# ***CASE INSTRUCTIONS***

*Your role in the case is to act as Weyerhaeuser managers, specifically members of Bob Prolman's team. You are asked to prepare recommendations for the Board of Directors and the Senior Management team (roles played by the judges). You can assume that directors and top managers know a lot about the forest business, but relatively little about the carbon value of forests.*

*Your case analysis should include at least the following:*

- *A ranking of the four investment opportunities, accompanied by compelling reasoning.*
- *Explanation of the assumptions you made in the spreadsheet analysis (for example, how you projected future prices) – the judges are sure to ask you about this!*
- *A discussion of non-monetary as well as monetary considerations in making the investment decisions.*

*You will be evaluated on how well you justify your recommendations – this is more important than the specific investment ranking that you choose. The judges will be particularly interested in how well you apply business school tools and concepts.*

*You are encouraged to do outside research, but you may not conduct any personal interviews as part of that research. (For example, do not call or e-mail anyone at the case company.) The only sources that you may use are inanimate ones (print or electronic).*

*The spreadsheet referenced in the case can be found at* *http://bschool.washington.edu/mbastud/keep.shtml* the keep session webpage.

*Good luck!*

# Weyerhaeuser: Foreign Investment in the Kyoto Era[1]

Bob Prolman, Director of International Environmental Affairs for the Weyerhaeuser Company, remembers February 16, 2005 as an important day. On this date, the Kyoto Protocol on Climate Change entered into effect. Prolman also remembers thinking that the Protocol could change Weyerhaeuser's business in significant ways—or that it might change nothing at all.

The Kyoto Protocol is the most important step in global efforts to control climate change by reducing the emissions of greenhouse gases. The Kyoto Protocol commits all participating countries to reducing their emissions of greenhouse gases by an average of 5.2% below their 1990 levels. To fulfill their commitments, countries must either decrease their greenhouse gas emissions or create "carbon sinks" (particularly forests) that offset emissions by taking carbon dioxide out of the atmosphere.

The Kyoto Protocol provides for market trading of "carbon credits" earned by reducing emissions or removing atmospheric carbon dioxide. It also allows participating countries to satisfy their own greenhouse gas commitments by investing in emission reduction or removal projects in other countries and earning credits there. As a result, markets for trading carbon credits have started to emerge across the globe. Given that most countries, including the U.S., are expected to eventually implement greenhouse gas emissions standards, carbon trading appears on its way to becoming a fact of life for firms around the world.

As a result, forest products companies are finding that they have a potential new asset: newly planted forests will have carbon value as well as timber value. Weyerhaeuser, one of the biggest forest products companies in North America, is in an interesting position with respect to future investments. Recently, Weyerhaeuser has begun to expand its forest operations beyond North America. For example, Weyerhaeuser acquired grazing land in Uruguay in 1996 and planted pine and eucalyptus trees. The Company also invested in timberland in Australia and New Zealand.

The management at Weyerhaeuser is contemplating further investments in the Southern hemisphere. The Kyoto Protocol and expanding carbon-trading markets make these decisions more complex. In light of the dual value (i.e., forest products and carbon credits) of timberland, how should future international forest-based investment opportunities be assessed? Is the potential value of carbon credits only monetary or might Weyerhaeuser derive important goodwill by creating a resource that is environmentally beneficial? Does exploiting forests for carbon credits fit with the strategy of Weyerhaeuser? What are the risks involved in getting into the carbon markets? What are the risks from *not* getting in? Prolman and his team have been asked to prepare action recommendations on this issue for the Board of Directors and top management.

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[1] This case was prepared by Gregory A. Bigley, Debra A. Glassman, and H. Kevin Steensma for the 2005 Global Business Challenge case competition. It is intended to illustrate business principles applied to corporate decision-making, rather than the effective or ineffective handling of administrative situations. The authors wish to thank Bob Prolman and the Weyerhaeuser Company for their help and support in this project. Some numbers and business facts in the case have been changed or are fictional to protect proprietary information. 

## WEYERHAEUSER COMPANY

### Early History

The company was founded in 1900 by Frederick Weyerhaeuser (1834-1914). Weyerhaeuser emigrated from Germany to the United States when he was eighteen. After several years in the United States working as a laborer, Weyerhaeuser found a job in a sawmill and lumberyard, where he worked his way up to foreman. With a partner, he purchased the mill in 1857 and soon thereafter began acquiring interests in other mills. Weyerhaeuser started to buy timberlands in the mid-1860s with the purchase of pine tracts in Wisconsin. He subsequently expanded into Minnesota, Idaho, Washington, and Oregon.

In 1891, Frederick Weyerhaeuser became a neighbor and friend of railway mogul James J. Hill (1838-1916), who was president of the Great Northern Railway and majority owner of the Northern Pacific Railway. Hill had acquired millions of acres of land along the route of the Northern Pacific Railway, from Lake Superior to Puget Sound. This land had originally been given to the railroad by the federal government in return for constructing a transcontinental rail line. On January 3, 1900, Hill sold 900,000 acres of this land in the state of Washington to Weyerhaeuser and fifteen investors for $6 an acre. At the time, this was one of the largest land transfers in the history of the United States. Weyerhaeuser and his partners organized the Weyerhaeuser Timber Company, with Weyerhaeuser as president. Initially, the company concentrated on buying land (eventually purchasing 3 million acres from Hill alone) and selling standing timber to other mill owners. When he died in 1914, Frederick Weyerhaeuser owned more forestland than any one else in the world.

In the early decades, the Weyerhaeuser Company produced lumber and developed value-added products such as paper and plywood. In the middle of the 20th century, the company diversified into a variety of businesses that were not closely related. Starting in the late 1980s, the company re-focused on timber production and related businesses. Exhibit 1 provides a timeline of notable events in Weyerhaeuser's corporate history.

### Today

Weyerhaeuser Company is headquartered in Federal Way, Washington. Its major lines of business include timberland, wood products, pulp and paper, real estate, and transportation.[2] With $19.9 billion in annual sales for 2003, it ranked 95th on the Fortune 500 for that year. It is the world's largest producer of softwood and hardwood lumber, engineered lumber products, softwood market pulp, uncoated freesheet paper, and containerboard and Kraft paper. It is the top forest products exporter in the United States and among the top United States exporters overall.

Weyerhaeuser operates about 270 sawmills, pulp and paper mills, and wood products plants. The company employs about 55,000 people in eighteen countries around the world. Weyerhaeuser manages 6.8 million acres of private working forest in the United States, controls

[2] For a more detailed description of Weyerhaeuser's business lines, see www.weyerhaeuser.com/ourbusinesses.

the cutting rights on 29.9 million acres of publicly owned forestland in Canada, and owns an additional 663,000 acres of Canadian forestland. The company also has joint operating interests covering 582,000 acres in Australia, New Zealand and Uruguay.[3]

**High-Yield Forestry and the Environment**

In 1966, George H. Weyerhaeuser (Frederick's great-grandson) became company president. Under his leadership, Weyerhaeuser launched the High-Yield Forestry program. This program consisted of large-scale clear-cutting (removing all or nearly all trees from a site), draining of wetlands, and use of chemical herbicides, fungicides, and fertilizers to increase tree growth and shorten "rotation" times.[4] These practices helped make Weyerhaeuser-managed forests among the most productive in the world.

During the late 1980s and early 1990s, the company faced increasing pressure from environmental groups and government regulators to reduce the impact of its operations on the environment. Public alarm around the issue of endangered species, particularly the spotted owl, led to the virtual prohibition of logging in U.S. national forests. In addition, the forest management procedures of private landowners, like Weyerhaeuser, became the subject of mounting criticism. Industry practices, such as clear-cutting, came under fire.

In response to these concerns, Weyerhaeuser and other private industrial landowners adopted modified methods of forestry management. The industry maintained, however, that productivity on intensively managed private land was becoming more important as a consequence of diminished productivity on federal lands. While continuing to use high-yield methods, Weyerhaeuser enhanced its forestry management practices to focus on both timber yields and forest ecosystem health. The size of clear-cuts was reduced, wider riparian buffer zones were established, and snag and living trees in cut areas were maintained to provide wildlife habitats. Weyerhaeuser went beyond general industry practices and adopted landscape design techniques to improve the appearance of harvest areas. It also continued its practice of replanting cut areas more quickly than called for by most forest practice codes. In addition, Weyerhaeuser refrained from draining wetlands and adopted practices of setting aside some forest land to enhance the long term ecology of an area. The company also emphasized its role as one of the oldest and largest recyclers of waste newspaper and other paper products, to help the public understand that its approach to being a sustainable manufacturer of forest products extends beyond the forest itself.

Today, Weyerhaeuser continues to combine the important productivity aspects of the High-Yield Forestry program with a concern for the quality of wildlife habitat and related values. Exhibit 2 lays out sustainable forestry principles that Weyerhaeuser endorses. Exhibit 3 summarizes Weyerhaeuser's philosophy on responsible forestry management.

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[3] Detailed investor information for Weyerhaeuser is available at http://investor.weyerhaeuser.com.

[4] Rotation is the planned time interval between timber harvests. It is a function of the number of years required to grow trees to maturity and the purpose for which the timber will be used.

## GLOBAL CLIMATE CHANGE AND THE KYOTO PROTOCOL

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) is a response to the global consensus that human activity is producing "dangerous" levels of "global warming," as indicated by a rising global mean surface temperature. The U.S. National Academy of Sciences reports that the Earth's surface temperature has risen by almost 1°C in the last 150 years and that warming has been accelerating in recent decades.[5] The Kyoto Protocol is based on the belief that changes to the chemical composition of the atmosphere brought about by human activity are largely responsible for this warming. Of particular concern is the increasing buildup in the atmosphere of certain heat-trapping gases that intensify the natural "greenhouse effect" that keeps the Earth at a habitable temperature.

The natural greenhouse effect is depicted in Exhibit 4. Solar energy passes through the Earth's atmosphere and warms the land and oceans. The Earth's surface then emits heat as infrared radiation. The "greenhouse gases" in the atmosphere—mostly water vapor and carbon dioxide (also ozone, methane and nitrous oxide)—trap the infrared radiation, thus warming the atmosphere.[6] Like the inside of a greenhouse, the Earth is warmer than it would be otherwise. In fact, without the greenhouse gases, the Earth's average temperature would be about -20° C; with the natural greenhouse effect, the Earth has an average temperature of about 15° C.

The natural composition of the Earth's atmosphere is 78% nitrogen, 21% oxygen, and 1% greenhouse gases. But human activity, particularly the burning of fossil fuels, has dramatically increased the greenhouse gas component of the atmosphere.[7] Increasing concentrations of greenhouse gases in the atmosphere trap more infrared radiation, leading to a higher global mean temperatures—hence "global warming."

Atmospheric carbon dioxide concentrations have increased significantly since the start of the Industrial Revolution—approximately 30% since 1750—and the rate of increase is rising. Studies of Antarctic ice cores indicate that the pre-industrial concentration of carbon dioxide was 280 ppmv (parts per million, measured by volume). Since 1958, measurements have been taken on the peak of Mauna Loa, a mountain in Hawaii that is far from local sources of pollution. From 1958 to 1998, carbon dioxide concentrations recorded at Mauna Loa rose from 316 ppmv to 369 ppmv.[8] These increases can be correlated with carbon dioxide emissions from fossil fuels. Some estimates suggest that by 2100 atmospheric carbon dioxide will be 75% to 220% higher

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[5] There is large year-to-year and decade-to-decade variation in average temperatures. It is the long-run trend that is of concern. For a discussion and data, see section entitled "It's getting hot in here," in Vital Climate Change Graphics Update, UNEP-GRID Arendel, February 2005, www.vitalgraphics.net/climate2.cfm.

[6] A variety of greenhouse gases exist. In order to compare the effects of the various gases, carbon dioxide is the benchmark, and emissions of other gases are measured as metric tons of "carbon dioxide equivalent." Global Warming Potential (GWP) is a measure of the warming effect of a greenhouse gas. See "Cooling or heating, a balancing act," in Vital Climate Change Graphics Update, UNEP-GRID Arendel, February 2005, www.vitalgraphics.net/climate2.cfm.

[7] Similarly, agricultural and land-use practices have increased methane emissions, automobile exhaust has increased ozone emissions, and industrial processes have added other greenhouse gases.

[8] Greenhouse gas measurement projects are described in "Tracking long-term measurements of gases and aerosols that contribute to climate change," NOAA Magazine Online, 2004, www.magazine.noaa.gov/stories/mag140.htm.

than pre-industrial levels. If the amount of carbon dioxide in the atmosphere doubles, it is estimated that the Earth's temperature will rise somewhere between 1.5° and 4.5° C.[9]

Scientists predict that global warming will melt polar ice sheets, raise sea levels, and acidify oceans. The effects of these changes could include more frequent extreme weather events (e.g., storms, droughts, floods), coastal erosion, changes in forest composition, alterations in agricultural growing areas, and loss of coral reefs. Scientists also predict that climate change effects will vary by region, with both negative and positive consequences. In some regions, there will be lower crop yields. In other regions, crop growing seasons will be extended and higher levels of atmospheric carbon may accelerate plant growth rates.[10] While there is much debate about the size, location, and timing of effects, the scientific evidence supports the connection between carbon dioxide emissions and global warming, and there is agreement that the social and economic challenges will be significant.

There are two approaches to addressing the problem of climate change caused by greenhouse gas emissions. One approach is to reduce emissions of greenhouse gases. This will likely require changes in production technology, for example in the energy sector. The emissions of greenhouse gases are much greater in the industrialized world than in the developing world. Because greenhouse gases mix uniformly in the atmosphere, the location of the source does not make a difference in atmospheric concentrations. However, many feel that, since industrial countries are responsible for most of the emissions, they should be responsible for most of the emission reductions.[11]

The second approach to the climate change problem is to "sequester" atmospheric carbon by putting it into "carbon sinks." In the natural carbon cycle, plants are carbon sinks; the process of photosynthesis removes carbon dioxide from the atmosphere and fixes it in the vegetation– both above ground and below ground (in the root and soil system).[12] Forests are a major reservoir of carbon, containing some 80% of all the carbon stored in land vegetation. As the volume of wood increases, so does the volume of carbon that is sequestered. Researchers have determined the formula for relating these two volumes.

**The Kyoto Protocol**

The United Nations Environmental Program (UNEP) was established in 1972, and this was the first step in an increasing UN effort to address global climate issues. The UNEP and the World Meteorological Association organized a number of conferences on climate change for both scientists and policymakers. In 1988 the two organizations created the Intergovernmental Panel on Climate Change (IPCC). The IPCC has become the foremost scientific body on climate

[9] IPCC Working Group I, Workshop on Climate Sensitivity, July 26-29, 2004, http://ipcc-wg1.ucar.edu/meeting/CSW/product/CSW_Report.pdf

[10] For a non-technical survey of effects, see "How Will Global Warming Affect My World?" United Nations Environment Programme, 2003, http://www.unep.org/themes/climatechange/PDF/ipcc_wgii_guide-E.pdf.

[11] The Pew Center on Global Climate Change has collected data on greenhouse gas emissions from a variety of sources. See www.pewclimate.org/global-warming-basics/facts_and_figures/. This website includes a glossary.

[12] For more information about the carbon cycle, see NASA's Earth Observatory website at http://earthobservatory.nasa.gov/Library/CarbonCycle/carbon_cycle2.html.

change, creating regular reports that summarize the latest scientific evidence and understanding about global warming.

These United Nations efforts ultimately led to the UN Framework Convention on Climate Change (UNFCCC), which was adopted at the Rio Earth Summit in 1992. The UNFCCC established the goal of stabilizing greenhouse gas emissions "at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system."[13]

In 1997, negotiations under the UNFCCC and the "compelling" reports of the IPCC led to the Kyoto Protocol, an international treaty aimed at reducing the emissions of greenhouse gases. Annex I of the Protocol lists countries with mandatory commitments to cut the emissions of six greenhouse gases by an average of 5.2 percent relative to a baseline of 1990 emissions over the 2008-2012 period (the "commitment period"). The Annex I Parties are all industrialized countries. Developing country signatories (what the Protocol calls the "Non-Annex I Parties") are not subject to binding emissions reduction commitments under the Protocol. See Exhibit 5 for a list of Annex I countries and their commitments.

The Protocol required ratification by at least 55 countries that account for at least 55% of developed country emissions. This threshold was reached in October 2004, with Russia's ratification. The Protocol entered into force three months later, on February 16, 2005.

As of that date, 128 countries had ratified the Protocol, of which 30 are industrialized countries. Only four industrialized countries are not parties to the current Protocol: Australia, Liechtenstein, Monaco and the United States. The U.S. and Australia have both stated that they do not intend to ratify the agreement. U.S. objections to the Kyoto Protocol revolve around two points. First, the U.S. contends that the Kyoto Protocol is too weak in its current form, because it exempts developing countries such as China and India from binding commitments. Second, the U.S. argues that the projected high cost of emissions reduction could severely inhibit economic growth.

The Kyoto agreement expires in 2012. The Protocol specifies that rules for post-2012 must be agreed to by 2007, and post-Kyoto discussions have already begun. A key question is whether the next agreement will include the non-Kyoto countries—notably, the U.S and Australia. Both the U.S. and Australia have indicated that they will not sign on to a post-Kyoto agreement unless it commits developing countries to binding emissions targets.

Many believe that the U.S. will eventually enact emissions reduction on a national level—either unilaterally or as part of a post-Kyoto agreement. In fact, there is mounting pressure on the U.S. federal government from a number of states (e.g., California and New York) to cap greenhouse gas emissions. Similarly, Australian states are putting pressure on the Australian national government by pushing forward with emissions reductions.

[13] Source: http://unfccc.int/2860.php , http://unfccc.int/essential_background/feeling_the_heat/items/2914.php.

**Means for Meeting Kyoto Protocol Commitments**

Each Annex I country can choose its own approach to achieving its Kyoto commitment. One approach is for a national regulatory body to allocate emissions quotas to various industry sectors. Ultimately, the allocations go down to the firm, and even the plant, level. For example, a specific power plant may be given an emissions allocation.

The countries and firms can then achieve atmospheric greenhouse gas reductions in a number of ways. For one, they can adopt cleaner production technology that emits less greenhouse gas. They can also offset their domestic emissions through a variety of land-use changes that create carbon sinks, provided there is "additionality"—that is, more carbon dioxide is removed than in the absence of the changes. The additionality requirement means that newly planted forests can create Kyoto carbon value, but standing forests do not. Specifically, both afforestation and reforestation satisfy the Protocol's additionality requirement. Afforestation is the planting of forests on land that (a) has not been covered by forests for at least 50 years or (b) was never forested. Reforestation is the planting of forests on land that was historically forested but which had another land use as of December 31, 1989.

Some countries will have to reduce current emissions by up to 20% in order to reach the target established by the Kyoto Protocol. Such reductions may not be readily accomplished by simply changing production methods or land use. As a result, the Kyoto Protocol provides three mechanisms for meeting commitments in a more cost-effective way.

One mechanism allows Annex I countries to get carbon credits from implementing emissions reduction or emissions removal projects in other Annex I countries. These are known as Joint Implementation Projects.

A second mechanism allows Annex I countries to meet their commitments by reducing emissions or creating carbon sinks in the developing world. These are called Clean Development Mechanism (CDM) projects.

The third mechanism is emissions trading, that is, the development of markets where emissions reduction or removal credits can be exchanged. The trading of carbon credits enables countries (and their companies) with high marginal costs of emissions reduction to purchase carbon credits from those with low marginal costs. For example, a company that reduces emissions by more that its allocated quota can accumulate carbon credits, which can then be sold to other companies or countries needing them. By harnessing market forces, countries and their companies will be able to meet their greenhouse gas targets more efficiently than through direct regulation, making overall compliance more likely. In such a "cap and trade" system, a treaty or regulatory body establishes the level of carbon reduction, and the market sets the price.

The existence of a carbon market requires there to be a national registry for projects that reduce emissions or sequester carbon, certification and monitoring of such projects, standardized contracts for trading carbon credits, and a bookkeeping system for tracking purchases and sales. Credits from certified afforestation and reforestation projects are called Certified Emissions Reductions (CERs).

Since 2000, many countries have begun developing carbon markets. To date, they have focused on the trading of emissions allowances, not credits related to carbon sinks. In January 2005, the European Union launched the largest such market for company-level trading in emissions reductions, the Emissions Trading Scheme (ETS). The ETS is accessible to all EU firms and also to non-EU firms operating in Annex I countries that have ratified the Kyoto Protocol. To further enhance the liquidity of carbon markets, steps are being taken to link the ETS with other domestic systems, such as those in Canada, New Zealand, Switzerland, and Norway.[14] The extent and timing of such agreements are still uncertain.

**Clean Development Mechanism Projects**

The aim of the CDM is to promote corporate investments that transfer technology to developing countries, as well as reduce emissions of greenhouse gases. For example, reforestation projects convert land that has not been forested to forested land through planting and seeding. In accordance with the Kyoto Protocol, developers of such projects get carbon credits, because new forestation sequesters carbon dioxide. Credits from such projects are tradable for up to 60 years.

However there are a number of requirements that must be met before such credits have monetary value. First, the developing country must have ratified the Kyoto Protocol (as a non-Annex I country) and have a national system for registering emission reductions. Second, project developers need to get host country certification of the quantity and additionality of the emission reductions. Furthermore, all CDM projects must be certified by the CDM Executive Board and registered in the UNFCCC database.

Seeking and maintaining approval can be expensive, depending on the bureaucratic processes of the host country. Initial costs can range from $250,000 to more than $1 million[15] depending on the project's complexity, scope, the sophistication of the host country's organization, local opposition and/or support, and the extent to which a team has to spend extended time in the host country working on the approval process. It can take 6-18 months to get all the approvals and registrations in place, and then these projects must be re-certified every five years.

Since the mechanism is still new, there is considerable uncertainty about which projects will gain host country approval and international certification. The first CDM project to successfully pass through the whole process was in Brazil; it was certified in November 2004.

The carbon credits generated by emissions reduction projects are known as "hard credits," because the size of an emissions reduction is known with a high degree of certainty. However, forest-based carbon credits have much greater uncertainty. The amount of carbon

[14] A country like the U.S. or Australia, which has not ratified the Kyoto Protocol, may also have carbon markets to facilitate compliance with domestic emissions reduction targets. For example, U.S. firms can trade voluntary emissions reductions at the Chicago Climate Exchange. However, carbon credits traded in non-Kyoto markets cannot be used to comply with Kyoto Protocol requirements.

[15] All values in this case are in US dollars, unless otherwise indicated.

dioxide removal is estimated prior to the onset of a forestation project, verified after the project becomes operational, and monitored thereafter. There is risk that a project will not deliver the anticipated removal units. The amount of carbon dioxide that is actually removed by a forest depends on tree growth, which in turn depends on factors such as temperature, precipitation, wind, disease, pests, and fire. There is also the risk of project underperformance, for example due to shortcomings in planting or maintaining the forest.

In the evolving system of trading forest-based credits, contracts are not yet standardized, and there are no organized exchanges. For instance, there are both spot and forward contracts. In perhaps the most standardized approach to trading, the World Bank's BioCarbon Fund[16] is currently offering forward contracts for forest-based carbon credits at a guaranteed $4 per ton for the 2008-2012 period, with payments made in those years.

The value of a CDM project is highly dependent on the prices set in the carbon market. Because of the greater uncertainty associated with forest-based credits, they sell for much lower prices than hard credits. For example, in March 2005, hard credits traded through the ETS in the range of about $11 to $18 per metric ton of carbon equivalent, while forest-based credits traded in the $1-$2 range.

A recent study by the McKinsey Consulting group predicts that hard credit prices will range from 15 to 25 euros per metric ton in 2010.[17] Other forecasts of 2010 hard credit prices range from $23 to $215 per metric ton of carbon.[18] Estimates of future prices for forest-based carbon credits range from $2 to $25 per metric ton.

Carbon price projections depend on forecasts of many factors. One important factor is whether countries will commit to deep cuts in emissions after 2012 when the current Kyoto agreement expires, thereby increasing demand for carbon credits. A second factor is whether or not the U.S. and Australia will enter into future agreements, which will also affect the demand for carbon credits. A third factor is whether the demand for carbon credits will be reduced by technological developments such as cleaner energy sources or more efficient production methods. A final factor is whether forest companies will be deterred by the costs and risks, creating a limited supply of afforestation projects.

One major limiting factor is that, during the Kyoto commitment period, an industrialized country is not allowed to cover more than 1% of its base year emissions target using credits from CDM afforestation and reforestation projects.

Besides the uncertainty about approval and market prices, there are other risks associated with CDM projects. A host country could tax carbon revenue, and such revenue is subject to the

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[16] The World Bank BioCarbon Fund is a major buyer of carbon credits to finance projects that sequester or conserve greenhouse gases (http://carbonfinance.org/biocarbon/home.cfm). The fund's aim is to aid the emerging carbon credit markets and ensure that developing countries benefit from carbon finance opportunities. It uses investor capital to buy credits.

[17] Christoph Grobbel, Jiri Maly, and Michael Molitor, "Preparing for a low carbon future," McKinsey Quarterly, 2004, #4.

[18] EcoSecurities, Ltd., "Prototype Carbon Fund Market Intelligence Report," June 2001, http://www.ghgprotocol.org/docs/CarbonMarketIntelligenceReport.1.pdf.

usual financial repatriation risks. Furthermore, there is uncertainty regarding property rights associated with carbon credits. For instance, in late 2003, New Zealand's government nationalized forest-based carbon credits. Surprised forest owners claimed that the government was stealing $2.6 billion from them.[19] Historically, property rights in many developing countries are highly subject to change, suggesting the possibility that carbon credits generated by CDM projects could be nationalized.

The carbon trading system is based on seller liability. The company selling carbon credits is liable for any shortfall in its account. In such situations, the selling company would have to make up for any shortfall by, for instance, purchasing the difference on the international market. So, if a forest fire burns a CDM project, the seller of the carbon credits is responsible for acquiring an equivalent number of credits to compensate.[20]

It is unclear how many forest-based CDM projects will be viable in the near term. A recent report predicts:

> *"Private forestry companies will play a strong role in the CDM. They will tend to invest in countries where they already have operations and will select projects that are already approved. These projects will be driven by financial considerations and adapted for the purpose of generating carbon sequestration credits. Little effort will be made to design entirely new projects…"* [21]

## WEYERH AEUSER'S INTERNATIONAL INVESTMENTS

> *"We'll remain a North American company, but we'll become stronger by expanding our global footprint—especially in the Southern Hemisphere. We're already familiar with this part of the world, which contains ideal operating environments for us. As an industry leader in growing trees, we'll benefit from rotations half as long as those in North America. Global expansion will also help us serve customers around the world… Along our journey, we'll also have the chance to demonstrate that every action we take is done to improve customer service or increase shareholder value. We'll operate with greater speed and increased efficiency. Most important, it is a journey of continual improvement—a journey we will take while operating ethically and to the highest environmental standards." Weyerhaeuser CEO Steve Rogel*[22]

Weyerhaeuser began looking to expand its production internationally in the early 1990s. In 1995, Weyerhaeuser Forestlands International (WFI) was founded. Its purpose is to acquire and manage timberlands and associated manufacturing operations outside North America.

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[19] "Forest owners: Nationalisation of Kyoto credits is theft," The National Business Review, December 30, 2003.
[20] In the future, standardized insurance contracts and options markets may develop for hedging such risk.
[21] From "Carbon, Forests and People," International Union for Conservation of Nature and Natural Resources, 2002, http://ww.unep.org/themes/climatechange/PDF/Forests_People_Climate.pdf. Section 2 of this report contains a full discussion of prospects for forest-based CDM projects.
[22] "The Journey Ahead," remarks by Steve Rogel, Chairman, President and CEO at the 2004 Annual Meeting, Federal Way, Washington, April 13, 2004.

Starting in 1996, Weyerhaeuser purchased land in Uruguay, Australia and New Zealand. The initial purchase in Uruguay was 320,000 acres of "spent" land that was being used for cattle grazing. Weyerhaeuser planted pine and eucalyptus trees, from seeds and seedlings. The first harvest in Uruguay will be in 2005. In Australia and New Zealand, Weyerhaeuser bought established plantations.

The company had two primary motives for these Southern Hemisphere investments. The first motive was to reduce production costs by finding locations where trees grow faster. It takes at least 40 years for a Douglas fir in Washington or Oregon to grow big enough to cut for lumber. In the southern U.S., the period of growth is 30-35 years. In the Southern Hemisphere, trees can be harvested in 20 to 30 years in areas with warm weather, plentiful rain and flat terrain. A faster growing time means a lower production cost.

The second motive was to produce closer to growing Asian markets. Gary Drobnack, president of Weyerhaeuser Forestlands International, says,

> *"Proximity to growing markets would influence some of the decisions. Some of the fastest growing markets are outside the United States…China is an interesting place right now because of 20 years of economic growth. They have surpassed Japan as an importer of wood products…We need to figure out how competitive it is. We could make choices about supplying that market from Australia or North America."*[23]

Rogel also says,

> *"Since 1980, pulp imports into China have increased from half a million tons to almost six million last year. Such a growth rate is unparalleled in our industry…We must serve the needs of the emerging Chinese economy in a responsible manner that preserves the forests for future generations in the countries that supply pulp to China. These countries include Indonesia, Russia, Canada, the United States, Chile and Brazil."*[24]

Weyerhaeuser is not alone in moving production to the Southern Hemisphere. For example, International Paper has timberlands in Brazil and New Zealand. Boise Cascade produces in Brazil.

**Country Investment Opportunities**

At present Weyerhaeuser is considering additional investments in the Southern Hemisphere, specifically in Uruguay, Brazil, Chile, and Australia. With the Kyoto Protocol coming on line, the revenues from timber can also be supplemented by selling carbon credits derived from the sequestering capacity of new plantation projects.

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[23] Quoted in "Overseas trees; Weyerhaeuser sees its growth opportunities in the dirt, markets of nations other than the U.S., by Marcelene Edwards, The News Tribune, July 25, 2004.

[24] From "China: Final Frontier?" Remarks by Steve Rogel, at the Market Pulp Customer Forum, Vancouver, BC, May 10, 2004.

Bob Prolman brings together a team of managers drawn from various departments. The team has been asked to rank the four investment opportunities. So far, they have collected some country information and some data on costs and revenues.

**Uruguay**

One possible investment opportunity for Weyerhaeuser is to increase its holdings in Uruguay. Uruguay is a South American country that borders with both Brazil and Argentina. In March, 2005, a left-leaning government came to power for the first time in its history. Since the onset of democracy in 1984, the left has slowly increased its influence in the political realm. In 2004, the water and sanitation industries were nationalized, terminating agreements with fourteen private companies.

Uruguay is part of Mercosur, a trading block including Argentina, Brazil, and Paraguay. Uruguay's economy is somewhat vulnerable to economic downturns in its primary trading partners. From 1999-2002, the Uruguayan economy found itself in a recession primarily due to the contagious difficulties faced by its trading partners.

In a recent risk analysis conducted by Euromoney, Uruguay had a rating of 37 out of a possible 100 points (100 being least risky) (see Exhibit 6). In terms of corruption, Uruguay has a rating of 6.2 out of a possible 10 (10 being least corrupt) (see Exhibit 7).

Despite these ratings, Weyerhaeuser has existing infrastructure already established in-country. Colonvade S. A. is the WFI subsidiary in Uruguay. Plantation activities commenced in 1997. The objective of this existing operation is to provide a minimum of 2 million cubic meters of wood per year from an area of about 100,000 hectares. The plan is also to put in place by 2008 facilities to manufacture appearance-grade solid wood products for export. To date, more than 37,000 hectares have been planted. Harvesting is scheduled to commence in 2005. Because of the timing and other Kyoto Protocol rules, the current investment is not expected to produce CDM eligible credits.

Information on the ease with which a CDM project can be approved by the appropriate national bodies is limited. Currently there are no active CDM projects in the country.

**Brazil**

Another possible investment opportunity lies in Brazil. Similar to Uruguay, Brazil recently elected a left-wing president, Lula da Silva. Although President da Silva claims to be an economic pragmatist who accepts the role of the private sector in the development of Brazil, these views are not universally accepted within his political party. According to the Economist Intelligence Unit, social improvements have been disappointing and business groups have been growing increasingly dissatisfied with the lack of progress on regulatory reforms.

Compared to its neighboring countries, Brazil's education system is also somewhat inferior, despite it being a priority of the previous President. Brazil's healthcare system is likewise marked by corruption and inefficiencies.

Because Brazil is home to over 60,000 different plant and animal species, there is particularly high sensitivity to sustainable and environmentally sound forestry practices. Forests are believed to be a significant source of plants with medicinal uses and of other non-timber forest products, such as fruit and wildlife. This creates both a threat and an opportunity for forest products companies looking to exploit opportunities in Brazil, as some environmental groups are quick to criticize their forest management methods or object to logging in areas that they believe should be protected. However, reforestation and other multi-purpose forest-based projects could be viewed in a positive light if managed correctly.

There are currently six CDM projects that have been submitted for approval by Brazilian authorities. Only two have been approved. The approval process is viewed to be cumbersome, yet should not take more than 60 days if done correctly.[25] Point Carbon rates Brazil third out of thirteen CDM host countries (see Exhibit 8).

**Chile**

Lying on the west coast of South America, Chile is one of the fastest growing and most productive economies in the region. Approximately 11% of its land is forested and the dominant forestry model is clear-cutting. Despite its economic successes, unemployment remains high. Moreover, there is some uncertainty regarding the upcoming elections, scheduled for December 2005.

Chile has already approved seven CDM projects with several others at various stages. The approval process can take upwards of six months. Point Carbon rates Chile second among CDM host countries (see Exhibit 8).

**Australia**

Operations in Australia began in 1999. Green Triangle Forest Products and Weyerhaeuser Australia Pty Limited are WFI organizations in Australia. Green Triangle has a plantation and sawmill business on 24,000 hectares in the states of Victoria and South Australia. Here, it produces 330,000 cubic meters of logs and 227,000 cubic meters of other forest products per year. Green Triangle also operates sawmills at Lakeside and Dartmoor. Combined annual log throughput volume at Lakeside and Dartmoor is 600,000 cubic meters per year. In addition, Weyerhaeuser Australia operates two facilities in the Tumut region of New South Wales and one in the Caboolture area north of Brisbane, Queensland. The Tumut and Caboolture operations process over 800,000 cubic meters of logs.

[25] Source: PointCarbon, February 2005.

**Costs and Revenues in the Timber Industry**

The standard approach to evaluating an investment opportunity involves projecting future cash flows. The diagram in Exhibit 9 lays out the various points when costs and revenues might occur in a forestry investment. After the initial purchase of the land, planting normally occurs over the course of seven years, with an equal amount of land being planted each year. Seedling supplies are readily available in most countries and the cost to plant a hectare is typically equivalent to the original purchase price of the land. Thus, if the land is purchased for $500/per hectare, the cost to plant one hectare is roughly $500. At the beginning of the fifth year, a process of vegetation control begins. Similar to the planting period, the process occurs over the course of a seven-year period in equal increments.

If trees mature in 25 years, as in South America, the harvesting of the trees typically begins in the $26^{th}$ year. To maintain a stable forest, $1/25^{th}$ of the forest is harvested on a yearly basis and replanted each year.[26] The harvested trees have an expected yield of 600 cubic meters of wood per hectare in South America.[27]

Because of climate differences, growth is somewhat slower in Australia. Trees are normally harvested after 35 years of growth, in $1/35^{th}$ yearly increments. However, the periods of initial planting and vegetation control are the same as those of South America. Yield per hectare in Australia is 650 cubic meters of wood. The land costs, yields, and anticipated revenues for the various markets are provided in Exhibit 10.

Exploiting the potential carbon value is not without cost. To sell carbon credits within the Kyoto markets requires that the reforestation project be initially qualified. Qualification can range in cost from between $250,000 to $1,000,000, depending on the maturity of the country's carbon registry and overall bureaucracy. This qualification needs to be renewed every five years, when the carbon sequestering capacity is further verified. Costs for re-verification are approximately 20% of the cost to initially qualify. Revenues from carbon credit sales will depend on market price and volume available to sell.

**DECISION TIME**

Bob Prolman convenes his team for a briefing. He begins,

*"As you know, up until now, forest-sequestered carbon has not been a major concern for our company, because the market was not mature enough to support a substantive investment analysis and business decision. It was too speculative. But now I'm up to my eyeballs in senior management demands on this issue. Every time we do a major investment, my phone rings.*

[26] This approach is sometimes called "sustainable forest management," because the volume of wood reaches a steady state in which no more wood is removed than is replaced.

[27] In Exhibit 8, it is assumed that the revenue from the harvested timber is received at the very end of the year. For simplicity, we can treat the revenue as being received in year 27.

*It's time to conduct a more systematic analysis. Senior management wants to know whether we should be thinking about carbon assets when we make international investment decisions, like the choice among Uruguay, Brazil, Chile and Australia.*

*In some respects, this is a simple problem of calculating the present value of future cash flows.*[28] *But of course real life is more complicated than this. For one thing, there is uncertainty about future prices. Then there are all the other risks involved. We have to explain and, where possible, quantify the risks and uncertainties to make this usable for our company."*

Prolman goes to the blackboard and begins to outline the problem:

*"We want to invest wisely. Management wants a ranking of the four investment options.*

*Let's start by defining a standardized project—i.e., say a 100,000 hectares 'afforestation' investment with the forest rotations set up for timber—that is, assume we're selling logs. Remember that we have to assume that 20 percent of the land area we buy won't be planted. It will be for roads, conservation zones, and natural land features that just won't support any growth.*

*Let's assume we make this investment at the beginning of 2006. We can derive potential revenue not only from timber but also from carbon. However, there is significant uncertainty associated with the carbon markets. There is also a fair amount of uncertainty from investing in developing countries.*

*I've started a spreadsheet for you that has the basic information for South America and Australia.*[29] *I've put in the costs for land acquisition, planting and vegetation control; you'll notice that the cash flows and timing have an uneven periodic profile. I've also put in the wood volumes and carbon volumes. For carbon volume, I have entered both the maximum potential value as well as a reasonable expectation given the uncertainty of above and below ground growth. These figures are based on 100,000 hectares assuming that 80% is plantable and that the remainder is used for roads or will not support timber. Land prices vary by country (see Exhibit 10).*

*To compute present values, I've put in a discount rate of 8.5%. This is the average rate the investment community expects from domestic investments in forest assets. You can change the discount rate, of course. I'll let you figure out whether to add a risk premium for each country (see Appendix).*

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[28] The formula for net present value (NPV) can be written as follows:

$$\text{NPV} = \sum_{t=1}^{N} \frac{NCF_t}{(1+r)^t} - I_0,$$

where $N$ is the number of years, $NCF_t$ is the net cash flow in year t, $r$ is the discount rate, and $I_0$ is the initial cash outlay. In the special case of a cash flow that is the same for all years into the future (a perpetuity), the net present value reduces to

$$\text{NPV} = NCF/r$$

[29] See competition instructions for information on accessing the spreadsheet online.

*You will need log prices to value the timber and carbon credit prices to value the carbon. I've given you a range of log prices for each country, as prices will depend on how demand and supply conditions evolve over time. As for carbon prices—well, the estimates for the future are all over the place. You'll have to develop your own opinions, but make your assumptions really clear, because the Board will certainly ask about them. One thing I predict is that the market for carbon credits is likely to collapse by about 2046. Technological changes and the reduced use of fossil fuels will make the price go to zero by then.*

*I want you to model the uncertainty about future prices and quantities in the cash flows. If there are different scenarios, attach a probability to each and compute the expected cash flow as the probability-weighted average. For instance, if there's a 5% expropriation risk, a $100 cash flow becomes an expected cash flow of $95—that is, (0.95 x 100) + (0.05 x 0).*

*There are different assumptions that you can make about when and how the carbon stocks are sold. I suggest that you consider at most three scenarios. The first is the annual sale of the 'additionality' increment of carbon stocks stored by each year's growth. You can model this as a series of forward contracts (with the prices set today and payment on the future delivery dates, year by year). For example, the World Bank is offering $4 per metric ton for the years 2008-2012, whereby they will pay for each year's additionality at the end of each of those years.*

*The second scenario is a lump-sum payment now for the present value of future carbon deliveries. This is interesting from an investment point of view, because a cash payment up front for future delivery of the carbon assets means we have cash that could cover the costs of acquiring the land and planting out a new forest. This would effectively free up company capital for other uses. But, we would then be obligated to deliver those credits over time, no matter what—a future liability that we will have to factor into our risk assessment.*

*The last scenario is that we wait and see how the markets shake out and hang on to the carbon credits in the meantime. Of course this is more speculative, but if there is the potential for significant escalation in carbon prices, we could make a lot of money.*

*Do keep in mind that there is a transaction cost of approximately 3% of revenue for every contract.*

Prolman pauses and looks around the table. Then he concludes:

*So I want you to use my spreadsheet as a starting point for ranking the four investment possibilities. But don't focus your analysis solely on the number-crunching. Some of the risks and some of the considerations are not quantifiable.*

*Is selling carbon credits worth the hassle?*

*How much will it cost us to manage carbon assets?*

*What are the public relations and social responsibility aspects of carbon sink investment and management? Our customers could ask us, 'What are you doing about greenhouse gas*

*emissions?' We don't want to lose customers because our competitors are perceived as more socially responsible. Other stakeholders will want to know how we're helping the host country—are we creating jobs and helping to improve the quality of life? Will they like what we do, or will they be upset and want us to withdraw from the country? Maybe there's a non-cash value to our being progressive about this issue now.*

*What happens if we have a couple of cold winters and the public belief in the global warming process wanes? These markets may be tenuous.*

*Finally, does exploiting forests for carbon credits fit our corporate strategy? Let's not forget that we are a timber company – that's our culture and our blood."*

Prolman sits down and looks around the room. Some of the team members are smiling and making notes, others are frowning, and a few just have blank stares on their faces.

> *"Okay, that's probably enough to get you started. I'm looking forward to seeing what you come up with!"*

## EXHIBIT 1
## TIMELINE OF NOTABLE EVENTS IN WEYERHAEUSER'S HISTORY

- In 1900, Frederick Weyerhaeuser and fifteen partners bought 900,000 acres of forestland in the Pacific Northwest and founded Weyerhaeuser Timber Company

- In 1929, Weyerhaeuser built the largest sawmill in the world (at the time) in Longview, WA.

- In 1941, Weyerhaeuser established the nation's first certified tree farm in southwest Washington.

- Demands for lumber during World War I led to a substantial increase in the company's business. Weyerhaeuser lumber was used to build wooden ships, airplanes for reconnaissance and air-to-air combat, and barracks for troops. The military demand for lumber was so high that the Army sent soldiers to work as lumberjacks in Weyerhaeuser's forests, to increase production.

- Weyerhaeuser's diversification into the production of containerboard (1949), particleboard (1955), paper (1956), and other products led the company to drop "Timber" from its name in 1959.

- In 1963, Weyerhaeuser went public and opened its first overseas office in Tokyo.

- In 1966, George H. Weyerhaeuser (Frederick's great-grandson) became company president. Under George, Weyerhaeuser launched the High-Yield Forestry program.

- In the 1950s, 1960s, and 1970s, Weyerhaeuser diversified into a wide variety of businesses and products, from timber to private-label disposable diapers and pet supplies.

- The eruption of Mount St. Helens in 1980 destroyed 68,000 acres of Weyerhaeuser timber. That disaster and the soft U.S. lumber market depressed the company's earnings through 1982. Weyerhaeuser reduced its workforce by 25% during this period.

- Under John Creighton (president since 1988, CEO from 1991 until 1998), Weyerhaeuser refocused on forest products and organized along product lines rather than by geographic region. Less-successful ventures were put up for sale, including milk carton, hardwood, and gypsum board plants.

- In 1998, Steve Rogel, a veteran from competitor Willamette Industries, succeeded Creighton as CEO and became the first outsider to head Weyerhaeuser.

- Late in 2000 Weyerhaeuser made an unsolicited $5.3 billion offer for rival Willamette Industries, which Willamette's board of directors rejected. Willamette continued to resist Weyerhaeuser's takeover attempts in 2001. In March 2002, Weyerhaeuser finally acquired Willamette in a $6.1 billion cash deal.

- Between 1999 and 2002, Weyerhaeuser made two other large acquisitions, MacMillan Bloedel and Trus Joist International.

- Between 2002 and 2004, Weyerhaeuser was focused on reducing company debt and increasing productivity.

* This summary and the corresponding section of the text are based on information from www.weyerhaeuser.com, www.history.org, www.hoovers.com, and www.mergentonline.com.

**EXHIBIT 2**
**SUSTAINABLE FORESTRY PRINCIPLES***

Private forest landowners have an important stewardship responsibility and commitment to society. In keeping with this responsibility, American Forest and Paper Association members support the following principles:

**Sustainable forestry** — To practice sustainable forestry to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the managing, growing, nurturing, harvesting and reforesting of trees for useful products with the conservation of soil, air and water quality, wildlife and fish habitat, and aesthetics.

**Responsible practices** — To use in its own forests, and promote among other forest landowners, sustainable forestry practices that are economically and environmentally responsible.

**Forest health and productivity** — To protect forests from wildfire, pests, diseases and other damaging agents in order to maintain and improve long-term forest health and productivity.

**Protecting special sites** — To manage its forests and lands of special significance (e.g., biologically, geologically or historically significant) in a manner that takes into account their unique qualities.

**Continuous improvement** — To continuously improve the practice of forest management and also to monitor, measure and report the performance of our members in achieving our commitment to sustainable forestry.

* This summary is based on information from www.weyerhaeuser.com.

**EXHIBIT 3**
**RESPONSIBLE FOREST MANAGEMENT AT WEYERHAEUSER***

Weyerhaeuser believes in responsible management to sustain the world's forests and to meet a wide range of human needs. The best way to sustain forest resources globally is through a balance of three approaches:

- Protect one category of forests for biological diversity, recreation and other social and environmental values.

- Manage a second category intensively to produce as much wood and fiber as possible, while protecting the environment.

- Manage a third category less intensively to maintain more natural qualities, both to meet global needs for wood and to sustain local communities.

**Intensive Management.** Use environmentally responsible techniques to maximize the forest's ability to grow wood quickly. This is land that has been acquired because it is conducive to intensive forest management. Except in Uruguay, where Weyerhaeuser has planted trees in former pastureland, virtually all the company's forestland in the United States and the Southern Hemisphere has been harvested and regenerated at least once. In some areas, a third generation of trees is growing. By planting selectively bred seedlings, fertilizing the soil and thinning the trees before final harvest, Weyerhaeuser can grow wood on this land two to three times more quickly than it grows in comparable natural forests. Some researchers have estimated that an area equal to 20 percent of the world's forests, if managed intensively, could satisfy all of the world's need for paper and wood products.

**Less Intensive Management of Public Forests.** In Canada, where Weyerhaeuser manages public land under long-term lease, the company uses less intensive methods, which are better suited to local conditions and climate. The company regenerates the forest both by leaving "seed trees" so they'll drop seeds and by planting seedlings. Fertilization and thinning are done less often than with intensive management. Also, since trees in Canada grow more slowly, sustainable harvest rates are lower. In the boreal forest, Weyerhaeuser designs harvests to emulate commonly occurring natural disturbances, such as fire.

**Harvesting and Replanting.** Weyerhaeuser reforests after harvest. In the United States, clear-cutting is Weyerhaeuser's dominant harvest method, and planting is the dominant approach to reforesting. Planting is normally done the first winter after harvest, when the seedlings are dormant. Areas harvested in winter are often held over until the next planting season. Thus, the area planted in one calendar year will not exactly match the area harvested in the previous year, but, cumulatively, they will reflect full reforestation. In 2003, the size of Weyerhaeuser's average clear-cut was 81 acres, and 72 percent of those acres were planted within one year of harvest. In Canada, the company relies more on seed trees to reforest. Hence, natural regeneration with seed trees accounts for the difference between the number of acres planted and the number harvested.

* This summary is based on information from www.weyerhaeuser.com.

## EXHIBIT 4 - THE GREENHOUSE EFFECT

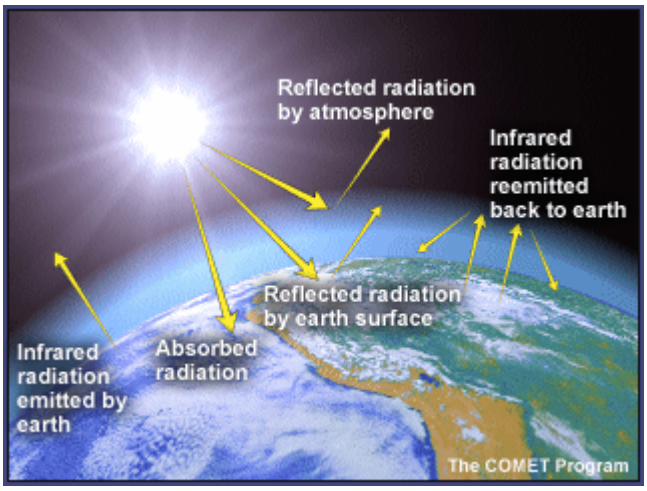


**EXHIBIT 5**
**KYOTO PROTOCOL ANNEX I COUNTRIES AND THEIR BASE YEAR 1990 EMISSIONS TARGETS**

| Country | Base year 1990 Target |
|---|---|
| Australia* | +8 |
| Austria | -8 |
| Belgium | -8 |
| Bulgaria | -8 |
| Canada | -6 |
| Croatia | -5 |
| Czech Republic | -8 |
| Denmark | -8 |
| Estonia | -8 |
| Finland | -8 |
| France | -8 |
| Germany | -8 |
| Greece | -8 |
| Hungary | -6 |
| Iceland | +10 |
| Ireland | -8 |
| Italy | -8 |
| Japan | -6 |
| Latvia | -8 |
| Liechtenstein | -8 |
| Lithuania | -8 |

| Country | Base year 1990 Target |
|---|---|
| Luxembourg | -8 |
| Monaco | -8 |
| Netherlands | -8 |
| New Zealand | 0 |
| Norway | +1 |
| Poland | -6 |
| Portugal | -8 |
| Romania | -8 |
| Russian Federation | 0 |
| Slovakia | -8 |
| Slovenia | -8 |
| Spain | -8 |
| Sweden | -8 |
| Switzerland | -8 |
| UK | -8 |
| U.S.* | -7 |
| European Union | -8 |
| | |
| | |
| | |
| | |

Source: UNFCCC Secretariat

* Australia and the U.S. did not ratify the Kyoto Protocol.

## EXHIBIT 6
## COUNTRY RISK ASSESSMENTS

| Country | Total Score (100) | Political Risk (25) | Economic Performance (25) | Debt Indicators (10) | Debt in Default (10) | Credit Rating (10) | Access to Finance (5) | Access to Capital Markets (5) |
|---|---|---|---|---|---|---|---|---|
| United States | 95.79 | 22.53 | 23.25 | 10 | 10 | 10 | 5 | 5 |
| United Kingdom | 93.49 | 24.13 | 19.37 | 10 | 10 | 10 | 5 | 5 |
| Australia | 89.51 | 21.59 | 18.15 | 10 | 10 | 9.79 | 5 | 5 |
| Chile | 65.01 | 18.16 | 10.94 | 8.38 | 10 | 6.25 | 1.57 | 2.75 |
| Brazil | 46.59 | 12.76 | 8.50 | 7.69 | 10 | 1.67 | .48 | 2.50 |
| Uruguay | 37.39 | 6.73 | 7.81 | 7.98 | 10 | .63 | 0 | .75 |
| Rwanda | 27.72 | 6 | 1.67 | 8.55 | 10 | 0 | 0 | 0 |
| North Korea | 9.28 | 4.65 | 3.47 | 0 | 0 | 0 | 0 | 0 |

Source: Euromoney, March, 2004

**EXHIBIT 7**
**CORRUPTION INDEX**

| Country | Rating (out of 10) | Rank |
|---|---|---|
| Finland | 9.7 | 1 |
| Australia | 8.8 | 9 |
| Netherlands | 8.7 | 10 |
| U.S. | 7.5 | 17 |
| Chile | 7.4 | 20 |
| Uruguay | 6.2 | 28 |
| Brazil | 3.9 | 59 |

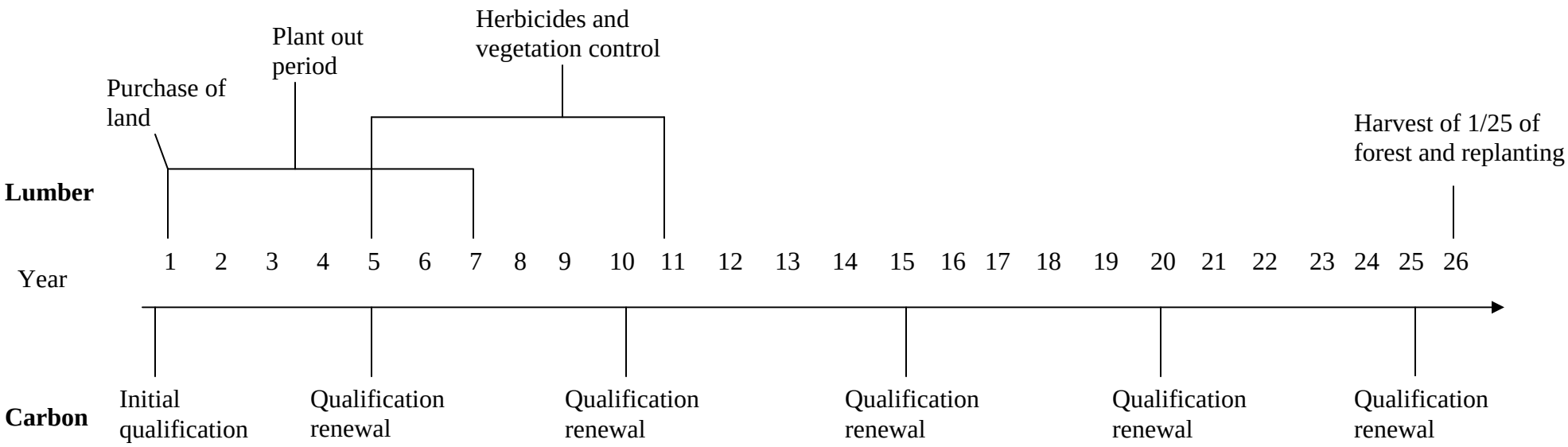
Source: Transparency International, 2004

**EXHIBIT 8**
**CDM HOST COUNTRY RATINGS, FEBRUARY 15, 2005**

| Ranking | Country | Rating |
|---|---|---|
| 1 | India | BBB- |
| 2 | Chile | BBB- |
| 3 | Brazil | BB+ |
| 4 | Peru | B+ |
| 5 | South Korea | B+ |
| 6 | China | B+ |
| 7 | Mexico | B |
| 8 | Morocco | B |
| 9 | Malaysia | B |
| 10 | South Africa | B- |
| 11 | Vietnam | CCC+ |
| 12 | Indonesia | CCC- |
| 13 | Thailand | CCC- |

Source: Point Carbon, www.pointcarbon.com.
*"Point Carbon updates the rating of all important CDM host countries continuously, based on a detailed assessment of factors related to institutions, project experience and potential, and investment climate."*
To date, Point Carbon has no rating for Uruguay.

**EXHIBIT 9**
**TIMELINE FOR TIMBER AND CARBON COSTS AND REVENUES**




Note: Costs are incurred at the beginning of the period indicated. Revenues are accrued at the end of the period indicated.

**EXHIBIT 10**
**LAND COSTS, YIELD, AND REVENUE BY COUNTRY**

| Country | Cost of land per hectare (US$) | Yield (cubic meters of wood per hectare) | Timber revenue per cubic meter (based on log sales prices, net of harvesting costs) |
|---|---|---|---|
| Uruguay | $300 | 600 | $25 - $35 |
| Brazil | $325 | 600 | $25 - $35 |
| Chile | $800 | 600 | $50 - $75 |
| Australia | $450 | 650 | $45 - $75 |

## APPENDIX
## THE DISCOUNT RATE FOR INTERNATIONAL TIMBERLAND INVESTMENTS

Standard rules for investment decisions say that expected future cash flows should be discounted using a discount rate that reflects the cash flows' risk. When a firm invests in projects that are similar to the ones it already has, it can use its weighted average cost of capital (WACC) as the discount rate for evaluating new projects.

Is the company's WACC appropriate when considering international investments? There are two schools of thought.

The first school of thought says the company's domestic cost of capital is appropriate. This can be justified by assuming that world capital markets are fully integrated, so that the cost of capital is the same whether funds are raised at home or abroad. Another justification is to assume that foreign investments carry country-specific or project-specific risk. These unsystematic (idiosyncratic) sources of risk are not priced, as they can be diversified away. In standard finance models, only systematic (market) risk is priced.

There is research supporting this first school of thought. For example, one recent study concluded that

> *"for the vast majority of companies, the domestic market factor contains all the information that is relevant to pricing assets internationally. For analyzing U.S. companies in particular, practitioners can generally rely on the domestic CAPM for computing the cost of equity capital."*[1]

Weyerhaeuser's WACC is proprietary information, but we can get an approximate range from other sources. In New Zealand, forest valuers are surveyed about what discount rate they use to estimate the market value of a forest. Their average discount rate is 8.3% (per annum). In addition, the average discount rate implicit in the sale prices of New Zealand forests is 10.5% for large forests (>10,000 hectares).[2] Estimates of WACC for the paper industry are in the range of 12.2-12.9%.[3] In the case, Prolman suggests using 8.5% as a first estimate for Weyerhaeuser's domestic cost of capital.

The second school of thought says that it is appropriate to add a country-specific risk premium to the discount rate the firm uses for domestic projects. This can be justified by assuming that world asset markets are not fully integrated and that there is a systematic risk associated with all the securities of a country, or that investors in the firm are unable to fully diversify away unsystematic risks.

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[1] Kees G. Koedijk and Mathiis A van Dijk, "Global Risk Factors and the Cost of Capital," Financial Analysts Journal 60/2, Mar/Apr 2004.
[2] "Discount rates used for forest valuation – results of 2003 survey," New Zealand Journal of Forestry, Nov. 2003.
[3] Robert S. Harris et al., "Divisional Cost-of-Capital Estimation for Multi-Industry Firms," Financial Management, Summer 1989.

It is intuitively appealing to treat foreign investment as riskier than domestic investment. In fact, a 2003 survey of U.S. multinational firms found that *"seventy-eight percent responded that foreign investments, as a general rule, should carry higher hurdle rates."*[4]

The country risk premium is often measured as the difference between the yield on a risk-free investment (government bond) in a country like the U.S. and the yield on a similar security in the other country. Another approach is to specify a multi-factor Capital Asset Pricing Model (CAPM), with both a beta for the world market and a beta for the country's market. The country risk premium is then the country beta times the excess return of the country market portfolio (i.e., quantity of risk times price of risk).

In reviewing a variety of studies, we found estimated country risk premia in the following ranges (all per annum):

| | |
|---|---|
| Australia | 0.0 – 3.5% |
| Brazil | 0.5 – 8.5% |
| Chile | 0.3 – 4.6% |
| Uruguay | 1.4 – 9.3% |

[4] Stanley Block, "Divisional Cost of Capital: A Study of Its Use by Major U.S. Firms," The Engineering Economist, Vol. 48/4, 2003.