CALCULATING THE WORLD BANK FOOTPRINT: THE WWF METHODOLOGY

Calculating the World Bank's carbon footprint is a complex task because of the diversity of activities it undertakes. World Bank support consists of a spectrum of services from offering advice to direct project lending. To calculate carbon emissions associated with an activity it is necessary to identify specific increases in emissions as a result of an action. Therefore where World Bank involvement consists of financial support for a power plant, for example, the determination of emissions is relatively straightforward. In cases such as technical support for a programme of market reforms which may lead to undefined increases in energy generation, it may be impossible to meaningfully calculate resulting emissions, at the very least not until several years after the programme is complete. To make the task achievable we have placed certain parameters on the calculation of the footprint.

Data and methodology

For the purposes of this project we considered activities involving all World Bank Group members (IFC, MIGA and IBRD/IDA). The footprint takes into account emissions from fossil fuel-based extraction, production and energy generation projects. It does not include other emissions-intensive sectors, notably transport and certain forms of infrastructure and industry, or additional emissions from fossil fuel production, such as gas flaring. Furthermore, within World Bank financing for fossil fuel extraction and energy production there are a number of projects for which emissions are very difficult to estimate based on the data made publicly available by the Bank. In particular, World Bank advice and financial support for liberalisation in the energy and mining sectors often explicitly intends that such reforms will increase overall output in these sectors. Given that emissions resulting from such increases can only be assessed afterwards and are not necessarily monitored by the Bank they were not included in our assessment.

Finally, even where World Bank financing is for specific fossil fuel projects, rather than related programmatic work, information on the outputs of these projects is not always provided or publicly available. For example, World Bank support for oil and gas exploration is likely to lead to eventual extraction and end use, which will result in large quantities of emissions if the extraction is significant. However, again it is very difficult to determine these at the time of initial project approval. In addition, the rules of commercial confidentiality prevent details of the results of many exploration and expansion activities from being published, owing to the effect it would have on the market. Although as a lender the Bank has access to this information, it currently does not disclose this publicly. As a result, many projects – more than 20 between 2005 and 2008 alone – could not be included in the assessment of total emissions for which the World Bank is responsible.

Finally, supportive infrastructure projects in the extraction and power sectors, such as transmission lines for electricity, are not included in the footprint. Although these do not necessarily have measurable emissions, such projects do reinforce certain carbon intensive energy systems. Overall, the significant number of omissions from the calculations render the footprint an extremely conservative estimate of total emissions supported by World Bank funding.

Data collection

We calculated the footprint of World Bank energy sector investments between 1997 and 2008. Project data between 1997 and 2004 was based on information compiled by the Sustainable Energy and Economy Network (SEEN), which performed a similar exercise to calculate the Bank's carbon footprint[i]. WWF collated and analysed similar project data published by the World

Bank for projects up to and including May 2008. To calculate the emissions resulting from these projects we used conversion factors recommended by the IPCC which are listed below. Because the SEEN emissions data was calculated before the IPCC methodology was available, we recalibrated the SEEN data based on these factors, so that the full data set is consistent.

Calculation methodology

We calculated the footprint in terms of carbon dioxide (CO_2) emissions rather than carbon equivalent (an alternative measure that is often used)[ii]. We only assessed the CO_2 resulting from a project. Other greenhouse gases, which typically make up a very small proportion of emissions from fossil fuel combustion, but have higher global warming potential, are not included.

In order to calculate the end use, or indirect, emissions of the products from fossil fuel extraction the methodology assumes, albeit simplistically, that all fossil fuels extracted will be used for stationary combustion in the energy industry. It also presumes that all reserves activated with World Bank assistance will ultimately be extracted and burned. Given that this calculation is for an institution rather than a country, all end use emissions are calculated – not just those released within the borders of the project's host country. The methodology adopts an IPCC Tier 1 approach. In its guidance for countries to calculate their emissions the IPCC offers three options (Tiers) for methodologies depending on the quality of information available. The Tier 1 approach is the most simplistic. This provides standards emissions factors for fuels that do not account for the country origin of the fuel or the technology that will be used to process or consume these fuels. Tiers 2 and 3 are progressively more specific. Fossil fuels extracted in different geographical locations are not identical. The emissions they produce when burned are therefore slightly different. In addition the type of technology, for example combined cycle versus simple cycle power plants, will also have an effect on emissions generated. In terms of the World Bank calculation, accumulating all the data for fuel origin and technologies involved would be incredibly difficult. Therefore we have taken the Tier 1 approach. This approach is unlikely to have a significant impact on our data given the wide variety of locations and technology types the Bank supports. The Tier 1 'average' approach is therefore probably fitting for this task.

Emissions conversion factors taken from IPCC 2006 Guidelines for National Greenhouse Gas Inventories.

http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

TABLE 2.2
DEFAULT EMISSION FACTORS FOR STATIONARY COMBUSTION IN THE ENERGY INDUSTRIES
(kg of greenhouse gas per TJ on a Net Calorific Basis)

Fuel		CO_2			CH_4			N_2O		
		Default Emission Factor	Lower	Upper	Default Emission Factor	Lower	Upper	Default Emission Factor	Lower	Upper
Crude Oil		73 300	71 100	75 500	r 3	1	10	0.6	0.2	2
Orimulsion		r 77 000	69 300	85 400	r 3	1	10	0.6	0.2	2
Natural Gas Liquids		r 64 200	58 300	70 400	r 3	1	10	0.6	0.2	2
Gasoline	Motor Gasoline	r 69 300	67 500	73 000	r 3	1	10	0.6	0.2	2
	Aviation Gasoline	r 70 000	67 500	73 000	r 3	1	10	0.6	0.2	2
	Jet Gasoline	r 70 000	67 500	73 000	r 3	1	10	0.6	0.2	2
Jet Kerosene		r 71 500	69 700	74 400	r 3	1	10	0.6	0.2	2
Other Kerosene		71 900	70 800	73 700	r 3	1	10	0.6	0.2	2
Shale Oil		73 300	67 800	79 200	r 3	1	10	0.6	0.2	2
Gas/Diesel Oil		74 100	72 600	74 800	r 3	1	10	0.6	0.2	2
Residual Fuel Oil		77 400	75 500	78 800	r 3	1	10	0.6	0.2	2
Liquefied Petroleum Gases		63 100	61 600	65 600	r 1	0.3	3	0.1	0.03	0.3
Ethane		61 600	56 500	68 600	r 1	0.3	3	0.1	0.03	0.3
Naphtha		73 300	69 300	76 300	r 3	1	10	0.6	0.2	2
Bitumen		80 700	73 000	89 900	r 3	1	10	0.6	0.2	2
Lubricants		73 300	71 900	75 200	r 3	1	10	0.6	0.2	2
Petroleum Coke		r 97 500	82 900	115 000	r 3	1	10	0.6	0.2	2
Refinery Feedstocks		73 300	68 900	76 600	r 3	1	10	0.6	0.2	2
Other Oil	Refinery Gas	n 57 600	48 200	69 000	r 1	0.3	3	0.1	0.03	0.3
	Paraffin Waxes	73 300	72 200	74 400	r 3	1	10	0.6	0.2	2
	White Spirit and SBP	73 300	72 200	74 400	r 3	1	10	0.6	0.2	2
	Other Petroleum Products	73 300	72 200	74 400	r 3	1	10	0.6	0.2	2
Anthracite		98 300	94 600	101 000	1	0.3	3	r 1.5	0.5	5
Coking Coal		94 600	87 300	101 000	1	0.3	3	r 1.5	0.5	5
Other Bituminous Coal		94 600	89 500	99 700	1	0.3	3	r 1.5	0.5	5
Sub-Bituminous Coal		96 100	92 800	100 000	1	0.3	3	r 1.5	0.5	5
Lignite		101 000	90 900	115 000	1	0.3	3	r 1.5	0.5	5
Oil Shale and Tar Sands		107 000	90 200	125 000	1	0.3	3	r 1.5	0.5	5
Brown Coal Briquettes		97 500	87 300	109 000	n 1	0.3	3	r 1.5	0.5	5
Patent Fuel		97 500	87 300	109 000	1	0.3	3	n 1.5	0.5	5
Coke	Coke Oven Coke and Lignite Coke	r 107 000	95 700	119 000	1	0.3	3	r 1.5	0.5	5
	Gas Coke	r 107 000	95 700	119 000	r 1	0.3	3	0.1	0.03	0.3
Coal Tar		n 80 700	68 200	95 300	n 1	0.3	3	r 1.5	0.5	5
Derived Gases	Gas Works Gas	n 44 400	37 300	54 100	n 1	0.3	3	0.1	0.03	0.3
	Coke Oven Gas	n 44 400	37 300	54 100	r 1	0.3	3	0.1	0.03	0.3
	Blast Furnace Gas	n 260 000	219 000	308 000	r 1	0.3	3	0.1	0.03	0.3
	Oxygen Steel Furnace Gas	n 182 000	145 000	202 000	r 1	0.3	3	0.1	0.03	0.3
Natural Gas		56 100	54 300	58 300	1	0.3	3	0.1	0.03	0.3

TABLE 2.2 (CONTINUED)
DEFAULT EMISSION FACTORS FOR STATIONARY COMBUSTION IN THE ENERGY INDUSTRIES
(kg of greenhouse gas per TJ on a Net Calorific Basis)

Fuel		CO_2			CH_4			N_2O		
		Default Emission Factor	Lower	Upper	Default Emission Factor	Lower	Upper	Default Emission Factor	Lower	Upper
Municipal Wastes (non-biomass fraction)		n 91 700	73 300	121 000	30	10	100	4	1.5	15
Industrial Wastes		n 143 000	110 000	183 000	30	10	100	4	1.5	15
Waste Oils		n 73 300	72 200	74 400	30	10	100	4	1.5	15
Peat		106 000	100 000	108 000	n 1	0.3	3	n 1.5	0.5	5
Solid Biofuels	Wood / Wood Waste	n 112 000	95 000	132 000	30	10	100	4	1.5	15
	Sulphite lyes (Black Liquor)*	n 95 300	80 700	110 000	n 3	1	18	n 2	1	21
	Other Primary Solid Biomass	n 100 000	84 700	117 000	30	10	100	4	1.5	15
	Charcoal	n 112 000	95 000	132 000	200	70	600	4	1.5	15
Liquid Biofuels	Biogasoline	n 70 800	59 800	84 300	r 3	1	10	0.6	0.2	2
	Biodiesels	n 70 800	59 800	84 300	r 3	1	10	0.6	0.2	2
	Other Liquid Biofuels	n 79 600	67 100	95 300	r 3	1	10	0.6	0.2	2
Gas Biomass	Landfill Gas	n 54 600	46 200	66 000	r 1	0.3	3	0.1	0.03	0.3
	Sludge Gas	n 54 600	46 200	66 000	r 1	0.3	3	0.1	0.03	0.3
	Other Biogas	n 54 600	46 200	66 000	r 1	0.3	3	0.1	0.03	0.3
Other non-fossil fuels	Municipal Wastes (biomass fraction)	n 100 000	84 700	117 000	30	10	100	4	1.5	15

(a) Includes the biomass-derived CO_2 emitted from the black liquor combustion unit and the biomass-derived CO_2 emitted from the kraft mill lime kiln.
n indicates a new emission factor which was not present in the 1996 Guidelines
r indicates an emission factor that has been revised since the 1996 Guidelines

The assumption that all extracted products will be used in stationary combustion is certainly simplistic, particularly in the case of oil, which is predominantly used for transportation. However, data on final use from extraction projects is rarely available. As the relative emissions between stationary and mobile combustion are not substantially different[iii] this approach in fact admits fewer assumptions than attempting to estimate proportions of oil products that will be used in different forms of transport, particularly given the higher global warming potential of gases burned in air transport at high altitudes.

Additional assumptions built into the methodology are that projects operate at full capacity for a lifetime of 20 years, beginning at the time financing was approved. While a full capacity approach would overestimate the emissions of a project, the 20-year lifetime is extremely conservative (for example, the BTC oil pipeline has an estimated lifetime of 40 years). Thus, on balance, the calculation remains reasonably conservative. Where data is provided detailing a shorter lifetime of projects, or total reserves are stated, the calculation is done on this rather than a 20-year lifetime basis.

In any one project, a number of financial institutions may be involved. It is difficult, if not impossible, to determine which portion of the financing was the catalyst for the project. World Bank support, however, is often cited as important for attracting other forms of public and private finance for a project. For its footprint calculations we understand that the World Bank is adopting the approach that its financing is the catalyst for projects, and thus plans to attribute 100% of the emissions of any project to the World Bank's footprint, irrespective of the proportion of World Bank financing involved. WWF has therefore taken the same stance in our calculations. Furthermore, while World Bank institutions offer different forms of support (loans, grants, guarantees), we have treated all financing as equivalent, as all are assumed to be critical catalysts for any project.

It is possible – and there are several examples in the data set – for extraction projects financed by the Bank to provide the raw material for power generation projects that also have World Bank involvement. We have therefore excluded power generation projects where there is a likelihood that the fuel supply will have come from another World Bank project, to avoid double counting.

Double counting is also a potential problem where the Bank has provided additional financing facilities for the same project in subsequent years. Unless this has been for expansion of capacity, the emissions from these projects have been excluded so that emissions are only attributed once. Where more than one institution has provided support to a project, the emissions have been attributed to the institution with the largest proportion of financing.

We have used financial years instead of annual years, to ensure comparability with financing figures.

Example Calculations

Below are two example calculations to demonstrate the method used to calculate emission from the data provided by the World Bank. The conversion units used were taken from the International Energy Agency 2005 Statistics Manual and are listed below the calculations.

Example 1:

FY08 - India - Tata Mega Ultra 4000MW coal-fired power plant

MW (capacity per hr)	4000
GW (/1000)	4
TJ (*3.6) (see IEA unit conversions)	14.4
CO2 Emissions in kg/TJ (*IPCC factor 94600)	1362240
Emissions in tonnes (/1000)	1362.24
Emissions/day (*24)	32693.76
Emissions/yr (*365)	11933222.4
Emissions/20yr lifetime (*20)	238664448
Lifetime emissions in Megatonnes (/1000000)	238.664448
WWF emissions total (rounded to nearest Mt)	239

Example 2:

FY05 – Russian Federation – Novatek Gas – increase production by 9 billion cubic metres/ year

Cubic Metres (capacity per year)	9000000000
MJ (*37.83) (see m3 to MJ for Russian Gas in IEA unit conversions)	3.4047E+11
TJ (/1000000)	340470
CO2 Emissions in kg/TJ (*IPCC emissions factor 56100)	19100367000
Emissions in tonnes (/1000)	19100367
Emissions/20yr lifetime (*20)	382007340
Lifetime emissions in Megatonnes (/1000000)	382.00734
WWF emissions total (rounded to nearest Mt)	382

Unit conversion factors taken from the IEA Energy Statistics Manual, 2005.

http://www.iea.org/textbase/nppdf/free/2005/statistics_manual.pdf

Table A3.2 • Conversion Equivalents between Units of Volume

To: / From:	gal U.S. multiply by:	gal U.K.	bbl	ft^3	l	m^3
U.S. gallon (gal)	1	0.8327	0.02381	0.1337	3.785	0.0038
U.K. gallon (gal)	1.201	1	0.02859	0.1605	4.546	0.0045
Barrel (bbl)	42.0	34.97	1	5.615	159.0	0.159
Cubic foot (ft^3)	7.48	6.229	0.1781	1	28.3	0.0283
Litre (l)	0.2642	0.220	0.0063	0.0353	1	0.001
Cubic metre (m^3)	264.2	220.0	6.289	35.3147	1 000.0	1

Table A3.3 • Conversion Equivalents between Units of Mass

To: / From:	kg multiply by:	t	lt	st	lb
Kilogramme (kg)	1	0.001	9.84×10^{-4}	1.102×10^{-3}	2.2046
Tonne (t)	1000	1	0.984	1.1023	2204.6
Long ton (lt)	1016	1.016	1	1.120	2240.0
Short ton (st)	907.2	0.9072	0.893	1	2000.0
Pound (lb)	0.454	4.54×10^{-4}	4.46×10^{-4}	5.0×10^{-4}	1

Table A3.4 • Conversion Equivalents between Units of Energy

To: / From:	TJ multiply by:	Gcal	Mtoe	MBtu	GWh
Terajoule (TJ)	1	238.8	2.388×10^{-5}	947.8	0.2778
Gigacalorie	4.1868×10^{-3}	1	10^{-7}	3.968	1.163×10^{-3}
Mtoe*	4.1868×10^{4}	10^{7}	1	3.968×10^{7}	11630
Million Btu	1.0551×10^{-3}	0.252	2.52×10^{-8}	1	2.931×10^{-4}
Gigawatt-hour	3.6	860	8.6×10^{-5}	3412	1

*Million tonnes of oil equivalent.

Table A3.9 • Conversion Factors from Mass or Volume to Heat (Gross Calorific Value)

	LNG		GAS							
			Norway		Netherlands		Russia		Algeria	
To:	MJ	Btu	MT	Btu	MJ	Btu	MJ	Btu	MJ	Btu
From:	multiply by:									
Cubic metre*	40.00	37912	42.51	40290	35.40	33550	37.83	35855	39.17	37125
Kilo-gramme	54.40	51560	52.62	49870	45.19	45.19	42830	54.42	20.56	47920

* at 15°C.

Table A3.11 • Conversion Equivalents between LNG and Natural Gas Units

From: / To:	Metric ton of LNG multiply by:	cm of LNG	Standard cm*
Metric ton of LNG	1	0.948	1360
Cubic metre (cm) of LNG	0.45	1	615
Standard cm*	$7.35*10^{-4}$	$1.626*10^{-3}$	1

*1 Scm = 40 MJ.

Project data and CO2 emissions calculations 2005-2008: WWF collected and calculated

Country	Project Description	Financing Institution	Financial Year of Approval	CO2 Emissions in Mega tonnes (to nearest Mt)
Dominican Republic (Lat Am region)	Basic Energy. 11.5MW Diesel	IFC	FY05	1
Rwanda	Urgent Electricity Rehabilitation. Additional heavy fuel oil thermal generating units, in two stages, totalling to about 10 MW	IBRD/IDA	FY05	0
Russian Fed	Novatek Gas 9 billion cubic metres/year	IFC	FY05	382
Ghana	West Africa Gas Pipeline Company. 200,000 MMBtu/day.	MIGA	FY05	86
Jamaica	Jamaica Energy Partners 49.5 MW barge-mounted oil plant	IFC	FY05	2
Senegal	Kounoune Power. 67.5MW Heavy Fuel Oil power plant	IFC	FY05	3
Oman	MB Petroleum Block 5. 12000 barrels oil/day	IFC	FY05	39
Yemen	Yemen- Power Sector Project. Increase the energy output of the plant by 160 GWh. Heavy Fuel Oil	IBRD/IDA	FY06	1
Bulgaria	AES-3C Maritza East 1 EOOD. 600 MW (net) lignite coal-fired power plant.	MIGA	FY06	38
Egypt	Eg-El Tebbin Power Plant. The proposed project is a 700 MW natural gas power plant	IBRD/IDA	FY06	25
Argentina	Diadema II. 11,500 barrels oil/day	IFC	FY06	37

Turkey	Gas Sector Development. The Corum station will have a capacity of 30 MW and is required in order to enable increased supply from Russia, while the Erzincan station will have 39 MW of compression capacity	IBRD/IDA	FY06	2
Indonesia	ID- Domestic Gas Market Development Project. 550mmcfd (Million cubic feet per day)	IFC	FY06	247
Lat Am Region	Geopark. Exploration and production. 5,000 barrels oil/day	IFC	FY06	16
Lat Am Region	Geopark. Exploration and production. 40 million cubic feet/day gas	IFC	FY06	18
Uganda	Uganda Power Sector Development Project. 50MW Automotive Diesel Oil thermal plant	IBRD/IDA	FY07	2
Indonesia	PT Makmur Sejahtera Wisesa. 60MW coal fired power plant.	IFC	FY07	4
India	Lanco Amarkantak Thermal Power Station. 600MW Coal	IFC	FY07	36
Timor Leste	TP: Energy Services Delivery Project. This will increase power supply capacity by 500 KW. Diesel	IBRD/IDA	FY07	0
Jordan	JO- Ammam East Power Plant. 370MW Gas	IBRD/IDA	FY07	13
India	Petronet. LNG terminals. 7.5 million metric tonnes/annum	IFC	FY07	458
Pakistan	Engro Energy Ltd. 217MW gas plant	IFC	FY07	8
Pakistan	KESC. Karachi Electric Supply Corporation Ltd. 795MW gas generation expansion	IFC	FY07	28
Ecuador	Termoguayas Generation. Power Barges, 150MW, Heavy Fuel Oil	MIGA	FY07	7
Peru	Block Z-1. BPZ Energy Inc. Gas Processing plant. 125 million standard cubic feet per day (MMSCFD)	IFC	FY07	55
China	Liaoning Third Medium cities Infrastructure. 1172MW Coal	IBRD/IDA	FY08	70
India	Tata Mega Ultra Coal Power plant 4000MW	IFC	FY08	239

Chile	CTA. 2x165MW thermal coal/petroleum coke/biomass power units	IFC	FY08	20
Burundi	Multisectoral Water and Electricity Infrastructure Project. Support the operation of the existing thermal generation plant, which will add 5.5 MW capacity to the system during peaking hours, by providing funding to procure diesel fuel for 8 hours per week-day operation over three years.	IBRD/IDA	FY08	0
Peru	Peru LNG. LNG plant. 4.45 Million tonnes/annum	IFC	FY08	272
Cameroon	Kribi. Power development. 150MW Gas power plant	IFC	FY08	5
Cameroon	Kribi. Power development. 86MW Heavy Fuel Oil power plant	IFC	FY08	4
Russian Fed	Vostok - Vostok Energy Ltd. Gas production 46million cubic feet/day	IFC	FY08	213

Project data and CO2 emissions calculations 1997-2005: SEEN collected and calculated – emissions recalibrated by WWF

Country	**Project Description**	**Financing Institution**	**Financial Year of Approval**	**CO2 Emissions in Mega tonnes (to nearest Mt)**
Colombia	Drummond coal mine	MIGA	FY97	357
Algeria	Rhourde Yacoub Block 406A	MIGA	FY97	160
Cameroon	Rio del Rey oil field	IFC	FY97	335
China	Tuoketuo 3,600MW coal-fired power plant	IBRD/IDA	FY97	225
China	Waigaoqao 2,000MW coal-fired power plant	IBRD/IDA	FY97	125
China	Coastal-Wuxi 40MW diesel-fired power plant	MIGA	FY97	2
Hungary	Quick Start 200MW diesel-fired power plant	IBRD/IDA	FY97	9
Kenya	First Energy (150MW diesel-fired) power plants	IBRD/IDA	FY97	7
Senegal	Dakar 50MW gas-fired power plant	IFC	FY97	2

Pakistan	Tapal 126MW oil-fired power plant	MIGA	FY97	6
India	Coal India mining expansion	IBRD/IDA	FY98	3566
Bolivia, Brazil	Bolivia-to-Brazil gas pipeline	MIGA	FY98	446
Morocco	Jorf Lasfar 700MW coal-fired power plant	IBRD/IDA	FY98	37
Albania	Patos Marinza oil field	IFC	FY98	11
Equatorial Guinea	Zafiro offshore field	MIGA	FY98	177
China	Hunan Province 1,300MW coal-fired power plants	IBRD/IDA	FY98	81
China	Yancheng 2,100MW coal-fired power plant	IBRD/IDA	FY98	110
China	Coastal-Suzhou 76MW gas-fired power plant	MIGA	FY98	2
Vietnam	Ba Ria 120MW diesel-fired power plant	IFC	FY98	5
Argentina	Ag. Cajon 354MW gas-fired power plant	MIGA	FY98	12
Bangladesh	Khulna 100MW oil/gas-fired power plant	MIGA	FY98	2
Azerbaijan	Early Oil field and pipeline development	IFC	FY99	371
Georgia	Ninotsminda oil field	IFC	FY99	15
Thailand	EGAT power plants (4,100MW coal and gas)	IBRD/IDA	FY99	196
Yemen	Dabhan 50MW diesel-fired power plant	IBRD/IDA	FY99	2
Chile	GasPacifico pipeline	MIGA	FY99	59
Russia	Bitech - Silur oil field	IFC	FY99	20
Colombia	Harken oil/gas field	IFC	FY99	11
Colombia	Termotasajero 300MW coal-fired power plant	MIGA	FY99	19
China	Coastal-Nanjing 76MW gas/diesel-fired power plant	MIGA	FY99	4
China	Coastal-Guzu 24MW gas-fired power plant	MIGA	FY99	1
India	Astha Power 26MW oil-fired power plant	IFC	FY00	1
Mexico	Rio Bravo 250MW gas-fired power plant	IFC	FY00	9
Indonesia	Petrosea coal, oil & gas extraction	IFC	FY00	39
Brazil	Cabiunas/Campos gas processing plant	MIGA	FY00	233
Papua New Guinea	PNG gas development	IBRD/IDA	FY00	865
Chad, Cameroon	Chad (Doba) oil field, pipeline through Cameroon	IFC	FY00	464
Kazakhstan	Sazankurak oil field	IFC	FY00	64

Mozambique	Eskom/Mozal 850MW coal-fired power plant	MIGA	FY00	50
Dominican Republic	CEPM 50MW diesel-fired power plants	MIGA	FY00	2
Dominican Republic	Coastal Power 150MW gas-fired power plants	MIGA	FY00	5
Mexico	Central Saltillo 250MW gas/oil-fired pp	IFC	FY00	12
India	Sarshatali coal mine	IFC	FY01	194
Egypt	Sidi Krir 682.5MW gas-fired power plant	IFC	FY01	24
Kenya	Embakasi/Ruaraka 104MW power plants	IBRD/IDA	FY01	8
Indonesia	Dianlia coal transportation (Adaro)	IFC	FY01	2,564
Pakistan	Bhit gas field	IFC	FY01	64
Tanzania	Songo Songo pipeline, power plant	IBRD/IDA	FY01	57
Brazil	Barracuda-Caratinga oil field	MIGA	FY01	361
Nigeria	Niger Delta oil - Shell contractors	IFC	FY01	1,789
Russia	East Orenburg oil and gas field (ZAO Stimul)	MIGA	FY01	188
China	Alliant 225MW coal-fired power plants	IFC	FY01	14
Sri Lanka	Asia Power 51MW diesel-fired power plant	IFC	FY01	2
Algeria	Algeria 2,000MW gas-fired power plants	IBRD/IDA	FY01	71
China	Maanshan carbon black plant (4.5 MW oil-fired pp)	IFC	FY01	0
Panama	Bahia las Minas 355MW gas/oil-fired power plant	MIGA	FY01	17
Colombia	Omimex oil fields	IFC	FY02	21
Gabon	Etame Marin oil field	IFC	FY02	27
Kazakhstan	Alibekmola oil fields	IFC	FY02	106
Kazakhstan	Karachaganak oil field	IFC	FY02	3,565
Bulgaria	Maritza East 1 670MW coal-fired power	MIGA	FY02	42
Brazil	Bahia 185MW diesel-fired barge-mounted power	MIGA	FY02	8
Dominican Republic	Punta Cana-Macao 13MW diesel-fired pp	MIGA	FY02	1
Afghanistan	Secondary Cities power (incl. NW Kabul 45MW gas)	IBRD/IDA	FY02	2
Turkey	Ankara (Baymina) 763MW gas-fired power plant	MIGA	FY02	27
Bulgaria	Galata gas field	IFC	FY03	31
Indonesia	PT Saripari Pertiwi Abadi oil services	IFC	FY03	1,987

Venezuela	Acema, La Concepción, Oritupano, Mata oil fields	IFC	FY03	119
Brazil	Queiroz Galvão oil and gas production	IFC	FY03	17
India	Niko Resources oil and gas field	IFC	FY03	144
Brazil	TermoCabo 48MW diesel-fired power	MIGA	FY03	2
Jamaica	JPS 120MW diesel-fired power plant	IFC	FY03	5
Mexico	Rio Bravo III 495MW gas-fired power	IFC	FY03	17
Mexico	Rio Bravo IV 500MW gas-fired power	IFC	FY03	18
Nigeria	Ewekoro 12.5MW gas-fired power plant	MIGA	FY03	0
Vietnam	“Phu My 2.2” 715MW gas-fired power	IFC	FY03	25
Vietnam	“Phu My 3” 717MW gas-fired power	MIGA	FY03	25
Colombia	Carbones del Caribe coal mine, port	IFC	FY04	306
Azerbaijan, Georgia, Turkey	Baku-Tblisi-Ceyhan oil pipeline	IFC	FY04	3,224
Brazil	TermoFortaleza 311MW gas-fired power	IFC	FY04	11
China	Shanxi Antai coke export plant	IFC	FY04	51
Egypt	Nile Delta (Melrose/Merlon) gas development	IFC	FY04	36
India	Cairn Energy oil and gas developments	IFC	FY04	23
Indonesia	Indorama Synthetic 60MW coal-fired cogeneration power plant	IFC	FY04	4
China	China Green power plants (356MW coal; 34MW garbage-fired)	IFC	FY04	22
Brazil	TermoCabo 48MW diesel-fired power	MIGA	FY04	2
Ghana	Takoradi II 330MW oil-fired power plant expansion	IFC	FY04	15
Tanzania	Emergency power supply project (including 18MW diesel, 100MW oil, 76MW gas)	IBRD/IDA	FY04	7
Albania	Vlore 85MW-135MW oil/gas-fired power plant	IBRD/IDA	FY04	3
Bolivia	Gasryg gas pipeline	IFC	FY05	743
Sierra Leone	Power reform (including 30MW Kingtom power plant)	IBRD/IDA	FY05	1

Recalibrating the SEEN data

The SEEN data used emissions factors that pre-date the IPCC methodology used in the study by WWF. We therefore recalibrated the emissions values provided by SEEN according to the new factors used to ensure that the dataset is consistent. SEEN used different factors for extraction projects and power generation projects. Therefore the factors needed to recalibrate are different depending on whether of project was extraction (E) or power (P). For some fuels the IPCC methodology gives a number of factors depending on the sub-type of the fuel. SEEN factors did not differentiate in this way. We have therefore used an average of the different IPCC factors for the fuel type when calculating the recalibration factor for the SEEN data. For more information on the factors used by SEEN and their emissions value for projects please see the SEEN database and methodology http://www.seen.org/pages/db/method.shtml

Recalibration factors for SEEN data	
Fossil Fuel	**Factor**
Oil (E)	x1.04
Gas (E)	x1.1
Coal (E)	x0.94
Oil (P)	/2.56
Gas (P)	/2.25
Coal (P)	/2.92
Diesel (P)	/3.95

i *A wrong turn from Rio, the World Bank's road to climate catastrophe*, SEEN 2004. SEEN kindly provided us with the original project database on which emissions calculations were based.

ii Several aspects of the methodology reflect the approach taken by SEEN.

iii See IPCC 2006 *Guidelines for National Greenhouse Gas Inventories* for emissions factors used and the relative emissions from transport and stationary combustion www.ipcc-nggip.iges.or.jp/public/2006gl/index.html