

MH-CARBON

ECO₂-TRADING FOR THE FUTURE



An introduction to
Carbon Credits



Carbon Offsetting

Introduction

Many scientists, naturalists and well-established mainstream ecological foundations believe our world is being threatened by global warming and the effects of CO₂ emissions and acceptance of this concept has become more widespread in recent years. Even in these safe and relatively temperate shores, notable changes have occurred. The five months from May to September 2009 were the hottest in the UK since records began.

These scientists believe that reductions in carbon and greenhouse gas emissions are essential if we are to minimise our impact on the environment.

In response to the impact that industrialised nations are having on the global

environment, the Kyoto Protocol of 1997, since signed by 187 countries, introduced various measures and an infrastructure has evolved which, mainly through the media of Carbon Credits, rewards organisations making a valuable contribution to reducing carbon emissions and charges those whose carbon footprint is considered excessive. The dramatic growth of the Carbon Credit market to date shows just how much potential exists in a market which is only now beginning to be embraced by players as significant as America and China

Regulations, mostly subsequent to the Kyoto Protocol, and, quite separately, a demand emanating from a radical change in public mood have created two distinct markets for carbon offsets.

In the Compliance Market, companies, governments, or other entities buy carbon offsets and indeed have to do so in order to comply with post-Kyoto regulations on the total amount of carbon dioxide they are allowed to emit.

In the Voluntary Market, governments, companies and individuals all choose to purchase carbon offsets to mitigate their own greenhouse gas emissions be they from transport, power consumption or some other function. They are not legally obliged to do so.

It is important to understand the difference between these two markets.

How it Works

The Compliance Market

We have seen that the opportunity to trade carbon credits was created by the United Nations' Kyoto Protocol, a legally binding document committing countries to achieving reductions in the emission of greenhouse gases (GHGs). The treaty created a number of such targets that nations needed to meet in order to safeguard the environment. Collectively, industrial nations agreed to reduce their GHGs by an average of 5.2% from 1990 levels, the major impact of this to be borne by the most developed countries. The government of each Kyoto signatory country is now responsible for ensuring that it and companies operating there are reducing GHG emissions.

To facilitate this, the Kyoto Protocol established a medium, known as a carbon credit. Each carbon credit permits emissions of one tonne of CO₂. If a company has emissions over its allowance, then this entails a cost. Conversely, companies able to stay under their allowance receive credits which can be traded on exchanges.

Additionally, companies creating projects, say in developing countries, which actively reduce GHG emissions become eligible for these carbon credits and then can raise funds, by selling them, perhaps to a company exceeding its allowance, on an exchange.

Credits generated for the compliance market must come from a high standard project which

is regularly checked and verified by independent review boards appointed for each country. Each such project goes through rigorous testing and analysis to determine the resultant reduction of carbon emission or the amount of carbon it is in fact to remove from the atmosphere. Once validated and registered, the credits generated by a project are known as Certified Emissions Reductions (CERs).

The Voluntary Market

In the Voluntary Market, governments, companies and individuals all purchase carbon offsets to mitigate their own greenhouse gas emissions be they from transport, power consumption or some other function.

There are broadly two reasons why these organisations and individuals choose to buy voluntary credits. Firstly they may be doing to demonstrate Corporate Social Responsibility and to establish their brand as being sympathetic to major global issues. Secondly they may consider that emissions regulations will become more generally applicable in future and it is only a matter of time before they will be involved in a compliance scheme anyway.

Additionally they may consider the Voluntary market to be attractive financially and see good reason to hold a portfolio of credits.

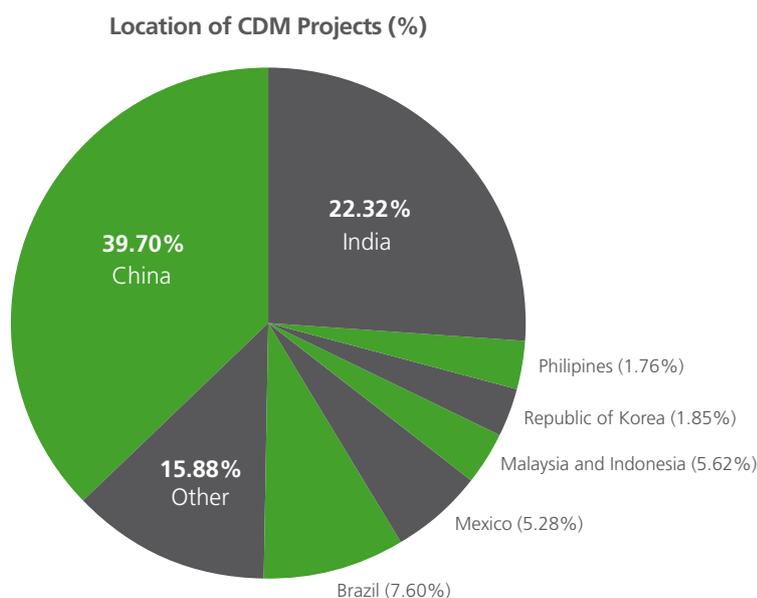
Though Voluntary Emissions Reductions (VERs) are verified by a third party, they do not carry

the costs associated with Certified Emissions Reductions (CERs), which are subject to much more stringent regulation, pushing up the price. This means that individuals and companies can reduce their emissions in a more efficient and cost effective way. Despite there being less regulation, VERs are still subject to a standard and emissions reductions must be real, measurable, permanent, additional to what is already being done, and independently verified.

The voluntary market may at present be smaller than the compliance market. However its growth is led not by public policy but by the private sector which is evolving its own infrastructure of organisations such as the Carbon Trust to advise companies on achieving carbon neutrality. With major companies such as Tesco, The Co-op, and Marks and Spencer aiming for carbon neutrality, it is the opinion of many active in these markets is that the wider scope and more competitive pricing of the voluntary market mean that it has a strong potential to outstrip the mature market size of the compliance regime.

This is where our clients can come in. They can choose to buy carbon credits emanating from projects which reduce CO₂ emissions. In time they may wish to sell them on to a company aiming for carbon neutrality.

Though MH-Carbon is active in both types of market for these reasons it specialises in the voluntary market.



United Nations Framework Convention on Climate Change, 2010

“ Each carbon credit is equivalent to one tonne of CO₂ ”

Projects reducing emissions

These are sample categories of environmental projects which reduce carbon emissions and may generate carbon credits:

Renewable energy sources

Sources of renewable energy, such as a wind farm or hydro-electricity plant, generate significant reductions in GHG emissions and can gain high levels of carbon credits. This type of projects has the added benefit of providing power as well as reducing emissions.

Capture of fugitive emission and waste handling and disposal

Developing and installing technology which captures emissions and waste and then either disposes of it in an environmentally friendly way or reuses it, results in a reduction in GHGs. This is the second biggest project type, as factories produce large amounts of waste are able to reuse it. For example, rice factories produce huge amounts of waste rice husks that can easily be burned for fuel and are carbon-free.

Manufacturing and chemical industries

These projects involve changing manufacturing processes to make them more environmentally-friendly. Changes to industrial processes can make significant reductions in carbon emissions.

Agriculture

A number of developing countries have large agricultural sectors but not the financial resources to make them environmentally sustainable. Projects which reduce animal waste such as methane, one of the most dangerous GHGs, and change agricultural process techniques to methods which are more environmentally friendly, can achieve significant reductions in carbon emission.

Mining and Metal production

These projects involve changing production processes to achieve significant reductions in carbon emissions and make them more environmentally-friendly.

Transport

This refers to the process of switching transportation to less carbon intensive means or introducing new technologies to improve vehicle fuel efficiency.

Afforestation and reforestation

Afforestation refers to the process of establishing a forest on land that has never been a forest, or has not been one for a considerable period of time. Reforestation refers to restocking existing forests and woodlands which have been depleted. This is especially important in regions such as South America where logging and other environmental destruction are widespread. Projects such as these have the added benefit of safeguarding the habitat of hundreds of species of animals which rely on forest and rainforest for survival.

Wastewater Treatment

Wastewater treatment facilities have significant impact on reducing the environmental effects of various industrial processes.

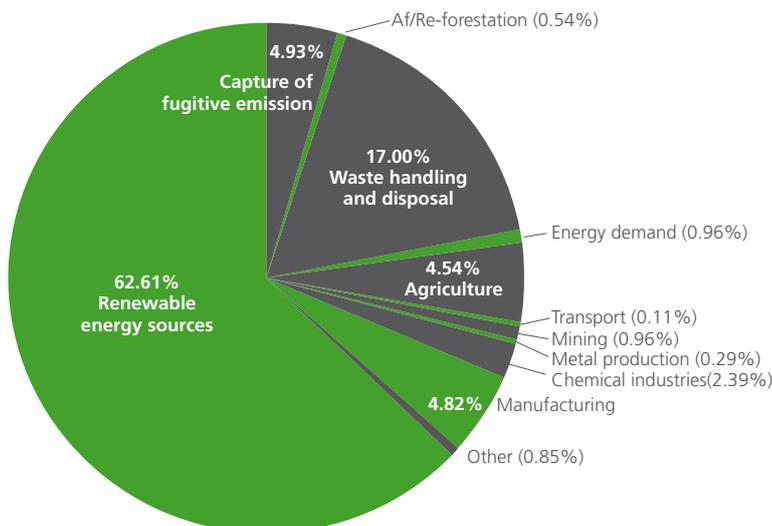
Industries which use innovation and technology to reduce this environmental impact are suitable for significant credits based on CO₂ reduction.

Methane Capture

Many process and industries produce environmentally harmful methane, from landfill sites to mines and farms.

Methane capture systems are a cost effective way of tackling climate change and they use proven technologies to address global warming. Methane fired power plants are already in use, turning the waste into energy. Projects such as these produce carbon credits.

CDM Project Distribution by Type (%)



United Nations Framework Convention on Climate Change, 2010

“ Each carbon credit is equivalent to one tonne of CO₂ ”

How Emission Reduction Projects Are Processed

The overall process implemented by the Kyoto Protocol to encourage emission reducing projects is known as the Clean Development Mechanism (CDM) and its various stages are outlined here. These stages are applicable to projects which will be eligible for the compliance market. The process for the voluntary market may not involve every stage.

There are a number of other project requirements for CDM projects, which must be met in order to qualify as a credit generating option.

The project needs to be undertaken in a country which has signed and ratified the Kyoto Protocol. This provides a good deal of variety but it does exclude projects from the United States as, currently, they have not ratified the Protocol.

The project must also conform to the sustainable development requirements in the host country and must not have an unacceptable negative impact on other elements of the environment as a by-product. The host country must also have a project board which verifies potential CDM projects and this is the point of contact for the project developer in that country.

CDM projects also have to conform to the concept of additionality. This means that all reductions in GHGs must be additional to what would have occurred without the project. Incorrect assessment of additionality is the main reason for project submissions to be held up or rejected completely (UNFCCC, CDM Guidelines, 2008).

The project development cycle below outlines the usual steps a project will go through in order to be registered and start receiving credits.

CDM project development cycle



UNFCCC, 2010

Main parties involved

A
CDM Executive Board (EB)
 Supervises the CDM, processes registration requests, develops guidelines, and issues CERs.

B
Designated Operating Entities
 Independent third parties which act as auditors for the project. They are certified by the EB, to check and validate the Project Design Document (PDD, a technical document describing the project).

C
Buyers
 To raise finance, project developers may sell to buyers. They are involved by forward-buying CERs at a lower price but with more risk, or opting to take an equity stake in the underlying project. These CERs can be sold on later.

D
Project Developers
 The company which develops and operates the CDM project. These can include:

- Private sector companies
- Governmental bodies
- NGOs
- Financial institutions.

E
Designated National Authorities (DNA)
 Each country involved in the CDM has a DNA. The authority is responsible for granting approval to local projects, which have fulfilled national criteria for sustainable development and with a good chance of succeeding at eventual registration. They are a focal point for the project developers. The UNFCCC maintains a list of DNAs.

The market: pricing and trading

Each carbon offset not only helps the environment but is an asset that can be bought and sold. This additionally presents financial opportunities for companies, governments and, importantly, individuals.

Once a project has been accredited and issued credits certified to a recognised standard, its associated credits can be traded on a suitable exchange.

On the compliance side alone, official research and projections from the United Nations Framework Convention for Climate Change indicate that the trading schemes are operating strongly and that demand for credits is exceeding supply by approximately 249.6 Mt of CO₂ every year (UNFCCC, 2009). The map below shows the

position of industrialised countries and whether they are buyers of credits. It demonstrates that most of Western Europe, Australia and the USA are net buyers of credits.

There are a number of reasons behind the purchase of carbon credits:

Market Prospects

Many, active in carbon markets, feel that, over time, prices will rise.

Risk diversification

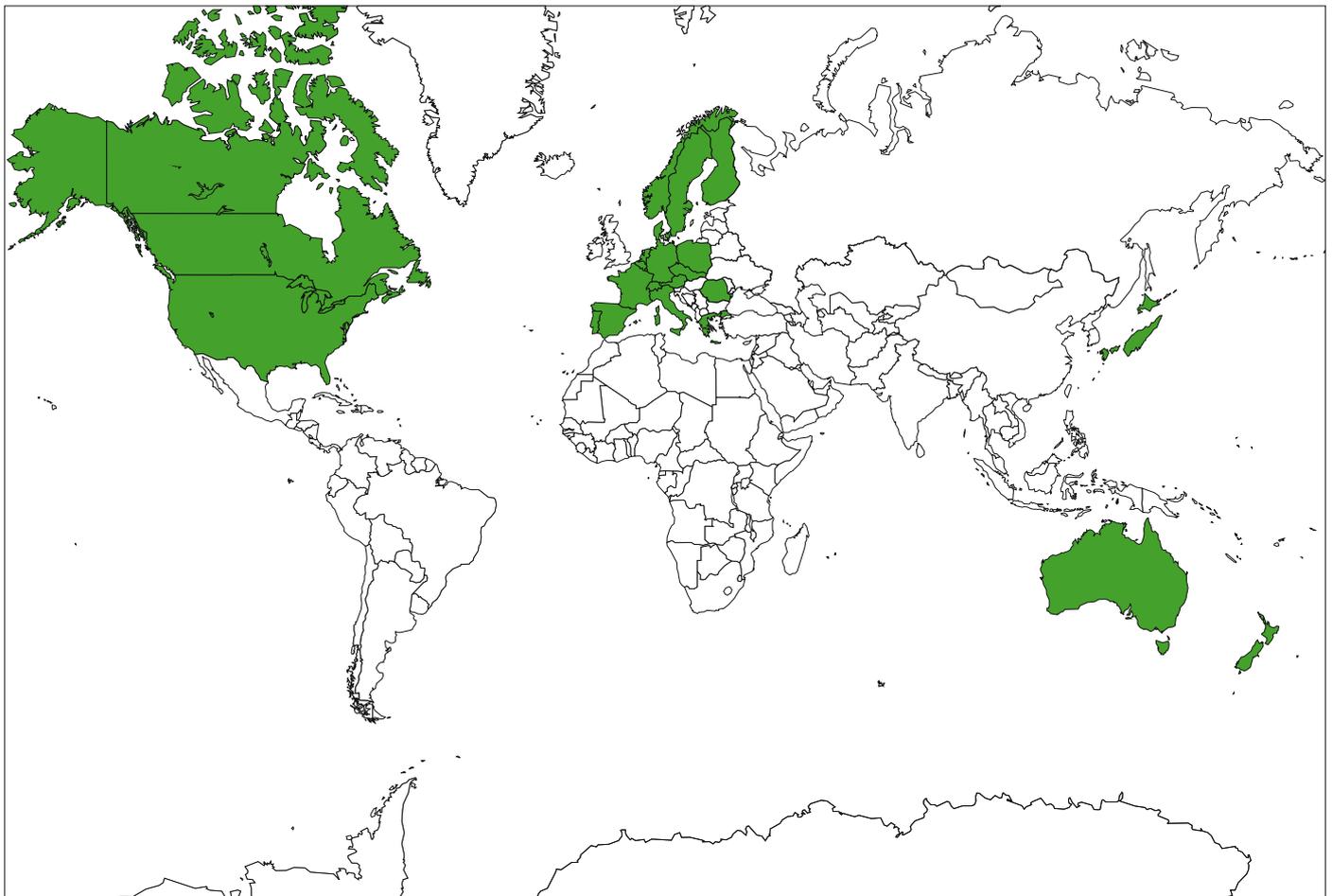
A number of buyers are purchasing different types of credits under all of the trading mechanisms in order to spread risk.

Good publicity

Some buyers, particularly large companies and governments, are purchasing credits in order

to demonstrate to the public and the electorate that they are contributing to sustainable development and are concerned about the future of the global environment.

Countries buying carbon credits - 2010/11



UNFCCC, 2009



How are credit prices established?

Credits are quoted in Euros (€) or US Dollars (US\$) for sale on the global market. Factors affecting credit prices include:

Market price

In the majority of cases, the value of compliance credits is benchmarked to the European Union Emission Allowance (EUA), the most established trading system. It is therefore important to have a strong understanding of the underlying market dynamics of the EUA.

Credit

Price negotiations can often depend on the credit worthiness of buyers and sellers e.g. projects operated by developing countries may offer lower prices as credit is more risky. Alternatively, projects run in a developing country but operated from the UK often sell for higher prices.

Terms and conditions of sale

If the seller offers delivery guarantees, uses established methodology or bears the cost of developing the documentation then premium prices can be negotiated.

Risk

The level of risk can significantly alter the price. This may include sovereign risk - is the project located in a politically unstable country? Or Quality risk - is the project developed to standards such as the CDM Gold Standard? And delivery risk - are there guarantees if the project fails to generate the expected volumes of emissions reductions.

Stage of project development

The more developed a project, in terms of approvals and documentation as well as physical construction, the less likely it is, in theory, to fail to generate credits. Therefore prices tend to be set higher.

Access to market

Generally, a wider access to market will result in higher bids, due to the competitive nature of buyers. For this reason, going through a credit

broker might be attractive to both buyers and sellers. Buyers get the benefit of convenience, quality and range of access to projects, while sellers get the benefit of the broad network of buyers this exposes them to.

Primary and Secondary Prices

Following the global economic contraction, prices of compliance credits fell dramatically from a peak of €28.73 in July 2008 to just under €10 in early 2009 (World Bank, State and Trends of the Carbon Market, 2009) as buyers' concerns over a lack of finance available to complete projects reached a peak.

In mid-June 2009, a recovery began in Credit prices of the 2009 vintage (this describing the year in which the offset took place) despite question marks over short-term supply. In the secondary market (CER), which is the trading of already issued CERs, futures contracts for December 2009 closed at €12.68 on the European Climate Exchange on 3rd August 2009 - a rise of almost 20% from mid-June of that year (Carbon Positive, August 2009).

The voluntary VER OTC market has seen large growth as sales volumes have increased year on year and the market has become more liquid.

As well as individuals, companies around the world have entered the market, offsetting their own emissions and offering the chance to their customers to offset theirs too. BP has entered into an emissions reduction programme, implementing a trading system across all its business units. It emphasises high quality credits with strict verification requirements. This programme constitutes a part of BP's overall strategic involvement in clean technologies and renewables.

TransAlta, a large Canadian coal fired utility, has announced its intention to become 'net carbon neutral' by 2020 - an initiative which would signify the need to purchase millions of tons of emissions reductions each year.

Airlines such as BA also offer their customers the opportunity to purchase credits to offset the emissions generated by their flights, and it is

schemes such as these that will lead to growth in the voluntary carbon market which could interest our clients. BA charge for each tonne of carbon offset on their flights, at approximately £11.70 per credit. Clear Offset, one of the largest offset companies, charge £15.49, and Pure Offsetting charge £10.90. On the EU Emissions Trading Scheme (EU ETS), spot prices for EUA credits are currently €13.58. The prices of voluntary credits are usually considerably lower than these and many, actively involved in the carbon credit markets, consider that this shows a clear direction for the voluntary carbon market.

Exchanges and funds

Of the current CER trading platforms, the European Union Emissions Trading Scheme (EU ETS) is by far the largest and it continues to dominate the global carbon market.

Year-end 2008 transactions valued at US\$92 billion represented an 87% year-on-year growth over 2007 with over three billion contracts traded (World Bank, State and Trends of the Carbon Market, 2009).

The options market is used as a tool on the exchange to hedge against volatility and risk and has continued to grow briskly. Options volumes on the London-based European Climate Exchange (ECX) increased five-fold between 2007 and 2008, and have continued overall growth since, if at a less startling rate thus solidifying its place as the global carbon market leader (World Bank, State and Trends of the Carbon Market, 2009).

To take advantage of this, a number of major finance houses have set up funds to purchase carbon credits. There are many major institutional carbon funds, including the World Bank Prototype Carbon Fund which raised US\$180m from governments and the private sector in 2002, and Dutch-based Carboncredits.nl, which raised US\$250m in the same year (UNFCCC, 2009).

Selling Carbon Credits VERs

As distinct from the CER and compliance market, which is geared to comply with the Kyoto Protocol, there is also a voluntary market, which is based on trading Voluntary Emission Reductions (VERs).

This market recognises activities which reduce GHGs and issues credits in the form of VERs. These can be sold to companies or individuals wishing to voluntarily reduce their carbon footprint.

VERs can be generated from projects which:

- are either based in a country that has not ratified the Kyoto Protocol (e.g. USA) or does not have the infrastructure to support the more elaborate requirements of the system required for Compliance Credits
- have not yet been registered under that system

- fall outside the scope of that system
- are too small to warrant the costs of being certified as a Compliance Credit
- are specifically developed for the voluntary market

VERs are developed according to a number of different standards and must be verified by a third party. The voluntary market does not have to comply with the Kyoto Protocol but there is, nevertheless, a standard which voluntary credits need to attain. The best known and respected of these is the Gold Standard which denotes best practice methodology and is a high quality label for carbon credits applicable to both the voluntary and compliance (Kyoto) markets.

Supporters of the Gold Standard are committed to promoting sustainable development through carbon offset markets that are characterised by transparency, sustainability and equality of access for all market participants.

The voluntary market is growing. In 2008, 123.4 million metric tonnes of CO₂E were transacted - a near doubling of the 2007 volume. There appears to have been a shift in the VER market to more structured growth facilitated greatly by the

development of intermediaries such as the Bank of New York which created a registry for VERs in June 2006.

“ The market is growing. In 2008, 123.4 million metric tonnes of CO₂E were transacted

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CERs

Buyers looking to sell their CERs to generate a surplus need to look at the various options available and weigh up the merits. Firstly it is most important to understand the buyer.

The preferences of buyers are not always just based on level of risk and price. Other facts may also be relevant.

For those who purchase CERs direct from the project developer, there are two main structures.

Equity stakes, where the buyer receives revenue from the proceeds of the project, including CER revenues or the CERs themselves, can be agreed.

Projects can also generate a secure revenue stream through the sale of forward contracts, where payment is made by the buyer upon agreed delivery of CERs on agreed dates. This provides higher risk but much lower prices and the potential for stronger price growth once the emission reductions are generated and issued (TFSGreen, 2009).

Prices generated take into account how early in the development of the project the buyer becomes involved and therefore how much risk is being taken on. There are also added benefits that can be built into the price such as social

benefits in terms of job creation, energy security and poverty reduction as well as any delivery guarantees. The buyer may also pay a premium where all documentation is already completed and paid for by the project developer.

The market is growing. In 2008, 123.4 million metric tonnes of CO₂E were transacted.

Carbon offset credits tradings schemes and exchanges Volume and value as of end 2009

	2008		2009	
	Volume (Mt CO ₂ E)	Value (US\$m)	Volume (Mt CO ₂ E)	Value (US\$m)
EU ETS	3,093	100,526	6,326	118,474
NSW	31	183	34	117
Chicago Climate Exchange	69	309	41	50
Total	3,193	101,018	6,401	118,641

Ecosystem Market Place, New Carbon Finance, 2010



Hotspots

Reforestation – Uruguay

Uruguay also has high potential for a reforestation projects. Close to 8% of the land area is forest and, due to the country's appropriate climate, there is the potential for much more.

It has recently adopted a Forestry Law benefiting companies in this activity, showing the government is keen to help this sector. This involves low start-up costs coupled with tax benefits.

A recent study by the Organisation for Economic Co-operation and Development found that funding carbon reduction projects in Uruguay has the potential to absorb 23% of its total GHG emissions by 2030.

Reforestation – Costa Rica

Costa Rica is now considered a politically stable country and was one of the first to sell carbon credits. A massive 30% of the country is designated as nature reserves and the government has announced its intention to become one of the world's first carbon neutral countries by 2021. This makes it an ideal place for a reforestation project.

Project developers buy rainforest land from private owners in the country and then contract third parties to measure CO₂ levels absorbed by replanting and avoiding deforestation. One company in particular is selling units worth 200 VERs per year for US\$12,000. These VERs can then be sold through a management company which takes a 5% fee. This essentially means buyers are forward purchasing VERs for US\$16 each. When the market develops, these are projected to sell for more.

Wind farm – Turkey

Choosing a location for a wind farm is extremely difficult and needs to be undertaken by a power company with the appropriate expertise as a huge number of variables can affect the suitability of the site.

Plans to install a wind power plant in Izmir, Turkey, connected to the national grid will significantly reduce GHGs and help to reduce Turkey's energy deficit.

The project is planned to generate approximately 797,745 tCO₂e emission reductions over 7 years and it was funded by the project developer forward by selling VERs.

Hydro electricity – Honduras

With an annual GDP per capita of only US\$3,000, Honduras is one of the poorest countries in the Western Hemisphere. It is a net importer of electricity with the contribution of fossil-fuelled power plants towards total electricity production growing from 37% to 60% between 2000 and 2003. Meanwhile, in the same period, the contribution of hydroelectricity decreased from 63% to 40%.

A project developer working with a major renewable energy supplier in Honduras, has created a hydro-electricity plant in the region.

As well as creating jobs and increasing economic development in the region, it is projected to produce 35,660 tCO₂e in reductions every year over a contract spanning 15 years

The low start-up costs involved in this project enhance the prospect of a growth in value of the associated carbon credits.

Biomass – India

As a major rice producer, there is potential for a biomass project in India. Rice production creates a by-product of rice husks. These are commonly burnt in landfill sites and give off environmentally damaging methane. Rice production firms working with local power companies are creating a processing plant enabling the burning of the husks to generate energy so this will offset the emissions. It is estimated that one processing plant attached to a rice production factory would reduce emissions by a total of 322,688 tonnes of CO₂. This is an average of 46,098 credits every year. The price of credits associated with a project such as this is likely to rise.

Agricultural Management - Uruguay

In Uruguay, 50.2% of country's GHG emissions come from the agricultural sector, in particular, methane from livestock. Uruguay emits approximately 1.6 tonnes of CO₂ per capita, every year, and the potential to reduce this is yet to be explored. The country has only 3 registered credit generating projects and none of these is in agriculture, despite this making the largest contribution to Uruguay's GHG emissions. This creates huge potential for carbon credit buyers. Past studies have shown that, as well as reducing GHG emissions, crop yields are increased as climate temperatures reduce and this is an added agricultural benefit.

The most popular way of managing the methane is by installing anaerobic digestion systems at large livestock farms. By working with a Uruguayan company with expertise in this specialised field, project developers and buyers of associated carbon credits can prosper.



Concerns

Carbon trading is extremely new and many companies, suppliers and buyers are still coming to terms with its possibilities.

The main concern is that compliance carbon credits are essentially a legal construct, whose existence is dependent on government intent. If governments no longer support the capping of emissions, the market will in effect cease.

Rulings on allocations also have a strong impact. If the European Commission allocates emission allowances which are too high, then the scheme would in effect be pointless. However, it is commonly felt that its plan is to gradually decrease the allocations, boosting demand for carbon credits and tightening their supply, so this risk is perceived to be minimal.

The other issue is over-supply. If countries are very successful in cutting their emissions, the number of credits will increase, and prices will fall. However, this is unlikely to happen as long as emission caps are tightened regularly.

The Kyoto Protocol is set to apply in its current phase from 2008 to 2012. Until 2012, the market is expected to stay relatively stable. A concern is that we cannot know how the carbon market place will change post-2012 following the Protocol review and the move into its 'second commitment period'. All the signs are that the caps will be further tightened. The EU ETS is calling for further sectors to be included in the agreement and has outlined a number of post-2012 scenarios. Under one such scenario, the international climate negotiations at UN level

will not reach a 'satisfactory' outcome, and the emission will be decreased by 1.7 billion tons in 2020 (-20%).

These concerns are generally considered to be minimal. As long as the environment remains a priority, companies, countries and governments will all continue to be on the lookout for ways to reduce their carbon output and buyers of carbon credits will have the potential to benefit.



Prices of carbon credits are indicative only and are based on current exchange rates. Carbon Credit prices can go down as well as up. It may be difficult to obtain true market process for VERs as many are transacted "over the counter" and as such values may vary from reseller to reseller. Currently VER's are illiquid in comparison to the compliance EUA credit market. There may be a big difference between the buying and selling price of carbon credits. Trading in carbon credits involves risk. You may get back less than your total outlay and in extreme cases make no recovery. However you may also benefit from any possible increase in the value of the carbon credits.

Any growth shown or suggested is a projection only and cannot be guaranteed.

MH Carbon deals in the physical delivery of carbon credits only operating mainly in the Voluntary credit market. MH-Carbon use carbon credits from recognised and independently verified projects to ensure the emission reductions are effective.

Whilst efforts have been made to ensure that the data and other information in this report are accurate, no warranty as such can be given and, additionally, information applicable to the carbon credit markets is subject to change.

The purpose of this report is solely to provide introductory information and some background to the specific topic. It is not intended for use directly or indirectly in market forecasting or for making decisions.

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