



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

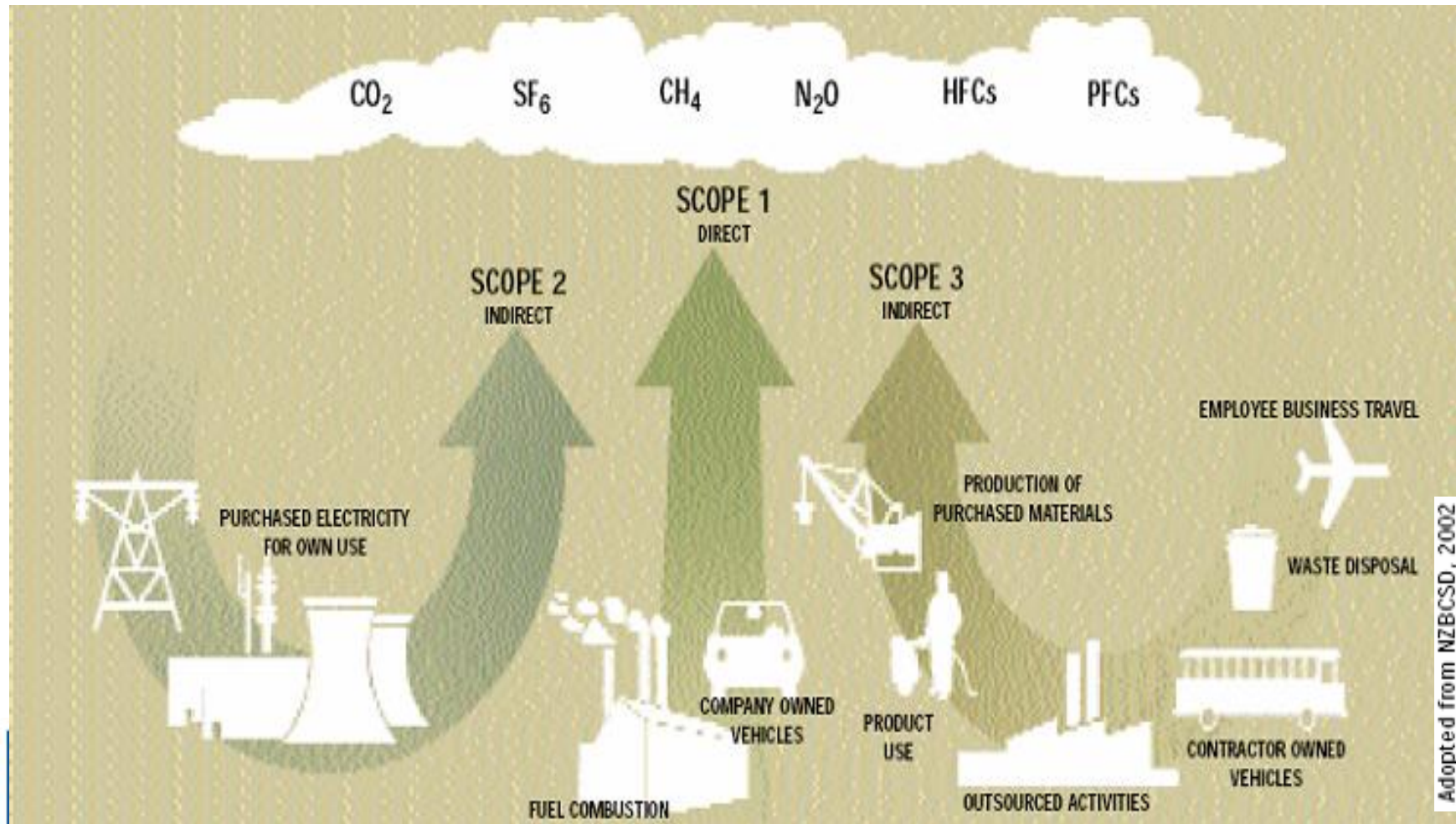


3. On Site Generation

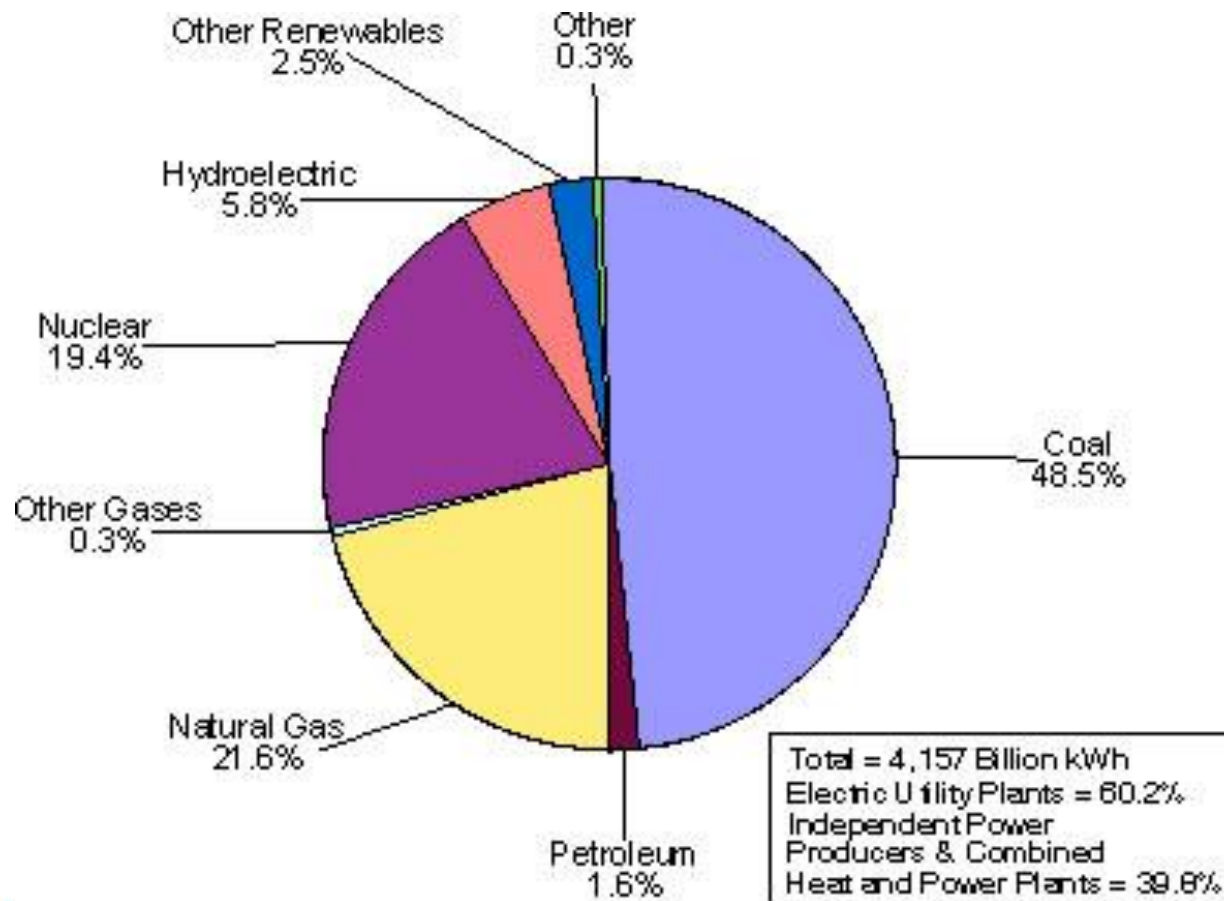
- Install renewable energy system on-site, e.g. solar panels, small wind, etc.



GHG Emissions Sources



National Electricity Mix



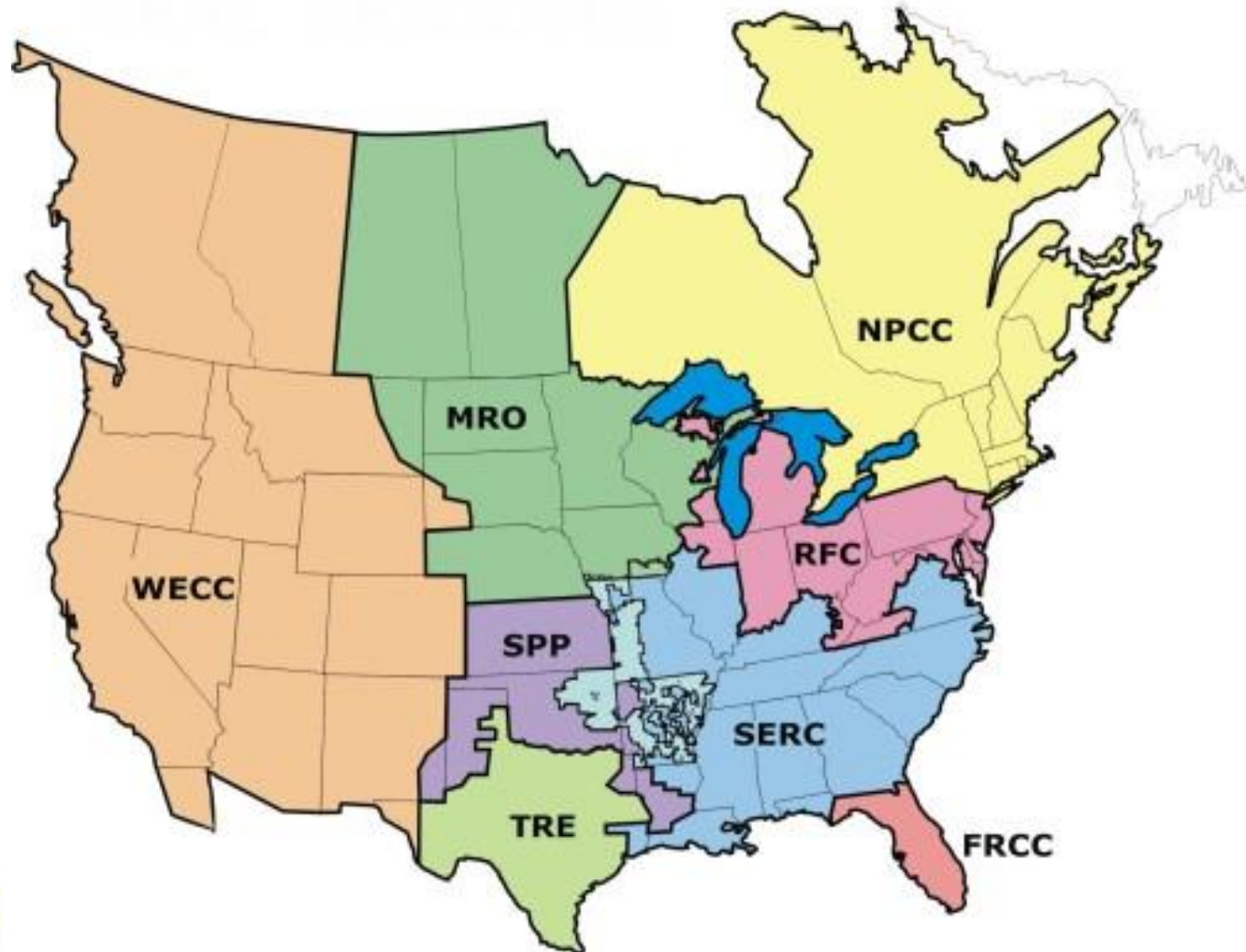
Source: Energy Information Administration, Electric Power Annual 2007.

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**

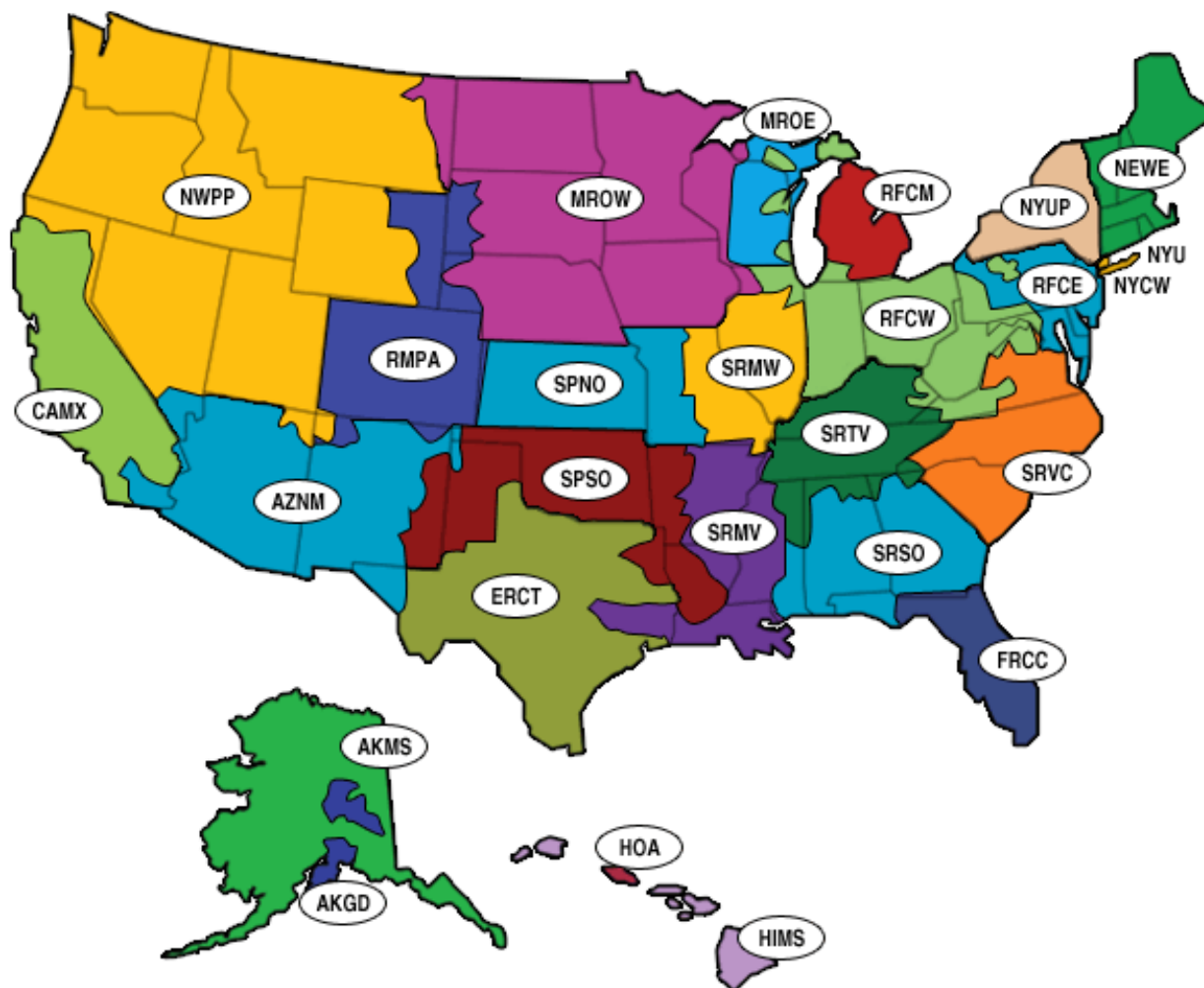


North American Electric Reliability Corporation (NERC) Regions



Emissions & Generation Resource Integrated Database (eGRID) Subregions Map

eGRID Subregion Representational Map



CO₂ Emissions and Related Claims

■ Green Power Partnership's Green Power Equivalency Calculator

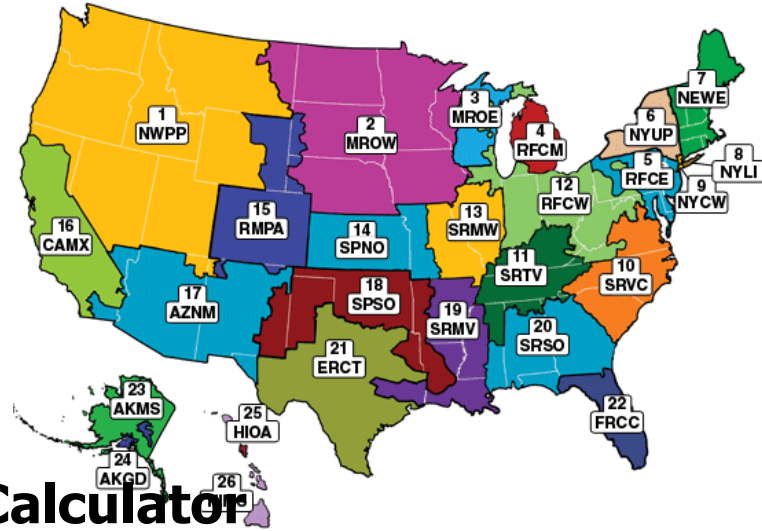
- Uses EPA's eGrid utility non-baseload emissions rates by subregion to translate a green power purchase from kilowatt-hours into more understandable terms, such as equivalent number of passenger vehicles, homes, etc.

■ 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.**

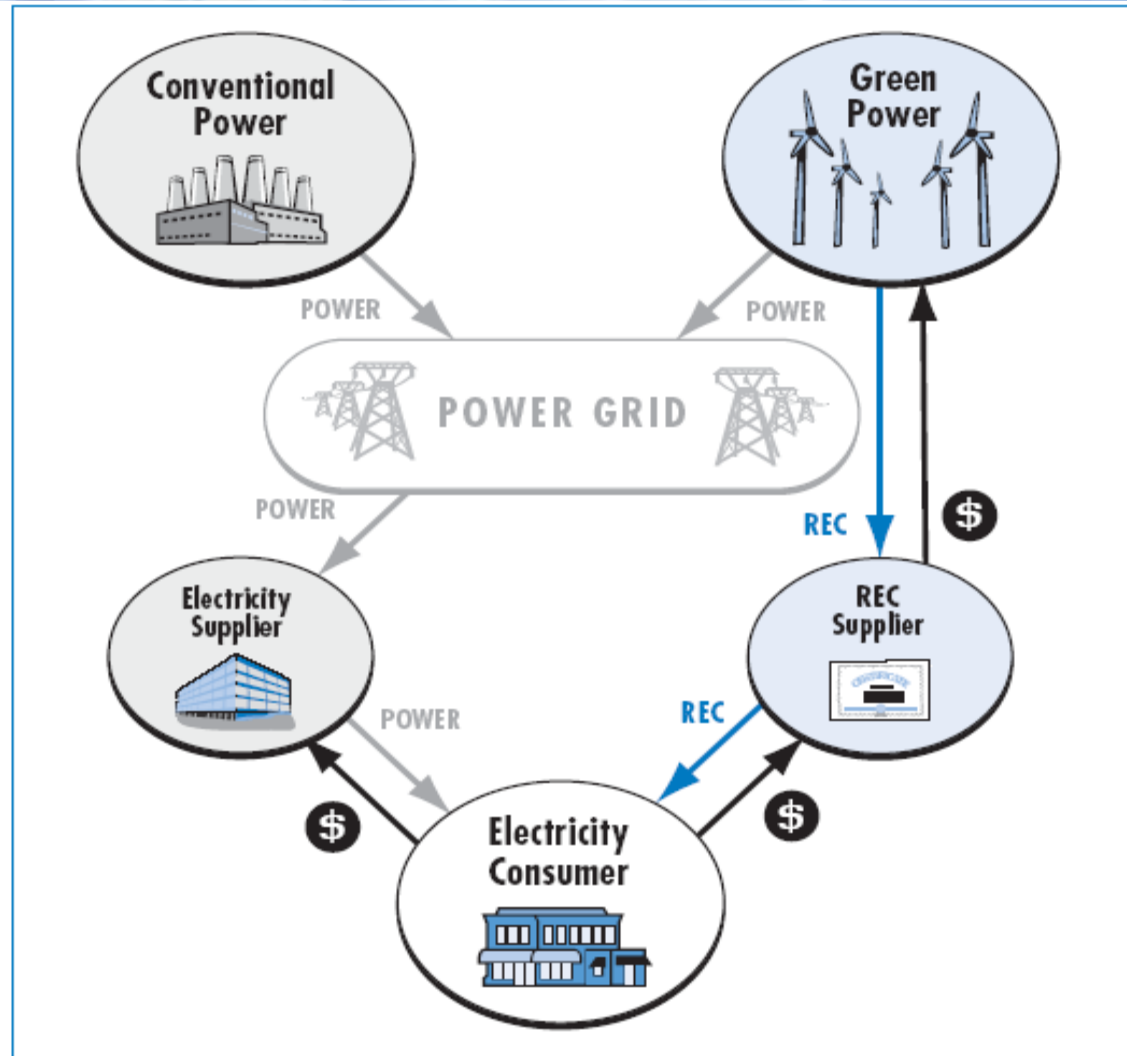
Capacity Factor

- **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.

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

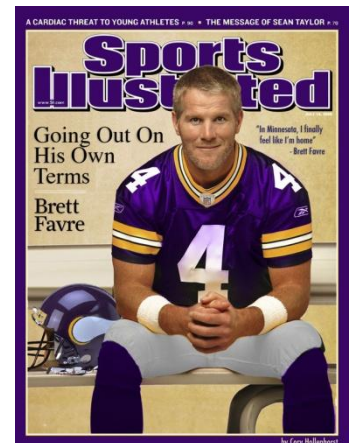
What is a REC?

- 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

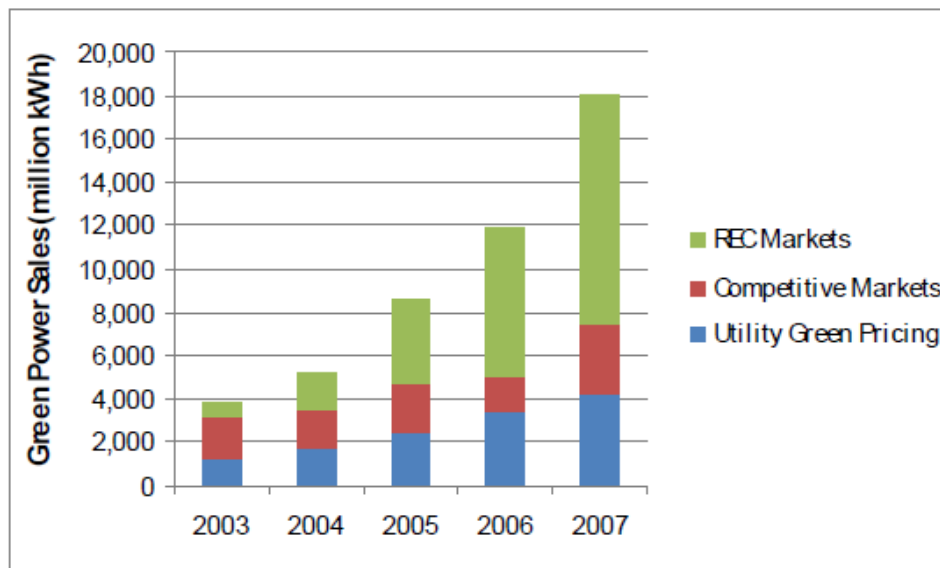
- **Buying/selling renewable energy and RECs helps to finance new renewable energy projects**
- **Long-term contracts for RECs and renewables help developers get financing**
- **Short-term and spot market transactions of renewable energy and RECs provides the market with liquidity**
- **In many cases, 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) |
|----------------------------|-------------------------|------------------------|-------------------|----------------|
| +1100 | 17,408,946 | 3,280,956 | 13,358,337 | 769,653 |
| % of GPP Total | | 19% | 77% | 4% |

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
 - Purchasing guidance
 - Marketing and communications support
 - Environmental impact information 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

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UNIVERSITY OF PENNSYLVANIA

GIANT EAGLE

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Want to Know More?

■ Basic Information

- An overview of Green Power Partnership is available on EPA's Web site www.epa.gov/greenpower
- To see full details of program requirements, please see: 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
- To see EPA's Green Power Purchasing Guide, please visit: www.epa.gov/greenpower/documents/purchasing_guide_for_web.pdf

■ More Questions?

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