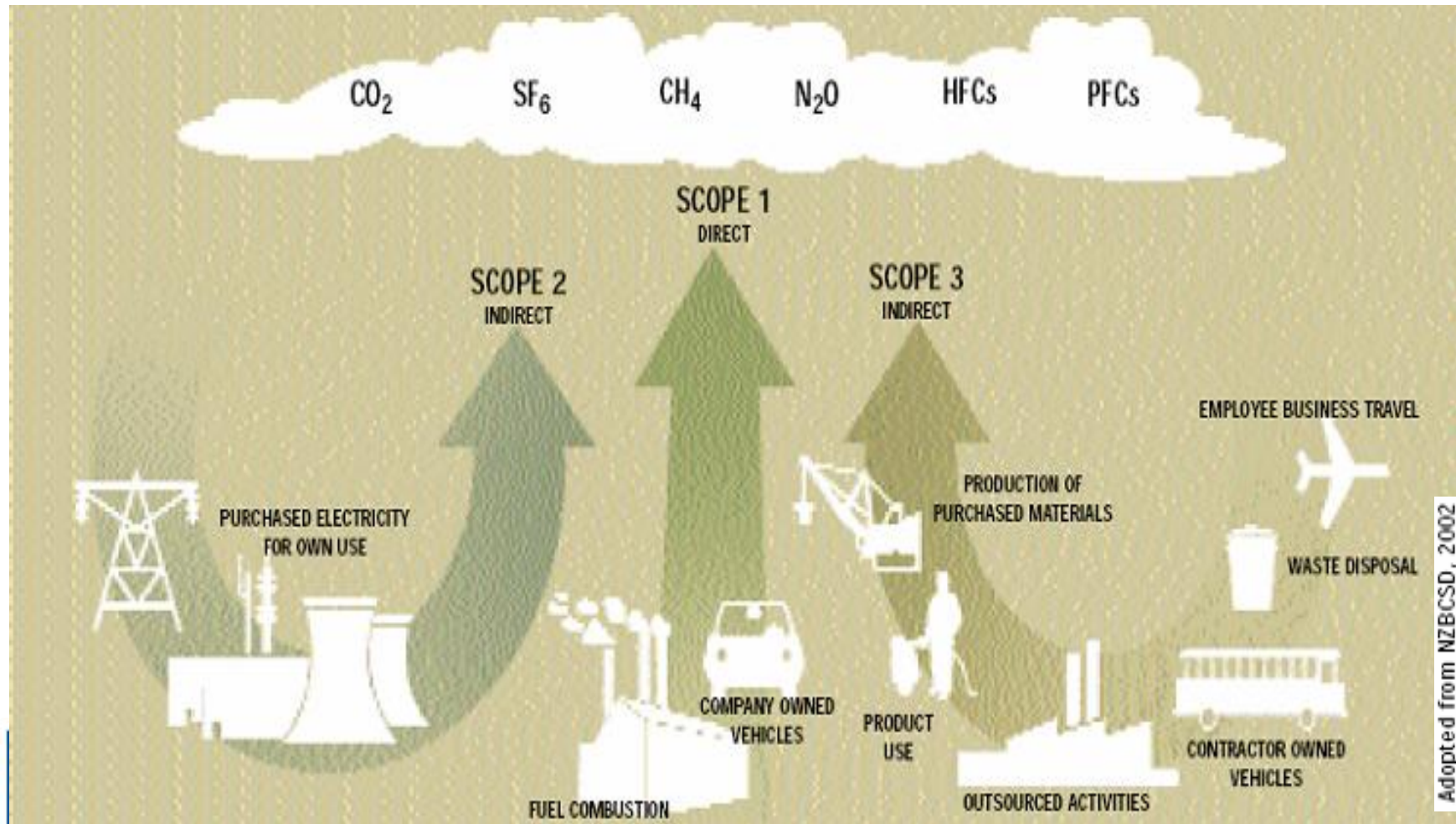


### 3. On Site Generation

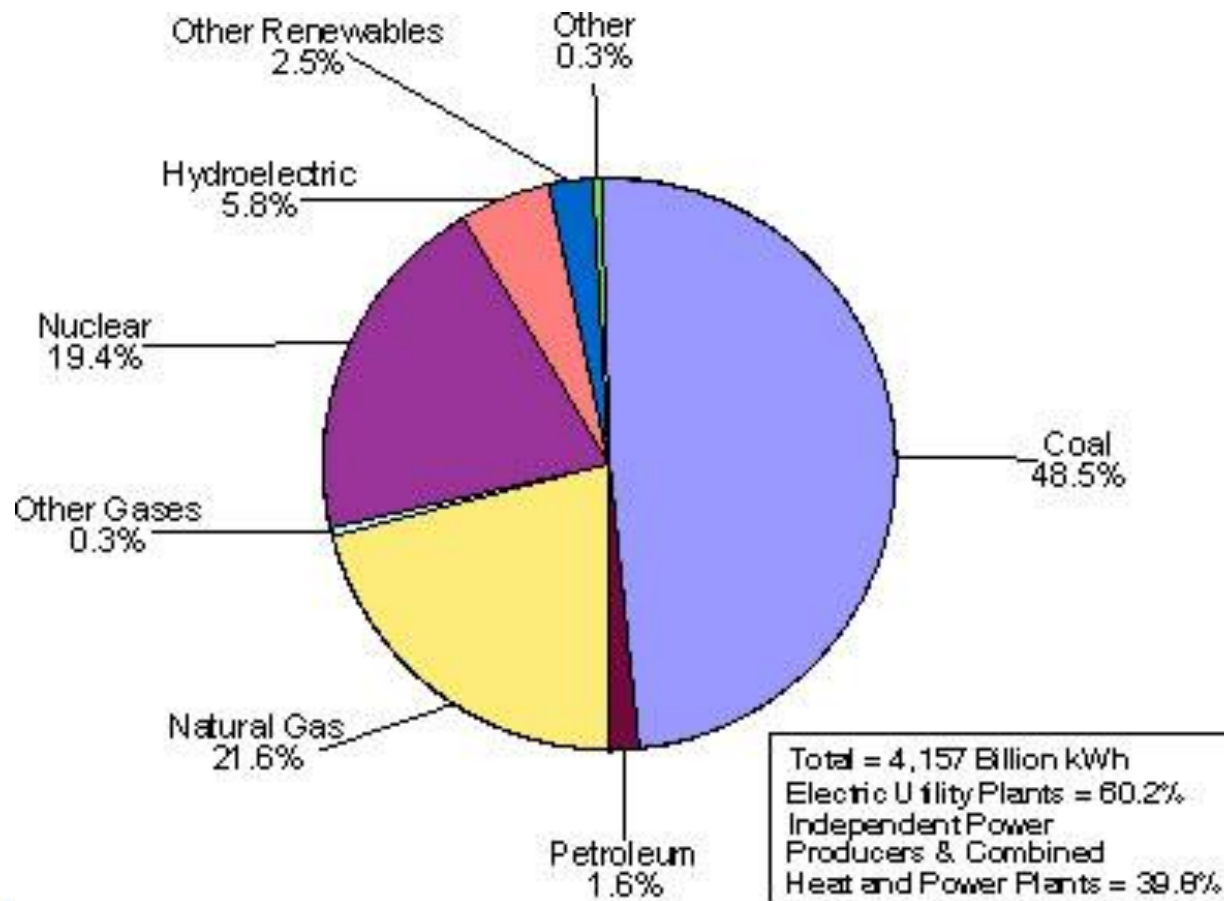
- Install renewable energy system on-site, e.g. solar panels, small wind, etc.



# GHG Emissions Sources



# National Electricity Mix



Source: Energy Information Administration, Electric Power Annual 2007.

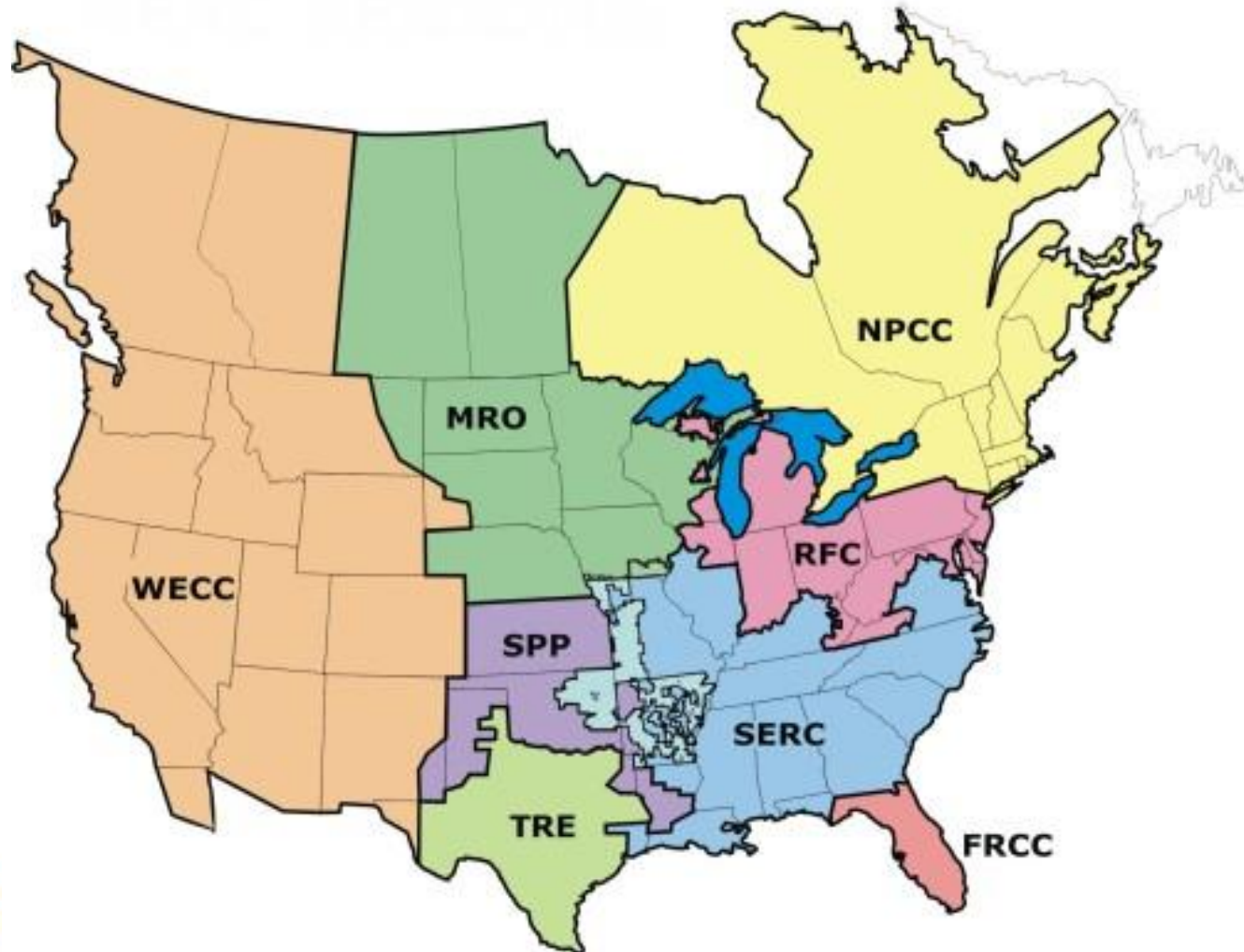


# Importance of the Grid

- **Renewables must be grid-tied to be Green-e/GPP eligible**
- **Net metering: gross output is eligible for RECs**
- **Intermittent resources: don't even worry about it**
- **Regional Grids: your environmental claims are based upon it**

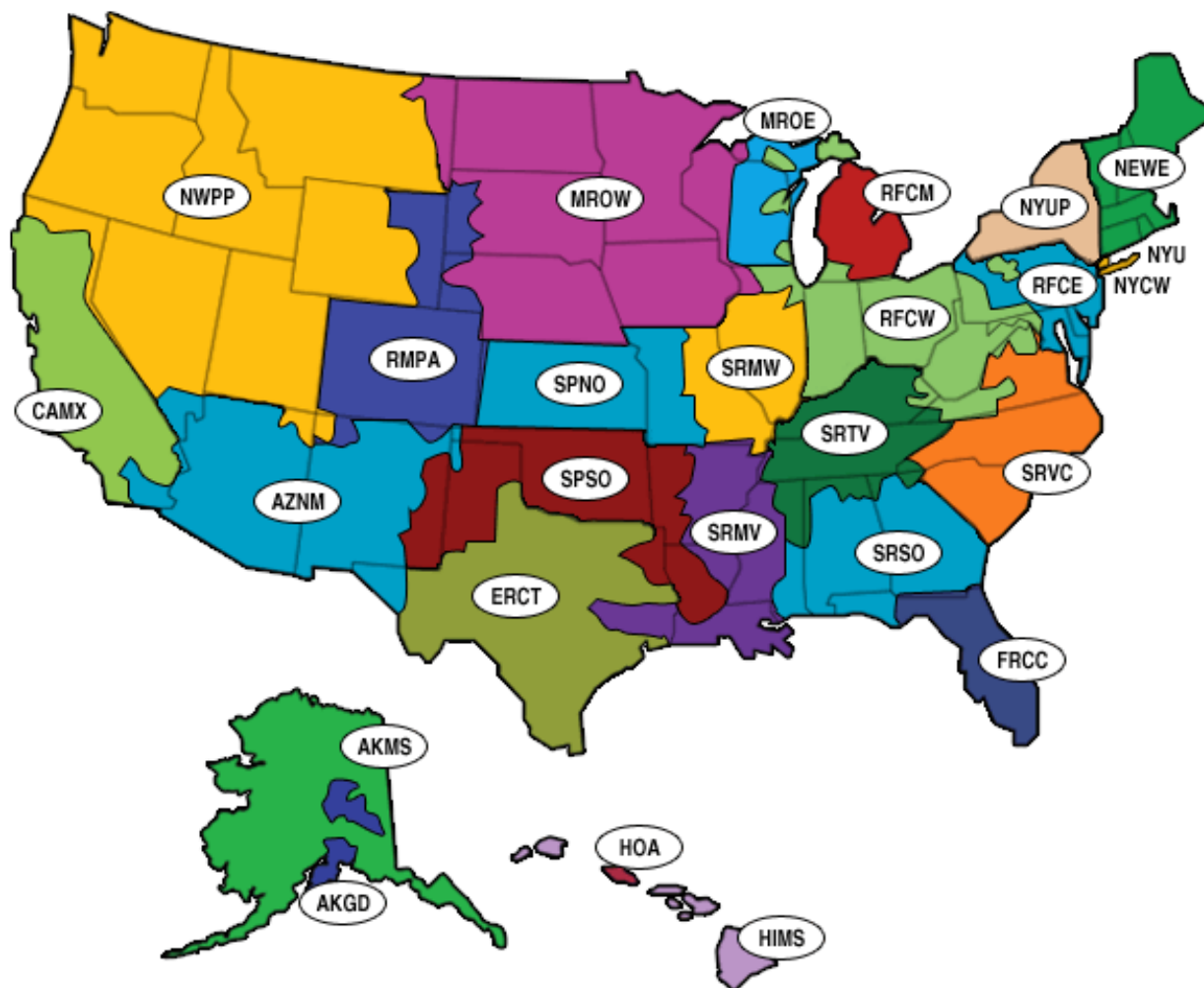


# North American Electric Reliability Corporation (NERC) Regions



# Emissions & Generation Resource Integrated Database (eGRID) Subregions Map

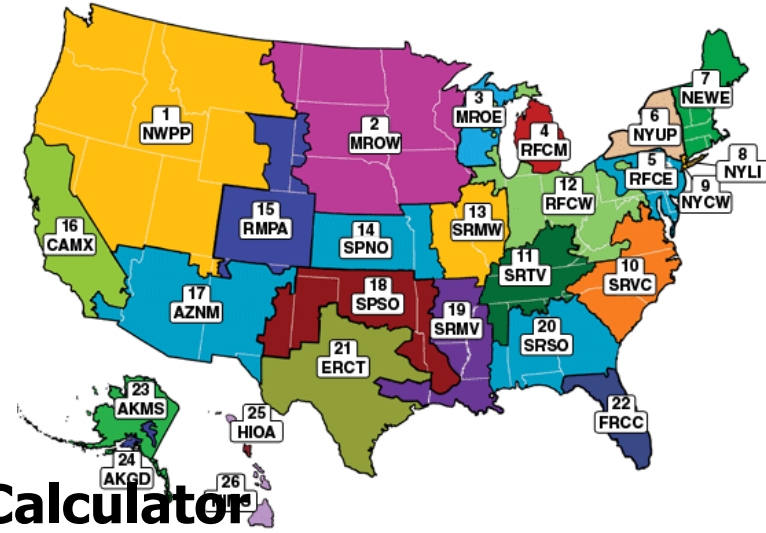
eGRID Subregion Representational Map



# CO<sub>2</sub> Emissions and Related Claims

- **Green Power Partnership's Green Power Equivalency Calculator**

- Uses EPA's eGrid utility non-baseload emissions rates by subregion to translate a green power purchase from kilowatt-hours into more understandable terms, such as equivalent number of passenger vehicles, homes, etc.



- **EPA's Greenhouse Gas Equivalencies Calculator**

- Uses non-baseload emission rates to convert reductions, such as kilowatt-hours or therms of natural gas, into carbon dioxide equivalent. The calculator can also translate a quantity of avoided emissions into an equivalent number of passenger vehicles, homes, etc.

- **Additional Resources:**

- Green Power Partnership's guidance on Making Environmental Claims
- National Association of Attorneys General's Environmental Marketing Guidelines for Electricity
- Federal Trade Commission's Green Guides



# Barriers to Expansion of Green Power

- **Renewable energy facilities (except biomass) do not require purchased fuel, but they do require large up-front capital expenditures.**
- **Renewables compete on price, and in some regions of the country electricity prices are low.**
- **To have a high capacity factor, you need excellent renewable resources.**
- **Renewable resource availability varies.**
- **To generate utility-scale renewables, you need transmission capacity and electricity demand.**

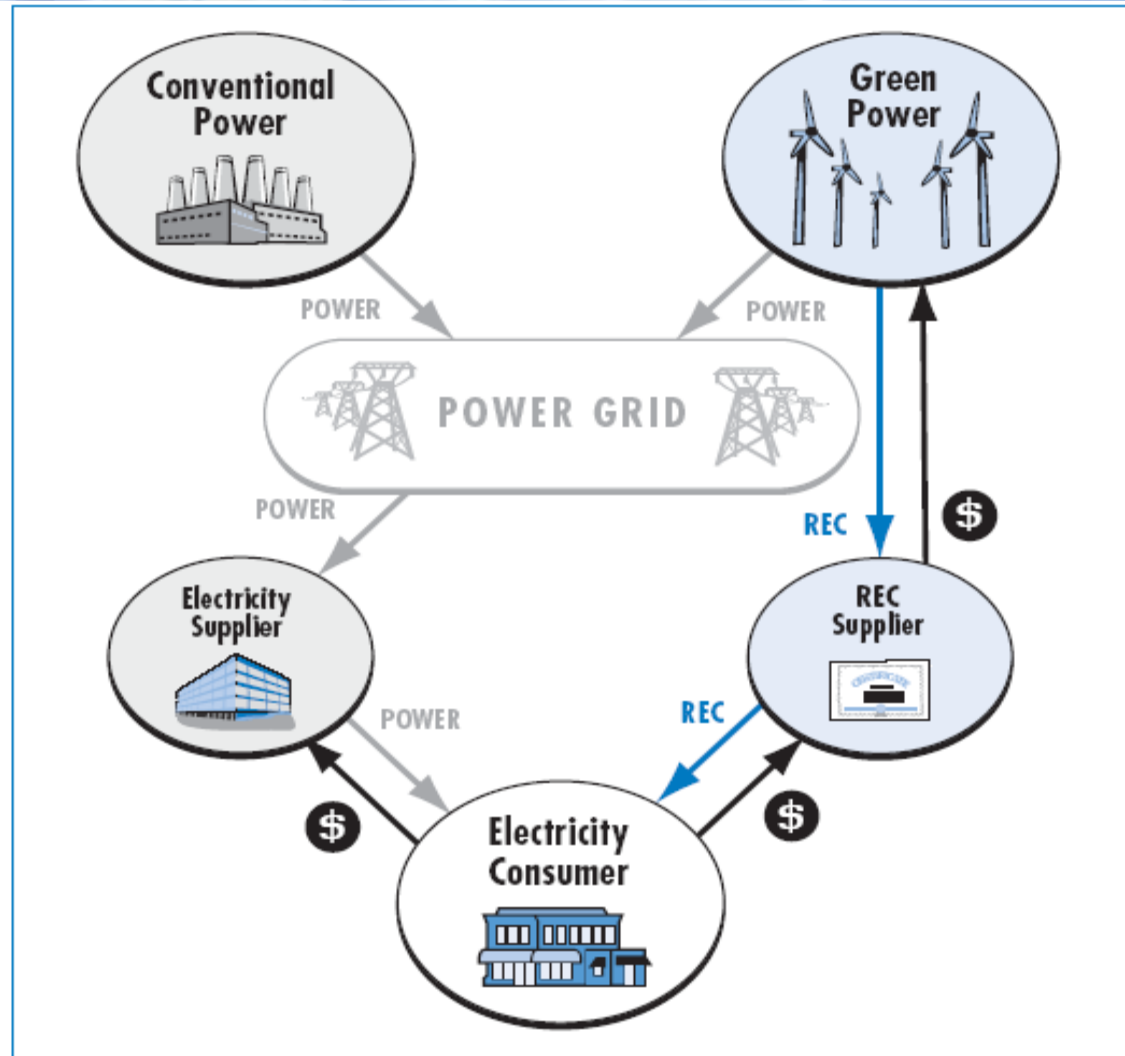
# Capacity Factor

- **Definition:** Ratio of the actual output of a power plant over a period of time and its output if it had operated at full nameplate capacity the entire time.

<b>Photovoltaic solar (in Massachusetts)</b>	<b>12-15%</b>
<b>Photovoltaic solar (in Arizona)</b>	<b>19%</b>
<b>Wind</b>	<b>20-40%</b>
<b>Thermal solar parabolic trough</b>	<b>56%</b>
<b>Gas combined cycle</b>	<b>60%</b>
<b>Thermal solar power tower</b>	<b>73%</b>
<b>Baseload coal</b>	<b>70-90%</b>
<b>Nuclear</b>	<b>92%</b>

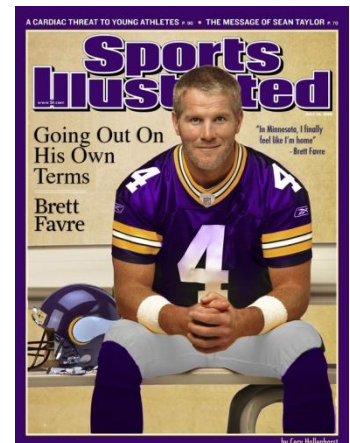
# What is a REC?

- A REC comprises the environmental attributes from 1 MWh of green electricity generation
- RECs are unique and vintaged and may not be double-counted
- RECs are functionally the same as utility-delivered green power



# RECs Trading

- **RECs are not a donation, REC purchasers are buying a specific megawatt hour of renewable energy**
- **RECs can be bought/sold/traded any number of times so long as no environmental, regulatory, or supply claim is made**
- **Once a claim is made, the REC is retired**
- **Unlike Brett Favre, a REC cannot come out of retirement**





# RECs Help in...

- **Substantiating compliance with RPS**
- **Supplying green pricing programs**
- **Providing choice for customers with no green power option**
- **Simplifies green procurement for national account holders**
- **Meeting emissions reduction goals**
- **Greening of events and products**

# Overall Benefits of RECs

- **Facilitate renewable energy markets**
- **Break down geographic boundaries**
- **Create fluidity in markets**
- **Direct dollars to lowest cost renewable resources**
- **Can be used as a financing mechanism for new renewable energy facilities**
- **Could be used for solar aggregation**
- **Monetize the value of attributes**

# Financial Benefits of RECs

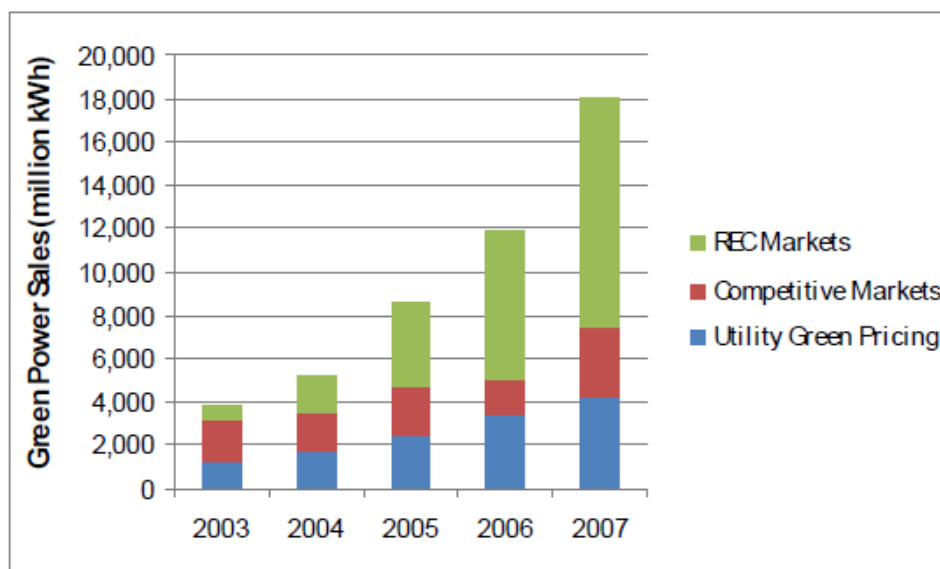
- **Buying/selling renewable energy and RECs helps to finance new renewable energy projects**
- **Long-term contracts for RECs and renewables help developers get financing**
- **Short-term and spot market transactions of renewable energy and RECs provides the market with liquidity**
- **In many cases, electricity contracts (Power Purchase Agreements – PPA) plus Production Tax Credits are not enough to make a project financially viable –that’s where RECs can make the difference**

# RECs' Place in the Market

Green Power Partnership (GPP) data:

Total Green Power Partners	Total Green Power (MWh)	Bundled Products (MWh)	RECs (MWh)	On-site (MWh)
<b>+1100</b>	<b>17,408,946</b>	<b>3,280,956</b>	<b>13,358,337</b>	<b>769,653</b>
<b>% of GPP Total</b>		<b>19%</b>	<b>77%</b>	<b>4%</b>

Overall market data:  
(Source: NREL, 2008)





# Green Power Value Proposition

- **Delivers high-impact/low-cost value**
- **Deploys quickly & scales up easily**
  - Most Partners increase GP purchase over time
  - More than 500 Partners using 100% green power
- **Resonates with customers, management, employees & other stakeholders**
- **Captures favorable media attention**
  - Clean technology
  - Domestic energy supply
  - New U.S. jobs
- **Addresses indirect emissions**

# Partnership Offerings & Benefits

- Credible Benchmarks
  - Metric for “How much green power is enough?”
  - Definition of eligible renewables
- Planning & Implementation Resources
  - Green power locator [www.epa.gov/greenpowerpubs/gplocator.htm](http://www.epa.gov/greenpowerpubs/gplocator.htm)
  - Purchasing guidance
  - Marketing and communications support
  - Environmental impact information [www.epa.gov/greenpower/pubs/calculator.htm](http://www.epa.gov/greenpower/pubs/calculator.htm)
- Recognition
  - Top 50 National list & Top 20 Retail list
  - Green Power Leadership Awards
  - Promotional opportunities
  - Use of the Partner logo →



# Green Power Partners by Sector: Who's Buying & How Much?

Industry	# Partners	Average MWh	Total MWh
Information Technology	57	45,327	2,583,652
Food & Beverage	37	55,559	2,055,686
Retail	68	30,134	2,049,079
Govt. (Local, Municipal)	92	19,559	1,799,437
Education (Higher)	87	15,488	1,347,499
Govt. (Federal)	16	75,484	1,207,741
Banking & Fin. Services	19	34,580	657,024
Govt. (State)	10	57,364	573,639
Green Power Community	24	23,638	567,324
Travel & Leisure	74	7,161	529,920
Health Care	45	11,652	524,342
Consumer Products	45	8,803	396,128
Industrial Goods & Services	40	6,102	244,086

# EPA's 1,200 Partners: *Purchasing +17 Billion kWh*



**PEPSICO**

**KOHL'S**  
expect great things



**STAPLES**



**Walmart**



MOTOROLA

**Penn**  
UNIVERSITY OF PENNSYLVANIA

**GIANT EAGLE**

**CISCO**

**HSBC**

**FedEx**

*Coldwater Creek*

**Office DEPOT.**



**WHOLE FOODS**  
MARKET

**SAFeway**

*Johnson & Johnson*

**Kimberly-Clark**



STATE STREET

Sprint



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**ING**

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**Raytheon**





# Want to Know More?

## ■ Basic Information

- An overview of Green Power Partnership is available on EPA's Web site [www.epa.gov/greenpower](http://www.epa.gov/greenpower)
- To see full details of program requirements, please see: [www.epa.gov/greenpower/documents/gpp\\_partnership\\_reqs.pdf](http://www.epa.gov/greenpower/documents/gpp_partnership_reqs.pdf)
- To see EPA's Top 50 national green power purchasers, please visit: [www.epa.gov/greenpower/toplists/top50.htm](http://www.epa.gov/greenpower/toplists/top50.htm)
- To see EPA's Green Power Purchasing Guide, please visit: [www.epa.gov/greenpower/documents/purchasing\\_guide\\_for\\_web.pdf](http://www.epa.gov/greenpower/documents/purchasing_guide_for_web.pdf)

## ■ More Questions?

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