

World Resources Institute
Annual Carbon Dioxide (CO₂) Inventory Report
Fiscal Year 2002

June 2003

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SUMMARY

This report describes WRI's fiscal year 2002 CO₂ inventory in detail including how data was gathered and calculations made. It compares our 2002 emissions with previous years, describes challenges we have encountered, our outreach activities and outlines steps that we are pursuing in 2003 to reduce our emissions.

WRI's CO₂ emissions in fiscal year 2002 were 1,306 metric tons, a 3.5% reduction over 2001. Our CO₂ inventory includes emissions from purchased electricity, air travel, employee commuting and paper use. Our two most significant emissions sources were purchased electricity (42%) and air travel (40%). Although air travel emissions increased by almost 12% between 2000 and 2001, they have now fallen to 1% below 2000 levels. Electricity emissions have been increasing since 2000. The increase between 2000 and 2001 was 16.7% and between 2001 and 2002, it was 6.4%. They are now 24% above 2000 levels.

The information contained in this report, as well as the calculations, are also available on WRI's website and SafeClimate.net. For more information about WRI's CO₂ commitment, contact Samantha Putt del Pino at 202-729-7660, sam@wri.org or Pankaj Bhatia at 202-729-7629, pankaj@wri.org.

Introduction

In 1999, WRI committed to reduce its impact on climate change by reducing its carbon dioxide (CO₂) emissions to net zero by 2005. To track our emissions and performance, we conduct a CO₂ inventory each year. The inventory follows the guidance in *Working 9 to 5 on Climate Change: An Office Guide*, which is consistent with the Greenhouse Gas Protocol (GHG Protocol). To download a copy of these standards, visit www.safeclimate.net or www.ghgprotocol.org. This report details our emissions and performance as of the end of fiscal year 2002.

Overview of accounting methodology

Organizational boundary: WRI has only one office which is located in Washington, DC. Therefore, this office is the only location included in WRI's CO₂ inventory.

Operational boundary: WRI's inventory includes emissions from electricity consumption, business air travel, use of paper and employee commuting. These emissions are further categorized into the following "scopes" as defined by the GHG Protocol:

- Scope 1 (direct emissions from sources that are owned/controlled by WRI such as combustion of fuel, process, or fugitive emissions)
 - WRI has no Scope 1 emissions
- Scope 2 (indirect emissions resulting from the generation of purchased electricity, steam or heat)
 - Consumption of purchased electricity (purchased electricity is the only source of energy in the building WRI occupies)
- Scope 3 (all other indirect emissions)
 - Business air travel by staff if booked through WRI (via travel agency or other sources)
 - Business air travel by partners/consultants (booked through WRI's travel agency)
 - Use of paper, including office paper, publications and checks
 - Employee commuting

The following emissions sources are not currently included in WRI's inventory:

- Transmission and distribution losses (electricity)
- Business car or train travel
- Business air travel by WRI employees, partners and consultants when the travel is not booked through WRI (for example if the travel is arranged by a partner)
- Business travel by WRI partners and consultants when the travel is booked by WRI but WRI's travel agency is not used
- Shipping/courier services
- WRI's operational boundary includes only CO₂ emissions but we are considering adding use of HFCs (Hydrofluorocarbons) in the building and WRI's refrigeration and air-conditioning equipment since this is a common source for many offices.

Base year: WRI selected 1990 for its base year to mirror what the U.S. requirements would have been had it ratified the Kyoto Protocol. The major challenge with this has been that data from 1990 is largely incomplete making comparisons against this base year less meaningful.

The most meaningful comparisons are those made against recent years for which more accurate data is available.

Emissions adjustments: As our knowledge and experience in inventory development grows, we may develop improved calculation methodologies and tools. When this happens, previous years reported emissions are adjusted according to the new methodology. Adjustments are also made when emissions factors are published that are more up-to-date than those that were available at the time the original calculations were made. Since published emissions factors are often a year or more behind, it will likely be necessary to make inventory adjustments each year. These adjustments allow our emissions accounting to be as accurate and consistent from year to year as possible.

Calculation methodology: The formula used for all CO₂ emissions in WRI's inventory is:

$$\boxed{\text{Activity data}} \times \boxed{\text{Emissions factor}} = \boxed{\text{CO}_2 \text{ emissions}}$$

Activity data = quantification of an activity of emissions source e.g. air miles traveled, kWh of electricity used, etc.

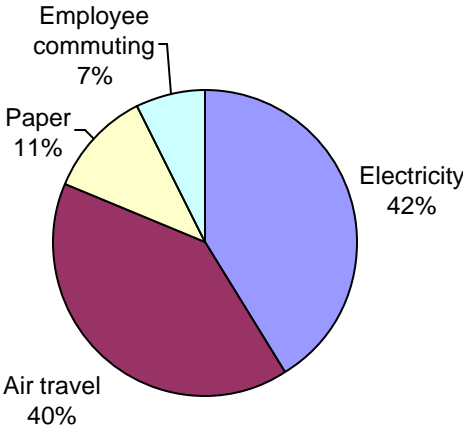
Emissions factor = A factor relating activity data and absolute emissions. The source-specific or published emissions factor data is used to convert activity data to an emissions value.

Our emissions for fiscal year 2002

WRI's total emissions for fiscal year 2002 were as follows. The activity data and emissions factors used are detailed in Appendix I.

SCOPE	QUANTITY (SOURCE)
SCOPE 1	0 metric tons of CO ₂
Subtotal	0 metric tons of CO₂
SCOPE 2	535 metric tons of CO ₂ (from purchased electricity)
Subtotal	535 metric tons of CO₂
SCOPE 3	529 metric tons of CO ₂ (from business air travel)
	148 metric tons of CO ₂ (from paper)
	94 metric tons of CO ₂ (from employee commuting)
Subtotal	771 metric tons of CO₂
TOTAL CO₂ EMISSIONS FOR FISCAL YEAR 2002	1,306 metric tons of CO₂

WRI's Estimated CO₂ Emissions, FY2002



Adjusted emissions

Reported emissions for 1998, 1999, 2000 and 2001 have been adjusted to account for the following improved methodologies and emissions factors. The adjusted emissions are detailed in Appendix II:

- Air travel: WRI developed a methodology to categorize air miles traveled by short (less than 281 miles/452 km), medium (between 281 miles/452 km and 994 miles/1600 km) and

long flights (more than 994 miles/1600 km) instead of short and long flights only. A new emissions factor for medium flights was derived using the available emissions factors for short and long flights.

- Rail travel: New emissions factors are available therefore our employee commuting calculations have been adjusted.
- Electricity: Based on GHG Protocol guidance (see Appendix III), we have traditionally used utility-specific emissions factors which we obtain from the EPA's E-grid database. However, we recently discovered that E-grid database historical data has been adjusted to reflect the utility's (PEPCO) current power plant ownership. Since PEPCO deregulated in 2001 and sold most of its power plants, these historical emissions factors are not representative of PEPCO's actual emissions history. Further, it is not possible at this time to ascertain the source or quantity of energy PEPCO procured from third parties after it sold its plants. Following GHG Protocol guidance, we have therefore adjusted our inventory using power pool emissions factors. Since the DC electric market is now deregulated, it will be necessary to use power pool emissions factors unless more specific data for the area becomes available.

The result of these adjustments is that our emissions reductions over time are greater than originally calculated.

Performance over time (2000 – 2002)

Since activity data for 1990, our base year, is largely incomplete, comparisons against this year have less meaning. The most relevant comparisons are those drawn against recent years (2000 – 2002) for which we have obtained more reliable and complete information. Therefore, the emissions performance described below compares year 2002 emissions with year 2000 emissions.

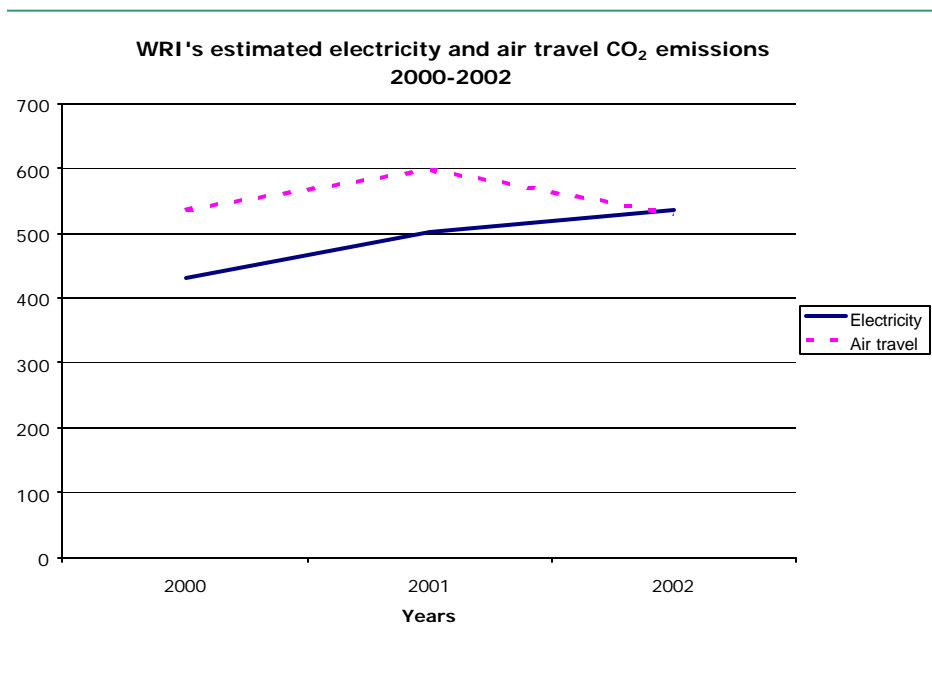
WRI's overall emissions have decreased by about 9% since 2000. Variances in emissions from air travel and electricity are described below as these represent WRI's two most significant sources of emissions.

Air travel: WRI's air travel pattern has remained fairly constant since 2000. About 1% of flights are short flights, 9% - 11% are medium flights and 88% - 90% are long flights. Total miles traveled increased by almost 10% between 2000 and 2001 but decreased by about 12% between 2001 and 2002. This decrease in travel could be due in part to the economic downturn of the past year.

Electricity: The greatest increase in our emissions is from purchased electricity which has risen over 24% since 2000. Given that WRI's office is already highly energy-efficient, we would expect our electricity emissions to remain more or less constant. However, WRI's office space is not separately metered, so we must estimate our electricity use based on the ratio of the building's electricity use to the space occupied by WRI. Overall electricity use in the building has increased significantly each year thus WRI's share of emissions has proportionately risen. The primary cause of the increase is that a large tenant has required increased cooling in their offices around the clock during the summer months. The building's air conditioning is usually switched off overnight and on weekends unless requested otherwise by a tenant. The other contribution to increased use of electricity in the building could be from higher occupancy

levels, though the building has been at 100 percent occupancy for the past year. We will adjust our calculations in 2003 to factor in the building's occupancy rate.

The chart below illustrates the trends in WRI's air travel and electricity use emissions over time.



Offsets

WRI's goal is to achieve zero net emissions by 2005. To achieve this goal, we need to purchase offsets¹. WRI purchased offsets for its 2000 and 2001 emissions based on emissions data available at the time, thus achieving our goal early. Now that improved methodologies have been developed and newer emissions factors are available, WRI has made corresponding adjustments to previous calculations as described in the previous section. As a result, our historic emissions have decreased and we have a surplus of offsets. The following tables detail our offset accounting.

¹ Offsets are reduction projects that occur outside the boundaries of the corporate inventory. They are reductions of direct or indirect emissions that occur outside the organizational and operational boundaries of the reporting company and occur as a result of projects that reduce GHG emissions or activities that promote carbon sequestration.

Offsets balance table: Fiscal year 2000

Offsets carried forward	Emissions calculated at time of purchase	Offsets purchased	Adjusted emissions	Offsets surplus/deficit (adjusted emissions minus offsets purchased)
0	2,011	2,011	1,436	575
Total offset surplus/deficit (surplus/deficit plus offsets carried forward)				575

Offsets balance table: Fiscal year 2001

Offsets carried forward	Emissions calculated at time of purchase	Offsets purchased	Adjusted emissions	Offsets surplus/deficit (adjusted emissions minus offsets purchased)
575	1,947	1,947	1,353	594
Total offset surplus/deficit (surplus/deficit plus offsets carried forward)				1,169

Issues

There are three main issues that have recently emerged in pursuit of our CO₂ commitment that need to be addressed: base year adjustment, how to pay for our annual offset purchase and offset accounting.

Base year adjustment

As previously discussed, our 1990 base year is less meaningful because activity data for that year is incomplete. In *Working 9 to 5 on Climate Change*, we recommend that organizations select a base year for which activity data is complete and accurate, so that comparisons drawn against the base year will be relevant. To be consistent with this guidance, we recommend that WRI adjust its base year to the year 2000 which is the nearest historical year for which complete and reliable activity data is available for all of our emissions sources.

Annual offset purchase

At the end of each fiscal year, a complete accounting is made of our CO₂ emissions. Once our emissions have been calculated, double-checked and reported, we then explore offset options for our emissions. This typically means that we are not ready to make an offset purchase until at least six months, and sometimes more into the following fiscal year. As a result, programs are often faced with an unplanned offset expense during the last quarter of the year when available funds are frequently at their lowest. We propose two options to address this issue:

- 1) Estimate offset costs in advance at the beginning of each fiscal year that programs can build into their annual budgets. This expense would be based on previous years' offset

expenses. The charge would be reconciled and adjusted when actual offset expenses are accrued. The advantage with this system is that it is relatively simple and programs would not be caught “off-guard” by their annual offset expense. The disadvantage is that the carbon consequences of activities would still only be factored in on an annual, instead of a more frequent basis.

- 2) Impose a “tax” on carbon-intensive activities such as air travel. This would result in the offset expense being distributed more proportionately to the source of emissions and programs would realize the carbon cost of their activities on a more daily basis. This would help improve awareness of our CO₂ commitment across the Institute and is consistent with the “polluter pays” principle. The disadvantage is that given the number of projects at WRI, it could be complicated to set-up a system that is not overly onerous and does not cost significant staff time to establish.

These and other alternatives will be explored during 2003 so that a new system can be implemented at the beginning of fiscal year 2004.

Offset Accounting

A number of adjustments to our inventory this year based on improved methodologies and new emissions factors have resulted in a significant offsets surplus as described in the offsets balance tables. Future adjustments could result in an offsets deficit. For example, the IPCC has recognized in one of its papers² that GHG emissions from air travel could be at a minimum two times greater than currently acknowledged. The IPCC has not yet revised its emissions factors for air travel based on this thinking, but if it did the impact on WRI’s offsets balance would be significant since air travel has accounted for between 37 and 44 percent of WRI’s inventory from 2000 to 2002. We do not have any clear guidance on how much of our offsets surplus should be used versus banked to help cushion against future adjustments, or whether banked offsets should be used within a defined time frame. We will convene a group of staff to consider this issue and provide a recommendation.

Engaging other organizations in climate protection

A key element of WRI’s CO₂ reduction commitment is to help other similar organizations calculate emissions, set targets and achieve emissions reductions. Guidance and tools were developed and enhanced in 2002 to support these outreach activities. Successes included:

- 1) *Working 9 to 5 on Climate Change: An Office Guide*. Completed in 2002 and published in early 2003, this publication captures the lessons learned through our experiences with our CO₂ reduction commitment and lays out practical step-by-step guidance to help other office-based organizations calculate and reduce their emissions.
- 2) New tools. Accompanying *Working 9 to 5 on Climate Change* is a set of calculation tools specially adapted for office-based organizations from the GHG Protocol calculation tools. The tools, which are also being used for WRI’s internal CO₂ inventory, are easy-to-use and include features to help new users avoid potential errors such as inconsistency between activity data and emissions factors. The tools can also be customized to suit the needs of individual offices.

² Aviation and the Global Atmosphere, IPCC, 1999. www.grida.no/climate/ipcc/aviation/index.htm, last viewed June 26, 2003.

- 3) Green power. We began work with WRI's Green Power Market Development Group to engage DC metro area NGOs and building owners on green power, helping them to understand the benefits of green power and how they can obtain it. The first steps towards a purchase of green power for WRI were also taken in 2002. This work has continued into 2003.

Plans for Fiscal Year 2003

The project activities being undertaken in fiscal year 2003 include:

- Improve Institute-wide awareness about WRI's CO₂ reduction commitment, including simple actions staff can take each day to reduce emissions.
- Meet with building tenants to promote *Working 9 to 5 on Climate Change: An Office Guide* and discuss building-wide emissions reduction activities.
- Pursue a building or WRI purchase of green power or green tags.
- Engage and assist other office-based organizations on implementing an emissions measurement and reduction plan, including hosting a workshop.
- Engage DC metro area organizations and building owners on green power.
- Explore alternative methods for distributing the costs of offsets across the Institute.

APPENDIX I

Our 2002 CO₂ Emissions

Scope 2

- **Electricity:** WRI occupies one complete floor and a small portion of another floor in an eight story building. This space is not separately metered, therefore, annual electricity use by WRI must be estimated. The formula used is:

$$\boxed{\text{(area of WRI space } \div \text{ total building area)}} \times \boxed{\text{Total building usage of electricity}} = \boxed{\text{WRI's estimated electricity use}}$$

Annual data on the building's electricity use is supplied by the property managers.




Scope 2	Source of emissions	Activity data	Emissions factor	Metric tons of CO ₂ *
(electricity)	Purchased electricity	1,075,448 kWh	1.1 lbs CO ₂ /kWh	535
Total				535 tCO₂

*Appropriate unit conversions are applied to achieve data in metric tons of CO₂.
Emissions factor source: U.S. EPA's E-Grid database, MAAC (owner), 2000 data

Scope 3



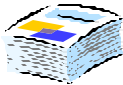
- **Business Air Travel:** Two methods are used to obtain activity data for air miles traveled:
 - 1) Air miles for travel booked through WRI's travel agency are automatically compiled and are available for download through the travel agency's web site.
 - 2) Staff are required to complete a travel authorization form for each trip taken. A section has been added to this form for staff to complete with information about miles traveled if the trip is not booked through WRI's travel agency.

Since emissions per mile are higher for short flights than for long flights, data on air miles traveled is further broken down in to short, medium and long flights as defined in the GHG Protocol mobile combustion tool and a unique emissions factor is applied to each.

		Source of emissions	Activity data	Emissions factor	Metric tons of CO ₂ *
 Scope 3  (air travel) 		Air travel, short flights	56,150 km	0.18 kg of CO ₂ /km	10
		Air travel, medium flights	451,223 km	0.13 kg of CO ₂ /km	57
		Air travel, long flights	4,198,290 km	0.11 kg of CO ₂ /km	462
Total					529 tCO₂

*Appropriate unit conversions are applied to achieve data in metric tons of CO₂.
 Emissions factor source: short and long flights, UK DEFRA, medium flights, derived from UK DEFRA







- Paper:** Emissions from paper result from the manufacturing and disposal processes, not the use of the paper itself. Activity data is collected in the following way:
 - Office paper: WRI's office manager supplies information, obtained from vendor invoices, about annual use of office paper.
 - Checks: WRI's staff accountant provides information about the number of checks written each year.
 - Publications paper: Staff are required to provide WRI's marketing manager with a copy of each publication (includes reports, brochures, invitations, postcards, etc.) produced by their program along with the quantity included in the print run and the number of partners associated with the publication. WRI's marketing manager uses this information to calculate the amount of paper used.

		Source of emissions	Activity data	Emissions factor	Metric tons of CO ₂ *
Scope 3 (paper)		Office paper	13,588 lbs	9,863 lbs of CO ₂ /ton	28
		Checks	750 lbs	11,571 lbs of CO ₂ /ton	2
		Publications	56,114 lb	10,249 lbs of CO ₂ /ton	118
Total					148 tCO₂

*Appropriate unit conversions are applied to achieve data in metric tons of CO₂.
 Emissions factor source: Environmental Defense's Paper Task Force, 1995, 2002.

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- **Employee Commuting:** WRI surveys its staff once each year to obtain information about average commuting habits. The information gathered is used to extrapolate average annual commuter miles traveled by all staff via various modes of transport.

		Source of emissions	Activity data	Emissions factor	Metric tons of CO ₂ *
Scope 3 (employee commuting)		Bus	20,806 miles	0.30 kg of CO ₂ /mile	6
		Metro	225,060 miles	0.16 kg of CO ₂ /mile	36
		Amtrak	25,839 miles	0.19 kg of CO ₂ /mile	5
		Commuter rail	154,186 miles	0.16 kg of CO ₂ /mile	25
		Car	2,369 gallons of gasoline	8.9 kg of CO ₂ /gallon	21
		Walk/bike	34,267 miles	0	0.00
				Total	94 tCO₂

*Appropriate unit conversions are applied to achieve data in metric tons of CO₂.

Emissions factor sources:

- Car travel, 8.87 kg of CO₂ per gallon (source: Energy Information Administration, *Emissions of Greenhouse Gasses in the United States 2000*, Appendix B, Table B1)
- Metro travel, 0.16 kg of CO₂ per passenger mile (source: Transportation Energy Data Book, Edition 22-2002, Tables 2.11, A.15)
- Commuter rail, 0.16 kg of CO₂ per passenger mile (source: Transportation Energy Data Book, Edition 22, 2002, Tables 2.11, A14)
- Intercity rail, 0.19 kg of CO₂ per passenger mile (source: Transportation Energy Data Book, Edition 22, 2002, Tables 2.11, A16)
- Bus travel, 0.30 kg of CO₂ per passenger mile (source: Bureau of Transportation, National Transportation Statistics, 2000)

APPENDIX II

Adjusted emissions, 1990 – 2002

After adjustments to account for improved accounting methodologies and more up-to-date emissions factors, WRI's adjusted emissions from 1990 to 2002 are as follows:

All emissions shown in metric tons of CO₂						
	1990 (base year)	1998	1999	2000	2001	2002
Scope 2						
<i>Imported electricity</i>	456	417	450	431	503	535
Scope 3						
<i>Air travel</i>	356	432	538	535	598	529
<i>Paper</i>	282	318	318	372	148	148
<i>Employee commuting</i>	---	---	---	98	104	94
Total	1,094	1,167	1,306	1,436	1,353	1,306

APPENDIX III

The chart below illustrates GHG Protocol guidance on selecting an emissions factor for Scope 2 (purchased electricity). The most relevant, up-to-date and accurate emissions factor should be applied:

