Emerging market for Green Certificates

Dr Marianne OSTERKORN, Director of REEEP
Dr Xavier LEMAIRE, SERN/REEEP

CONTENT

1. What is a certificate system?
2. How certificates system works
3. What are the benefits of certificates
4. Case studies
   - The case of harmonisation in EU (RECS)
   - The case of the certificates market in the US
1. What is a certificate system?
2. How certificates system works
3. What are the benefits of certificates
4. Case studies
   - The case of harmonisation in EU (RECS)
   - The case of the certificates market in the US

Certificates provide information of the added value of green electricity.
What is a Green certificate?

- Various types and denominations
  - Green Certificate, TREC, TRC, REC
  - Tradable Renewable (Energy) Certificate/Credits
  - Renewable Energy Credit / Green tags
- A piece of information
- Represents the benefits (aside from the physical electricity) associated with electricity generation by renewable sources
- It is a commodity which can be traded

How does a certificate system work

[Diagram showing the certificate market connecting with the electricity market, illustrating the processes of issuing, registration, and redeeming.]
Rationale of Green Certificates

- The main idea is to separate physical flux of electricity from its environmental benefits
- create a market where Green certificates can be traded distinct from the market for the supply and demand of electricity
- gives flexibility by allowing green producers of electricity to reach easily green consumers
- **Green certificates** could be generated and sold anywhere in the world where there is demand!

Certificate Systems within the right Framework enable Flexibility and Security for Investors

1. What is a certificate system?
2. How certificate system works
3. What are the benefits of certificates
4. Case studies
   - The case of harmonisation in EU (RECS)
   - The case of the certificates market in the US

What information is provided through certificates

- paper form
- electronic form

- Unique identification number.
- Generator.
- Date of issuing and the period of production covered by the TGC.
- Unit, amount (if the value of TGCs is not standardised).
- Location (country and region) of the plant.
- RE Source (solar, hydro, wind etc.).
- Technology (type of unit, size, age etc.).
- Capacity of the plant.
- Expiration date of the certificate (could be infinity).
- Direct support received for the production of renewable electricity.
- Indirect support (for instance dispatch priority) received.
Tracking the Life cycle of certificates

Certification” of the Plant

Measuring of produced Electricity

Issuing of Certificates

Transfer of Certificates

Redemption of Certificates

Life cycle of a Green Certificates
Central registration of certificates

Example: How to issue Issuing certificates
Balance for an account owner

<table>
<thead>
<tr>
<th>Account owner</th>
<th>Reference</th>
<th>Date</th>
<th>Overview Tradable Green Certificates account for month/year</th>
<th>Last balance</th>
<th>Bought</th>
<th>Sold</th>
<th>New balance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See specifications priest for full details

CONTENT

1. What is a certificate system?
2. How certificate system works
3. What are the benefits of certificates
4. Case studies
   - The case of harmonisation in EU (RECS)
   - The case of the certificates market in the US
How can green certificates be used?

- Monitoring and Statistics:
  - Proof of RE generation
  - Labelling
  - Disclosure (guarantee of origin)

- International trade:
  - Proof of import/export of renewable energy

- Incentive system
  - Requires Obligations and incentives/penalties
  - Together with Feed-in tariff
  - Together with tax incentive

Proof of RE generation/Labelling/Disclosure

- Some suppliers may wish to target “green” consumers by selling them an electricity product with high renewables content
- The labelling body could require Green Certificates to be redeemed in order to verify compliance with label criteria. e.g. generated from hydro plant with a capacity below 20MW
- Within EU it is obligatory that suppliers provide customers with information on the fuel mix for their electricity. Green Certificates can be used as guarantee of origin
Benefits of Green Certificate Systems

- Green Certificates can be traded across country boundaries
- Green Certificates overcome physical electricity transfer restrictions
- Green certificates promote best practice: it gives incentives to most economical sites, since the physical barrier to trade of RE benefits is removed e.g. even production of solar electricity in tropical countries but green certificates bought by consumers in the North?
- Green Certificates help to remove the requirement that supply & demand of RE occur at same time
- Green Certificates can prove compliance with public support schemes

Constraints of Green Certificate Systems

- Risk of double counting must be avoided
- Reliable tracking system of the whole life cycles of the certificates is a “must”
- Legal framework has to be stable (obligations, penalties)
- No harmonized market, very scattered systems
- Market based prices
Conclusions

- Green Certificates provide information
- Green Certificate systems can be used with many different RE policies
- Green Certificates offer flexibility and transparency for the market
- Green Certificate systems have been proven to be robust and fraud-resistant

CONTENT

1. What is a certificate system?
2. How certificate system works
3. What are the benefits of certificates
4. Case studies
   - The case of harmonisation in EU (RECS)
   - The case of the certificates market in the US
In Europe are many incentive systems in place

National Certificate Systems don’t contribute to a liquid European Certificate Market

<table>
<thead>
<tr>
<th>Country</th>
<th>Start</th>
<th>Supported RES</th>
<th>Demand Driver</th>
<th>Certificate Size</th>
<th>Validity</th>
<th>Target</th>
<th>Flexibility</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>2002</td>
<td>Hydro, Wind, Solar, Biomass, Geothermal</td>
<td>Suppliers</td>
<td>1 MWh</td>
<td>5 years</td>
<td>3%</td>
<td>(2010)</td>
<td>Banking</td>
</tr>
<tr>
<td>Belgium</td>
<td>2002</td>
<td>Hydro, Wind, Solar, Biomass, Geothermal</td>
<td>Suppliers</td>
<td>1 MWh</td>
<td>5 years</td>
<td>3%</td>
<td>(2010)</td>
<td>Banking</td>
</tr>
<tr>
<td>Italy</td>
<td>2004</td>
<td>Hydro, Wind, Solar, Biomass, Geothermal</td>
<td>Production</td>
<td>10 MW</td>
<td>Year</td>
<td>3%</td>
<td>(2004)</td>
<td>Banking against a penalty price</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2001</td>
<td>Hydro, Wind, Solar, Biomass, Geothermal</td>
<td>Producers</td>
<td>1 - 5 GW</td>
<td>1 year</td>
<td>10%</td>
<td>(2020)</td>
<td>No banking</td>
</tr>
<tr>
<td>Sweden</td>
<td>2001</td>
<td>Wind, Solar, Biomass, Geothermal</td>
<td>Producers</td>
<td>1 - 5 GW</td>
<td>1 year</td>
<td>10%</td>
<td>(2020)</td>
<td>No banking</td>
</tr>
<tr>
<td>UK</td>
<td>2002</td>
<td>Hydro, Wind, Solar, Biomass, Geothermal</td>
<td>Producers</td>
<td>1 MWh</td>
<td>1 year</td>
<td>10%</td>
<td>(2020)</td>
<td>No banking</td>
</tr>
</tbody>
</table>

Existing Green Certificate Systems

- EU: UK, Italy, Belgium, Sweden, etc. - Renewables Obligations
- Netherlands - Certificates facilitate tax exemption
- Europe - private RECS initiative
- US - Several states use Green Certificates + moves to establish a North American Green Certificate market
- Australia - Sustainable Energy (Electricity) Act introduced RE Certificate trading
- South Africa?
RECS - the only voluntary reliable certificate system

- Harmonised European standard for (national) Tradable Renewable Electricity Certificate Systems
  - Basic Commitment = Overall standard
  - Domain Protocols = (National) implementation
  - Technical specifications interfaces certificates registries

- Comprises all major European utilities - for disclosure and green customers

- Launched in 1998 today implemented in 18 countries: 15 EU members, 2 EU accession countries, + Norway + Switzerland, Slovenia

- Currently no European market, but RECS provides a working exchange platform for diverse TREC systems

RECS meets high Quality Standards

1. Only Plants selected through a precise Procedure are eligible for RECS Certification
2. Continuous Auditing of the actual Operation is implemented
3. Any Subsidies the Plant receives must be declared on the Certificate
4. Issuing of RECS Certificates is exclusively based on Metering Data (1MWh - 1 Certificate)
5. RECS Certificates have unique Numbers throughout their Lifetimes (5 years)
Countries RECS members

- EC likely members
  - Accession - 2004
  - Accession - 2007
  - Current members
Certificate Issued by technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>RECS Certificates Issued per Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ind.&amp; comm.waste</td>
<td>95,619, 0%</td>
</tr>
<tr>
<td>Mun.solid waste</td>
<td>338,796, 1%</td>
</tr>
<tr>
<td>Other biogas</td>
<td>0, 0%</td>
</tr>
<tr>
<td>Sewage gas</td>
<td>25,100, 0%</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>20,685, 0%</td>
</tr>
<tr>
<td>Forestry etc.</td>
<td>12,151,721, 43%</td>
</tr>
<tr>
<td>Offshore wave</td>
<td>0, 0%</td>
</tr>
<tr>
<td>Offshore tidal</td>
<td>0, 0%</td>
</tr>
<tr>
<td>Onshore wave</td>
<td>0, 0%</td>
</tr>
<tr>
<td>Onshore tidal</td>
<td>0, 0%</td>
</tr>
<tr>
<td>Hydro</td>
<td>15,282,644, 54%</td>
</tr>
<tr>
<td>Geothermal</td>
<td>166,024, 1%</td>
</tr>
<tr>
<td>Energy crops</td>
<td>86,249, 0%</td>
</tr>
<tr>
<td>Photovoltaic</td>
<td>0, 0%</td>
</tr>
<tr>
<td>Thermal</td>
<td>0, 0%</td>
</tr>
</tbody>
</table>

Status: 1. August 2003

CONTENT

1. What is a certificate system?
2. How certificate system works
3. What are the benefits of certificates
4. Case studies
   - The case of harmonisation in EU (RECS)
   - The case of the certificates market in the US
Certificates in the USA

- 14 of 19 RPS states in USA uses Certificates to demonstrate compliance
- There is also a strong voluntary market which cannot be neglected
- Prices can vary a lot on the compliance markets
  - From 0.70 US cents/MWh (Maine)
  - To 35-49 US dollar/MWh (New England)
- Prices on the voluntary market
  - From 2 US dollar to 6 US dollar (new generation)
  - But some sources like 200 US dollar/MWh
  - From 1 US dollar to 3 US dollar (existing generation)

---

Market size in the USA

<table>
<thead>
<tr>
<th>Compliance Markets</th>
<th>Current REC Market Size (million MWh)</th>
<th>Current REC Market Value ($ millions)</th>
<th>2010 REC Market Size (million MWh)</th>
<th>2010 REC Market Value ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-13</td>
<td></td>
<td>$140</td>
<td>45</td>
<td>$600</td>
</tr>
<tr>
<td>Voluntary Markets</td>
<td>3</td>
<td>$15-$45</td>
<td>20</td>
<td>$100-$300</td>
</tr>
<tr>
<td>Total</td>
<td>11-16</td>
<td>$155-$185</td>
<td>65</td>
<td>$700-$900</td>
</tr>
</tbody>
</table>

Source: National Renewable Energy Laboratory
Tracking system in the USA

Use of certificates in the USA

- Certificates can be sold
  - Bundled with the electricity to local retailers
  - Unbundled at a regional or national level
- Certificates can be aggregated from small systems
- Certificates can be sold in advance of generation
The future of TREC in the USA

- National registration?
  - State registration currently so a generator can be in several tracking systems and issue REC in each tracking system

- Link with the emission certificate market?
  - Currently RE not eligible or there is no rules to allow participation

- Clarity of the system for end-users?
  - Currently, the system tends to get too complex to be understood
    - E.g. sale of certificate without the totality of their environmental attributes, sale of certificates without corresponding electricity

Conclusions

- Green Certificates provide information
- Green Certificate systems can be used with many different RE policies
- Green Certificates offer flexibility and transparency for the market
- Green Certificate systems have been proven to be robust and fraud-resistant
- Green Certificates will be used in an growing market