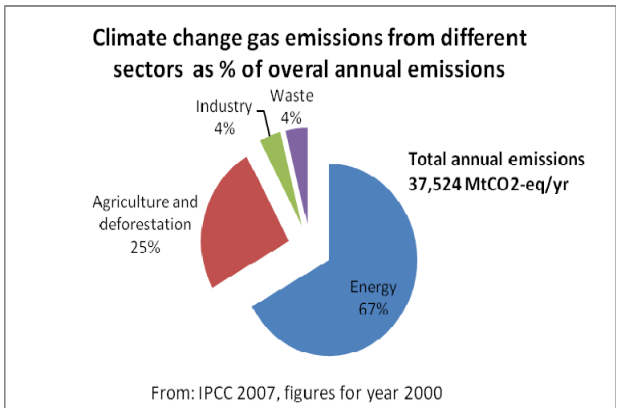
PRACTICAL ACTION
Technology challenging poverty

RENEWABLE ENERGY

CLIMATE CHANGE AND CARBON FUNDING

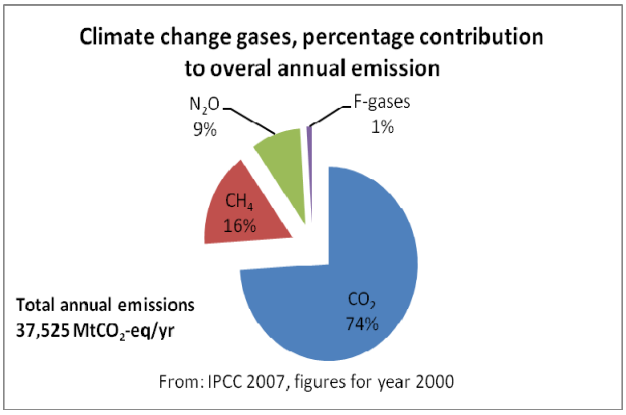
An important aspect of renewable energy development is the displacement of polluting energy source. With the rising in governments', aid agencies' and other funders' awareness of the climate change problem, carbon off-setting and low-carbon funds have been set up to promote technologies which contribute to a reduction in greenhouse gas emissions. In addition, in recent years there has been an increase in private sector off-setting carbon emissions by investing in low-carbon technologies.

A diverse range of mature renewable energy technologies is now available, including small hydro power, wind power, solar photovoltaic, biofuels and geothermal. These use local natural resources to meet energy needs. As a result of the concern about global warming, a whole new area of investment opportunities has been opened up for the development of these technologies.



Climate change

The Intergovernmental Panel on Climate Change – the most authoritative international body on this subject – has clearly demonstrated that climate change is already happening, that it is due to human activity, and that temperatures could rise on average between 2°C and 4°C over the coming century. The impacts of climate change range form flood to drought and from freshwater scarcity to hunger, with these impacts greatest in developing countries as they often lie in vulnerable climactic zones, and have limited capacity and resources to adapt. From the pie charts it is clear that CO_2 emission from the energy sector are the major cause of climate change.



CO_2 from energy sources

A move from using fossil fuels to using renewable energy is one way of mitigating climate change by significantly reducing emissions of CO_2. In order to calculate the CO_2 saving from using renewable, it is important to compare the carbon emissions from the different technologies. This is shown in the table as tonnes of CO2 emissions per unit of energy produced.

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Example: A typical 200 kW mini hydro electric scheme would produce 28 GWh over its 25 year lifetime and approximately 140 tonnes of CO_2. For the same amount of energy an oil fired power station would produce 20,500 tonnes of CO_2.

Renewable energy at the forefront of climate change mitigation

The table above demonstrates that there is a significant benefit from renewable energy in terms of reducing greenhouse gas (GHG) emissions from energy production. Emissions from renewable energy can be several orders of magnitude lower that the emissions from conventional fossil fuel power. In addition, there is significant climate change benefit for energy efficiency project, such as improved cook stoves or higher efficiency industrial processes. In many cases renewable energy and energy efficiency projects have a double benefit of addressing both a development benefit (such as electrifying an isolated community) and climate change benefit.

Electricity Production Sources	Tonnes CO_2 / GWh[1]2
Coal	851 to
Oil	1362
Gas	733
Geothermal	367 to 561
Wind Turbines	57.0
Photovoltaic	9.0
Small Hydro	59-71
Large Hydro	5
Biomass fuel	32.0
	14.0

Note: the CO_2 emissions for the renewable energy technologies are calculated by dividing the carbon emissions over the project life cycle (raw materials inputs, construction and running) by the energy produced over the lifetime of the technology. The emissions shown for the fossil fuels are from the power station only.

Because of the climate change benefits of renewable energy, many national governments provide grants or preferential condition for development of some renewable technologies.

The Carbon Market

The Kyoto Protocol of the UNFCCC has set binding targets for signatory industrialised countries to reduce their carbon emissions by 2012. A post 2012 climate change agreement is currently under negotiation. These targets have ensured that many industrialised countries have made significant reductions in the emissions from their own energy sectors. However, it is often less costly for a developed country to pay for emissions reduction in a less developed country, rather than reduce emission at home. This has led to the development of a global 'carbon market'.

Similarly, many private sector companies have been forced by consumer pressure to assess the carbon emissions from their own corporate activities. Increasingly companies are reporting their carbon emissions along side financial information, and in a number of cases they are offsetting their carbon by paying for renewable energy and energy efficiency projects. This has created a private offset carbon market.

There is some controversy that the offset market means that industrialised countries or high emitting private sector companies can 'pay' for carbon emission reduction, rather than taking action at home to avoid GHG emissions. However, the market system does provide funds for developing countries to move towards lower carbon technologies.

There is a move towards setting a quality standard for carbon offset projects, which would ensure that the carbon market supports long-term moves towards a lower carbon energy sector, and that offset projects also offer a sustainable development benefit. The 'Gold Standard Foundation' is at the forefront of setting quality standard.

The cost of saving carbon emissions

Both the carbon market of the Kyoto protocol and voluntary off-setting (see next page for details), have given a price for a tonne of carbon.

1 Fossil fuel emissions from: World Bank source
2 Renewable emissions from: Estimates from ETSU,

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An industrialised country, can purchase a 'certified emission reductions' or CER for around $25 per tonne of CO_2. That is the industrialised country can pay US$25 to be allowed to emit CO_2 by paying towards a low-carbon project in a developing country.

Similarly, a private sector company may decide, for corporate social responsibility reasons, to off-set the cost of its carbon emissions (say energy used in its buildings or the emissions form air travel). Offsets can be purchased for around US$10 to US$20 per tonne CO_2 of emitted.

This money can then be invested in a range of renewable energy or energy efficiency projects which can verify that one tonne of CO_2 has been avoided for every carbon offset purchased.

Details of carbon funding mechanisms are given on the next page.

Carbon funds

Global Environment Facility

The Global Environment facility (GEF) is a co-operative venture between over 30 National Governments and the World Bank, United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

An independent financial organization, the GEF provides grants to developing countries for projects that benefit the global environment and promote sustainable livelihoods in local communities. Since 1991, the Global Environment Facility has provided $6.8 billion in grants to support over 1,900 projects that produce global environmental benefits in more than 160 developing countries and countries with economies in transition. About one quarter of this fund has been spent on climate change and renewable energy projects. GEF funds are contributed by donor countries. In 2006, 32 donor countries pledged $3.13 billion to fund operations for four years.

GEF Small Grants Programme (SGP) was launched in 1992 to provide support for community-level initiatives. Medium size projects are limited to a maximum of $1 million in GEF funds. Full size project (larger than $1million) go through a rigorous application and monitoring process.

Further Information from: http://www.gefweb.org

Clean Development Mechanism

The Clean Development Mechanism (CDM) is an arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment to invest in projects that reduce emissions in developing countries, as an alternative to more expensive emission reductions in their own countries.

The presence of a market for carbon reduction credits (known as 'certified emission reductions' or CER)) creates a value for emissions reductions which stimulates investment (known as carbon financing) for low-carbon projects in developing countries.

The most important factor of a carbon finance project is that it can demonstrate that it would not have occurred without the additional incentive provided by emission reductions credits. Projects acceptable for carbon financing under the CDM must demonstrate that they:

- Deliver real emissions savings that go beyond what would happen in a "business-as-usual" scenario
- Are independently verified (note: the verification process to demonstrate that CO_2 emissions reduction has taken place does incur some additional cost to the project)

Further information from: http://cdm.unfccc.int
Community Development Carbon Fund: http://carbonfinance.org

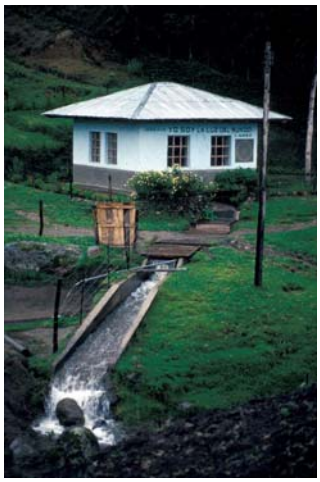
Voluntary Carbon offsetting

Voluntary carbon offsetting involves companies or individuals paying to offset the emissions associated with a specific action through the purchase of verified units of GHG emissions savings (known as "offsets"). For example, you can offset a flight or a car journey with the emissions saved in a renewable energy project.By buying offsets, the purchaser provides finance for green projects, such as renewable energy or energy efficiency. Voluntary offsetting often will prioritise small scale community based projects which have greater sustainable development benefit. See examples on next page.

Companies who manage voluntary offsetting funds include[3]:

Carbonaided: http://www.carbonaided.com
CarbonNeutral: http://www.carbonneutral.com
Climate Care: http://www.climatecare.org
The Climate Trust: http://www.climatetrust.org
atmosfair: http://www.atmosfair.de
co2balance: http://www.co2balance.com

Carbon off-setting examples



Peru Micro Hydro - Annual Saving in GHG Emissions - 5,000 TCO2e [4]

Micro hydro projects provide rural communities with access to a clean and reliable energy source. Emission savings are created as hydro power displaces other more carbon intensive fuels that would otherwise be used to generate electricity in the area.

Sri Lankan Biogas Projects – Annual Savings in GHG Emissions – 3,132 TCO2e[4]

The project has involved the introduction of over 60 new biogas schemes, meeting 75 per cent of household cooking needs. GHG emission savings are created as the biogas displaces other more carbon intensive fuels.

Bangladesh Cook Stoves - Annual Saving in GHG Emissions - 5,000 TCO2e [4]

The project has resulted in the installation of an additional 7,500 cook stoves installed and working. GHG emissions savings are derived from more efficient use of biomass to supply energy needs than traditional cooking methods.

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3 The offsetting companies listed here have been recommended on reputable sources. However, Practical Action recommend that renewable energy developers make a thorough check of offsetting companies for reputation and quality standards of the offsetting arrangements.

4 Carbonaided

Tamil Nadu Wind Power Project, India – Annual savings in GHG emissions - estimated 50,0000 tCO2e[5]
This project sees the construction of 28 new wind turbines in India. The turbines have a total capacity of 21.93 MW and will contribute towards greening Tamil Nadu's electricity supply. By providing renewable energy, the project helps to reduce India's reliance on fossil fuels for electricity generation.

Solar Home Lighting, India Annual Savings in GHG emissions - 12,500tCO2e between 2004-2008
The project supports a company which sells solar lighting systems, replacing kerosene lamps, in rural India. The solar systems include a small solar photovoltaic panel, a battery and energy efficient lights,

(Note: TCO"e = tonnes CO_2 equivalent)

Sources of Information

The **Renewable Energy and Energy Efficiency Partnership** (**REEEP**) is an active, global public-private partnership that structures policy and regulatory initiatives for clean energy, and facilitates financing for energy projects.

REEEP International Secretariat,
Vienna International Centre,
Room D1732, Wagramerstrasse
5, A – 1400 Vienna, Austria

email: info@reeep.org
Phone: +43 1 26026-3425
http://www.reeep.org

The **Gold Standard Foundation** offers a quality label to CDM/JI and voluntary offset projects, fetching premium prices. Renewable energy and energy efficiency projects with sustainable development benefits are eligible. The Gold Standard is endorsed by over 44 non-governmental organizations worldwide. Gold Standard projects are preferred by a range of government and private actors.

The Gold Standard
c/o BASE
22 Bäumleingasse, CH-4051
Basel, Switzerland

Phone: +41 (0)61 283-0916
Fax: +41 (0)61 271-1010
http://www.cdmgoldstandard.org

Most countries have joined the international treaty -- the **United Nations Framework Convention on Climate Change (UNFCCC)** -- to begin to consider what can be done to reduce global warming. Recently, a number of nations have approved the Kyoto Protocol, which has more powerful (and legally binding) measures. The UNFCCC secretariat supports all institutions involved in the climat change process, and oversees the CDM.

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Phone: (49-228) 815-1000
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http://unfccc.int

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5 CarbonNeutral

The Intergovernmental Panel on Climate Change (IPCC) has been established by WMO and UNEP to assess scientific, technical and socio- economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. The reports by the IPCC's three Working Groups provide a comprehensive and up-to-date assessment of the current state of knowledge on climate change.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

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Practical Action is a development charity with a difference. We know the simplest ideas can have the most profound, life-changing effect on poor people across the world. For over 40 years, we have been working closely with some of the world's poorest people - using simple technology to fight poverty and transform their lives for the better. We currently work in 15 countries in Africa, South Asia and Latin America.

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