



# Renewable Energy Certificates

Harvard Energy Journal Club



# What are RECs?

“Non-tangible traded commodity certifying the amount of renewable energy used in manufacturing a good.”

- Operate across several countries (Australia, US, UK, EU, India)
- Precise definition varies. In most cases 1 REC = 1 MWh from renewable sources
- Solar RECs

A.k.a. Green Tags, Renewable Energy Credits, Tradable Renewable Certificates (TRCs)

# Why not just buy renewable electricity?

- Large, complex grid systems distribute electricity from multiple sources
- Once in the system, no way of distinguishing clean from dirty...

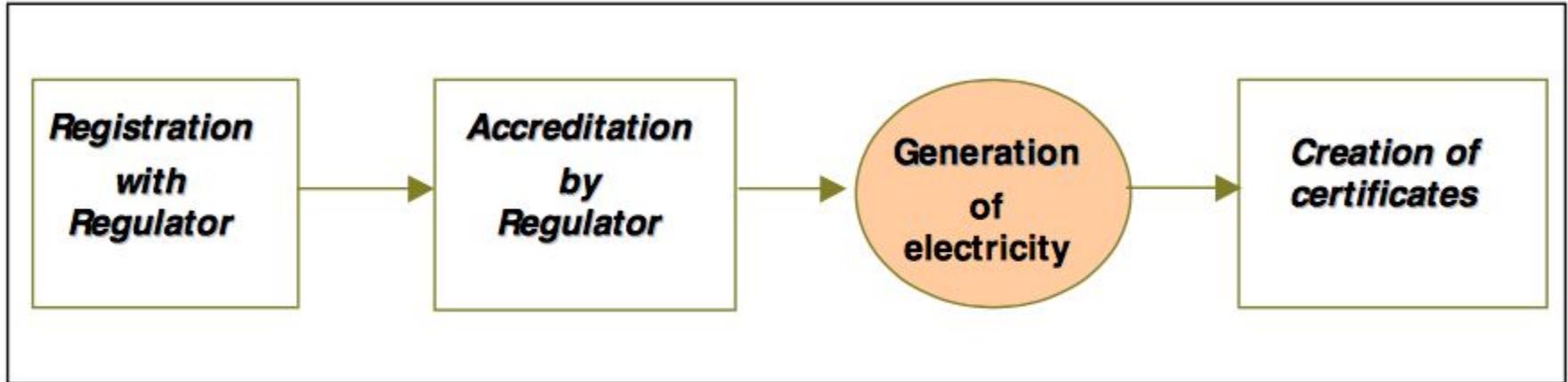
“Electrons are electrons are electrons”

- RECs **separate** the value of renewable electricity from the underlying product, and allow it to be certified and traded
- Essentially a market-driven production subsidy

# How do they work?

1. RE providers are allocated one REC **for each MWh produced**, each with a unique serial number (prevents double counting/fraud)
2. The electricity is funneled into the grid according to the normal dispatch system
3. The REC can then be **sold** on the REC spot or futures markets
4. The **buyer** can then **claim** to have purchased 1 MWh of renewable energy per certificate and use it towards its renewable portfolio standard (RPS) requirements, or use it voluntarily. **At this point the REC is retired and cannot be sold further.**

**Bottom line:** An REC can only be 'used' to make environmental/carbon claims once in its lifetime.



Gwen Andrews (2001) "Market Based Instruments: Australia's experience with trading RECs"

[https://unfccc.int/files/meetings/workshops/other\\_meetings/application/pdf/andrews.pdf](https://unfccc.int/files/meetings/workshops/other_meetings/application/pdf/andrews.pdf)

# Retirement / Expiration

Once retirement occurs, an REC **cannot** be resold, donated or transferred. No one, other than the owner of the retired REC, can make claims associated with it.

Triggers:

- (1) **Deployment of REC credit** by a customer, marketer, electricity generator or energy utility to comply with regulatory or legal emissions requirements or renewables standards
- (2) **Sale of an REC**, in whole or in part, for any purpose
- (3) **Public claims** associated with an REC purchase by an end-use customer

e.g.

If a utility buys 100 MWh of power from a grid supplied mainly by **coal-fired generators** and buys **50 RECs**, it can legally be considered to have purchased 50 MWh of electricity from renewable sources.

Similarly, if a utility buys 100 MWh of power from a grid supplied mainly by **wind farms**, it will need **50 RECs** to make a similar claim.

# Who uses them?

RECs are bought predominantly by utilities, individuals and businesses looking to reduce their respective carbon footprints. Leaders in the US:

- Among agencies... the EPA offsets 100% of its electricity through RECs
- In government... U.S. Air Force at **899 GWh** (2007)
- In education... UPenn, at **192.7 GWh**.
- In business... Intel (**1300 GWh**) and Whole Foods (**509 GWh** incl. 100% of electricity).

# How are they priced?

What explains the differences in REC prices between regions?

- **When** it was created
- **Where** the producing facility is located
- **Supply-demand conditions** on spot and futures markets
- Whether the REC is retired to comply with RPS or voluntarily (this is behind most of the difference in prices between states)
- **Source** of renewable power (e.g. solar RECs are generally more valuable in states that have specific solar RPS targets)
- Regulatory **uncertainty**

## Texas and Nepoch systems – main features

	Texas	Nepoch
<b>System in operation since</b>	July 2001	July 2002
<b>Number of states served</b>	One	Six – Connecticut, Rhode Island, Massachusetts, Maine, New Hampshire, Vermont
<b>Number of market participants</b> <i>(not all categories of market participant listed)</i>	24 generators, 53 retail electricity providers, 7 active brokers	95 generators, 37 load-serving entities (LSEs), 4 active brokers
<b>Certificates for</b>	Renewables only	All types of generation, as well as the 'residual mix'
<b>Certificate called</b>	Renewable Energy Credit (REC)	Nepoch certificate (further defined as RPS eligible in Connecticut, Maine and Massachusetts)
<b>Information tracked</b>	5 fields, including year and quarter of generation, type of renewable, facility ID and REC serial number	9 fields, including certificate serial number, plant data, name/capacity, fuel type, emissions data, labour data, eligibility for state RPS, eligibility for Green-e
<b>Certificates in generators' accounts</b>	75 days after the quarter ends	95 days after the quarter ends
<b>Transfer periods for certificate sales</b>	<ul style="list-style-type: none"> <li>■ Counterparties can trade on a forward basis</li> <li>■ Generators can transfer RECs to a buyer as soon as the RECs are allocated, and the REC may be resold an unlimited number of times during its life</li> <li>■ Anyone can hold a REC until it expires</li> </ul>	<ul style="list-style-type: none"> <li>■ Counterparties can trade on a forward basis</li> <li>■ There are 4 transfer periods a year, one for each quarter</li> <li>■ At the end of the transfer period, certificates must be transferred from primary accounts to reserve accounts or they will be 'cleared' by the system and assigned to the residual mix</li> <li>■ Once certificates are in a reserve account, they may not be resold for compliance purposes</li> </ul>
<b>'Lifespan' of certificates</b> <i>(a function of the RPS)</i>	3 years (year of generation + 2 years)	Cannot be resold after transfer period closes; Massachusetts allows limited banking for up to 3 years (year of generation + 2 years)
<b>Imports possible</b>	Yes, under certain circumstances, but has not yet been done	Yes, if power is delivered real-time, but has not yet been done
<b>Approximate cost of the system</b>	Information not available to the public	\$2.5 million a year for the first 2 years, then \$1.25 million a year thereafter. (The cost of the system is borne by the LSEs)

# Mandatory vs Voluntary Markets

RECs can be purchased directly or on the open market.

- **Mandatory:** Renewable Portfolio Standards (RPS), for a % of energy from renewables
- **Voluntary:** PR / CSR exercise for companies; “warm fuzzies” for green people
- Can theoretically be purchased by anybody
- Valid for a limited time (usually 1-3 years)
- Market participants subject to auditing and membership fees (e.g Green-e in the US)

# Futures Markets

- **Futures markets** trade RECs that have not yet come into existence

RE developers can raise funds on futures markets by entering into contracts for the sale of RECs...

...but the counterparty will not actually receive them until after the power is produced (a factor that would be priced into the risk premium)

**Typically:** five-year contracts, tranches of 1GW (1,000 RECs)

# Non-US experiences

- **Australian REC Registry:** internet-based. Administered creation, identification and trading. Successful until torpedoed by new government.
- **European REC System (RECS):** voluntary exchange to stimulate pan-European investment in renewable energy.
  - Requires evidence of quantity produced, with specific pricing/trading methodology
  - Certificates can be traded between different countries
  - EU Directives with obligatory guarantees of origin are replacing voluntary disclosure to increase transparency + pricing accuracy.
- **UK Renewable Obligation Certificates (ROC):** mandatory RPS, tax rebates on biodiesel, RE subsidies, 20% GHG reduction target by 2020
  - Closed in 2011, to be replaced with contracts-for-difference scheme (derivatives)
- **Others:** Italy, Belgium, Sweden and Norway



Issues

# 1. Additionality

- Idea that creating a market for RECs introduces new renewable energy into the grid **in addition to that which would have existed without the policy.**
- As long as electricity markets function correctly, RECs should always produce positive additionality.
- Research shows that RECs retired in states where the RPS is voluntary **do not lead to additional investment** in renewable energy, **or additional generation.**
- Simply creating a supply of RECs does not inherently increase demand for renewable generation capacity.

## 2. Environmental benefits

Greenpeace + WWF claim that RECs do not guarantee env. benefits.

- Argument 1 - Economics: until demand for RECs exceeds supply of fossil-fuel generation, FF power is simply used elsewhere, changing nothing in aggregate unless absolute consumption declines.
- Argument 2 - Marketing: Traders have been known to misleadingly imply that RECs provide direct environmental benefit. In theory, an energy customer can use REC purchases to claim that they “reduce” their carbon footprint/intensity, even if their end-use remains unchanged or actually increases.

### 3. “Balkanised” markets

Pollution is **not geographically confined** and may travel across state and national boundaries.

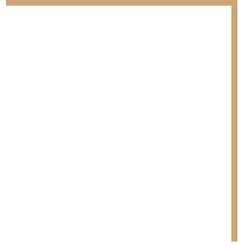
REC markets **are geographically confined** by the state-by-state legislation that regulates them, with differences in prices and incentives between states.

There is a clear incentive for electricity consumers in states with voluntary RPS to **free ride** on pollution abatement by electricity consumers in neighboring states with mandatory RPS.

# 4. Rigid markets

- RECs can only be sold once - means **limited liquidity** and flexibility in trading
- Little or no **speculation**: constrains ability to efficiently match supply and demand of RE financing
- **High risk** = short-term positions on futures markets
- **Volatility** = deterrent to long-term investment

Solutions?



# 1. Standards

## Labelling schemes

- WWF-funded “ok-power” label in Germany, uses tracking system.
- Require contracts for renewable energy specifically to be delivered, with non-renewables as an alternative source.

## Additional standards

- Banning power plants that adversely affect ecosystem services
- Requiring that part of the certification fee per kWh is invested in eco-friendly power generation or technology.
- Arcadia Power (US trader) buys RECs from specific projects supplying the same ISO grid as their customer

## 2. Markets

**Harmonization** across state boundaries helps national standards to be more effective in measuring and adequately pricing pollution prevention.

- e.g. EPA's sulfur oxide (SO<sub>x</sub>) and nitrous oxide (NO<sub>x</sub>) cap-and-trade programs

**Deregulating** markets to allow speculative capital to operate

- WARNING: must be managed carefully to avoid excessive speculation.
- More liquidity = price stability = approximation to traditional free market commodity exchange.



Any RECommendations  
for Trump?

