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FRAMEWORK CONVENTION ON CLIMATE CHANGE

CONVENTION - CADRE SUR LES CHANGEMENTS CLIMATIQUES

PRESS KIT

THE HAGUE 2000

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Contents

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PRESS RELEASE

Crucial climate change talks set for The Hague

Governments to decide future of Kyoto Protocol

Bonn, November 2000 – Ministers and diplomats from some 160 governments will meet in the Dutch city of The Hague from 13 – 24 November to accelerate international action to reduce greenhouse gas emissions.

A global strategy on climate change has been agreed under the 1992 United Nations Climate Change Convention and its 1997 Kyoto Protocol. This international legal regime promotes financial and technical cooperation to enable all countries to adopt more climate-friendly policies and technologies. It also sets targets and timetables for emissions reductions by developed countries.

Most governments, however, have still not ratified the Protocol, which means that its emissions targets for developed countries – which add up to an overall 5% reduction compared to 1990 levels during the five-year period 2008-2012 – are not yet in effect. Many governments are awaiting agreement on the operational details of how the Protocol will work in practice before deciding on ratification.

The Hague meeting must decide these details and ensure that they will lead to action that is both economically efficient and environmentally credible. It must also strengthen the effectiveness of the many activities taking place under the Convention.

"The Hague conference is a make or break opportunity for the climate change treaties," said Michael Zammit Cutajar, the Convention's Executive Secretary. "Unless governments of developed countries take the hard decisions that lead to real and meaningful cuts in emissions and to greater support to developing countries, global action on climate change will lose momentum."

"The meeting's success will be measured by the early entry into force of the Kyoto Protocol – I hope by 2002, ten years after the adoption of the Convention at the Rio Earth Summit. With scientists increasingly convinced that we are already witnessing the effects of global warming, we must ensure that the next decade produces real progress on lowering emissions and moving economic growth on to climate-friendly paths," he said.

Developed countries are concerned that this rapid transition to a lower-emissions economy could have short-term economic implications, including a potential impact on trade

competitiveness, both among themselves and vis-à-vis those developing countries that are now industrializing.

The Protocol will only enter into force after it has been ratified by at least 55 Parties to the Climate Change Convention, including industrialized countries representing at least 55% of this group's total 1990 carbon dioxide emissions. So far, only 30 countries – all from the developing world – have ratified the Protocol.

Key Protocol-related issues that still need to be resolved include rules for the Protocol's Clean Development Mechanism and its Joint Implementation and emissions trading systems, rules for obtaining credit for improving "sinks" (by planting new trees to absorb carbon dioxide from the atmosphere, for example, thus offsetting emissions), a regime for monitoring compliance with commitments, and accounting methods for national emissions and emissions reductions.

Key Convention-related issues include technology transfer, capacity building, financial assistance, and the special concerns of developing countries that are particularly vulnerable to climate change or to the economic consequences of emissions reductions by developed countries. The various Protocol and Convention issues are strongly interlinked and will only be resolved as part of a package deal.

The Hague meeting is officially called the Sixth Session of the Conference of the Parties to the Convention, or COP 6. It is expected to draw well over 5,000 participants and a large number of ministers. Dutch Environment Minister Jan Pronk has been designated the conference President.

Note to journalists: The press accreditation form, official documents, and other information are posted at www.unfccc.int. For interviews or additional information please contact Michael Williams in Geneva at (+41-22) 917 8242/44, fax (+41-22) 797 3464, e-mail mwilliams@unep.ch or Nardos Assefa in Bonn at (+49-228) 815-1526, fax (+49-228) 815-1999, e-mail nassefa@unfccc.int.

PRESS BACKGROUNDER

A closer look at the "crunch" issues for The Hague

The climate change talks cover a range of issues that is as broad as it is complex. Most of the issues are both technical and political and are linked to one another. There is no one correct way to prioritise them, but the following list offers a reasonable approach to grouping the main questions. Agreement on all the issues will be necessary for COP 6 to be considered a success.

1 – The "flexibility" mechanisms. The Protocol establishes three innovative mechanisms – the clean development mechanism, joint implementation, and emissions trading – that developed countries may use to lower the costs of meeting their national emissions targets. Their usefulness is based on the fact that, as far as the global climate and atmosphere are concerned, it does not matter where emissions originate. Because it can be cheaper to reduce a ton of greenhouse gas emissions in countries that are, for example, less energy efficient, the mechanisms can help ensure that the overall Kyoto target is achieved as inexpensively as possible.

The Protocol text authorizing these mechanisms is brief and leaves it to the current negotiations to determine how they should operate in practice. The Hague meeting must decide the roles of various institutions and craft the accounting rules for allocating credits. In the case of the two project-based mechanisms – the CDM and JI – it must also elaborate criteria for project eligibility and baselines for measuring each project's contribution to reducing net emissions.

A difficult sticking point is whether or not there should be a ceiling on how much credit a government can obtain through the mechanisms. The Protocol states that the use of the mechanisms is to be "supplemental" to domestic action. Some governments argue that there should therefore be a quantified ceiling on how many credits can be obtained from the mechanisms; others disagree.

The three mechanisms are:

* The clean development mechanism (CDM). The CDM will promote sustainable development by encouraging investments by private firms and governments in projects in developing-countries that reduce or avoid emissions, for example by moving to clean technologies. Developed countries will receive credit against their targets for emissions avoided by these projects. In addition, a levy on the CDM will fund projects that help the most vulnerable developing countries adapt to future climate change impacts.

One of the issues still to be resolved is whether only projects relating to emissions limitation should be eligible for the CDM, or if reforestation and other "sink" projects that absorb carbon should be allowed too. Also, unlike for the two mechanisms described below, credits obtained through the CDM will be for avoiding emissions in developing countries that are not subject to Kyoto's quantified targets; since CDM deals are thus not a zero-sum game within the Kyoto envelope, the CDM accounting system will need to be particularly rigorous to uphold the Protocol's environmental credibility.

* Joint implementation (JI). Like the CDM, JI will offer credits for contributing to projects in other countries. JI projects, however, can only be based on investments in developed countries subject to targets under the Kyoto Protocol, including many of the countries in Central and Eastern Europe and the former Soviet Union. Unlike the CDM, then,

JI deals occur within a zero-sum game where credits obtained by the investing country are offset by debits to the country hosting the project.

* An emissions trading regime. This mechanism will allow developed countries to transfer emissions credits to each other. The idea is that developed countries that reduce emissions more than is required by their national target will be able to sell their excess emissions credits to countries that find it more difficult or expensive to reduce their own emissions. Thus, emissions trading will reduce the overall cost of meeting the targets.

A key issue with emissions trading has been the concern that certain countries – notably Russia and the Ukraine – will be able to meet their targets with minimal effort and could then sell large quantities of emission credits (known as "hot air") to others. This could reduce pressure on some industrialized countries to make domestic cuts and change the long-term trend in their own emissions patterns.

2 – "Sinks". Sinks, or LULUCF in the jargon (land use, land use change, and forestry), introduce the technically complex and politically charged question of how much credit countries can receive against their emissions targets for promoting activities, such as reforestation or ending deforestation, that strengthen carbon sinks.

New and growing plants are called sinks because they remove carbon from the air, thus reducing a country's "net emissions" (total emissions minus removals). In most developed countries, on balance, land and forests do act as sinks. However, in many countries around the world, deforestation and changes in land-use release large amounts of CO_2 into the atmosphere.

For some countries, growing new forests could be cheaper than reducing industrial emissions. Because it can be difficult to estimate just how much carbon a given tree or forest absorbs, rigorous accounting systems are needed for determining base lines and measuring changes. Also needed are clear definitions of what counts as a sink since it can be difficult to distinguish between the natural uptake of carbon by the biosphere and uptake caused by purposeful human activity or climate change policies. Decisions are also needed on whether or not to give credit for non-forestry sinks, such as agriculture and soils. Other issues include ensuring that climate-driven activities do not have negative impacts on biodiversity or socio-economic conditions, and that stored carbon that is credited is not later released into the atmosphere (for example during a forest fire).

3 – North-South cooperation. While only developed countries have targets and timetables for cutting emissions, developing countries can have a role to play in promoting sustainable development and thereby lowering the emissions-intensity of their economic growth. Strengthening their ability to do so will require an agreement on financial and technological cooperation. This should include a framework for capacity building, the necessary funding from developed countries, and practical steps for promoting the transfer of climate-friendly technologies to developing countries.

4 – Adverse impacts of climate change and of response measures on vulnerable countries. Under the Convention, the international community has accepted its responsibility to assist the least developed countries, small island states, and other vulnerable regions to adapt to the impacts of climate change and of policies to reduce emissions. Some of these states have called for various funds or programmes on adaptation, climate-related disasters, and research and observation. Other states are urging action to assist or compensate governments – notably the oil-exporting developing countries – that may be affected by

efforts to meet the Kyoto targets. These issues will need to be a part of the overall package at COP 6.

5 – A compliance regime. To be credible, the Kyoto Protocol must have rules for determining compliance and measures for responding to cases of non-compliance. The key question is what the consequences of non-compliance should be. Alternative proposals call for payments into a compliance fund, extra reductions to be made in future periods, restrictions on the use of the mechanisms in future periods, financial penalties and the formulation of action plans. Other items for discussion include whether non-compliance applies only to Protocol commitments or to Convention commitments that are "referred to" in the Protocol, the balance of representation from different regions on the compliance committee, and membership in the expert review groups.

REVISED PRESS KIT TABLE – Greenhouse gas emissions from developed countries 1990 – 1998

(All figures gigagrams or percentage change. The 1990 figures for all GHGs without sinks offer reasonable approximations to the 'assigned amounts' against which the Kyoto targets will be measured; however, there are various inconsistencies – e.g. implications of KP Article 3.7 not reflected, some base years for HFCs/PFCs/SF6 differ – and the figures will continue to be revised.)

COUNTRY	CO_2 1990 w/o sinks	CO_2 1998 w/o sinks	Percent Change	CO_2 1990 sinks	CO_2 1998 sinks	Percent change	All GHGs 1990 w/o sinks	All GHGs 1998 w/o sinks	Percent Change	Kyoto Target (%)	COUNTRY
Australia	278 669	337 973	21.3	70 092	35 173	-49.8	423 237	484 699	14.5	+8	**Australia**
Austria	62 130	66 604	7.2	-9 215	-7 633	-17.2	75 452	80 315	6.4	-8 (-13)	**Austria**
Belgium	113 997	121 975	7.0	-2 057	-977	-52.5	136 463	145 372	6.5	-8 (-7.5)	**Belgium**
Bulgaria*§	103 856	55 150	-46.9	-4 657	-6 233	33.8	157 090	84 317	-46.3	-8	**Bulgaria*§**
Canada	465 755	529 431	13.7	-39 141	-21 833	-44.2	611 770	692 230	13.2	-6	**Canada**
Czech*	165 490	128 268	-22.5	-2 281	-3 757	64.7	189 837	147 777	-22.2	-8	**Czech***
Denmark	52 894	60 125	13.7	-916	-973	6.2	69 567	76 144	9.5	-8 (-21)	**Denmark**
Estonia*	37 797	19 232	-49.1	-11 317	-3 356	-70.3	40 719	21 756	-46.6	-8	**Estonia***
Finland	60 771	63 945	5.2	-23 798	-9 713	-59.2	75 202	76 315	1.5	-8 (0)	**Finland**
France	387 590	412 860	6.5	-59 617	-69 783	17.1	553 778	558 726	0.9	-8 (0)	**France**
Germany	1 014 500	886 181	-12.6	-33 719	-33 493	-0.7	1 208 807	1 019 745	-15.6	-8 (-21)	**Germany**
Greece	85 164	100 449	17.9				105 346	124 315	18.0	-8 (-25)	**Greece**
Hungary*§	83 676	57 601	-31.2	-3 097	-441	42.4	101 633	83 677	-17.7	-6	**Hungary*§**
Iceland	2 147	a 2 282	6.3				2 576	a 2 696	4.7	+10	**Iceland**
Ireland	31 575	40 019	26.7	-5 020	-6 448	28.5	53 497	63 718	19.1	-8 (-13)	**Ireland**
Italy	432 565	459 461	6.2	-25 614	-23 634	-7.7	518 502	541 542	4.4	-8 (-6.5)	**Italy**
Japan	1 124 532	b 1 230 831	9.5	-83 903	a -96 705	15.3	1 213 262	b 1 330 555	9.7	-6	**Japan**
Latvia*	24 771	8 287	-66.5	-10 826	-10 508	-2.9	35 669	11 504	-67.7	-8	**Latvia***
Liechtenstein	208			-22			260			-8	**Liechtenstein**
Lithuania*	39 535	16 694	-57.8	-8 848	7 712	-187.2	51 548	23 851	-53.7	-8	**Lithuania***
Luxembourg	12 750	a 9 545	-25.1	-295	a -295	0.0	13 448	a 10 223	-24.0	-8 (-28)	**Luxembourg**
Monaco	108	138	27.6				111	142	28.4	-8	**Monaco**
Netherlands	161 360	181 370	12.4	-1 500	-1 700	13.3	217 882	236 251	8.4	-8 (-6)	**Netherlands**
New Zealand	25 398	28 941	14.0	-21 530	-20 896	-2.9	73 068	74 886	2.5	0	**New Zealand**
Norway	35 146	41 700	18.6	-9 590	-17 588	83.4	52 141	56 148	7.7	+1	**Norway**
Poland*§	476 625	337 450	-29.2	-34 746	-29 820	-14.2	564 286	402 477	-28.7	-6	**Poland*§**
Portugal	43 132	53 891	24.9	-3 994	-4 674	17.0	63 858	74 870	17.2	-8 (-27)	**Portugal**
Romania*§	194 826	c 125 597	-35.5	-2 925	c -6 590	125.3	264 879	c 164 026	-38.1	-8	**Romania*§**
Russian Fed.*	2 372 300	d 1 495 920	-36.9	-392 000	d–840 000	114.3	3 040 062	d 1 962 441	-35.4	0	**Russian Fed***
Slovakia*	62 237	43 772	-29.7	-2 426	-1 683	-30.6	76 304	52 818	-30.8	-8	**Slovakia***

COUNTRY	CO_2 1990 w/o sinks	CO_2 1998 w/o sinks	Percent Change	CO_2 1990 sinks	CO_2 1998 sinks	Percent Change	All GHGs 1990 w/o sinks	All GHGs 1998 w/o sinks	Percent Change	Kyoto Target (%)	COUNTRY
Slovenia*	13 935			-2 293			19 212			-8	**Slovenia***
Spain	226 057	273 017	20.8	-29 252	-29 252	0.0	305 746	369 856	21.0	-8 (-15)	**Spain**
Sweden	55 443	56 953	2.7	-34 368	-27 680	-19.5	69 399	73 842	6.4	-8 (-4)	**Sweden**
Switzerland	44 409	44 809	0.9	-4 343	-6 109	40.7	53 005	53 706	1.3	-8	**Switzerland**
Ukraine*	703 792	314 445	-55.3	-52 107	-68 708	31.9	919 220	454 934	-50.5	0	**Ukraine***
UK	584 220	546 390	6.5	21 186	14 984	-29.3	741 489	679 850	-8.3	-8 (-12.5)	**UK**
US	4 914 351	5 478 051	11.5	-1 159 994	-773 019	-33.4	6 048 786	6 726 997	11.2	-7	**US**
Annex I °	14 493 711	13 643 500	-5.9	-1 984 133	-2 067 947	4.2	18 147 110	16 982 195	-6.4	-5	**Annex I °**
Annex II °	10 214 871	11 027 149	8.0	-1 456 610	-1 102 270	-24.3	12 686 651	13 553 405	6.8	- -	**Annex II °**
EIT °	4 278 840	2 616 351	-38.9	-527 523	-965 677	83.1	5 460 459	3 428 790	-37.2	- -	**EIT °**

Source: Climate Change Secretariat, "National Communications from Parties Includes in Annex I to the Convention : Greenhouse Gas Inventory Data from 1990 to 1998", Document FCCC/SBI/2000/11. Please see original document for the complete set of footnotes.

Notes:

The 1990 figures for all GHGs without sinks offer reasonable approximations to the 'assigned amounts' against which the Kyoto targets will be measured; however, there are various inconsistencies (e.g. implications of KP Article 3.7 not reflected, some base years for HFCs/PFCs/SF6 differ) and the figures will continue to be revised.

Annex I: includes all the countries listed in the table, which are the Parties with quantified emissions targets under the Kyoto Protocol.

Annex II: includes the most industrialized countries only, listed here without asterisks.

EIT: the countries with economies in transition, indicated here by asterisks.

Gigagram = 1,000 tons

Columns 1-3: CO_2 without sinks: includes emissions from energy, industry, waste, and other sources. **Columns 4-6:** CO_2 from sinks: includes emissions from changes in forests and other woody biomass stocks, forest and grassland conversion, abandonment of managed lands, and emissions and removals from soils. Negative values in gigagrams indicate net removal of CO2 from the land-use change and forestry sector; negative values in percentage represent a decrease in removals in relation to the year 1990 and positive values indicate an increase in removals, except for Australia and the UK, where the negative values in percentage change indicate less emissions or greater removals. **Columns 7-9:** All greenhouse gases: includes emissions of the six gases addressed by the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), HFCs, PFCs, and sulphur hexafluoride (SF_6). Expressed as CO_2 equivalents. Carbon removals by sinks are excluded.

Column 10: The Kyoto Protocol emissions targets expressed as a percentage increase or decrease from 1990 levels (or other reference period). The European Union as a group are committed to –8%; the national rates allocated through an internal EU agreement are indicated here in parentheses. The targets are to be achieved in the five-year period 2008–2012.

§ Some Parties with economies in transition use base years other than 1990: Bulgaria (1988), Hungary (average of 1985-87), Poland (1988) and Romania (1989). These base years are given in this table in lieu of 1990. ° Totals for 1998 based on the latest available data for each country.

a latest available data is from 1995; **b** Latest available data is from 1997; **c** Latest available data is from 1994; **d** Latest available data is from 1996.

CO2 - fuel combustion emissions, 1997*

Largest emitters: Annex I and non-Annex I Parties (Million of tones of CO2)

	Top ten: Annex I & non-Annex I Parties		% world	Top ten Annex I Parties		% Annex I	Top ten non-Annex I Parties		% non-Annex I
1	United States	5,470	24%	United States	5,470	41%	China	3,121	35%
2	China	3,121	14%	Russian Federation	1,456	11%	India	881	10%
3	Russian Federation	1,456	6%	Japan	1,173	9%	Republic of Korea	422	5%
4	Japan	1,173	5%	Germany	884	7%	Mexico	346	4%
5	Germany	884	4%	United Kingdom	555	4%	South Africa	345	4%
6	India	881	4%	Canada	477	4%	Brazil	301	3%
7	United Kingdom	555	2%	Italy	424	3%	Iran	285	3%
8	Canada	477	2%	Ukraine	376	3%	Saudi Arabia	266	3%
9	Italy	424	2%	France	363	3%	Indonesia	257	3%
10	Republic of Korea	422	2%	Poland	350	3%	Thailand	175	2%
	Total	14,863		*Total*	11,529		*Total*	6,399	
	% of world total	65%		*% of world total*	50%		*% of world total*	28%	
				% of Annex I total	86%		*% of non-Annex I total*	72%	
	next ten			**next ten**			**next ten**		
11	Ukraine	376	2%	Australia	306	2%	Argentina	138	2%
12	France	363	2%	Spain	254	2%	Venezuela	137	2%
13	Poland	350	2%	Netherlands	184	1%	Kazakhstan	127	1%
14	Mexico	346	2%	Belgium	123	1%	Malaysia	124	1%
15	South Africa	345	2%	Czech Republic	121	1%	Uzbekistan	102	1%
16	Australia	306	1%	Romania	111	1%	Egypt	99	1%
17	Brazil	301	1%	Greece	81	1%	Pakistan	89	1%
18	Iran	285	1%	Finland	64	0%	D.P.R. of Korea	78	1%
19	Saudi Arabia	266	1%	Austria	64	0%	United Arab Emirates	78	1%
20	Indonesia	257	1%	Denmark	62	0%	Singapore	73	1%
	Total of top 20	18,058		*Total of top 20*	12,898		*Total of top 20*	7,443	
	% of world total	79%		*% of world total*	56%		*% of world total*	32%	
				% of Annex I total	96%		*% of non-Annex I total*	83%	

Groups	total emissions		% of world total	t CO2 per capita
World#	22,981		na	3.97
Annex I Parties	13,385		58%	11.75
Annex II Parties	10,938		48%	12.22
European Union	3,209		14%	8.58
EIT Parties	2,696		12%	8.48
Annex I (nonEU+EIT)	10,425		45%	12.42
non-Annex I Parties	8,928		39%	1.95

* source: IEA CO2 emissions from fuel combustion 1971-1997, Paris, 1999. # World includes all Parties and non-Parties to the UNFCCC. Note: Data from IEA has been used as the UNFCCC secretariat database does not contain data for all Parties. However, the IEA data is broadly comparable to that reported to the UNFCCC secretariat by Parties

CO2 - fuel combustion emissions, 1997* (per capita emissions)

Largest emitters: Annex I and non-Annex I Parties (tonnes of CO2 per capita)

	Top twenty: Annex I & non-Annex I Parties		Top twenty Annex I Parties		Top twenty non-Annex I Parties	
1	Qatar	44.08	United States	20.50	Qatar	44.08
2	Bahrain	35.23	Luxembourg	20.42	Bahrain	35.23
3	United Arab Emirates	30.11	Australia	16.52	United Arab Emirates	30.11
4	Kuwait	25.01	Canada	15.76	Kuwait	25.01
5	Singapore	23.47	Finland	12.47	Singapore	23.47
6	United States	20.50	Estonia	12.47	Saudi Arabia	13.27
7	Luxembourg	20.42	Belgium	12.04	Trinidad and Tobago	13.25
8	Australia	16.52	Denmark	11.81	Israel	9.37
9	Canada	15.76	Netherlands	11.81	Republic of Korea	9.18
10	Saudi Arabia	13.27	Czech Republic	11.74	South Africa	8.50
11	Trinidad and Tobago	13.25	Germany	10.77	Cyprus	8.32
12	Finland	12.47	Ireland	10.27	Kazakhstan	8.02
13	Estonia	12.47	Russian Federation	9.89	Malta	7.78
14	Belgium	12.04	United Kingdom	9.40	Oman	7.64
15	Denmark	11.81	Japan	9.29	Libyan Arab Jamahiriya	7.37
16	Netherlands	11.81	Poland	9.06	Turkmenistan	6.74
17	Czech Republic	11.74	Iceland	8.85	Venezuela	6.00
18	Germany	10.77	New Zealand	8.81	Malaysia	5.71
19	Ireland	10.27	Austria	7.94	Yugoslavia	4.88
20	Russian Federation	9.89	Norway	7.79	Iran	4.68

* source: IEA CO2 emissions from fuel combustion 1971-1997, Paris, 1999.

PRESS BACKGROUNDER
A survey of climate change basics

An introduction to climate change

Human activities are releasing greenhouse gases into the atmosphere. Carbon dioxide (CO_2) is produced when fossil fuels are used to generate energy or when forests are cut down and burned. Methane (CH_4) and nitrous oxide (N_2O) are emitted from agricultural activities, changes in land use, or other sources. Artificial chemicals called halocarbons (CFCs, HFCs, PFCs) and other long-lived gases such as sulphur hexafluoride (SF_6) are released by industrial processes.

Rising levels of greenhouse gases are expected to cause climate change. In the long-term, the earth must shed energy into space at the same rate at which it absorbs energy from the sun. By increasing the atmosphere's ability to absorb infra-red radiation, humanity's greenhouse gas emissions will force the climate to somehow restore the balance in energy flows. This adjustment will include a "global warming" of the earth's surface and lower atmosphere. But this is only part of the story. Warming up is the simplest way for the climate to get rid of the extra energy. But even a small rise in temperature will be accompanied by many other changes: in cloud cover and wind patterns, for example. Some of these changes may act to enhance the warming (positive feedbacks), others to counteract it (negative feedbacks).

According to the Intergovernmental Panel on Climate Change (IPCC), climate models predict that the global temperature will rise by about 1-3.5°C by the year 2100. This projected change is larger than any climate change experienced over the last 10,000 years. It is based on current emissions trends and assumes that no efforts are made to limit greenhouse gas emissions. There are many uncertainties about the scale and impacts of climate change, particularly at the regional level. Because of the delaying effect of the oceans, surface temperatures do not respond immediately to greenhouse gas emissions, so climate change will continue for many decades after atmospheric concentrations have stabilized. Meanwhile, the balance of the evidence suggests that the climate may have already started responding to past emissions from human activity.

Climate change is likely to have a significant impact on the global environment. In general, the faster the climate changes, the greater will be the risk of damage. The mean sea level is expected to rise 15-95 cm by the year 2100, causing flooding of low-lying areas and other damage. Climatic zones (and thus ecosystems and agricultural zones) could shift towards the poles by 150-550 km in the mid-latitude regions. Forests, deserts, rangelands, and other unmanaged ecosystems would face new climatic stresses. As a result, many will decline or fragment, and more species will become extinct.

Human society will face new risks and pressures. Food security is unlikely to be threatened at the global level, but some regions are likely to experience food shortages and hunger. Water resources will be affected as precipitation and evaporation patterns change around the world. Physical infrastructure will be damaged, particularly by sea-level rise and by extreme weather events. Economic activities, human settlements, and human health will experience many direct and indirect effects. The poor and disadvantaged are the most vulnerable to the negative consequences of climate change.

People and ecosystems will need to adapt to future climatic regimes. Past and current emissions have already committed the earth to some degree of climate change in the 21st century. Adapting to these effects will require a good understanding of socio-economic and natural systems, their sensitivity to climate change, and their inherent ability to adapt. Many strategies are available for adapting to the expected effects of climate change, although they may be too expensive or difficult to implement for poorer countries.

Stabilizing atmospheric concentrations of greenhouse gases will demand a major effort. Based on current trends, the total climatic impact of rising greenhouse gas levels will be equal to the impact that would be caused by a doubling of pre-industrial CO_2 concentrations by 2030, and a trebling or more by 2100. Freezing global CO_2 emissions at their current levels would postpone CO_2-doubling to 2100; emissions would eventually have to fall to about 30% of their current levels for concentrations to stabilize at doubled-CO_2 levels sometime in the future. Given an expanding world economy and growing populations, this would require dramatic improvements in energy efficiency and fundamental changes in other economic sectors as well as in personal lifestyles.

Many options for limiting emissions are available in the short- and medium-term. Policymakers can encourage energy efficiency and other climate-friendly trends in both the supply and consumption of energy. Key consumers of energy include industries, homes, offices, vehicles, and farms. Efficiency can be improved in large part by providing an appropriate economic and regulatory framework for consumers and investors. This framework should promote cost-effective actions, the best current and future technologies, and "no regrets" solutions that make economic and environmental sense irrespective of climate change. Taxes, regulatory standards, tradable emissions permits, information programmes, voluntary programmes, and the phase-out of counterproductive subsidies can all play a role. Changes in practices and lifestyles, from better urban transport planning to personal habits such as reducing automobile use and turning out the lights, are also important.

Reducing uncertainties about climate change, its impacts, and the costs of various response options is vital. In the meantime, it will be necessary to balance concerns about risks and damages with concerns about economic development. The prudent response to climate change, therefore, is to adopt a portfolio of actions aimed at controlling emissions, adapting to impacts, and encouraging scientific, technological, and socio-economic research.

The Climate Change Convention

The United Nations Framework Convention on Climate Convention is the foundation of global efforts to combat global warming. Opened for signature in 1992 at the Rio Earth Summit, its ultimate objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

The Convention sets out some guiding principles. The precautionary principle says that the lack of full scientific certainty should not be used as an excuse to postpone action when there is a threat of serious or irreversible damage. The principle of the "common but differentiated responsibilities" of states assigns the lead in combating climate change to developed countries because of their historical emissions and their greater capacity to respond. Other principles deal with the special needs of developing countries and the importance of promoting sustainable development.

Both developed and developing countries accept a number of general commitments. All Parties will develop and submit "national communications" containing inventories of greenhouse gas emissions by source and greenhouse gas removals by "sinks". They will adopt national programmes for mitigating climate change and develop strategies for adapting to its impacts. They will also promote technology transfer and the sustainable management, conservation, and enhancement of greenhouse gas sinks and "reservoirs" (such as forests and oceans). In addition, the Parties will take climate change into account in their relevant social, economic, and environmental policies; cooperate in scientific, technical, and educational matters; and promote education, public awareness, and the exchange of information related to climate change.

Industrialized countries undertake several specific commitments. Most members of the Organization for Economic Cooperation and Development (OECD) plus the states of Central and Eastern Europe – known collectively as Annex I countries – are committed to adopting policies and measures aimed at returning their greenhouse gas emissions to 1990 levels by the year 2000. (While emissions data for 2000 are not yet available, most developed countries seem unlikely to meet the aim.) They must also submit national communications on a regular basis detailing their climate change strategies. Several states may together adopt a joint emissions target. The countries in transition to a market economy are granted a certain degree of flexibility in implementing their commitments.

The richest countries shall provide "new and additional financial resources" and facilitate technology transfer. These so-called Annex II countries (essentially OECD members) will fund the "agreed full cost" incurred by developing countries for submitting their national communications. These funds must be "new and additional" rather than redirected from existing development aid funds. Annex II Parties will also help finance certain other Convention-related projects, and they will promote and finance the transfer of, or access to, environmentally sound technologies, particularly for developing country Parties. The Convention recognizes that the extent to which developing country Parties implement their commitments will depend on financial and technical assistance from the developed countries.

The supreme body of the Convention is the Conference of the Parties (COP). The COP comprises all the states that have ratified or acceded to the Convention (186 by October 2000). It held its first meeting (COP 1) in Berlin in 1995 and meets on a yearly basis unless the Parties decide otherwise. The COP's role is to promote and review the implementation of the Convention. It will periodically review existing commitments in light of the Convention's objective, new scientific findings, and the effectiveness of national climate change programmes. The COP can adopt new commitments through amendments and protocols to the Convention; in December 1997 it adopted the Kyoto Protocol containing stronger emissions-related commitments for developed countries in the post-2000 period.

The Convention also establishes two subsidiary bodies. The Subsidiary Body for Scientific and Technological Advice (SBSTA) provides the COP with timely information and advice on scientific and technological matters relating to the Convention. The Subsidiary Body for Implementation (SBI) helps with the assessment and review of the Convention's implementation.

A financial mechanism provides funds on a grant or concessional basis. The Convention states that this mechanism shall be guided by, and be accountable to, the Conference of the Parties, which shall decide on its policies, programme priorities, and eligibility criteria. There should be an equitable and balanced representation of all Parties within a transparent system of governance. The

operation of the financial mechanism may be entrusted to one or more international entities. The Convention assigns this role to the Global Environment Facility (GEF) on an interim basis; in 1999 the COP decided to entrust the GEF with this responsibility on an on-going basis and to review the financial mechanism every four years.

The COP and its subsidiary bodies are serviced by a secretariat. The secretariat arranges for sessions of the COP and its subsidiary bodies, drafts official documents, services meetings, collects data, compiles and transmits reports submitted to it, facilitates assistance to Parties for the compilation and communication of information, coordinates with secretariats of other relevant international bodies, and reports on its activities to the COP.

The Kyoto Protocol

The Kyoto Protocol to the United Nations Framework Convention on Climate Change strengthens the international response to climate change. Adopted at the third session of the Conference of the Parties (COP 3) in December 1997, it contains legally binding emissions targets for Annex I (developed) countries for the post-2000 period. By arresting and reversing the upward trend in greenhouse gas emissions that started in these countries 150 years ago, the Protocol promises to move the international community one step closer to achieving the Convention's objective.

The developed countries commit themselves to reducing their collective emissions of six key greenhouse gases by at least 5%. This group target will be achieved through cuts of 8% by the European Union (the EU will meet its target through different rates distributed among its member states), Switzerland, and most Central and East European states; 7% by the US; and 6% by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to 1%, Australia by up to 8%, and Iceland 10%. The six gases are to be combined in a "basket", with reductions in individual gases translated into "CO_2 equivalents" that are then added up to produce a single figure.

Each country's emission target must be achieved in the period 2008-2012. It will be calculated as an average over the five years. "Demonstrable progress" must be made by 2005. Cuts in the three most important gases – carbon dioxide, methane, and nitrous oxide – will be measured against a base year of 1990 (with exceptions for some countries with economies in transition). Cuts in three long-lived industrial gases – hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride – can be measured against either a 1990 or 1995 baseline. (A major group of industrial gases, chlorofluorocarbons, or CFCs, are dealt with under the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer and therefore not included in the Kyoto Protocol.)

Countries will pursue emissions cuts in a wide range of economic sectors. The Protocol encourages governments to cooperate with one another, improve energy efficiency, reform the energy and transportation sectors, promote renewable forms of energy, phase out inappropriate fiscal measures and market imperfections, limit methane emissions from waste management and energy systems, and protect forests and other carbon "sinks". The measurement of changes in net emissions (calculated as emissions minus removals of CO_2) from forests is methodologically complex and needs to be clarified.

The Protocol reaffirms the general commitments of both developed and developing countries under the Protocol. It reiterates the need to take measures to limit emissions and promote adaptation to future climate change impacts; submit information on their national climate change programmes

and inventories; promote technology transfer; cooperate on scientific and technical research; and promote public awareness, education, and training. The Protocol also reiterates the need to provide "new and additional" financial resources to meet the "agreed full costs" incurred by developing countries in carrying out these commitments.

The Conference of the Parties (COP) of the Convention will also serve as the meeting of the Parties (MOP) for the Protocol. This structure is expected to reduce costs and facilitate the management of the intergovernmental process. Parties to the Convention that are not Parties to the Protocol will be able to participate in Protocol-related meetings as observers.

The new agreement will be periodically reviewed. The Parties will take "appropriate action" on the basis of the best available scientific, technical, and socio-economic information. The first review will take place at the second COP session serving the Protocol. Talks on commitments for the post-2012 period must start by 2005.

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