



Guide to Offsetting Carbon Dioxide Emissions



COMPANY PROFILE

Stonyfield Farm, Inc. is a manufacturer of all natural yogurt, frozen yogurt, and ice cream. Begun in 1983 as a project of the Rural Education Center to help revitalize New England agriculture, Stonyfield Farm is committed to a healthful way of life by providing all natural products and encouraging sustainable agriculture. Based in Londonderry, New Hampshire, Stonyfield Farm products are distributed nationwide in leading supermarkets, natural foods stores, fine foods stores, colleges, yogurt shops and other institutions.

Stonyfield Farm Mission

- To provide and sell the very highest quality natural agricultural products possible;
- To educate consumers and producers about the value of supporting family farmers;
- To provide a healthful, productive and enjoyable workplace for all employees, with opportunities to gain new skills and advance personal career goals;
- To recognize our obligations to stockholders and lenders by providing adequate return on their investment; and
- To serve as a model that environmentally and socially responsible businesses can also be profitable.

Our Environmental Mission- A Healthy Planet Is Our Business

We recognize, as a corporate priority, the health of our planet and the interdependence of human activity with all natural systems – biological, air, water,

and soil. To honor our stewardship responsibilities, we operate on these guiding principles:

I. Sustainable Use of Resources

We strive for the sustainable use of resources by intentionally designing and managing our facilities and activities to be in harmony with nature's processes. This includes relying on natural energy flows, using resources efficiently, working toward zero waste and the elimination of toxic chemicals, and supporting biological diversity and local ecosystems.

II. Model Sustainable Business Practices

We strive for and model sustainable business practices which are environmentally sound, economically viable, and we seek opportunities to educate stakeholders such as customers, suppliers, investors, coworkers and fellow businesses, on specific actions that can be taken to reduce their impact on the environment.

III. Create Systems to Ensure Adherence to these Principles

We work toward creating systems which ensure the proper adherence to these principles, to track our progress, and to report our progress to all stakeholders. We accept responsibility for the effects of our design decisions and activities on humans and natural systems, and uphold the health and safety of our workers and community as our highest priority.

IV. Invest in the Environment

We invest our resources in activities which restore the health of our natural environment and create beauty.

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FOREWORD

At Stonyfield Farm, we do not allow critics of nepotism to stand in the way of environmental progress. Nancy Hirshberg, our Director of Natural Resources (and my sister) has been the Head Chef for this concoction, and has earned our heartfelt appreciation.

We are also deeply indebted to Dr. Mark Trexler of Trexler and Associates, Inc., who has been an invaluable resource for this project.

Special thanks for their enormous contributions also go to John Falconer of American Forests, and to Trey Kellett and Mieke van der Wanssem, interns extraordinaire.

PLEASE SHARE THIS BOOKLET! By sharing the results of Stonyfield's efforts to reduce global warming, we hope to inspire more businesses and individuals to take similar action. In the interest of rapid dissemination, we encourage you to copy this booklet and spread the word on how to decrease global warming.

Please send comments, advice and tales from the front lines to us. We'd love to hear from you.

Gary Hirshberg
President/CEO
November 20, 1997

INTRODUCTION

AT A STONYFIELD FARM staff retreat in the winter of 1996, a group of employees tried to envision a sustainable future by asking, “If our company were someday to be operating completely in adherence with the concept of sustainability — meeting the needs of the present without jeopardizing those of future generations — what would Stonyfield Farm look like?”

Clearly, the use of non-renewable fossil fuels such as oil and propane is not sustainable. Similarly, the fuels we burn to make and distribute our yogurt release more carbon into the atmosphere in the form of carbon dioxide (CO₂), than we absorb through other activities. This too is unsustainable.

The result of the staff retreat, and the inspiration for this guide, was a set of corporate environmental goals that would advance Stonyfield Farm along the continuum of sustainability. The environmental goals we established for our company included minimizing our energy use and converting from non-renewable energy sources to non-carbon-emitting renewable energy. A specific goal was to offset 100% of the CO₂ emissions from our production facility’s energy use by the year 2002.

In 1997, five years ahead of schedule, we have achieved this mitigation goal, offsetting the CO₂ emissions from the energy used in our production facilities through investing in a reforestation project in Oregon.

Although the practice of carbon offsetting is not new — electric utilities, in particular, have been investing in carbon offset projects since 1989 — we found that developing information on how to convert our energy use into CO₂ emissions and searching for reputable offset projects was difficult and time-consuming.

We created this booklet to make it easier for businesses to get started offsetting their emissions. It begins with a concise description of what carbon mitigation is and how your business can get involved. It provides a brief description of global climate change, an overview of carbon mitigation strategies, a review of Stonyfield Farm’s carbon mitigation program and suggestions for how businesses can get started offsetting their own CO₂ emissions.

The appendices provide additional information that will be useful for companies pursuing a carbon offset strategy, including brief descriptions of current carbon projects and names of independent organizations that are connected with carbon offset projects, or that can help set up programs.

We hope this booklet is a useful tool in advancing companies’ efforts to pass along to future generations a world as bountiful as that which we are blessed to have today.

GLOBAL CLIMATE CHANGE AND CARBON DIOXIDE EMISSIONS

GLOBAL CLIMATE CHANGE

“The time to consider the policy dimension of climate change is not when the link between greenhouse gases and climate change is conclusively proven, but when the possibility cannot be discounted and is taken seriously by the society of which we are a part. We in BP have reached that point. It is an important moment for us. A moment when analysis demonstrates the need for action and solutions.”

— John Browne, Chief Executive, British Petroleum, 1997

This dramatic statement by an international oil company executive that we must not wait to act in preventing global warming, thrusts human-induced climate change into the forefront as one of the most pressing environmental issues of our time. Compared in scale to the tobacco companies' acknowledgment that there may be a link between cancer and smoking, Browne's words are an urgent call to the business community to take a strong leadership role in reducing global warming.

Scientists have concluded that human activities are contributing to changing our planet's climate by emitting heat-trapping or “greenhouse” gases into the atmosphere — including carbon dioxide, methane, and other gases. The combustion of fossil fuels (such as coal, oil, and natural gas), burning of forests for agriculture or development, cattle ranching, and rice farming contribute to the release of these gases. Carbon dioxide (CO₂) is known to be the most significant greenhouse gas¹.

The good news is that climate change due to human activities can be reversed. We can reduce our own use of fossil fuels through energy efficiency. We can also “offset” our emissions through investments in projects which sequester carbon from the atmosphere or prevent its generation, such as renewable

energy, efficiency, forest protection and reforestation.

The net effect of offsetting our emissions can be the achievement of “carbon neutrality”. Since CO₂ circulates around the globe almost evenly, the carbon released from propane combustion at a New Hampshire yogurt making facility can be offset by a renewable energy or forestry project anywhere in the world.

THE PROBLEM

It is widely believed that global climate change is resulting from an increase in the concentration of atmospheric gases which trap heat in the same way that glass functions in a greenhouse. These so called “greenhouse gases” (GHG) have always occurred naturally, but their increasing concentrations due to human activities is causing additional heat to be trapped, leading to a rise in global temperature.

The Intergovernmental Panel on Climate Change (IPCC), a body of more than 2,000 scientists, concluded in its widely-sited second assessment report that “the balance of evidence suggests a discernible human influence on global climate”² These scientists predict that, unless greenhouse gas emissions are reduced substantially, by the year 2100 the earth's average global temperature will rise 1° to 3.5° Celsius. By way of comparison, during the last ice age the earth's temperature was only 5° C colder than it is now.

Taking into consideration that global temperatures have only increased about 0.5° Celsius over the past 100 years, a rise of 1-3.5° Celsius is a severe change in temperature which may cause variable and unpredictable temperature changes. Some of the main impacts predicted from computer modeling include³:

- Change in Rainfall Patterns – Warmer tempera-

¹United Nations Environment Program, *The Greenhouse Gases*, UNEP/GEMS Environmental Library No. 1, 1987

²Union of Concerned Scientists (UCS), Global Warming fact sheet “What is Global Warming?”

³NRDC world wide web page on global warming: <http://www.igc.org/nrdc/bkgnd/gwcons.html>

tures can lead to more intense rainfall in some areas, flooding and more frequent drought-like conditions in others.

- **Rise In Sea Level** – Warmer temperatures will cause partial melting of mountain glaciers and polar ice caps, as well as thermal expansion of the oceans. It is predicted that the rate of sea-level rise will increase two to five times. Low-lying areas will be especially vulnerable.
- **Agricultural Changes** – Warmer temperatures might either cause crop yields to dramatically increase or decrease, depending on assumptions of the temperature increase, potential benefits of increased CO₂, and adaptation measures.
- **Health Effects** – The predicted increase in frequency and intensity of heat waves could cause more heat-related deaths, as well as aggravate local air quality problems which already afflict more than 80 million Americans. It is also predicted that the warmer temperatures will increase the potential geographic spread and virulence of tropical diseases.

While there may not be consensus within the scientific community as to the magnitude and timing regarding the risks associated with global warming due to increased CO₂ concentrations in the atmosphere, there is little disagreement that climate change itself poses a serious threat to human civilization. Insurance companies with an interest in protecting their investments have become active in the development of policies to reduce climate change.

THE MAJOR GREENHOUSE GASES

The most important greenhouse gases (GHGs) include carbon dioxide, methane, nitrous oxide, chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs).

- **Methane (CH₄)**: A hydrocarbon gas that is the principal constituent of natural gas and is produced from landfills, coal mining, oil and gas production and distribution, and domesticated animals,

as well as natural wetlands and rice paddies. The amount of methane in the atmosphere has more than doubled since industrialization.

- **Nitrous oxide (N₂O)**: A potent greenhouse gas, the primary anthropogenic emissions of which are thought to come from nitrogen-containing fertilizers for agriculture, and to a lesser degree, fossil fuel combustion and biomass burning.
- **Chlorofluorocarbons (CFC 11 & CFC 1₂) and hydrofluorocarbons (HFCs)**: Inert, non-toxic gases used in refrigeration, packaging, insulation, or as solvents and aerosol propellants, among other uses. CFCs, in addition to threatening the ozone layer, are potent greenhouse gases. Their greenhouse-forcing effect, however, may be negated by their cooling effect in the stratosphere.
- **Carbon dioxide (CO₂)**: Occurs naturally in the atmosphere and plays an important role in almost all living organisms. Animals exhale CO₂ and plants take in CO₂ for photosynthesis — using the carbon to manufacture carbohydrates. CO₂ is produced from burning coal, oil, natural gas, and land clearing and deforestation.

WHY FOCUS ON CARBON DIOXIDE?

At the dawn of the industrial revolution less than 200 years ago, atmospheric concentrations of CO₂ were stable at about 278 ppm. With industrialization, millions of years of carbon previously “stored” in the earth’s crust has been mined as oil, coal and natural gas, and burned for energy, releasing CO₂ into the atmosphere.

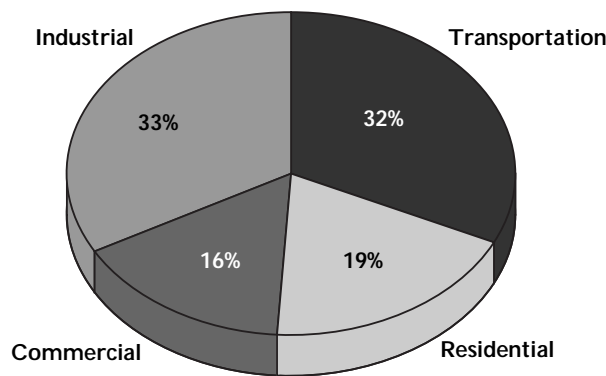
Simultaneously, large quantities of CO₂ have been released through land-clearing and forest-burning activities around the world. The result is that atmospheric concentrations of CO₂ are now at 360 ppm and are continuing to rise. In the coming century they are predicted to double, and possibly triple, from pre-industrial levels.

CO₂ consists of one carbon molecule and two oxygen molecules. Greenhouse gas emissions and offsets

are generally measured in metric tons of CO₂ or CO₂ equivalents. One metric ton of CO₂ contains one part carbon (or approximately 600 pounds of carbon) and two parts oxygen. Therefore, when calculating emissions and offsets it's important to specify whether it is tons of CO₂ or carbon.

U.S. Human Induced Greenhouse Gas Emission Sources

Note: Emissions from electricity use are included in each sector's percentage. Electric generation by utilities comprise 35%



of total U.S. GHG emissions.

Source: "Emissions of Greenhouse Gases In The United States 1996", DOE/EIA-0573 (96)

GLOBAL AND NATIONAL EFFORTS TO CURB GREENHOUSE GAS EMISSIONS

On an international scale, most countries are working towards agreements to curb CO₂ production as part of their obligations under the United Nations Framework Convention on Climate Change (FCCC), which 154 countries signed in 1992 in Rio de Janeiro, Brazil.

Industrialized nations, such as the U.S., agreed to "adopt national policies and corresponding measures on the mitigation of climate change, by limiting [their] anthropogenic emissions of greenhouse gases

and protecting and enhancing [their] greenhouse gas sinks and reservoirs."⁴ The goal set by the FCCC for industrialized countries was to reach 1990 greenhouse gas emission levels by the year 2000. It is now widely believed that most industrialized countries, including the US, will not meet this goal.

The US has initiated several programs to reduce carbon emissions. In response to domestic obligations under the Rio agreement, in October 1993 the White House released the Climate Change Action Plan (CCAP) setting emission reduction targets and action steps. The CCAP presents more than 50 initiatives to achieve 1990 emission levels including carbon offsets. Climate Wise, is a voluntary program of the Department of Energy (DOE) and Environmental Protection Agency (EPA) created to encourage businesses to take comprehensive, cost-effective industrial energy efficiency and pollution prevention actions to reduce greenhouse gas emissions (see Appendix 2).

The Energy Policy Act of 1992, statute Section 1605 (b), also referred to as the Voluntary Greenhouse Gas Reduction Reporting System, mandates that the U.S. Department of Energy (DOE) establish protocols in a national database for defining corporate greenhouse gas emissions baselines and encourages companies to undertake and register emissions reduction or sink-enhancing greenhouse gas emissions projects. As the U.S. does not expect to attain 1990 emission levels by the year 2000, clearly existing policy and action by U.S. government and industry is not enough.

Individual states are beginning to recognize the need to address global climate change and are developing their own action plans and programs. Oregon, for example, has introduced the first CO₂ standard for the construction of electrical generating facilities in a bill that requires new plants to have net per kWh CO₂ emissions that are 17% lower than the best commercially operating plant in the U.S. This essentially requires new facilities to buy offsets to mitigate a certain percentage of their carbon emissions.

⁴Richard Monastersky, "Stage Set for Curbing Global Warming Gases," *Science News* vol. 150, July 27, 1996, 54.

WHAT BUSINESS AND INDUSTRY CAN DO

At Stonyfield we believe that business is the most powerful institution on the planet. We contend that most societal and environmental problems exist because business has not made their solutions our priority. Only when business determines that Global Climate Change is our priority, will we begin to see meaningful efforts towards reversing these trends. Therefore, it is incumbent on business leaders to adopt a Total Quality Approach to this challenge. Here is ours.

STEP 1: REDUCE ON-SITE EMISSIONS — EFFICIENCY AND RENEWABLES

The most important actions to decrease carbon dioxide emissions are reducing energy use and/or switching to non-carbon emitting fuels. Increasing the energy efficiency of process equipment, lighting, steam systems, and building shells are some of the most important and cost-effective actions and the first steps to undertake. Climate Wise (see Appendix 2) provides case studies of companies that have saved millions of dollars through energy efficiency gains.

Aside from the significant cost savings from using less energy, these environmental initiatives can deliver important, less-tangible benefits. Employees feel good about working for a company that demonstrates its commitment to the environment. Employee loyalty and lower turnover have a positive bottom line benefit.

Additionally, many studies have demonstrated that a large percentage of consumers if given a choice would prefer to buy from an environmentally responsible company⁵. Environmental stewardship is a way of adding value to your product or service for your customer.

Recent evidence also suggests that positive environmental performance can impact stock value. With a growing number of stock purchase decisions based on environmental screens, a company committed to

pro-active environmental practices such as the efficient use of energy has a competitive advantage. The value of all of these less tangible returns — building market share, employee loyalty, and improved stock performance — translates to a healthier bottom line.

STEP 2: DEFINE OFFSETS

According to carbon mitigation expert Dr. Mark Trexler of Portland, Oregon based Trexler and Associates, Inc., carbon offsets are:

“... a mechanism by which the impact of emitting a ton of CO₂ can be negated by avoiding the release of a ton elsewhere, or absorbing a ton of CO₂ from the air that otherwise would have remained in the atmosphere.”

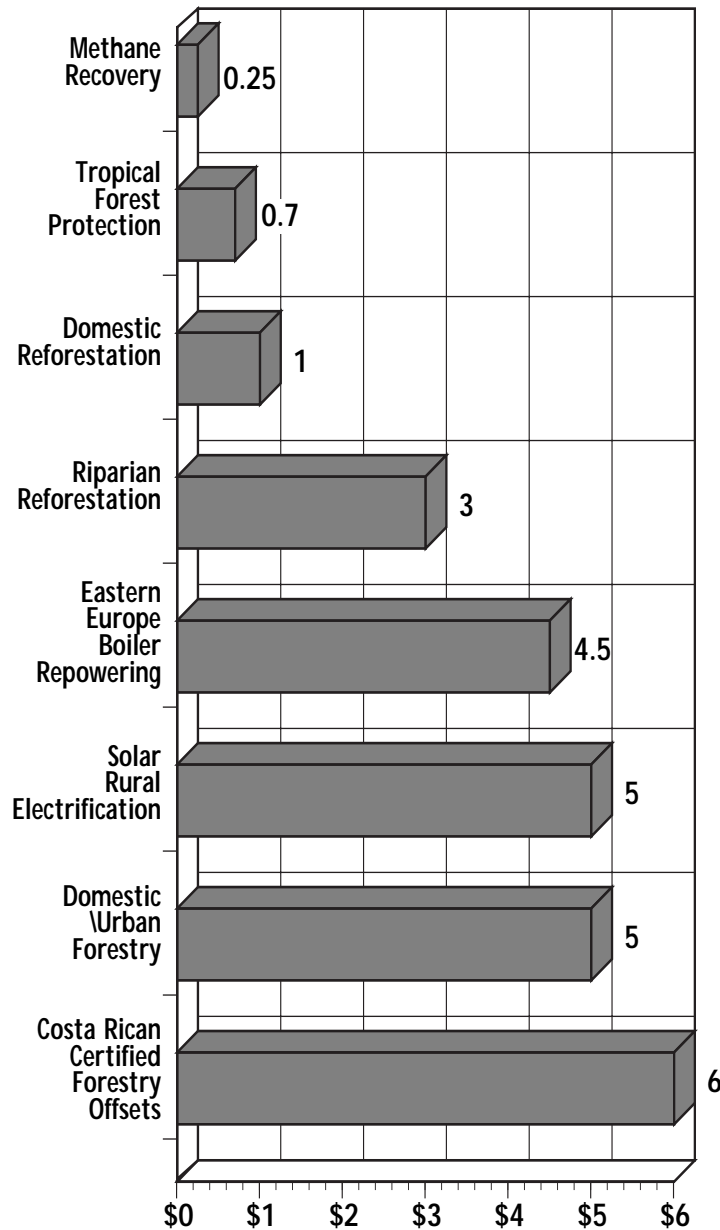
Carbon offsets are activities that either remove existing carbon from the atmosphere or prevent additional carbon from being released into the atmosphere. *These offsets are ‘off-site’ activities that do not directly involve a corporation’s own emissions.*

In 1989, AES Corporation, a U.S. independent power producer, initiated the first carbon offset project by voluntarily offsetting the emissions of its planned coal-fired power plant in Connecticut. Many more companies have invested in carbon offset projects since then. Currently, dozens of businesses, both in the U.S. and internationally, are either planning, or have already invested, in offset projects ranging from forest management and reforestation to methane recovery, making a switch to lower emitting fuels or to electricity generation through renewable solar, wind, biomass or hydropower. (For a description of some of these projects, see Appendix 1.)

On average, offset projects cost companies between \$.50 and \$3.00 per ton of CO₂.

⁵The 1997 Cone/Roper Cause-Related Marketing Trends Report, available from Cone Communications, Inc. (617) 227-2111.

Sample Costs of Existing CO₂ Offset Projects



Clearly, carbon offsets are an effective tool for mitigating CO₂ emissions, but they should not be a substitute for implementing on-site energy efficiency practices. It is not acceptable to continue to increase energy use without regard to efficiency, only to placate the conscience with investment in an offset project.

STEP 3: DETERMINE YOUR “CARBON FOOTPRINT”

Until now, we’ve focused on emissions from production facilities’ energy use. A company’s carbon emissions extend much further than the CO₂ released from the energy used to operate its buildings.

In the case of Stonyfield Farm, emissions result from the diesel fuel which powers the trucks transporting our raw and finished goods. There is an energy cost for moving milk from the farm to Stonyfield, as well as at the farm itself, where electricity is used to power the milking machines and other farm equipment. The corn and other crops that feed the cows, even if they are grown on the same farm, require energy inputs, such as fuel for tractors and the natural gas used to manufacture the fertilizer. All of these energy expenditures produce environmentally-damaging emissions.

A company’s total “carbon footprint” is much larger than simply the facility energy use. It includes the emissions resulting from transporting goods, employee travel and commuting, solid waste incineration, packaging production, etc.

Identifying the scope of the offset is the first step. How large a portion of your company’s total carbon footprint that you choose to offset will depend on your goals and financial resources.

STEP 4: CALCULATE EMISSIONS

Once you have defined the part of your footprint to be offset, perform the calculations listed in the worksheet below to determine the CO₂ emissions.

Yearly Carbon Dioxide Emissions Worksheet⁶

	Amount			CO ₂ Factor		Annual Total (lbs of CO ₂)
Business Energy Use						
Electricity	_____ kWh	x	1.5	lb/kWh	=	_____
Fuel Oil and Diesel	_____ gallons	x	22.4	lb/gal	=	_____
Pipeline Natural Gas	_____ 1000ft ³	x	120.6	lb/1000ft ³	=	_____
Propane, Bottled Gas	_____ gallons	x	12.7	lb/gal	=	_____
Transportation						
Automobiles (gasoline)	_____ gallons	x	19.6	lb/gal	=	_____
Air Travel	_____ miles	x	0.8	lb/mile	=	_____
Truck (diesel fuel)	_____ gallons	x	22.4	lb/gallon	=	_____
TOTAL lbs CO₂:						_____
Divide by 2,204 for the total annual metric tons of CO₂ emissions:						_____

Notes:

- Energy use: Check your utility bills or call your utility companies to determine how much energy you use, including electricity, heating oil, and natural gas.
- Transportation: You may choose to include product distribution miles traveled as well as employee commuting miles.
- Automobiles, trucks, and other motors: Divide the total number of miles each vehicle is driven by its miles-per-gallon performance to calculate the total gallons used in a year.
- These conversion factors are from Appendix F. Fuel and Energy Source Codes and Emission Coefficients of the U.S. Department of Energy Form EIA-1605EZ (1996) OMB No. 1905-0194. The figures represent national averages. For a more accurate conversion rate for your state, contact the Climate Wise program.

STEP 5: CHOOSE AN OFFSET PROJECT⁷

There are three main types of offset opportunities: CO₂ emissions reductions, carbon sequestration in vegetation and soils, and emissions reductions of other greenhouse gases from an off-site source.

CO₂ Emissions Reductions

These offsets prevent the release of CO₂ into the atmosphere. Emissions reductions include energy supply improvements such as boiler upgrades and carbon scrubbers; switching to lower carbon fuels such as renewables, natural gas or hydrogen; demand side efficiencies such as lighting retrofits and appliance efficiency; and transportation effi-

⁶Adapted with permission from an article by Dan Smith, "Carbon Debt: Restoring The Balance", *American Forests*, Autumn 1996, p.11

⁷Adapted with permission from information provided by Dr. Mark Trexler, Trexler and Associates, Inc., Portland Oregon.

ciency improvements such as employer subsidies for public transportation and use of alternative fuel vehicles. Preventing deforestation through land protection also prevents CO₂ emissions.

Carbon Sequestration in Vegetation and Soils

These offsets remove CO₂ from the atmosphere. Options include planting new trees, substituting wood for energy-intensive concrete and steel, changing agricultural practices to increase soil carbon uptake, growing and utilizing energy crops. Forest management to maximize carbon sequestration, or reforestation of cleared land are also examples. Improving the retention of CO₂ can be accomplished with increased storage of carbon in soils and improved use of durable wood products (which are stored carbon) as a substitute for non-wood products.

Emissions Reductions of Other Greenhouse Gases

Non-CO₂ offset options include reducing methane emissions from coal mines, gas pipelines or livestock, reducing nitrous oxide emissions from biomass burning or agricultural fertilizer use, or reducing the emissions of CFC's or similar substances.

Very often offset projects provide ancillary benefits beyond the climate change mitigation contribution. Examples include providing economic opportunities for local communities as with planting fruit and nut trees; improved soil quality, water absorbing capacity and decreased erosion through increasing soil carbon content; cooling buildings as with urban reforestation; and recreational opportunities a result of land protection.

It's important to choose an offset that matches your objectives. A coffee company with overseas operations may choose to direct funds toward a rural solar electrification project which benefits the people in regions where they purchase their beans. A law firm that wants to build its local client base may choose to direct its offset funds toward an urban tree planting program in their community to reap some of the positive public relations benefits. A company with a commitment to volunteerism,

may choose a project which will allow hands-on participation by its employees.

STEP 6: CHOOSE AN OFFSET PARTNER

The field of carbon offsets is young and evolving. Projects initiated during the past decade offer valuable lessons to help guide companies just beginning to explore a carbon offset program. We have compiled a list of some of the key issues that must be considered when choosing an offset project or partner.

Offset Quality

Offset quality refers to the range of issues influencing a project's likely ability to decrease greenhouse gas emissions or increase carbon sequestration. Putting it simply, will the project actually offset emissions? Questions to ask include is the project idea feasible? Is the science sound? Is it possible to cost-effectively and accurately measure the benefits? Is the necessary infrastructure in place to assure success? Specific criteria often discussed in the context of offset quality include the following:

- *Project Reliability* – Is it likely that the intended carbon benefits will be achieved for the projected period? To a large extent, this will depend on project management and the existing political, economic, and social conditions surrounding the project. Ways to ensure project reliability include working with experienced and knowledgeable implementing organizations, avoiding experimental and controversial projects, and using conservative assumptions in calculating project benefits.
- *Incremental Impacts* – Would carbon benefits have resulted without the project? For example, if the offset is the purchase of forest threatened with development and deforestation, one should be able to show that the deforestation would have occurred had the investment not been made. If the offset involves energy efficiency, one should be able to show that whatever is being done exceeds standard practice. Although a particularly tricky issue, assessing the incremental impact is important to the credibility of an offset.
- *Ability to Quantify the Project* – Can the offset be accurately measured? This can vary greatly

according to offset project type and size (see project accountability). The credibility of a project can be affected by how easy it is to quantify.

- *Carbon Benefit Leakage* – Are there project consequences that reduce the calculated benefits of the offset? Specifically, “leakage” can result from market, behavioral, or physical feedback to a project that may “take back” some of the project’s projected benefits. Such “take back” is a commonly observed phenomenon in energy efficiency projects where for example the resulting dollar savings can encourage the energy consumer to turn up the thermostat. The same phenomenon can occur in a reforestation project if the new tree planting drives down timber prices and convinces other people to stop growing trees. Also, a reforestation project on land previously used as agricultural could “leak” if the farmers who were using the reforested piece of land simply move to another piece of land and clear the forest to continue their farming activities. In that case, although a parcel of land is reforested, there would be no net CO₂ sequestration. The number of potential leakage points, as well as the likelihood and magnitude of the potential leakage, can affect the project’s credibility and the ability to accurately quantify its benefits.

Project Accounting

Project accounting includes measuring, calculating, and valuing the relative benefits of greenhouse gas offset measures. Some offsets are easier and more quantifiable than others. Benefits can be temporary or permanent. Project accounting should be clearly documented and performed by a group or individual who is reputable and experienced in offset accounting.

Monitoring and Verification

The monitoring and verification systems help to ensure project implementation; determine actual carbon benefits; provide information to improve project implementation; and to generate information to improve offset policies and strategies. Monitoring and verification can be expensive and is not necessarily easy or accurate. It is recommended that independent third parties provide the monitoring and verifi-

cation to provide an unbiased perspective.

International vs. Domestic

Domestic projects tend to be easier to implement and oversee as they are more controllable, reliable, and accessible. They are also generally more expensive, especially forestry projects since temperate trees have much slower carbon absorption rates than tropical trees.

International projects, especially those in developing countries, tend to be more complicated and risky due to possible political or economic instabilities and possible legislative and regulatory changes. Their typically lower costs are attractive for those seeking to offset large quantities of emissions. International projects can also provide multiple social, economic, and environmental benefits, as well as opportunities to leverage funds for greater impact through debt-for-nature swaps, foreign aid, and volunteer services.

Joint Implementation (JI) refers to the policy of pursuing climate change mitigation projects in foreign countries to claim CO₂ emission reductions at “home”. The benefit of JI is that countries with limited or expensive offset options could pursue more cost-effective opportunities. Projects seeking JI approval can apply to the US Initiative on Joint Implementation (USIJI) for acceptance. If future policies include CO₂ credit swapping, USIJI will become an important factor as it will likely “certify” acceptable projects.

Joint implementation is very controversial, however. Critics believe that JI permits industrialized nations to avoid their obligations to reduce their own emissions through investment in demand side management of energy and a switch to renewables energy sources. JI is also criticized as “carbon colonialism”, exploiting the “low hanging fruit”, or inexpensive and easy projects of developing nations. Some developing nations object to their land being used to offset industrialized countries’ carbon emissions, wanting instead to keep their land and land use under their own control. It remains to be seen how international policies will develop regarding joint implementation.

Since the field of CO₂ offsets is still in its infancy, both

quantification and qualification of projects is still evolving. The quality and costs of projects vary greatly and do not necessarily correlate with the project type. This means that companies must carefully consider their own objectives in pursuing offsets. For example, if governments develop carbon credit programs in the future, a company might choose quite a different set of projects than if public relations were the primary goal.

Although it is important to acknowledge the controversial aspects of offsetting emissions, the potential ancillary benefits of these investments are substantial and must be recognized as well. CO₂ offset funds can be a powerful tool for initiating research and development in renewable and emerging environmental technologies; for protecting and restoring biodiversity and biologically significant ecosystems; and for creating funding for indigenous development projects which can provide economic opportunity for local peoples. Clearly, the benefits of working with an experienced, credible partner that can provide the necessary project accountability, cannot be understated.

A SAMPLE CARBON MITIGATION PROGRAM: STONYFIELD FARM, INC.

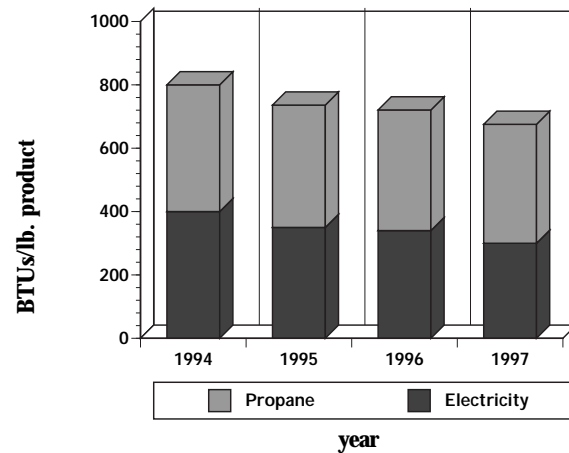
REDUCING EMISSIONS

At Stonyfield Farm we place a high priority on energy efficiency. Reducing energy use saves money and helps the environment. In the past year alone we have implemented many new practices to reduce our use of energy and the consequent emissions.

We reduced the amount of facility energy we “consume” per pound of yogurt by 9% and subsequent CO₂ emissions by 15%. We’ve achieved tens of thousands of dollars of annual savings through energy-conserving lighting retrofits, hot water heat recovery, redesigning our hot water sanitation system and other process improvements.

Through recycling and re-use we currently divert more than 60% of our “waste” from the incinerator. Our Buy Recycled Policy conserves trees, energy and water.

Total Facility Energy Use Per Pound of Product

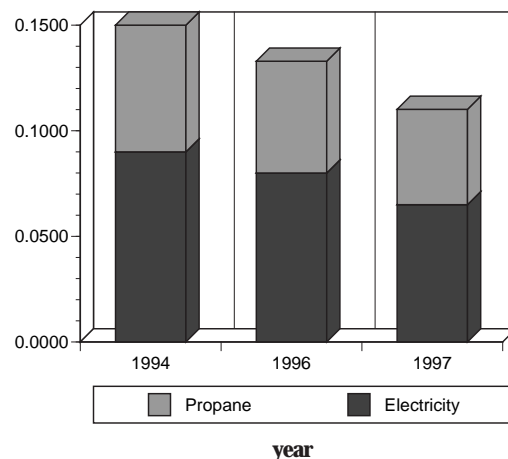


STONYFIELD'S CARBON FOOTPRINT DEFINED

We limited our goal to offsetting our production facility carbon emissions for several reasons:

- Facility energy use is a substantial contributor to our overall energy use.
- Facility energy consumption data is readily available and easy to measure.
- Until our competitors also choose to offset their emissions, we are incurring an added cost that they do not bear.
- We needed to start somewhere. If we waited until we could do it all, we'd be doing nothing.

Lbs. of Facility CO₂ emissions per lb. Product



STONYFIELD FARM EMISSIONS CALCULATIONS: FISCAL YEAR 1997

Stonyfield Farm Yearly Carbon Dioxide Emissions Worksheet*

	Amount			CO ₂ Factor		Annual Total (lbs of CO ₂)
Business Energy Use						
Electricity	<u>2,565,600</u>	kWh	x	0.852 lb/kWh	=	<u>2,185,891</u>
Fuel Oil and Diesel	<u> </u>	gallons	x	22.4 lb/gal	=	<u> </u>
Pipeline Natural Gas	<u> </u>	1000ft ³	x	120.6 lb/1000ft ³	=	<u> </u>
Propane, Bottled Gas	<u>162,502</u>	gallons	x	12.7 lb/gal	=	<u>2,063,775</u>
TOTAL lbs CO₂:						<u>4,249,667</u>
Divide by 2,204 for the total annual metric tons of CO₂ emissions:						<u>1,928</u>

Notes*:

- The conversion rate of CO₂ per kWh of electricity is for New Hampshire as stated in EPAct 1605 (b). it is lower than the national average because the source is a high percentage of nuclear energy and low percentage of high carbon fuels.
- conversion rate of CO₂ per gallon of propane as stated in EPAct 1605 (b).

CHOOSING A PARTNER: The Stonyfield/Trexler Partnership

After researching many worthy projects with national and international development and environmental organizations, Stonyfield chose to partner with Portland, Oregon based climate change mitigation firm Trexler and Associates, Inc. (TAA).

Development or conservation is the primary objective of most of the organizations proposing carbon offsets today. Although we examined many impressive development and conservation projects, we selected a partner whose focus and expertise was carbon offset strategies.

We wanted to partner with someone who could provide us with a wide array of options, who was well versed in all aspects of climate change policy and who would be able to guide us through the myriad of policy and technical questions surrounding this nascent field. TAA met and exceeded all of those conditions.

TAA has worked with utilities implementing carbon offsets since 1991. Their staff were involved in the first carbon offsets in the late 1980's. They bring to the partnership a leadership role in carbon offset policy development; technical expertise in climate change mitigation options; carbon offset portfolio and project development and brokering experience; and legal and policy analysis capabilities.

When approached about working with Stonyfield Farm, a significantly smaller company with a fraction of the carbon emissions of most seeking offsets, TAA rose to the challenge, creating the "Climate Neutral Portfolio", a carbon fund for companies and individuals to invest in offset projects. This innovative portfolio offers a wide range of offset projects from which the "investor" can choose including national and international projects in reforestation, renewables and fuel switching (see Appendix 1).

TAA has worked closely with partner organizations around the world to develop credible offset projects, managed by local organizations. TAA provides the

partner organization with technical assistance and links the project with investors. TAA provides annual reports to investors regarding the offset project's accomplishments and performance and registers the project as provided for by Section 1605 (b) of the 1992 Energy Policy Act.

The TAA portfolio offers many advantages. Unlike most development agencies, TAA provides a variety of projects from which to choose. Although we chose a reforestation project for year one, another year we can choose to invest in renewables or methane recovery. The Climate Neutral Portfolio meets our changing needs. Because of TAA's experience, we feel confident that the project accountability is assured with on-going monitoring and verification.

Large utilities investing in offsets pay tens of thousands of dollars for the initial project development and on-going monitoring and verification. If charged on a time-and-material basis, Stonyfield would have paid more for the up-front project set-up costs than the total investment. TAA has solved this problem by providing the portfolio services with an offset overhead charge instead of on a time-and-material basis.

A travel agency investing in the portfolio to offset emissions for the travel of its customers, for instance, would pay only an affordable percentage of the total investment, in lieu of a large, front-end start-up fee.

THE PROJECT

Working with TAA, Stonyfield identified the key objectives for our first-year's offset project. We determined it should be measurable and quantifiable with third party auditing, provide multiple benefits — such as economic, environmental and health — have active local participation in the project's management, be expandable for future years and be U.S.-based until there is more consensus on Joint Implementation.

We selected a reforestation project in the Pacific Northwest through the Oregon Forest Resource Trust (OFRT) for our first year's offset investment project. These factors influenced our decision:

- We believed a reforestation project would be the simplest way to communicate the complex concept of carbon offsets to our yogurt consumers. It's easier to explain planting trees to absorb CO₂ than rural solar electrification as an offset strategy.
- The project is an Oregon state initiative with broad local support.
- It's in the United States so we can avoid the Joint Implementation controversy.
- Growth rates and carbon accumulation in Douglas Fir and other Pacific Northwest tree species are well-documented, so we felt confident in the project accounting.
- Oregon's strict Forest Practices Act ensures permanent benefits. The project targets lands that in all likelihood would not otherwise have been planted and would not have naturally regenerated. The project provides local economic benefits through transforming land into healthy, working forests, as well as multiple environmental benefits such as improved water quality, better soil stability, creation of wildlife/fishery habitat and improved air quality.
- Oregon is also an emerging market for Stonyfield's products. As with any other business investment, it is prudent to leverage every opportunity to increase the return on investing in carbon offsets. Unlike on-site carbon mitigation, there is no immediately apparent financial benefit to offset investments. With onsite efficiency, a company saves money through lower utility costs. There are less-measurable financial returns from carbon offset projects, though: employee pride, customer loyalty and investor interest. We believe it essential to leverage the less tangible benefits to maximum advantage.

The Oregon Department of Forestry (ODF) ensures that the planted parcels conform to the Oregon Forest Practices Act, and monitors the

planting. ODF will continue to make site inspections on a yearly basis for five years. At the end of the fifth year, the ODF will inspect the property and certify that the specified number of tree seedlings are established per acre and that seedlings are well distributed. U.S. DOE's Guidelines for Voluntary Reporting of Greenhouse Gases include default values for carbon storage for Douglas fir on different sites in the Pacific Northwest. Reporting of OFRT CO₂ benefits will be made using these default values or using actual survey data.

TAA provides Stonyfield with documentation of the planting and monitoring of the site. They report CO₂ benefits associated with the project to the US. DOE under section 1605 (b) of the Energy Policy Act of 1992.

On a small plot of land by a stream in Oregon, we have contributed to the rejuvenation of a cleared forest. Healthy Douglas Fir seedlings drinking in fresh water and the sun's rays will grow in our children's lifetime into deep forest, rich with moss and abundant life.

IN CONCLUSION

With a small financial investment, Stonyfield Farm will offset approximately 2000 tons of CO₂. With a strong monitoring system in place, the offsets will be verified. The people of Oregon have a few more acres of cleared land returned to forest, with the added benefit of watershed and riparian habitat restoration. It may not solve the problem of global warming, but it's a solid step in the right direction.

The simple act of offsetting emissions — reinvesting in our planet — can have profound resonance. Is Stonyfield's 2000 tons of CO₂ offsets really going to affect climate change?

Not if we're alone.

Although Stonyfield's emissions are relatively small, the collective impact of greenhouse gas abatement on the part of many small- to medium-size firms could be profound, delivering as well the ancillary benefits of millions of dollars invested in our future- renewable energy, efficiency, reforestation and land protection.

The journey of a thousand miles begins with a single step. We challenge you to join us in these restorative activities and invest in the many worthwhile projects that provide multiple benefits to the environment and our communities. Your employees, your customers, your investors and our children will thank you.

APPENDIX 1: SAMPLE CARBON OFFSET PROJECTS

The following descriptions of current CO2 offset projects were provided by Trexler and Associates, Inc (TAA). They are intended to give the reader a general understanding of CO2 offset project options. For more information on any of the projects, contact TAA at (503) 786-0559.

All of the projects listed are currently being implemented or awaiting funding.

Type of Offset International Reforestation
Project Title AES-CARE Guatemala Reforestation Project
Location of Implementation Guatemala
Tons of CO2 Benefit 66 million tons
CO2 Offset Price/Ton \$.05/ton
Project Description Implemented in 1989 as the first carbon offset, the project expanded on a pre-existing CARE social forestry project in Guatemala. The project consists of tree-planting in wildlots and agroforestry applications, increasing biomass yields through soil conservation techniques and conservation of forest biomass through non-planting activities such as fire prevention.

Type of Offset Solar Rural Electrification
Project Title Sri Lankan Rural Electrification
Location of Implementation Sri Lanka
Tons of CO2 Benefit 938,000 tons
CO2 Offset Price/Ton \$5.00/ton
Project Description Widespread application of small-scale photovoltaic (PV) systems for individual rural households that have remote likelihood of the conventional power grid reaching them in the next 20 years. Displacing the kerosene used for lighting in millions of rural homes will significantly reduce CO2 emissions.

Type of Offset International Land Conservation/Protection
Project Title ECOLAND Land Conservation Initiative
Location of Implementation Costa Rica
Tons of CO2 Benefit >1,200,000 tons
CO2 Offset Price/Ton \$.54
Project Description The project will result in the permanent protection of primary tropical forest that otherwise would be deforested. It provides for the purchase and conveyance to the Costa Rican National Park Service of privately held land. The lands purchased are considered to be under imminent threat of deforestation through agricultural or pastoral expansion, or through logging.

Type of Offset	Fuel Switching
Project Title	Decin District Heat Plant Repowering
Location of Implementation	Czech Republic
Tons of CO2 Benefit	608,952 tons
CO2 Offset Price/Ton	\$4.33/ton
Project Description	The project will switch the inefficient, coal-fired boiler in the city of Decin to natural gas. The new plant will be a cogeneration facility. Waste heat will serve the city residents as well as tremendous air quality and health benefits.

Type of Offset	U.S. Urban Forestry
Project Title	Salt Lake City Urban Forestry Project
Location of Implementation	Salt Lake City, Utah, USA
Tons of CO2 Benefit	10,000 Tons
CO2 Offset Price/Ton	\$10.00/ton
Project Description	The project involves planting shade trees in lower income neighborhoods or in new subdivisions. The trees are placed to maximize shading value, thus reducing coal-based electricity consumption for evaporative coolers and air conditioners. The cost-effectiveness of urban forestry is highly site-specific, depending on air conditioner penetration rates and local climate. It also appears more costly than it is, since homeowners' dollars savings from lower electricity consumption are not included in the calculation of CO2 offset costs.

Type of Offset	Methane Recovery and Utilization
Project Title	PacifiCorp Methane Recovery
Location of Implementation	Ohio, USA
Tons of CO2 Benefit	100,000 tons
CO2 Offset Price/Ton	\$.60/ton
Project Description	The project collects the methane from the ventilation ducts at a long-abandoned Ohio coal mine, and uses the methane to generate electricity. Because methane is such a potent greenhouse gas, simply converting it to CO2 by burning it has a significant CO2 benefit. In addition, using the methane to produce electricity displaces power that would otherwise be produced using coal as a fuel.

APPENDIX 2: SELECTIVE RESOURCE LIST FOR INFORMATION ON CLIMATE CHANGE AND CO2 OFFSETS

Non-Governmental Organizations With Expertise In Climate Change

TREXLER AND ASSOCIATES, INC. (TAA)
1131 S.E. River Forest Road
Portland, OR 97267
Tel: 503-786-0559, Fax: 503-786-9859
Contact: Mark Trexler, President
<http://www.teleport.com/~taa/>

Trexler and Associates, Inc. is an internationally recognized leader in the climate change field, and is one of just a few companies worldwide specializing in climate change mitigation policies, technologies, and projects. TAA works with companies, governments, nongovernmental organizations, and project developers to promote environmentally sound, technically viable, and cost-effective climate change mitigation measures. TAA is currently implementing several carbon offset projects internationally and in the United States. Projects in TAA's portfolio include landfill and sewage treatment plant methane capture and cogeneration, energy efficiency, reforestation and forest protection, biomass energy, and rural solar electrification. Extensive information about TAA and its activities is available on its web site.

AMERICAN FORESTS

P.O. Box 2000
Washington, DC 20013
Tel: 202-955-4500, Fax: 202-955-4588
Tel: 1-800-368-5748
email: member@amfor.org, or falconer@amfor.org
web: <http://www.amfor.org>
Contact: John Falconer, Director of Development, ext. 210

American Forests is the oldest national conservation organization in the U.S. They have developed an assortment of forestry projects that produce significant greenhouse gas reductions while achieving other important environmental and economic benefits. Their projects expand wildlife habitat, protect watersheds, and

heal damaged forest systems while sequestering carbon in a simple, credible way. Projects include urban tree planting, rural forest restoration, domestic carbon plantations, and international Joint Implementation projects.

Stonyfield Farm has worked primarily with Trexler and Associates and American Forests. However, through our research we learned of many organizations doing work on climate change. What follows is a sampling of organizations:

Business for Social Responsibility (BSR), Business and The Environment Program, 609 Mission St., 2nd Floor, San Francisco, CA 94105-3506, Phone (415) 537-0888, Web Page: <http://www.bsr.org>

Conservation International, 1015 18th Street, NW, Suite 1000, Washington, DC 20036, Phone 202-429-5660, Contact: Matthew Quinlan, Web Page: <http://www.conservation.org>

The Nature Conservancy, 1815 North Lynn Street, Arlington, VA 22209, Phone 703-841-5372, Contact: Tia Nelson, Web Page: <http://www.TNC.org>

Natural Resources Defense Council (NRDC), 40 West 20th St, NY, NY, 10011, Phone (212) 727-2700, Web Page: <http://www.igc.org/nrdc>

Pacific Forest Trust, Forests Forever Fund, Box 879, Boonville, CA 95415, Phone (707) 895-2090.

Rainforest Action Network, 221 Pine St., Suite 500, San Francisco, CA 94104, Phone 415 398-4404, Web Page: <http://www.ran.org/ran/>

Rainforest Alliance, 65 Bleecker Street, New York, NY 10012-2420, Phone 212-677-1900, Web Page: <http://www.rainforest-alliance.org>

Trees for the Future, 11306 Estonia Dr., P.O. Box 1786, Silver Spring, MD 20915, Tel: 301-929-0238 or 800-643-0001, Web Page: <http://www.treesftf.org>

Union of Concerned Scientists (UCS), National Headquarters, 2 Brattle St., Cambridge, MA 02238-9105, Phone (617) 547-5552, Web Page: <http://www.ucsusa.org>

World Resources Institute (WRI), 1709 New York Avenue, NW, Washington, D.C. 20006, Phone (202) 638-6300, Web Page: <http://www.wri.org>

World Wildlife Fund (WWF), 1250 24th St. NW, Washington, D.C. 20037-1175, Phone (202) 293-4800, Web Page: <http://www.panda.org/climate>

GOVERNMENT RESOURCES

Climate Wise, A voluntary program sponsored by the U.S. EPA and the Department of Energy (DOE) to reduce U.S. greenhouse gas emissions. Climate Wise encourages businesses, industry, and state and local governments to take innovative approaches to turning energy efficiency, waste minimization, productivity enhancement, and environmental performance into corporate assets. Phone 800-459-WISE, Web Page: <http://www.epa.gov/climatewise>.

Energy Information Administration (EIA), Provide a listing of publications and Data including "Emissions of Greenhouse Gases In The United States 1996", DOE/EIA-0573(96). Publications can be downloaded from their Web Page: <http://www.eia.doe.gov/environment.html#GHG>

United Nations Environment Programme (UNEP), Information on U.N. and Intergovernmental Panel on Climate Change (IPCC) initiatives. Web Page: <http://www.IPCC.ch>

U.S. Climate Action Network, A clearinghouse for environmental activists on climate change issues. They produce short publications on global warming activities that are free of charge. Phone 202-289-2401, or email: uscan@igc.apc.org.

U.S. Department of Energy, Voluntary Reporting of Greenhouse Gases Program, Communications Center,

Phone (800) 803-5182, Web Page: <http://www.eia.doe.gov/oiaf/1605/frntend.html>

US EPA Green Lights Program, A voluntary program sponsored by the U.S. Environmental Protection Agency (EPA) that encourages the widespread use of energy-efficient lighting, the improvement of building shell and appliance efficiency, and the phasing-out of CFC use in heating, ventilating, and air conditioning systems. Phone 888-782-7937, Web Page: <http://www.epa.gov/greenlights.html>

U.S. Global Change Research Information Office (GCRIO), Provides access to data and information on global change research and mitigation strategies. Web site includes a section "Ask Dr. Global Change". 2250 Pierce Rd., University Center, MI 48710, Phone (517) 797-2730, Web Page: <http://www.gcrio.org>

PUBLICATIONS AND REPORTS

American Forests quarterly magazines, especially: Autumn 1996, *How to Pay off Your Carbon Debt*; Summer 1996, *The Carbon Build-Up*; September 1993, *Are you an Eco-Titan?*

CO2 Diet for a Greenhouse Planet: A Citizen's Guide for Slowing Global Warming, by John DeCicco, James Cook, Dorene Boize, and Jan Beyea (National Audubon Society, 1990). This guide provides information on calculating carbon emissions for individuals.

Forests and Global Change, Volume 1: Opportunities for Increasing Forest Cover, by Neil Sampson and Dwight Hair, editors (American Forests, 1992).

Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions, by R. Neil Sampson and Dwight Hair, editors (American Forests, 1996).

For a more complete bibliography and list of resources on climate change, contact the TAA website at <http://www.teleport.com/~taa/pubs.html>.

Notes

¹United Nations Environment Program, *The Greenhouse Gases*, UNEP/GEMS Environmental Library No. 1, 1987

²Union of Concerned Scientists (UCS), Global Warming fact sheet “What is Global Warming?”

³NRDC world wide web page on global warming: <http://www.igc.org/nrdc/bkgrd/gwcons.html>

⁴Richard Monastersky, “Stage Set for Curbing Global Warming Gases,” *Science News*, vol. 150, July 27, 1996, 54.

⁵*The 1997 Cone/Roper Cause-Related Marketing Trends Report*, available from Cone Communications, Inc. (617) 227-2111.

⁶Adapted with permission from an article by Dan Smith, “Carbon Debt: Restoring The Balance”, *American Forests*, Autumn 1996, p.11

⁷Adapted with permission from information provided by Dr. Mark Trexler, Trexler and Associates, Inc., Portland Oregon.