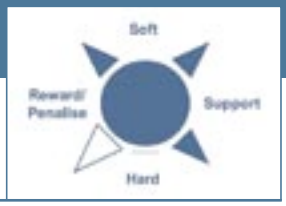

3. Certificate Trading

Definition and objectives

In certificate trading systems governments establish a maximum quantity of emissions to the environment in a region and issue certificates or permits allowing certificate holders to emit pollutants or the use of environmental goods up to the defined maximum. Firms may only emit pollution for which they hold certificates and certificates can be freely traded among firms. By purchasing additional certificates, firms may increase their emissions beyond the limit set out in their initial allocation of certificates. Since the number of certificates available is limited, firms selling certificates must reduce their emissions beyond the level in their initial permit allocation. Trade occurs between certificate holders who have different costs and opportunities for reducing their emissions with the result that pollution abatement occurs where it is achievable at the lowest cost.

Certificate trading has been applied to a large degree as an instrument to reduce air pollution (US-EPA 2003: 2-1), and the following description largely deals with certificate trading applied with this objective. However, the instrument can be used to address a wide range of problems as shown in the first step in the implementation process below, with most of the issues raised here equally applying.

Mode of operation

Different kinds of players are normally involved in certificate trading systems, such as governmental agencies, private companies, certificate brokers and others. Whereas governmental agencies are primarily responsible for setting up the framework for certificate trading, companies and brokers are mainly engaged in the following market activities.

Figure 1 provides an overview on how the involved players relate to each other:

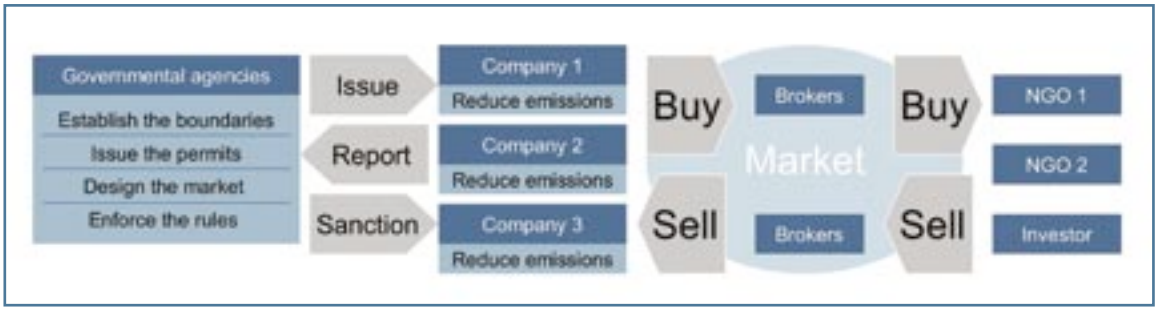

Figure 1: Different actors in a certificate trading system

Governmental agencies normally lead the process of setting up a certificate system. Generally this occurs in five major steps:

Step	Issues to consider
Establishing the boundaries	Government decides what shall be covered by the certificates, e.g.: **Emissions** Certificates can entitle the holders to emit a certain amount of measured (or estimated) pollution (i.e. air or water pollution, land contamination, noise). Emissions are suitably addressed by a certificate trading system if the impact caused by the emission is the same or similar for each unit, is more or less uniformly distributed and does not involve serious health problems for humans that need immediate action.

	Usage rights Certificates that entitle land use (e.g. for tourism construction), use of governmental infrastructure, and may cover hunting or fishing rights. **Natural resources** Provide certificate holders with the right to extract or use a certain resource, e.g. water, fuels, timber, metals, other raw materials, etc…
Setting up the system	This entails who shall be subjected to the certificate trading, the quantity of certificates issued, dates for implementation of the programme and penalties for non-compliance (US-EPA 2003:3-2). Other issues for consideration include whether emission limits will be reduced over time (necessitating a retirement of issued certificates) and the geographical scope of the system. It also needs to be decided if additional certificates are to be issued under certain circumstances. For example, carbon credits can be granted for re-forestation that binds carbon emission and thereby creates a 'carbon sink' (Australian Greenhouse Office 1999c).
Issuing the certificates	In the beginning the certificates need to be allocated among the participants. Different mechanisms can be used to do this (Tietenberg 2003:410): **Auctions** Certificates are allocated in a public auction where the highest bidders get certificates. Auctions lead to revenue raised for the issuing authorities. **Grandfathering** Certificates are allocated due to past emission levels of the participants in a certain reference period. **Random access** Certificates are allocated via a 'lottery'. **First come, first serve** The first applicants get the certificates.
Designing the market	Procedures and rules for trading the certificates need to be set. It has to be decided who can trade and on what terms. This can include spatial restrictions to trade, and rules for transactions of trading emissions in one period against emissions in former or future periods ('banking'). Institutions eligible for serving as brokers have to be selected. It has to be decided who is responsible for monitoring the market activities and take actions to ensure proper functioning.
Enforcing the rules	Emissions need to be measured and reported. In case certificates do not cover emissions at specific emission sources, sanctions need to be imposed by the authorities.

Table 1: Steps and issues to be considered regarding certificate trading. Source: Adopted from Australian Greenhouse Office 1999a, OECD & EEA 2005

Strengths & weaknesses

Certificate trading can achieve environmental goals with certainty and at low costs – with the condition that the trading system has to function properly. The benefits and weaknesses of a certificate trading system are summarised in the table below:

Strengths	Weaknesses
Environmental goals are achieved at lower costs Environmental improvements happen in the best place and with the best technology that yields the environmental goal with the lowest costs. Practical experience confirms that trading systems indeed reduce the costs of achieving a given environmental goal, and this often allows more ambitious environmental goals than under direct regulation (Tietenberg 2003).	**Reliance on other policy instruments** Certificate trading relies on government's capacity to sanction businesses in case of non-compliance. Consistent measurement and enforcement of compliance rules has proven necessary for programmes to yield the environmental and economic benefits envisioned.

Promote long-term resource efficiency
Trading systems promote continuous resource efficiency improvements and research in environmental technologies, especially if the number of certificates is reduced in a predictable manner over time.

Certainty to achieve environmental goals
The government can set the amount of certificates autonomously. The level of emissions cannot exceed the amount of certificates if actors are compliant, even with unexpected economic growth and new emission sources.

Freedom of allocation
The efficiency of the instrument does not depend on how certificates are initially allocated. The allocation mechanism can thus be used to reach other political goals: Auctions can be used to raise government revenue; grandfathering can help to buy political support from businesses. Certificates, e.g. fishing rights, can also be allocated to local communities for giving them ownership of local natural resources and strengthen their position vis-à-vis large businesses.

Functioning market for certificate trading required
Markets for certificate trading work only if sufficient supply and demand of certificates exists and is expected to exist in the future.

Evasive actions
Re-locating activities to places outside of the regulated area remains probably the most frequent evasive action taken, leading to economic losses and undermining the environmental effect, especially as activities are likely to be shifted to a country with lower environmental standards.

Increasing concentration
Better-capitalised businesses can buy out smaller certificate holders and thereby gain undue market power (Tietenberg 2003). When applying grandfathering rule to initially allocate the certificates, new market entries can be hindered, as the businesses entering the market need to buy certificates that were issued to established businesses for free.

Table 2: Strengths and weaknesses of certificate trading. Source: Tietenberg 2003, UNEP 2004

A certificate trading system imposes different category costs such as:

Category	Description	Faced by
Set-up	…for setting up the system as outlined above	Government
Abatement	…for activities to reduce emissions	Businesses
Market operation	…for trading certificates in the market. …for running the market and keeping records …overseeing market transactions	Businesses Brokers Government
Monitoring	…for monitoring and reporting emission levels	Businesses
Sanctioning	…for assessing compliance and sanctioning	Government

Table 3: Costs associated with certificate trading

As the certificate trading system reduces the abatement costs occurring when implementing technological and organisational changes to reduce emissions, parts of these savings can be used to finance costs for setting up and running a certificate trading system on both business and government side. Site owners can be required to pay for monitoring equipment or pay a fee per certificate to cover government expenses (for examples see Tietenberg 2003, p. 404).

Success factors

General economic and political framework conditions need to be supportive of certificate trading. This covers a range of legal, fiscal and economic issues, including capacities within governments. While some are directly under governmental influence and can be addressed in the short term, others require more long-term oriented action by governments. Some basic conditions are summarised below:

Success factor	Issues to consider
Rule of law and low corruption levels	…to ensure that sanctions are actually applied. A large informal sector and in-complete record keeping of businesses can also result in implementation gaps.
Proper enforcement of property rights	…to give businesses an incentive to invest in pollution abatement installations.
A functioning judiciary system	…allowing governmental offices to get judicial support for imposing fines and giving third parties the possibility to sue businesses not in the state of compliance.
Functioning financial systems	…as the basis for establishing a functioning market for certificates. If business actors lack experience with formal financial institutions, markets are going to be small with few transactions taking place.
Functioning reporting systems	…as governments are unable to control all emission sources, they need to rely on functioning reporting systems where businesses report their emissions together with other data.
Governmental capacity	…is needed at all steps of the process described above. Governments need to gather sound data to set appropriate emission limits, handle the emission data submitted by companies and finally administer the fines.

Table 4: Legal, fiscal and economic conditions needed for the functioning of certificate trading systems (from UNEP 2004)

Key Literature and Case Studies

Australian Greenhouse Office (1999a-d): ***National Emissions Trading: Establishing the boundaries.*** Discussion paper Series (1-4), Commonwealth of Australia, Canberra.

OECD & EEA (2005): ***OECD/EEA database on environmentally related taxes, fees and charges, other economic instruments and voluntary approaches used in environmental policy and natural resources management.*** http://www2.oecd.org/ecoinst/queries/Main.htm, accessed 2 February 2006

Tietenberg, T. (2003): ***Environmental and Natural Resources Economics,*** 6th edition, Boston: Addison Wesley.

UNEP (2004): ***The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges.*** United Nations Environment Programme

US-EPA (2003): ***Tools of the Trade: A Guide to Designing and Operating a Cap and Trade Program for Pollution Control.*** United States Environmental Protection Agency, Office of Air and Radiation

Case Studies / Examples	Link
European Union Emission Trading Scheme (EU ETS)	http://ec.europa.eu/environment/climat/emission.htm
International Emissions Trading Association	http://www.ieta.org
US Environmental Protection Agency – Allowance Trading System	http://www.epa.gov/airmarkets/trading/