

Argentina											
(Millions of US Dollars)											
1996 GDP	1997 GDP	1996 Total X	1996 Total M	1997 Total X	1997 Total M	1996 M/GDP	1997 M/GDP	1996 X/GDP	1997 X/GDP	1996 M+X/GDP	1997 M+X/GDP
297359	323386	23710.7	23761.8	25516	30349	0.07990947	0.0938476	0.079737624	0.0789026	0.159647	0.17275021

JOE, _____ 10/9
 RAYMOND HAD ME TYPE
 THIS UP FOR YOU. I HOPED
 IT'S WHAT YOU WERE LOOKING
 FOR. IT'S SAVED ON THE
 C DRIVE, UNDER THE FOLDER
 TITLED WORK. THE DOC.
 IS CALLED ARGENT. XLS

— JASON

Argentine X to Brazil						
(Millions of US Dollars)						
	1996 X to Brazil	1997 X to Brazil	1996 Total X to Brazil/Total Argentina X	1997 Total X to Brazil/Total Argentina X	1996 X to Brazil/1996 Argentina GDP	1997 X to Brazil/1997 Argentina GDP
	6614.8	7751.9	0.27897953	0.303805455	0.022245165	0.023971044

Argentina

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e n e r g y d a t a

[Total Energy](#) [Petroleum](#) [Natural Gas](#) [Coal](#) [Electricity](#) [Other Data](#)

Note: to read reports in PDF format, click [HERE](#) to download a free copy of **Adobe Acrobat Reader**.

The following country-specific information is available:

- **Data**

- Recent Monthly Crude Oil Production [[txt](#)] (from the *International Petroleum Statistics Report* [[html](#)])
- Country Energy Balance [[html](#)] - This energy balance is presented for the most recent year for which complete data are available. (See this note [[html](#)] for more details.) The data come from the World Energy Database, a Microsoft Access database, which also contains complete energy balances for earlier years in the 1990s and a less complete energy balance for the most recent year. The World Energy Database can be downloaded from here [[html](#)]. Annual time series data, by fuel type, starting with 1980, for most countries, can be accessed by using the red fuel-type navigation bars near the top of this page.

Joe - which (if any)
do you want?
R

- **Reports**

- "The Transformation of Argentina's Electricity Industry" [[html](#)] (from *Electricity Reform Abroad and U.S. Investment*, October 1997 [[html](#)])
- Country Analysis Brief [[html](#)] - An overview of the energy situation in this country.
- Non-OPEC Fact Sheet [[html](#)]
- Privatization Profile - Petroleum [[html](#)] (from *Privatization and Globalization of Energy Markets*, October 1996 [[html](#)])
- Privatization and Genesis of the Multinational Power Company [[html](#)] (from *Privatization and Globalization of Energy Markets*, October 1996 [[html](#)])

File last modified: March 23, 1998 by MJG

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Argentina at a glance

9/16/98

POVERTY and SOCIAL

1997

	Argentina	Latin America & Carib.	Upper-middle-income
Population, mid-year (millions)	35.2	494	571
GNP per capita (Atlas method, US\$)	8,570	3,880	4,520
GNP (Atlas method, US\$ billions)	302.0	1,917	2,584

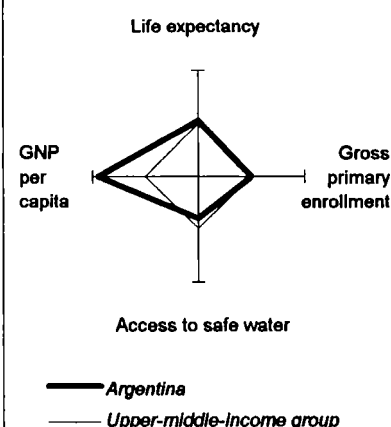
Average annual growth, 1991-97

Population (%)	1.1	1.7	1.5
Labor force (%)	1.9	2.3	1.9

Most recent estimate (latest year available, 1991-97)

Poverty (% of population below national poverty line)	26	..	..
Urban population (% of total population)	88	74	73
Life expectancy at birth (years)	73	70	70
Infant mortality (per 1,000 live births)	22	32	30
Child malnutrition (% of children under 5)	2	..	..
Access to safe water (% of population)	64	73	79
Illiteracy (% of population age 15+)	4	13	15
Gross primary enrollment (% of school-age population)	107	111	107
Male	..	..	..
Female	..	..	..

Development diamond*

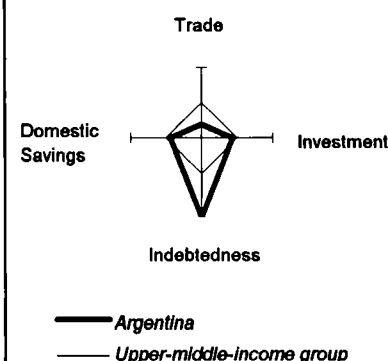


KEY ECONOMIC RATIOS and LONG-TERM TRENDS

	1976	1986	1996	1997
GDP (US\$ billions)	51.2	110.9	298.7	322.7
Gross domestic investment/GDP	30.7	17.5	18.5	18.9
Exports of goods and services/GDP	9.2	8.2	8.9	8.7
Gross domestic savings/GDP	34.0	19.3	18.1	18.2
Gross national savings/GDP	34.1	14.8	16.5	16.4
Current account balance/GDP	1.3	-2.6	-1.3	-2.9
Interest payments/GDP	0.9	3.3	1.9	2.0
Total debt/GDP	18.1	47.3	32.4	32.4
Total debt service/exports	34.4	82.8	47.2	49.3
Present value of debt/GDP	..	..	29.5	..
Present value of debt/exports	..	..	277.7	..

	1976-86	1987-97	1996	1997	1998-02
(average annual growth)					
GDP	0.6	3.8	4.8	8.6	4.0
GNP per capita	-1.9	2.9	3.7	7.1	3.1
Exports of goods and services	2.8	8.5	6.7	9.1	6.5

Economic ratios*



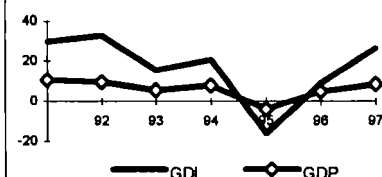
STRUCTURE of the ECONOMY

	1976	1986	1996	1997
(% of GDP)				
Agriculture	8.2	7.8	7.7	7.3
Industry	50.9	37.4	35.5	36.4
Manufacturing	39.1	27.4	24.7	24.8
Services	41.0	54.8	56.8	56.3
Private consumption	56.6	..	..	..
General government consumption	9.4	..	..	..
Imports of goods and services	5.9	6.3	9.2	9.4

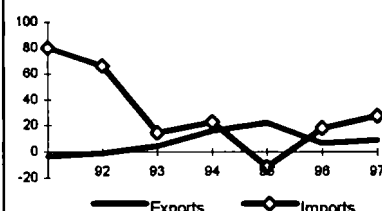
(average annual growth)

	1976-86	1987-97	1996	1997
Agriculture	1.2	2.8	3.0	3.3
Industry	-1.5	3.5	5.0	11.2
Manufacturing	-1.3	3.0	5.3	9.2
Services	2.1	4.1	4.9	7.7
Private consumption	..	..	..	..
General government consumption	..	..	..	..
Gross domestic investment	-4.8	7.5	8.8	26.5
Imports of goods and services	1.1	19.5	18.2	27.1
Gross national product	-0.4	4.2	4.6	8.1

Growth rates of output and investment (%)



Growth rates of exports and imports (%)

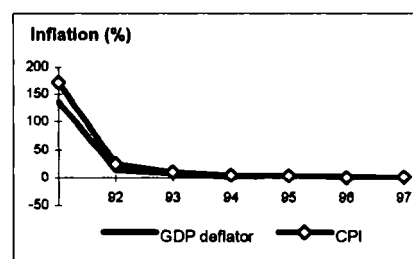


Note: 1997 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

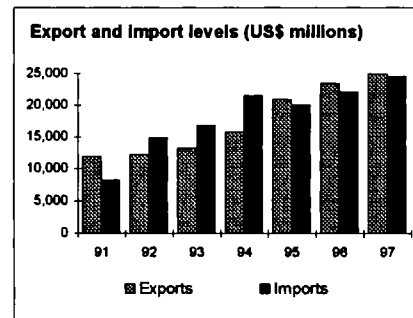
PRICES and GOVERNMENT FINANCE

	1976	1986	1996	1997
Domestic prices				
(% change)				
Consumer prices	..	..	0.2	0.5
Implicit GDP deflator	433.3	75.7	1.5	-0.5
Government finance				
(% of GDP, includes current grants)				
Current revenue	..	..	15.4	16.7
Current budget balance	..	..	-0.8	-0.4
Overall surplus/deficit	..	..	-1.8	-1.3



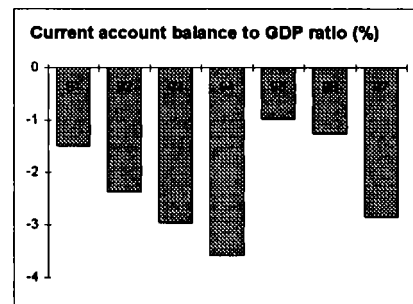
TRADE

	1976	1986	1996	1997
(US\$ millions)				
Total exports (fob)	..	..	23,493	24,970
Food	..	..	2,203	2,148
Meat	..	..	1,955	2,158
Manufactures	..	..	12,004	13,139
Total imports (cif)	..	..	22,179	24,619
Food	..	..	..	..
Fuel and energy	..	..	1,009	1,022
Capital goods	..	..	5,249	5,996
Export price index (1995=100)	..	..	104	104
Import price index (1995=100)	..	..	104	106
Terms of trade (1995=100)	..	..	101	98



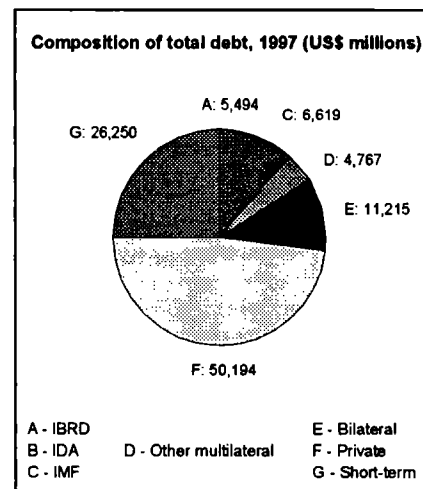
BALANCE of PAYMENTS

	1976	1986	1996	1997
(US\$ millions)				
Exports of goods and services	4,609	8,433	27,037	29,318
Imports of goods and services	3,468	6,486	27,910	34,899
Resource balance	1,141	1,947	-873	-5,581
Net income	-508	-4,808	-3,248	-4,005
Net current transfers	..	2	334	346
Current account balance	657	-2,859	-3,787	-9,240
Financing items (net)	261	1,976	7,563	12,302
Changes in net reserves	-918	883	-3,776	-3,062
Memo:				
Reserves including gold (US\$ millions)	..	4,427	19,745	22,807
Conversion rate (DEC, local/US\$)	2.00E-9	9.00E-5	1.0	1.0



EXTERNAL DEBT and RESOURCE FLOWS

	1976	1986	1996	1997
(US\$ millions)				
Total debt outstanding and disbursed	9,278	52,450	96,677	104,539
IBRD	343	1,140	5,372	5,494
IDA	0	0	0	0
Total debt service	1,616	7,323	14,965	17,264
IBRD	44	210	608	635
IDA	0	0	0	0
Composition of net resource flows				
Official grants	0	3	..	..
Official creditors	42	268	1,449	758
Private creditors	1,078	375	4,709	6,690
Foreign direct investment	0	574	1,936	3,000
Portfolio equity	0	0	..	..
World Bank program				
Commitments	115	724	946	1,221
Disbursements	20	408	1,077	797
Principal repayments	19	134	282	299
Net flows	1	273	795	498
Interest payments	25	75	326	335
Net transfers	-24	198	469	162



Argentina

Year: 1995

Energy Production (Quads) = 3.0169

Energy Consumption (Quads) = 2.4760

Oil (Thousand Barrels per Day)

	<u>Production</u>	<u>Refinery</u>	<u>Recycled</u>	<u>Imports</u>	<u>Exports</u>	<u>Stock Build</u>	<u>Consumption</u>	<u>Unaccounted for Supply</u>
Crude Oil	715.00	422.95		13.82	305.87	0.00	0.00	0.00
NGL's	42.00	42.00		0.00	0.00	0.00	0.00	0.00
Other Oils	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Refinery Gain	5.00	13.48						8.48
Gasoline		122.52		15.26	24.82	0.00	120.44	7.49
Jet Fuel		20.55		1.32	0.58	0.00	21.28	0.00
Kerosene		6.79		0.00	0.00	0.00	6.79	0.00
Distillate		172.37		27.03	12.96	0.00	185.83	-0.61
Residual		49.38		4.51	16.90	0.00	35.84	-1.16
LPG's		28.81		6.38	11.54	0.00	58.40	34.76
Unspecified		78.01		1.53	0.19	0.00	45.80	-33.55
TOTALS	762.00	478.42		69.84	372.86	0.00	474.40	15.41

Natural Gas (Billion Cubic Feet and Quadrillion Btu)

Gross Production	(Billion Cubic Feet)	1076.05	Dry Imports	(Billion Cubic Feet)	69.92
Vented and Flared	(Billion Cubic Feet)	77.69	Dry Exports	(Billion Cubic Feet)	0.00
Reinjected	(Billion Cubic Feet)	45.91			
Marketed Production	(Billion Cubic Feet)	952.45			
Dry Production	(Billion Cubic Feet)	883.23	Dry Production	(Quadrillion Btu)	0.9565
Dry Consumption	(Billion Cubic Feet)	953.15	Dry Consumption	(Quadrillion Btu)	1.0323

Coal (Thousand Short Tons and Quadrillion Btu)

	<u>Production</u>		<u>Imports</u>		<u>Exports</u>		<u>Stock Build</u>	
	(1000 Tons)	(Quads)	(1000 Tons)	(Quads)	(1000 Tons)	(Quads)	(1000 Tons)	(Quads)
Hard Coal			1553	0.0329	41	0.0009	-19	-0.0004
--- Anthracite	0	0.0000						
--- Bituminous	336	0.0071						
Lignite	0	0.0000	0	0.0000	0	0.0000	0	0.0000
Coke			0	0.0000	24	0.0005	-7	-0.0002
Total Coal	336	0.0071	1553	0.0329	65	0.0014	-25	-0.0005
Consumption : (1000 Tons) =			1850		(Quads) =		0.0392	

Electricity (Million Kilowatts, Billion Kilowatt Hours, and Quadrillion Btu)

	<u>Capacity</u>	<u>Generation</u>			<u>(Billion kwh)</u>	<u>(Quads)</u>
	(Million kw)	(Billion kwh)	(Quads)			
Hydroelectric	8.008	33.377	0.3471	Total Imports	2.338	0.0243
Nuclear	1.018	7.070	0.0835	Total Exports	0.221	0.0023
Geothermal and Other	0.000	0.000	0.0000	Losses	4.856	
Thermal	10.584	28.923				
Totals	19.610	69.370		Consumption	66.631	

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**STATEMENT OF MR. CARLOS SAUL MENEM
PRESIDENT OF THE REPUBLIC OF ARGENTINA
AT THE UNFCCC FOURTH CONFERENCE OF THE PARTIES
Buenos Aires, November 11, 1998**

The Republic of Argentina is deeply honored to host this world meeting, with representatives from all over the world and expresses through its President the warmest greetings, and full of hope.

Work done so far, show the crucial work of the United Nations Framework Convention on Climate Change.

The Republic of Argentina is honored to have signed the Convention; and presently, the Kyoto Protocol is in the process of ratification at the National Congress, already having had the approval of the Senate.

As I maintained at the Earth Summit hold in Rio de Janeiro in 1992, our purpose is to erase the false option between economic growth and environmental protection.

The Argentine economy has grown accumulative 52% since 1990, due to the opening up and the modernization and the strength of the fiscal and monetary institutions of our country.

Argentina is one of the countries in the world that have grown the most in this decade and nowadays we participate competitively in the most dynamic circuit of the world economy.

Moreover, within the context of the international financial crisis unleashed in July 1997, Argentina has continued to grow, and has increased permanently, the levels of its reserves and the deposit of its financial system, and the flow of direct foreign investments has also increased sensibly.

These investments grow, presently, at a rate of approximately US\$ 800 millions per month, and an investment of over of than US\$ 70.000 millions are expected from 1998 to 2002.

Argentina achieved these goals after ten years of efforts, with a development that moves to cleaner options.

During this decade, the economy grew at an average rate of a 6% accumulative per year. The increase of the greenhouse gases per capita have only been less than 1% during this period.

In the next two years, Argentina will become a thermoelectric energy producer, which is the least polluting at the world scale.

- For the year 2000, the main sector of the thermoelectric generation, will convert to cycle combined, with a thermal performance superior to 55%, as a consequence of US\$ 2,000 millions investments already completed or in an advanced degree of execution.

- As a consequence of these changes, the thermal generation in Argentina, will have the minor average level of contamination with carbon dioxide, than the one in any other country of the world.

Permanently, we try to achieve these goals of economic development and integration in the global economy as a country concerned in the protection of the environment and in keeping our competitiveness.

This is not aspiration that has emerged of ethical duty, we strongly believe that this is the only sustainable way to grow facing the globalization of the world economy.

That is why, I stress that the option between economic growth and environmental protection is false, and that only their articulation offers an stable perspective, of sustained and integrated progress for mankind.

This is our commitment to this present world and all of the future generations: we want to preserve the planet and at the same time offer an horizon of economic growth, progress and hope for all.

The planet is our home, and to preserve it is our responsibility of one or all.

We can not ignore the warning signals that nature has given as this year, in which the UNFCCC Fourth Conference of the Parties is taking place. The planet, painfully is issuing a warning call to all mankind.

I need also to express our deeply sorrow for our brothers and sisters from Central America, affected by terrible hurricanes and their painful consequences.

Climate catastrophes such as floods, tornados, droughts, forest fires, that causing thousands of deaths and leaving hundred of thousands of people homeless, are without doubt a world responsibility, of all and every country without any distinction or whatsoever.

Being a country with a clean growth, is the only sustainable way to grow and in the conditions that world economic globalization imposed today.

I would like strongly to point out here, that the agriculture subsidies of develop countries promotes increases the carbon emissions. The systematic use of this kind of subsidies produces severe environmental damages.

A strategy of clean development is the best and most effective tool that emerging countries have against the non-tariff barrier protectionism of developed countries.

We are convinced that this will be the position that the world community will adopt in the years to come, without any difference of sectors.

In this historic phase of mankind, the birth of universalism in practical, political e institutional terms, not only the highly developed countries might contribute to the creation of a New World order.

Also, the emerging countries also share the responsibility to assume their own initiatives to face and solve every challenge of the 21st century, which is about to dawn.

Argentina does not wish to make the effort outside the system. We want to establish the goals in the frame of the Convention. We have not been able to achieve this goal, but we will work hard from now on in order to do so in the Fifth meeting of the Conference of the Parties.

Meanwhile, we will define our targets that will determine how we will grow with minimum carbon dioxide emissions.

These goals will be defined with the participation of every social sector, through a broad debate at the national level and in the next Conference of the Parties, we shall express our commitment for the period 2008-2012.

We shall continue working to achieve that countries like the Republic of Argentina, that also wish to commit their own targets, are able to take part of all the mechanism of the system.

This implies the creation of a new way in the Convention, which would allow all the countries to participate of all the mechanisms of the Convention and the Kyoto Protocol.

Argentina assumes this commitment and will honor that responsibility of the people of the earth.

As Lisandro de La Torre, one of the major Argentinean politicians of the XX century said:

" Those who know where they are going, and follow the straight path, there will not be travelling this path alone for long".

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Vulnerability and Adaptation to Climate Change in Latin America

CR SPECIAL

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BOOK VERSION

Guest Editor: Cecilia Ramos-Mañé

Assistant Guest Editor: Annie Hareau



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CIENCIA Y TECNOLOGIA HOY

SCIENCE AND TECHNOLOGY TODAY

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EVALUATION OF ENERGY SECTOR

MITIGATION OPTIONS IN LATIN AMERICA

Co-Chairs: Emilio Lèbre La Rovere (Brazil), Martha Perdomo (Venezuela)

Rapporteur: Odón de Buen (México)

Participants: Ron Benioff (USA), Ana Rita Chacón (Costa Rica), Daly Espinoza (Panama), Stephen Hall (IIEC/Chile), Ubaldo Inclán G. (Mexico), Jorge Landa (Mexico), Gustavo Lozada (Ecuador), Nora Pereira (Venezuela), Juan Quintanilla (Mexico), Patricia Ramírez (Costa Rica), Juan Pedro Searle (Chile), Nohemi Zerbi Urdaz (Puerto Rico)

INTRODUCTION

The energy sector is currently the main source of CO₂ emissions in most Latin American countries. Even in Brazil, where present CO₂ emissions from deforestation are much larger than those from energy use, the latter will soon become the main source of CO₂ emissions.

Many Latin American countries have already started to build inventories of CO₂ emissions from energy generation. A few countries have also undertaken mitigation studies, and the implementation of some mitigation options, in order to comply with the activities outlined in their climate change country plans. In addition, some countries have already

implemented other measures (eg., energy efficiency) which would result in CO₂ emissions reduction, but are not necessarily part of a climate change country plan.

Even though there is a wide variety of natural resources and other local factors among the countries studied, a number of common problems of Latin American countries were identified in the group discussion. Its main conclusions which are summarized below would then apply to most countries represented by the group participants listed above. Of course, the opinions expressed here reflect solely the personal views of the participants of the group and do not represent the views of any institutions.

Methods to Assess Costs and Effects of Measures

Mitigation Cost Concepts

A precise definition of the costs accounted for in the evaluation of mitigation options is needed. A clear distinction must be made between four cost concepts found in the literature:

- a) direct engineering and financial costs of specific technical measures to reduce emissions.
- b) economic costs for the energy sector as a whole.
- c) macroeconomic costs: the impact of a mitigation strategy on the level of GDP and its components.
- d) welfare costs: social and ecological impacts, both direct and indirect.

Most of the studies of mitigation options available so far in Latin American countries address only the cost concepts (a) and (b). It is necessary to widen the scope of the cost assessments in order to consider costs covered under definitions (c) and (d).

Models, Scenarios and Identification of Measures

Most models applied to assess the cost of mitigation options in Latin America were designed in the context of industrialized countries and are not well suited to study the economies of developing countries. It is necessary to build new models, or at least carefully adapt existing ones to the specific features of each coun-

try in the studied region. One starting point of study should be the more recent models which try to merge top-down and bottom-up approaches. Efforts directed towards further development of models specific to Latin America, such as the Super Olade model of the power sector, should be broadened to incorporate mitigation efforts.

It is very important that the models be kept transparent — simple, and easy for policy makers to understand. The insights generated by modelling analyses are much more important than the numerical results. A comprehensive view should be first and foremost in their design, before developing sectoral analyses which are more data dependent.

Given the wide spectrum of future development paths open to Latin American countries, particular attention should be given to the definition of multiple baselines. The reference scenarios should explore contrasted options on critical assumptions such as: the efficiency of the baseline scenario, population growth, income distribution patterns, GDP growth, consumption patterns, resource and technology availability, geographical distribution of economic activities, transportation patterns, the level of exports from selected sectors (trade patterns), and international oil prices, among others.

Before ranking mitigation measures based upon comparative cost analyses using an integrated energy/economic model, a careful identification of each single mitigation measure must be available. Methods to undertake this identification should encompass the whole fuel cycle.

Problems Faced in Collecting Data for Mitigation Assessment and How to Solve Them

Main Areas Where Data are Lacking

Most countries in the region publish annual national energy

balances, which are the main source of data for mitigation assessment research. However, this data is not sufficient and it is therefore recommended that complete energy balances — from raw energy resources to useful energy end-uses — be published regularly by all Latin American countries. Economic analyses are also needed under a common methodological framework. In particular, the following sectors usually present important information gaps: firewood and other non-commercial fuels, and transportation.

How to Solve Data Availability Problems

Specific surveys should be carried out on a national, regional and local basis periodically. The surveys should cover energy consumption disaggregated by end-uses in some key sectors: main industrial branches, transportation, and firewood and other non-commercial fuels. Ideally, these surveys would be incorporated into the national surveys conducted on a regular basis by governmental agencies responsible for data collection.

It is also important to build upon the local knowledge (within government agencies, research centers, universities, consulting firms and NGOs) to make estimates to complete the existing information gaps and to calculate the appropriate coefficients of CO₂ emissions from national fuels.

International Data Banks

The IPCC (Intergovernmental Panel on Climate Change) and the executive secretariat of FCCC (Framework Convention on Climate Change) should establish international data banks on mitigation options, under a common methodology to ease comparative analyses and make them widely available. In Latin America, the OLADE Energy Information System could be improved and extended to include data needed for mitigation studies.

Promising Mitigation Options and Barriers to their Adoption

Identification of Most Promising Mitigation Options

In most Latin American countries, there is much opportunity for energy efficiency improvements, mainly in the power sector and in transportation. The potential of alternative energy sources such as natural gas and renewables (hydropower and biomass, mainly; solar and wind energy, secondly) is generally important in most countries in the region. Tapping their potential can also be complemented by other specific options available which best suit the individual countries, in accordance to the local context.

Barriers to the Adoption of Mitigation Options

The persistence of economic and social/political/cultural/institutional barriers hampers the adoption of the most promising mitigation options in Latin American countries, even the most cost-effective options. The constraints faced by government agencies when formulating and implementing national energy policies frequently lead to decisions which tend to only increase future CO₂ emissions, not abate them.

In this connection it should be noted that the policies for the energy sector adopted by multilateral financial agencies are frequently in conflict with attaining the objectives of the FCCC. The present trend towards privatization of the energy sector promoted by these agencies is leading to an increasing emphasis on thermal power generation from fossil fuels rather than hydropower development. In the case of Brazil, the ethanol programme is being phased out by a return to gasoline fueled cars.

Compatibility of Mitigation Options With National Development Goals

Increasing Awareness of

Climate Change Risks

The dissemination of information to the public about climate change risks should be pursued by all available means: general and specific educational programs (including curriculum development of regular courses at all levels), media diffusion, and support to NGOs, among others.

Turning Mitigation Into a Secondary Benefit of National Development Goals

The reduction of CO₂ emissions is not a priority included in the national development plans of most countries in the region. However, a number of measures directed towards attaining national development goals could include CO₂ abatement options.

Once identification of win-win opportunities for mitigation are identified, there should be a careful assessment of costs and benefits associated with each option. Cost-benefit analyses should be completed not only for the country as a whole, but also for each of the stakeholders involved in the implementation of mitigation options. In order to encourage the adoption of mitigation options, measures will have to be taken, as some Latin American countries feel that they should not be responsible for paying these incremental costs.

Incentives (e.g. rebates) could be supplied to independent groups interested in implementing economic development projects which include a mitigation component. The incremental financial needs should be supplied by GEF (Global Environment Facility), the financial mechanism of FCCC.

Financial and Technical Support From International Agencies

It is imperative that international agencies play an active role in fostering the development of energy efficiency and renewables in Latin America, and give full financial and technical support to the

implementation of "no-regret" mitigation options.

As seen in the previous section, this would require the reshaping of current policies adopted by multilateral financial agencies in the region, since these agencies strongly influence national development choices. The consistency of their actions with the objectives of FCCC should be ensured.

Use of Country Study Results to Develop Mitigation Plans

Elaboration of Mitigation Projects and Activities Implemented Jointly

The results of studies which assess mitigation options are an essential input to the evaluation of mitigation projects aimed at seeking financial support for their implementation. It is also important to convey the results to allow for identification of a ppropriate joint implementation projects. Dissemination of this information would prevent any negative social effects that these proj-

ects could cause, as illustrated by the experience accumulated so far in a few countries of the region.

Design of Economic and Normative Policy Tools

These results can also be very useful in designing appropriate policy tools directed at adopting mitigation options. Latin American countries have accumulated considerable experience in the application of normative tools when implementing their energy and environmental policy. However, many difficulties arise in the enforcement of these regulations. There is great opportunity for the adoption of economic tools while implementing Latin American national environmental policies.

Institutional Building to Address Climate Change Issues Within Energy Policies

Coordination of National Institutions

In order to formulate and

implement a long-term integrated energy policy to address climate change mitigation, there needs to be cooperation between oil, power, coal, and other energy institutions. The important oil companies and utilities, in particular, have to be involved in the discussion of mitigation options. In those countries where a National Energy Commission already exists, this interministerial commission should lead this discussion.

National institutions could act as the vehicle for implementing the national commitments to FCCC, and some countries have established sustainable development commissions to that end.

Filling the Institutional Gap to Support Renewables and Energy Efficiency

One of the major barriers to promoting the development of energy efficiency and renewable energy programs is the absence of well established institutions holding re-

sponsibility for these technologies. Such oversight is needed, as the technological applications are scattered in many low scale end-uses at the level of final energy consumers. In that context, it should be mentioned that some countries in the region are trying to establish Energy Efficiency, Renewable Energy and Environmental Centres. These efforts should be supported, and one could also consider the creation of regional or sub-regional engineering companies, consulting firms and energy saving companies.

Financial Mechanisms

In order to ensure the desired stability of the institutional setting responsible for addressing climate change issues, a financial mechanism is needed to automatically provide a stable budget for its operation without any interruptions, to avoid the administrative discontinuity very frequently observed in Latin American countries.

ENERGY SECTOR MITIGATION OPTIONS

IN LATIN AMERICA

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INTRODUCTION

The evaluation of greenhouse gas mitigation options in the energy sector is challenging. It requires methodologies that allow the comparison of economic-energy and environmental scenarios for alternative fuels and energy technologies and at

the same time make the scenarios compatible with current national development goals.

Modeling energy demand and mitigation scenarios for developing countries, especially in Latin America (LA), is even more challenging. Important economic changes are occurring in the region. LA coun-

tries are moving from protected economies to more open market oriented economies. In addition, depreciation of currency, debt, unemployment, problems of social instability and a significant share of the population living under the poverty line provide a very difficult context for modeling scenarios of fu-

ture energy demand. Furthermore, like other developing regions, LA faces a policy dilemma. When economic growth increases, demand for energy rises, and large investments are needed in the energy sector.

This summary analyses the problems related to method-

ologies and policies of greenhouse gas mitigation options in the energy sector in Latin America. It is divided into two sections. Section 1 discusses fundamental issues regarding modeling energy sector mitigation scenarios. Section 2 provides responses to six key questions regarding mitigation methods: (a) what are the best methods for assessing costs and benefits of measures? (b) what are the problems faced in countries in collecting data for mitigation assessment and how can they be solved? (c) what are the most promising mitigation options for countries in the region? (d) how can reductions be made compatible with current national development goals, (e) how can results of modeling be used to develop mitigation plans? and (f) do existing institutions address climate change energy policy effectively?

I. Fundamental Issues in Modeling Scenarios

Modeling is essential to the development of greenhouse gas mitigation scenarios. However, this process would be more useful to the policy making community if some of the following issues were addressed as a broader framework in the analysis process:

- (1) Broadening policy analysis to consider the primary concerns of planners in each country, economic growth and social development.
- (2) Consideration of various macroeconomic indicators like the distribution of income among socioeconomic groups, unemployment, and foreign exchange.
- (3) Standardization of a set of economic, energy, and energy technology data that could be maintained by an organization located in Latin America, and
- (4) An institutional commitment to maintaining the capability of collecting data, developing methodologies, and

formulating the needed policy analyses.

Framework for Mitigation Scenarios

Policy makers in most Latin American countries are more concerned with economic development, reducing unemployment, improving the foreign exchange situation, and ameliorating local air pollution problems, than directly with global climate change. Consequently, it would be advantageous to design baseline and GHG emission reduction scenarios that represent realistic planning scenarios for policy makers in each country.

Under this framework, mitigation scenarios will only be useful to policy makers if they are integrated with the development planning efforts that are necessary to the country and which therefore occupy most of its attention. The method by which this integration can be achieved will vary from country to country and depend on how overall economic policies are determined. In some cases, this may simply involve taking existing economic objectives and translating them through to the inputs required by the energy planning models, while in others, objectives must be clarified and new data and methods may need to be developed.

Macro-Economic Indicators

Economic variables that are essential for LA countries, but generally not addressed in the existing models for projecting greenhouse gas emissions from the energy sector are the effects of the policies on the distribution of income, the impact on unemployment, the impact on the foreign exchange status of the country, and the capital requirements of the mitigation program. This problem represents a formidable challenge to the analyst because of a lack of appropriate data to initialize and estimate the parameters of any

projections system. Nonetheless, any start that can be made towards including the impact of policy initiatives on these indicators will greatly improve the usefulness and credibility of the modeling system to the policy making community.

Systematic Data Development

There is a perception among researchers and policy makers in LA that a strong effort to collect and standardize data developed by experts in the individual countries would be very useful to countries in the region. This database would include historical data on economic activity, fuel use, and end-use energy service demands, as well as cost and efficiency data for current and projected energy production, conversion and utilization technologies. The standardization and systematic compilation of this data would facilitate interpretations of the results produced for each individual country and the comparison of results across countries. The «Organización Latinoamericana de Energía» (OLADE) could accomplish this objective if sufficient resources were made available to it.

Indigenous Analysis Infrastructure

The process of data acquisition and energy-economics modeling was pursued in Latin America during the oil crises of the 1970s with the help of many outside consultants, and is now being repeated in response to the signing of the Framework Convention on Climate Change in 1992. In between, much of this type of work was discontinued; in fact, there is a perception that a great deal of useful work accomplished during the earlier period was lost because of lack of institutional memory in many of the countries. Thus, it would be useful if data and model development activities, as well as policy development

activities, could be maintained through appropriate institutions in the host countries. This would serve to insure the relevance and continuity of the work. Consultants could still be brought in on specific modeling and new technology assessment issues, but these interactions would also be organized by researchers and policy makers in the host countries.

II. Key Questions

(1) What Are the Best Methods for Assessing Costs and Benefits of Mitigation Measures?

Different methods are available for evaluating GHG emissions and cost effectiveness mitigation options. Methodologies for projecting energy supply range from optimization models to simulation models, driven in most cases by projection for energy using end use activities. Most of these methodologies provide useful tools for mitigation assessment. However, effective evaluation and credible policy making depend on the availability of database information and model transparency and manageability. In addition, successful use of these methodologies requires avoiding allowing trivial choices of model structure and input assumptions to completely determine results.

Getting credible projections of future energy service demands (or even current data on current energy service demands) is difficult, but modeling end-use tools allow the user to build such projections from more fundamental assumptions about population growth, economic growth, and saturation levels for particular end uses. Each of the modeling approaches that are currently used in LA have provided useful information, even from the very preliminary analyses that have been completed thus far. Each employs different types of inputs and provides different types of outputs. In addition, it would be

useful to compare the methods currently being used in Latin America with similar efforts in other regions of the world.

(2) What Are the Problems Faced in Countries in Collecting Data for Mitigation Assessment and How Can They Be Solved?

It is recognized that sufficiently detailed and validated data is absolutely essential to successful model development and use. The scope and accuracy of the model both depend highly on the availability of data. It would be very useful if a Latin American-wide organization like OLADE would take on the task of collecting economic, energy use and energy technology data according to standardized definitions and formats, in order to facilitate the dissemination of the data throughout the region (and to the international community). It is essential that OLADE network as much as possible with groups collecting similar types of information for the OECD countries, like the OECD itself, the IEA, and even groups in Asia, Africa, and international research organizations. In addition, technology data should be cross checked with organizations like Lawrence Berkeley National Laboratory and the Electric Power Research Institute in the U.S., as well as key international organizations like the International Institute for Applied Systems Analysis (IIASA) and the International Atomic Energy Agency (IAEA). The quality and continuity of this data is absolutely essential—it is often of direct interest to the policy making community in addition to being key inputs to the modeling systems.

(3) What Are the Most Promising Mitigation Options for Countries in the Region?

Substitutions being planned or contemplated in Latin America are similar to ones embarked upon by the OECD countries forty to fifty years

ago. That is, industrialization is a key policy objective at present in most Latin American nations. Historically, this has led to increased use of fossil fuels. New technologies may have altered the range of available energy supply options since then, and the resource base of the Latin American Countries differs from that in other regions of the world, but the trend towards increased fossil fuel consumption seems almost unavoidable. Thus, the relevant policy initiatives may be expected to reduce the rate of increase in carbon emissions, but not lower them.

In picking technology options, it is important to keep track of the total resources in the region. For example, although many of the countries may be planning to switch to natural gas from other more carbon intensive fuels, only Mexico, Venezuela, Colombia and Argentina have sizable reserves, and even theirs are probably not large enough to support the widespread use of gas throughout the region. Similarly, some of the key hydroelectric resources are shared amongst the different countries, and between electricity production and agriculture in each country. In addition, the capital requirements for hydroelectric generation can be a substantial fraction of the total capital requirements for many of these countries. Their development requires innovative financial mechanisms related to GHG emissions issues.

Although the internationalization of industry would likely make energy use in that sector more efficient, transportation and household demands would be subject to information and decision making limitations and the effects of advertising not related to energy use or environmental consequences. Thus, in these sectors, fuel price changes will not always drive structural changes that reduce energy intensities. Thus, in these sectors energy efficiency standards may prove to be useful policy tools, as well as programs di-

rected at the production or importation of vehicles and appliances.

(4) How Can GHG Reduction Be Made Compatible With Current National Development Goals?

There exist analyses which are already of use to those involved in developing policy options that help systematize large amounts of data, clarify tradeoffs, and identify “no regrets” options (those which can be justified even without considering the global climate change issue). On the other hand, these analyses would be more useful if the studies could be embedded in a more fundamental policy analysis framework which explicitly considers those issues and output measures which are of direct interest to national economic and environmental planners. The macro-level variables that would be of interest to policy makers include the impact of the policies considered on: (1) the distribution of income, (2) the level of unemployment, (3) the foreign exchange situation, (4) the rate of inflation, (5) the use of available capital, (6) the emissions of sulfur oxides, nitrous oxides, and particulate matter, and (7) the use of available fresh water resources. Some of these items can be addressed in the modeling frameworks that have been employed so far, while others (like income distribution, employment, and fresh water use) are not yet represented in any of the modeling systems currently being employed.

(5) How Can Results Be Used to Develop Mitigation Plans?

Given the present priorities of Latin American governments, GHG mitigation options would be more feasible if they were seen as development and environmental goals with ancillary GHG emissions reduction benefits. In addition, all those who hold stake in a particular policy area (e.g., the national oil company, the na-

tional and/or private electric utility companies) would need to be brought into the policy development process in order for those policies to be implemented successfully.

(6) Do / Can Existing Institutions Address Climate Change Energy Policy Effectively?

This question can be divided into two issues: (1) the adequacy of existing institutions, and (2) the development of new institutions if necessary. A common theme in this discussion was the necessity of adequate technical skills and continuity of the effort in the Latin American countries. In some countries the turnover in personnel when the presidential administration changes are so extensive that much of the expertise and institutional memory required to conduct the required studies is lost. This leads to great inefficiencies as a whole new set of government analysts must be trained and given the opportunity to gain experience. A strong recommendation for these countries is to reduce the turnover that occurs when the administration changes, or to establish new institutions that could provide the requisite expertise, continuity, and training. It is also important to maintain self-sufficiency in performing GHG emission reduction policy studies in the region and in each individual country. Such a capability has not been maintained in the past, leading to great efficiency losses.

Main Conclusions

1. Methods for evaluating GHG mitigation options have to be transparent and manageable.

2. A systematic and continuous development of data that ensures continuity of analysis efforts within countries is needed. OLADE could be the LA organization which takes on the task of collecting economic, energy use and energy technology data according to standard-

ized definitions and formats; this would facilitate the dissemination of the data throughout the region.

3. A broader framework for mitigation analyses, one which produces scenarios compatible with current na-

tional development goals, which is essential. This should include impacts development planners will need to

consider, such as income distribution, unemployment, foreign exchange situations and capital requirements.

GREENHOUSE GASES MITIGATION ANALYSES

IN THE FORESTRY AND AGRICULTURE SECTORS

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INTRODUCTION

Latin America has the largest tropical forests in the world. During the last two decades, however, Latin America has experienced some of the world's fastest rates of deforestation. It is estimated that 6.4 million hectares (ha) of forests, of which 4.4 to 4.9 million ha are closed forests, are lost annually. In addition to creating several local environmental problems, the extensive deforestation results in total emissions of about 0.5 to 0.7 petagrams of carbon (PgC) per year. Within Latin America as a whole, deforestation and forest degradation constitute the primary source of greenhouse gas emissions, contributing approximately 50% to 70% of total regional emissions. In some countries, greenhouse gas emissions from agriculture are also important and surpass emissions from the forestry sector (e.g., Uruguay). The causes of deforestation and forest degradation are multiple and complex. Some of the significant factors contributing to deforestation are government policies that have favored conversion of forests to agriculture and pasture; land speculation; insecure

land ownership, particularly among small land holders; the management of forests under a «mining» logic; and infrastructure building (such as roads and hydroelectric plants). The continuous impoverishment of rural inhabitants also contributes to deforestation. Conversion of forests to pasture lands has been, by far, the dominant forest conversion activity. Historically, cattle ranching benefited from large subsidies and other economic incentives which favored its rapid expansion within tropical forests. Also, cattle ranching used to be strongly promoted in the region by international institutions such as the Inter-American Development Bank and the World Bank. In many cases, the expansion of cattle ranching was linked to meat exports to the United States.

The current situation makes it necessary and urgent to explore alternatives for sustainable forest and agriculture management. Appropriately developed, greenhouse gases mitigation analyses can be used to identify promising options and policies. As discussed below, the key to the success of mitigation analyses is to make greenhouse gas re-

ductions a byproduct of more general strategies that promote sustainable development in the region.

This paper summarizes the discussions of the working group with regard to greenhouse gases mitigation analyses in the non-energy sector. The first section addresses the current state of mitigation analyses in forestry and agriculture in Latin America. Subsequent sections examine the problems of deriving standard methods for mitigation analyses, the type of data needed for these analyses and their current availability, and strategies for implementing the mitigation options identified. Because very limited information is available regarding mitigation analyses in the agriculture sector, this paper concentrates on the forestry sector.

Current State of Mitigation Analysis in Latin America

A greenhouse gases mitigation analysis in the forestry and agriculture sectors involves the following general steps: (1) screening of the mitigation options; (2) assessment of the current and future land area for

implementing the different options; (3) estimation of the unit carbon emission and sequestration for each option; (4) estimation of the costs and benefits of each option; (5) development of future scenarios; (6) evaluation of the cost-effectiveness of each option; and (7) analysis of the policies, institutional arrangements, and incentives necessary to implement the different options.

At present, only two countries (Mexico and Venezuela) have begun national mitigation analyses. Several other countries (including Peru, Ecuador, Costa Rica, and Bolivia) have prepared draft proposals, but are currently devoting most of their effort to forest and agriculture greenhouse gas inventories. In Argentina, work has been concentrated in the agriculture sector. Analysis of mitigation options at the project and micro-regional level are available in several countries.

Preliminary results for Mexico and Venezuela indicate that the long-term carbon sequestration potential in both countries is large, ranging from 1.4 PgC of carbon to between 2.5 and 4.6 gigatonnes of carbon. Converting forests from