

**INTERNATIONAL CARBON EMISSION OFFSETS:  
A Tradeable Currency for Climate Protection Services**

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**INTRODUCTION**

The threat of global climate change, caused in part by carbon dioxide from tropical deforestation and fossil fuel use, demands new approaches to resolving international economic and environmental problems. Debt-for-nature trades are a promising example, and further initiatives are needed to expand the supply of funds available to conservation and climate protection efforts. While both the responsibility and the financial resources for reducing carbon emissions are in the industrialized nations, much of the potential for reducing future emissions is in the developing nations. Thus, successful solutions to the climate problem will likely require significant transfers of resources, including debt relief, from North to South.

International carbon emission offsets (ICEO's) would provide a currency for investing in climate protection services, such as reforestation or energy efficiency measures, as a way to comply with national policies to reduce carbon emissions. By creating an international market mechanism that assigns a value to climate protection, offsets would enlarge the range of options available to those charged with reducing carbon emissions, increasing the potential for economically efficient results. The opportunity to sell offsets, or to trade them for debt relief, would provide the developing

nations with a tangible economic incentive to use clean energy technologies and to protect their forests, rather than to deplete them.

An emerging understanding of the potential impacts of climate change is forcing decision-makers in the industrialized nations to assume some degree of responsibility for reducing their nations' contribution to the problem. Already, legislation is under consideration and negotiations are beginning to address the climate problem, principally through efforts to limit and reduce global carbon emissions. Assuming that one or more industrialized nations agree to reduce carbon emissions, these nations will need to adopt policies to achieve the reductions. Various market-based policies, including carbon emission taxes and tradeable emission permits, would create value in reducing atmospheric carbon.

The role of internationally tradeable offsets would be to impart this value to carbon-saving services anywhere in the world. For example, Third World nations would find themselves endowed with a valuable export commodity in the form of the environmental services from their forested or potentially-forested lands. Instead of having to choose between economic development and environmental protection, developing nations would have incentives for sustainable development, especially afforestation and renewable energy projects, which promise important contributions to the protection of the Earth's climate.

A full scale carbon emission offset program would take advantage of the following economic and policy mechanisms:

- An international agreement that sets a goal for the reduction of carbon emissions (globally and for individual nations) and formalizes cooperation in a system of ICEO's;

- A system of tradeable carbon emission offset rights, with which the holder, by reducing carbon emissions anywhere in the world, can comply with its country's climate policy, such as a carbon tax or an emission ceiling;
- A market for carbon-saving projects, such as reforestation or energy efficiency, valued according to the equivalent quantity of carbon dioxide they save or replace;
- A set of incentives for exchanging Third World debt for commitments to reforestation or other carbon-saving projects.

Together, these mechanisms would provide an international market in carbon-saving services. The different mechanisms are highly complementary to each other and to the ratification of a climate-protection treaty; however, each can operate independently, without need for the others to be in place. Individual nations can use these mechanisms to encourage and enforce reductions in carbon emissions that could be mandated by international agreement. This market would allow carbon emitters to seek the least expensive ways to reduce emissions, and it would give debt-ridden nations a tangible incentive to protect their natural resources.

## **BACKGROUND**

By burning fossil fuels, every nation emits some portion of the carbon dioxide and other trace gases that contribute to global warming (the Greenhouse Effect), and the resulting changes to the Earth's climate are likely to adversely affect many types of natural and agricultural systems (1). While scientific evidence convincingly indicates that global warming will lead to severe ecological impacts, such as shifting rainfall patterns, expanding areas of desert, and a rising sea level, it is not known accurately when, where, and how severe the impacts will be (2).

Worldwide emissions of carbon dioxide, the cause of more than half of the global warming, are not distributed equally at present. Approximately 80 percent of total emissions come from fossil

fuels, mostly from industrialized nations (3). The U.S. and the U.S.S.R. are the largest contributors, together emitting nearly half of the world's carbon from fossil fuels (4). Much of the remaining 20 percent are believed to come from deforestation, mostly in tropical developing nations (5). Brazil is the largest contributor of carbon from deforestation, with an estimated 20 percent of the world's biological carbon emissions (6).

In order to stabilize the atmospheric concentration of carbon dioxide, global emissions must be reduced by more than 50 percent from current levels (7). Current trends in energy consumption and land use indicate that the developing nations will probably emit an increasingly share of the greenhouse gases and thus cannot be ignored in any strategy to solve the problem. Technological advances, if applied only in the industrialized nations, will not be sufficient to protect the Earth's climate. It therefore appears that new economic initiatives, backed by strong national policies and international agreements, are needed to implement the measures that can alleviate global warming.

## **TOWARD A CLIMATE PROTECTION AGREEMENT**

The very fact that alleviating the global warming problem requires international cooperation might make the prospects for solutions seem remote, given the history of such efforts. However, there are clear precedents for international negotiation in the area of global environmental protection. For example, the signing in 1987 of the Montreal Protocol, a twenty-four-nation agreement (now with more than forty signatory nations) on the regulation of chlorofluorocarbons (CFC's), which contribute to global warming and endanger the Earth's atmospheric ozone layer, indicates potential for improved international cooperation regarding environmental and resource issues.

Several international bodies have already proposed various types of agreements concerning greenhouse gases. In June 1988, the World Conference on the Changing Atmosphere called for a strengthening of the Montreal Protocol limiting CFC production and a 20 percent reduction in

global carbon dioxide emissions by the year 2005 (8). Since mid-1988, several bills have been introduced in both houses of the U.S. Congress to enact similar goals for the U.S.

If adopted, these goals would establish a timetable for reducing carbon emissions. Although nations may be able to agree to the overall goal, there will be much argument over the assignment of responsibility for achieving the reductions. The dominant responsibility is clearly with the industrialized nations, who have borrowed the assimilative capacity of the atmosphere in building their affluent economies (9). However, even if nations agree to their level of responsibility, or their share of the remaining assimilative resource, some industrialized nations will likely be physically or technically limited in their ability to reduce emissions to the necessary level (10).

Thus, it appears essential for the success of international climate protection negotiations to separate the assignment of responsibility for climate protection (who pays for it) from the opportunities to reduce or prevent emissions (who does it). This separation requires a mechanism to transfer resources, when necessary, from nations with unfulfilled responsibility to those with unexploited opportunities. If such a mechanism exists, it would be less painful for nations to agree to an emission reduction goal and to accept their share of the responsibility for meeting the goal.

For example, the World Conference on the Changing Atmosphere also called for a world fund for atmospheric stabilization, financed in part by taxes on fossil fuel use in industrialized nations, to promote conservation in developing nations (8). Although this approach appears inherently fair and efficient, it may be difficult to implement. Defining the operating rules and enforcement procedures would require a high degree of consensus among nations, some of whom would have a great deal at stake, and achieving such consensus could be very time-consuming. Moreover, it is difficult to imagine a preliminary version of such a system, as there would be little incentive for one nation to contribute until its trading partners did so.

## **INTERNATIONAL CARBON EMISSION OFFSETS (ICEO's)**

A market-based approach such as ICEO's could distribute the burden and the benefits of climate protection in a similar way as a world fund. However, by decentralizing decision-making through the market, this approach avoids the need for a new international bureaucracy and allows gradual implementation, starting with a few nations. An ICEO program would require international oversight only for the sake of standardization of score-keeping and compliance procedures, perhaps governed by according the United Nations or the World Bank. This simplification would reduce the scope of international agreements that would be necessary to implement such a program.

ICEO's could be traded by nations with different types of domestic pollution control policies, with score-keeping and compliance governed according to international agreement by the United Nations (U.N.) or the World Bank. An ICEO program would not, however, require the creation of a new international bureaucracy to administer the transactions. Instead, the program could begin incrementally with a few nations.

Carbon dioxide is not a local pollution problem; only the global concentration matters. Thus, it is not necessary that polluting firms reduce only their own emissions, when it may be much less costly for them to help reduce somebody else's emissions, for example by investing in energy efficiency or reforestation, even if they invest in another country. They could also invest in renewable or nuclear energy projects, which produce no carbon dioxide. The concept of emission offsets provides a tradeable currency with which to negotiate for energy or forestry projects in order to reduce global carbon emissions. This currency would assign a value to carbon-saving services, allowing the standardization of certain types of international transactions.

Tradeable emission offsets have been used by the U.S. Environmental Protection Agency (EPA) as a mechanism for enforcing the National Ambient Air Quality Standards in air quality control

regions that fail to meet the standards established by the Clean Air Act. New pollution sources must find ways to reduce emissions, in the region where they want to locate, by more than the amount of pollution that they will emit. One way is to obtain emission offsets.

In this context, an offset is a tradeable permit to emit a certain amount of pollution, and it can be obtained in a number of ways, including shutting down an existing source of emissions or installing better emission controls on sources that may or may not be owned or operated by the permit seeker. At first, offsets had to be applied immediately to new or expanded sources, but the policy was later modified to allow emission reduction measures to be "banked" as credits against future increases. This change provided greater incentives for prompt action (11).

This scheme, as applied to conventional pollutants, creates a tradeable currency for allocating the pollution-absorbing resource within a local air quality "bubble." Sources with high abatement costs and the ability to pay can obtain offsets by paying to reduce emissions from sources with lower costs but less ability to pay. Because offsets create a market for pollution control services, they provide a more economically efficient means of pollution control than direct regulation of emission control equipment. Simulation studies have shown that the costs of complying with existing emissions regulations are two to six times greater than control achieved through efficient market mechanisms (12).

In the case of carbon emissions, we propose extending the air quality "bubble," for tradeable carbon dioxide offsets, to the entire atmosphere of the Earth. Regulatory standards and other market mechanisms, such as emission taxes, are less flexible when they can only be applied within a nation. However, a system of tradeable ICEO's would not require that individual nations use tradeable offsets to enforce their own emission reduction policies. Different nations could use any performance-based or market-based approach, including an emission ceiling (regulating the quantity emitted), a carbon dioxide tax (regulating the cost of emissions), or other policies.

Emission taxes, for example, could be more efficient if firms are allowed to credit ICEO's against their emission tax bill. The essential prerequisite for an ICEO system is that individual nations allow investments that reduce carbon emissions in other countries to comply with their own national policies.

ICEO's are not meant to allocate international rights to emit greenhouse gases, such as through an auction process as proposed for some regional emission offset programs (13). This approach, applied internationally, would create immense market power for either buyers or sellers, and no international body would be capable of enforcing such a system. We assume that only international negotiation can accomplish the allocation, and that ICEO's would be used to supplement national policies to achieve the agreed-upon allocation.

ICEO's would, however, provide more than the fine-tuning of an established process. ICEO's would provide a mechanism, which could be gradually implemented, to allow the separation of the opportunities for reducing emissions from the responsibility to do so. By making a climate protection agreement easier to implement, this mechanism could make an agreement easier to reach.

## **CARBON SAVING SERVICES**

Because tropical forests play a crucial role in the Earth's carbon balance, they provide an essential carbon-saving service. ICEO's would assign a value to climate protection, and therefore to carbon storage, providing the tropical nations with a tangible economic incentive to protect their forests, rather than to deplete them. Thus, each hectare of forested land, or land that can potentially be reforested, can provide a valuable environmental service to customers anywhere in the world.

This process has already been pioneered by Applied Energy Services, a U.S. electric power company that, motivated by concern over global warming, contributed \$US 2 million to a project

that will plant 52 million trees in Guatemala. The trees are expected to absorb as much carbon as the company's new 180 000 kilowatt power plant will produce in 40 years (14). The tree-planting project added less than one percent to the cost of the power plant, although the company's cash investment will be supplemented by \$US 14 million in in-kind services from U.S., Guatemalan, and international organizations. If the value of these services were added to the company's cost, the total would still be less than 10 percent of the total plant cost. This higher figure compares very favorably with preliminary cost estimates for technologies to remove carbon dioxide from power plant emissions, which have not yet been demonstrated on a commercial scale (21,22).

Carbon-saving services need not be forest projects. As suggested earlier, low-carbon energy projects, based on energy efficiency or renewable energy sources, would be attractive to those seeking ICEO's. Investments in these energy projects would qualify for carbon emission offsets in proportion to the carbon-equivalent of the energy saved or produced. For a given energy project, the allocation of emission offset credit to the project owner and the outside investor would be a matter of negotiation between the parties. Also, emission offset credit could be distributed as part of the ownership rights to share-holders in an individual project. The opposing interests of the various parties would create price competition and help to identify and finance the most cost-effective carbon-saving projects.

### **DEBT-FOR-NATURE TRADES**

The Third World debt crisis has spawned a secondary market for unpaid foreign debts. These debts may now be exchanged, at a substantial discount, for equity or investment privileges in the debtor nations. Although this process has the effect of increasing foreign influence in Third World economies, it provides a precedent for a much more promising type of debt-swapping process: debt-for-nature trades (15).

Under this scheme, conservation organizations buy the discounted debt, and then trade it to the debtor government, not for equity, but for the right to manage forest lands, financed by interest-bearing bonds in local currency. The conservation organization can be foreign, domestic, or a combination. In fact, each of these three possibilities has already worked successfully, although the capital to buy the debt must ordinarily come from outside the debtor nation (15).

The debt-for-nature process provides multiple benefits: 1) the debtor nation internalizes some of its foreign debt, saving precious foreign currency, 2) the foreign banks receive the market value of the bad debt and write off the remainder as a business loss, 3) funds become available for investments in conservation and reforestation, 4) the use of these funds provides economic and employment opportunities in protecting, rather than destroying, forests, 5) protected forest reserves and parks provide opportunities for increasing foreign exchange through tourism and research visits.

Several debt-for-nature trades have already been accomplished. The first was engineered in 1987 by a U.S. conservation group that used private donations to purchase \$US 650 000 in discounted Bolivian debt and exchanged the debt for a commitment to protect 1.5 million hectares of forest land (16). The government of Ecuador has offered interest-bearing local-currency bonds to fund conservation projects in exchange for up to \$US 10 million in external debt. This project was implemented entirely by an indigenous, non-governmental organization, Fundacion Natura (17). In Costa Rica, the government traded local-currency bonds to international conservation groups in exchange for \$US 1.5 million in discounted debt (18). The groups use the interest from the bonds to buy land and equipment, and pay for personnel and expenses to manage forest reserves and begin reforestation work. The government has since expanded this program to \$US 70 million worth of debt-trades (19).

The U.S. government has assisted this process by allowing the market value of the donated debt to be written off as a charitable contribution, if the donation is made to a U.S.-based group. It may

be possible to extend this provision to the entire face value of the donated debt, and to donations made to local groups, such as those responsible for the Ecuador swap and some of the Costa Rica swaps (16). Also, bills have been introduced in both houses of the U.S. Congress that call on the World Bank and other multilateral development banks (MDB's), whose policies prohibit debt rescheduling, to allow developing nations to repay parts of their debt by establishing conservation easements to protect forests and wetlands. This measure would be especially valuable in Africa, where the MDB's hold a large share of the external debt (20).

## **PUTTING THE PIECES TOGETHER**

Each of the mechanisms described above can contribute to alleviating the problem of global climate change. While each component can operate alone in a specific policy context, assembling the different components together, under the policy umbrella of a multilateral agreement for the reduction of carbon emissions, would provide a set of economic and policy tools for rewarding actions that protect the Earth's climate.

An example of the application of these mechanisms would be a situation in which (Figure 1):

- Under the terms of an international climate-protection treaty, a nation enacts legislation that requires a specified reduction in total carbon emissions;
- Power plant owners in this nation are required to reduce carbon emissions by some fraction to comply with the law and the treaty, or else pay a tax or penalty;
- Rather than pay the tax or penalty, they purchase ICEO's from an international broker;
- The broker arranges for investment in its own or another country's reforestation, renewable energy, or other project that reduces the carbon load on the atmosphere, in exchange for debt relief, cash, or other instruments;

- By dealing with a bank holding discounted debt, the broker is able to reduce the cost of the ICEO by leveraging a greater amount of investment (in local currency) than by dealing strictly in foreign exchange;
- The recipient nation benefits from the conservation project and complies (in part) with the treaty through participation in the transaction.

This example is not the only innovative means to create an international market in atmospheric and climate protection. Many different combinations of the mechanisms described earlier could be used, provided that there is a sufficient degree of international consensus about the severity of the global warming problem, and a commensurate policy commitment to alleviating the problem.

## **THE DEVELOPMENT CONNECTION**

Under existing conditions, most developing nations face strong pressures to pollute and deplete their natural resources. These nations have an urgent need to increase their use of energy-consuming services. Increasing industrialization and urbanization, together with rising living standards create greater demands for energy (21). At the same time, the greatest threat to remaining tropical forests is poverty. Growing Third World populations, without sufficient jobs or land to grow food, have little choice but to clear forests in an effort to maintain a subsistence standard of living (22).

At the national level, Third World export economies are generally dominated by trade in non-renewable primary commodities, such as timber, and pollution-intensive goods, such as paper. One way for these nations to compete in the international markets for these commodities is to ignore the environmental costs associated with the production of their export goods (22). Thus, domestic poverty and the international markets provide incentives to deplete resources, such as forests, and not to control pollution, such as greenhouse gas emissions. Furthermore, most

developing nations do not have sufficient resources to manage the forests that they have already protected.

Debt-for-nature trades provide a crucial mechanism for relieving the pressure of foreign debt on the natural resources of developing nations. According to Dr. Alvaro Umaña, Minister of Natural Resources, Energy and Mines in Costa Rica, debt trades provide the only available incentives for protecting and enlarging forest habitats. Unfortunately, the limited resources of the international conservation community can never be sufficient to protect and reforest a large fraction of the world's tropical forest land (19).

A much larger source of capital, however, could be the carbon emitters of the industrialized world. ICEO's would give them an incentive to seek carbon offsets by investing in discounted Third World debt and exchanging this debt for carbon-saving through forest conservation and reforestation, as described above. We recommend that ICEO's and other market-based mechanisms be considered in the continuing debate and negotiations regarding measures to protect the Earth's climate.

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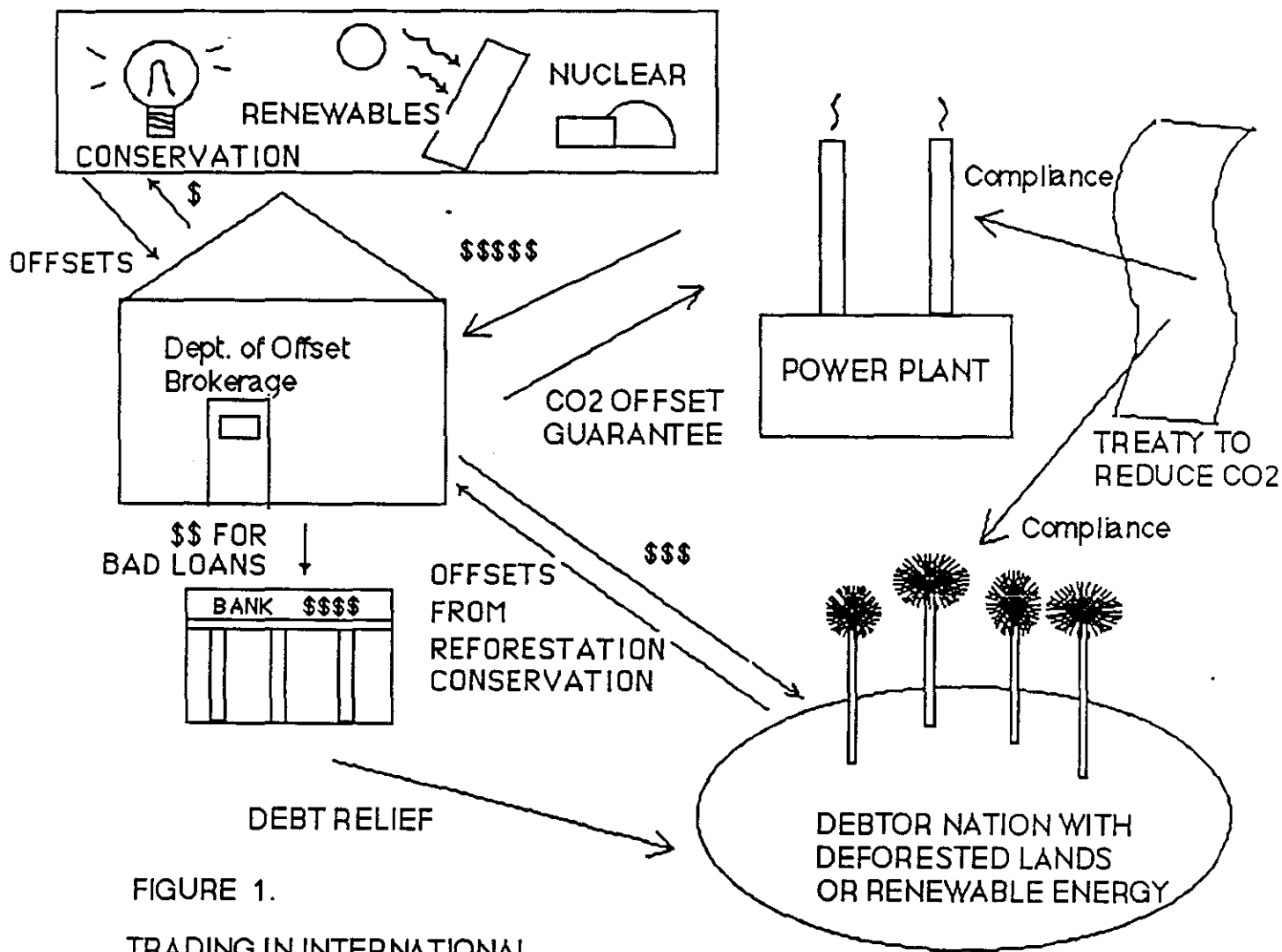


FIGURE 1.

TRADING IN INTERNATIONAL EMISSIONS OFFSETS USING DEBT RELIEF AS CURRENCY