COLUMBIA LAW SCHOOL

CENTER FOR CLIMATE CHANGE LAW

Compilation of International Authorities Supporting Specific Measures to Combat Climate Change

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Introduction

This document is a compilation of international authorities that endorse or require various specific measures to combat climate change.

Not included here are the large number of general obligations for states to limit the pollution they emit or allow. Rather the focus is on specific kinds of mitigation and adaptation measures.

For the purposes of this document, these measures to combat climate change have been divided into the following categories:

A. Selection, design and construction of new energy generating and consuming facilities to have least impact
B. Phaseout of old highly polluting facilities
C. Energy efficiency improvements to existing buildings, facilities
D. Conversion of vehicle fleets
E. Elimination of fossil fuel subsidies
F. Reduction of deforestation
G. Technology transfer to developing countries
H. Mitigation and adaptation assistance to developing countries
I. Acceptance of climate-displaced persons
J. Promote Sustainable Consumption Patterns

The document comprises a non-exhaustive compilation of extracts from various international agreements, environmental treaties and resolutions / declarations of international organizations, as well as reports from several respected international bodies. While the UNFCCC, the Kyoto Protocol and decisions of the Conference of the Parties contain the most authoritative and directly applicable obligations regarding climate change, other international conventions, declarations, agreements and charters also give legal support for some of these specific measures. Certain agreements included in this document are not directly related to climate change but contain language that supports complementary actions, such as avoiding deforestation or conserving water resources.

The weight and authority behind these measures varies depending on the sources that endorse them and whether the language used sets out a mandatory obligation or is merely aspirational. Certain obligations have received considerably more international policy attention than others. Binding obligations to undertake some of the measures necessary to combat climate change that are included in this compilation have not yet been adopted through any multilateral agreements. They may have, however, been given some weight by their inclusion in agreements among smaller groups of countries or in “soft law” documents such as resolutions and declarations of international organizations. In addition to legal authorities, this compilation incorporates extracts from reports issued by expert international agencies (such as the IPCC, UNEP, the IEA and the IMF). Policy recommendations from these reports have been included, as well as references to existing

international or domestic programs that have been implemented that could demonstrate the acceptance and feasibility of measures to combat climate change.

As the influence of a particular provision or recommendation depends on its source, this document is organized to highlight which sources provide the most material regarding each category of measure. Material from source documents containing three or more relevant passages is preceded by a heading indicating the source. Other sources providing fewer passages are listed at the end of each section under "Miscellaneous." Each individual passage contains a footnote reference and all source documents are listed on page 4. The source list includes a brief description of each source, and a link to a list of signatory parties if relevant. Additional definitions from the source document have been included in the text if relevant. Any citations or references in the original text have been omitted. Certain quotations are repeated in different sections of the document if found pertinent for different topics. Italics were added to emphasize particularly relevant or useful language. Authoritative sources that contain recommendations contrary to the measures or that warn of a lack the limited capacity of legal instruments in a specific context are included and indicated with a dagger symbol (†).

List of Sources

Agenda 21 (Report of the United Nations Conference on Environment and Development) (1992)
Agenda 21 is a non-binding action agenda for the UN, other multilateral organizations and individual governments that can be implemented at local, national and global levels.

Asia-Pacific Economic Cooperation (APEC) Forum, Leaders' Declaration (2009)
Declaration of the leaders of the APEC member economies at their annual summit in 2009. APEC is an intergovernmental grouping that operates on the basis of non-binding commitments, and currently has 21 members, which are listed here:
http://www.apec.org/About-Us/About-APEC/Member-Economies.aspx

Barbados Programme of Action (BPOA): Report of the Global Conference on the Sustainable Development of Small Island Developing States (1994)
The Barbados Programme of Action addresses the special challenges, constraints and development needs of small island developing States and sets forth specific actions and measures at the national, regional, and international levels in support of sustainable development.

The Berlin Rules on Water Resources (2004)
The Berlin Rules on Water Resources is a document adopted by the International Law Association, which summarizes international law customarily applied to freshwater resources. The document supersedes the International Law Association's earlier "The Helsinki Rules on the Uses of the Waters of International Rivers," which was limited to international drainage basins and aquifers connected to them.

Climate Change and the Human Rights to Water and Sanitation--Position Paper (2009)
This is a position paper released by the Office of the High Commissioner for Human Rights that discusses the legal obligations applicable to the impacts of climate change on human rights to water and sanitation, as well as ways to address adverse impacts through policy-making.

Proposed Convention for Persons Displaced by Climate Change (CCDP) (2012)
This is a proposal for a convention that would establish a regime for the provision of pre-emptive, adaptive assistance to those likely to be displaced. It was prepared by a group of Australian lawyers and does not have any legal authority.

Convention on the Law of the Non-navigational Uses of International Watercourses (1997)
This is a UN treaty pertaining to the uses and conservation of all waters that cross international boundaries, including both surface and groundwater. The treaty has not entered into force, as it requires 35 countries to do so and is currently ratified by only 30 countries. The status of the Watercourse Convention and the current ratifying parties can be found at:

http://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&lang=en

Convention on Long-Range Transboundary Air Pollution (LRTAP) (1979)
This convention was established through the UN Economic Commission for Europe and sets out general principles relating to air pollution abatement, along with an institutional framework for bringing together research and policy. It entered into force in 1983. It currently has 51 Parties that can be found at:
http://www.unece.org/env/lrtap/status/lrtap_st.html

Draft International Covenant on Environment and Development, 4th Ed (2010)
This draft covenant was released by the International Union for the Conservation of Nature and is a blueprint for an international framework agreement consolidating and developing existing legal principles related to environment and development. It serves as an authoritative reference and checklist for legislators, civil servants and other stakeholders worldwide when drafting new, or updating existing, policies and law.

Energy Charter Treaty (1994)
This treaty provides a multilateral framework for energy cooperation that is unique under international law. It entered into force in 1998 and has a total number of 54 signatories as of June 2013. The status of ratifications can be found here:
http://www.encharter.org/fileadmin/user_upload/document/ECT_ratification_status.pdf

Environmental Refugees: An Emergent Security Issue (2005)
This paper, written by Oxford University Professor Norman Myers, was presented at the 13th Economic Forum of the Organization for Security and Co-operation in Europe.

The Future We Want (Rio+20 Declaration) (2012)
This was a resolution adopted as the final outcome of the 2012 UN Conference on Sustainable Development. It was adopted by consensus of the 193 Member States of the UN.

Gleneagles Plan of Action: Climate Change, Clean Energy and Sustainable Development (2005)
This plan of action was adopted at the Group of 8 ("G8") summit in 2005. The G8 includes Canada, France, Germany, Italy, Japan, Russia, USA and UK.

Global Fuel Economy Initiative (GFEI): International comparison of light-duty vehicle fuel economy: An update using 2010 and 2011 new registration data (2013)
This working paper was released by the GFEI, an organization that exists to promote debate and discussion around the issue of fuel economy. The GFEI is a collaboration between the FIA Foundation, the IEA, the International Transport Forum, UNEP, the International Council on Clean Transportation and the Institute of Transportation Studies.

The G20 Los Cabos Summit Leaders' Declaration (2012)
Declaration from the meeting of the Group of 20 ("G20") held in 2012, in Los Cabos, Mexico. The Members of the G20 include: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, the Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States of America and the European Union.

The G20 Pittsburg Leaders' Statement (2009)
Declaration from the meeting of the Group of 20 ("G20") held in 2009, in Pittsburg, USA. The Members of the G20 include: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, the Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States of America and the European Union.

The Hague Declaration on the Environment (1989)
This declaration, initiated by the governments of the Netherlands, France and Norway, was signed by representatives of 24 states. The signatories can be found here: http://wrmin.nic.in/index3.asp?subsublinkid=292&langid=1&sslid=375

Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007)
The most recent assessment report of the IPCC about the state of scientific, technical and socio-economic knowledge on climate change, its causes, potential impacts and response strategies.

Intergovernmental Panel on Climate Change (IPCC) Renewable Energy Sources and Climate Change Mitigation (2011)
Report prepared by the IPCC on renewable energy and climate change mitigation.

International Civil Aviation Organization (ICAO) Assembly Resolution A37-19 (2010)
Resolution adopted by the 37th ICAO Assembly, which set an aspirational goals of improving annual fuel efficiency of the international aviation sector by 2 per cent and stabilizing its global CO2 emissions at 2020 levels.

International Energy Agency (IEA): Redrawing the Energy Climate Map (2013)
This is a World Energy Outlook Special Report that maps out the current status and expectations of global climate and energy policy and sets out four specific measures for the energy sector that can be quickly and effectively implemented, at no net economic cost, to help keep the 2 °C target alive while international negotiations continue.

International Institute for Applied Systems Analysis (IIASA) Global Energy Assessment (2012)
The International Institute for Applied Systems Analysis is a scientific research institute located in Laxenburg, Austria. It is supported by member organizations from 20 countries. The IIASA's Global Energy Assessment defines a new global energy policy

agenda, proposing recommendations for how societies think about, use, and deliver energy. A list of the IIASA's member organizations can be found here: http://www.iiasa.ac.at/web/home/about/nationalmembers/National-Member-Organizations.en.html

International Monetary Fund (IMF): Climate Policy and the Recovery (2009)
An IMF Staff Position Note authored by Benjamin Jones and Michael Keen.

International Monetary Fund (IMF): Energy Subsidy Reform: Lessons and Implications (2013)
Report issued by the IMF providing advice on energy subsidy reform.

Johannesburg Plan: World Summit on Sustainable Development (WSSD) (2002)
Implementation plan for the Johannesburg Declaration on Sustainable Development, adopted by the WSSD in 2002.

Joint report by IEA, OPEC, OECD and World Bank on fossil-fuel and other energy subsidies: An update of the G20 Pittsburgh and Toronto Commitments (2011)
A document prepared for the G20 Meeting of Finance Ministers and Central Bank Governors (Paris, 14-15 October 2011) and the G20 Summit (Cannes, 3-4 November 2011).

Convention on Long-range Transboundary Air Pollution (LRTAP) Protocol on Further Reduction of Sulfur Emissions (1994)
A protocol to the LRTAP Convention which has 29 parties as of June 2013. A list of parties can be found at: http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-1-e&chapter=27&lang=en

Montreal Protocol on Substances that Deplete the Ozone Layer (1987)
A protocol to the Vienna Convention for the Protection of the Ozone Layer whereby parties agreed to the phasing out of the production of numerous ozone depleting substances. All 193 Member States of the UN are party to the Protocol. For a list of parties, see here: http://ozone.unep.org/new_site/en/treaty_ratification_status.php

Report of the Office of the United Nations High Commissioner for Human Rights on the relationship between climate change and human rights (2009)
Report prepared at the request of the Human Rights Council, based on consultation with UN Member States, agencies, programmes and funds, regional intergovernmental organizations, national human rights institutions, and non-governmental organisations.

Report of the United Nations Conference on Environment and Development (1992): Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests
Adopted by the UN Conference on Environment and Development along with Agenda 21 and the Rio Declaration.

Rio Declaration on Environment and Development (Rio Declaration) (1992)
A short declaration adopted by the UN Conference on Environment and Development setting out 27 principles for future sustainable development.

Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) (1972)
The declaration of the first major UN conference on the environment, which sets out 26 general principles concerning the environment and development.

United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) (1994)
Adopted in 1994 and entered into force in 1996, this Convention that seeks to combat desertification and provide assistance to states dealing with the effects of drought. As of May 2012, it had 195 parties. For a list of parties to the Convention, see here: http://www.unccd.int/en/about-the-convention/the-convention/Status-of-ratification/Pages/default.aspx

United Nations Environment Programme (UNEP) Emissions Gap Report (2012)
First produced by UNEP in 2010, the Emission Gap Report provides information on the current trajectory of greenhouse gas emissions, and the level of reductions necessary to meet global goals regarding to the mitigation or limitation of climate change.

United Nations Environment Programme (UNEP) Risø Centre on Energy, Climate and Sustainable Development: Technologies for Climate Change Mitigation: Transport Sector (2011)
A guide prepared by the UNEP Risø Centre and funded by the Global Environment Facility, that provides advice and guidance for mitigation in the transport sector.

United Nations Framework Convention on Climate Change (UNFCCC) documents:

- **UNFCCC (1992)**
  Negotiated during the 1992 Rio Earth Summit and entered into force in 1994, the UNFCCC aims to prevent "dangerous" human interference with the climate system. It currently has 195 parties, who are listed here: http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php
- **Kyoto Protocol (1998)**
  A protocol to the UNFCCC, the Kyoto Protocol was adopted in 1997 and entered into force in February 2005. It sets out quantified emissions reduction or

limitation commitments for particular developed country Parties. It currently has 192 parties, who are listed here:
http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php

- **Bali Action Plan (CP.13) (2007)**
  Outcome of the 13th Conference of the Parties to the UNFCCC.
- **Copenhagen Accord (CP.15) (2009)**
  Outcomes of the 15th Conference of the Parties to the UNFCCC.
- **Cancun Agreements (CP.16) (2010)**
  Outcomes of the 16th Conference of the Parties to the UNFCCC.
- **Durban Platform (CP.17) (2011)**
  Outcomes of the 17th Conference of the Parties to the UNFCCC.
- **Doha Conference (CP.18) (2012)**
  Decisions made at the 18th Conference of the Parties to the UNFCCC.

World Charter for Nature (Annex to UN General Assembly Resolution 37/7) (1982)
Prepared with the assistance of an ad hoc group of experts, this document sets out general principles of conservation.

World Commission on Environment and Development: Our Common Future (1987)
Also known as the Brundtland Report, this report was issued by the Commission (chaired by former Norwegian Prime Minister Gro Harlem Brundtland). The Commission was established by the UN to propose long-term strategies for sustainable development.

United Nations Environment Programme (UNEP): "30 Ways In 30 Days": inspiring action on climate change and sustainable development (2011)
A compilation of case studies prepared by UNEP that demonstrate the feasibility of various actions to combat climate change.

List of Acronyms

APEC	Asia-Pacific Economic Cooperaiton
BPOA	Barbados Programme of Action
CCDP	Convention for Persons Displaced by Climate Change
CCS	Carbon capture and sequestration
CESCR	Committee on Economic, Social and Cultural Rights
GEA	Global Energy Assessment (by IIASA)
GFEI	Global Fuel Economy Initiative
GHG	Greenhouse gas
IIASA	International Institute for Applied Systems Analysis
ICAO	International Civil Aviation Organization
IEA	International Energy Agency
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
LRTAP	Convention on Long-range Transboundary Air Pollution
OECD	Organisation for Economic Co-operation and Development
OHCHR	Office of the High Commissioner for Human Rights
OPEC	Organization of the Petroleum Exporting Countries
RE	Renewable energy
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
WSSD	World Summit on Sustainable Development

A. Selection, design & construction of new energy generating and consuming facilities to have least impact

1. Energy: General Statements on efficiency and sustainability

IPCC

"*Climate change policies related to energy efficiency and renewable energy are often economically beneficial, improve energy security and reduce local pollutant emissions*."[1]

"*New energy infrastructure* investments in developing countries, upgrades of energy infrastructure in industrialized countries, and *policies that promote energy security*, can, in many cases, *create opportunities to achieve GHG emission reductions* compared to baseline scenarios. Additional co-benefits are country-specific but often include air pollution abatement, balance of trade improvement, provision of modern energy services to rural areas and employment (high agreement, much evidence)."[2]

"Energy efficiency and utilisation of renewable energy offer synergies with sustainable development. In least developed countries, energy substitution can lower mortality and morbidity by reducing indoor air pollution, reduce the workload for women and children and decrease the unsustainable use of fuelwood and related deforestation."[3]

LRTAP Protocol on Further Reduction of Sulfur Emissions

"Taking into account articles 2 to 5, the ongoing research, exchange of information and monitoring and the results thereof, the cost and effectiveness of local and other remedies and, *in order to combat air pollution*, in particular that originating from new or rebuilt installations, each Contracting Party undertakes to develop the best policies and strategies including air quality management systems and, as part of them, control measures compatible with balanced development, in particular by using the best available technology which is economically feasible and low- and non-waste technology*."[4]

> *"*"Air Pollution" means the introduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects* of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment, and "air pollutants" shall be construed accordingly"[5]

"*The Parties shall*, consistent with their national laws, regulations and practices, *facilitate the exchange of technologies and techniques, including those that increase energy efficiency, the use of renewable energy* and the processing of low-sulphur fuels, to reduce sulphur emissions, particularly through the promotion of:

a) The commercial exchange of available technology;

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[1] IPCC Fourth Assessment Report (2007), p.61
[2] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 10
[3] IPCC Fourth Assessment Report (2007), p.59
[4] LRTAP Protocol on Further Reduction of Sulfur Emissions (1994), Article 6
[5] LRTAP Protocol on Further Reduction of Sulfur Emissions (1994), Article 1(a)

b) Direct industrial contracts and cooperation, including joint ventures;
c) The exchange of information and experience;
d) The provision of technical assistance." [6]

Miscellaneous

"Increase investment in *cleaner production and eco-efficiency* in all countries through, inter alia, incentives and support schemes and policies directed at establishing appropriate regulatory, financial and legal frameworks. This would include actions at all levels to:

a. Establish and support cleaner production programmes and centres and more efficient production methods by providing, inter alia, incentives and capacity-building to assist enterprises, especially small and medium-sized enterprises, particularly in developing countries, in improving productivity and sustainable development;
b. Provide incentives for investment in cleaner production and eco-efficiency in all countries, such as state-financed loans, venture capital, technical assistance and training programmes for small and medium-sized companies while avoiding trade-distorting measures inconsistent with the rules of the World Trade Organization;
c. Collect and disseminate information on cost-effective examples in cleaner production, eco-efficiency and environmental management and promote the exchange of best practices and know-how on environmentally sound technologies between public and private institutions;
d. Provide training programmes to small and medium-sized enterprises on the use of information and communication technologies."[7]

"We acknowledge that green economy in the context of sustainable development and poverty eradication will enhance our ability to manage natural resources sustainably and with lower negative environmental impacts, *increase resource efficiency* and reduce waste"[8]

"An Integrated Energy System Strategy is Essential: An integrated approach to energy system design for sustainable development is needed – one in which energy policies are coordinated with policies in sectors such as industry, buildings, urbanization, transport, food, health, environment, climate, security, and others, to make them mutually supportive. The use of appropriate policy instruments and institutions can help foster a rapid diffusion and scale-up of advanced technologies in all sectors to simultaneously meet the multiple societal challenges related to energy. *The single most important area of action is efficiency improvement in all sectors.* This enhances supply side flexibility, allowing the GEA challenges to be met without the need for technologies such as CCS and nuclear."[9]

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[6] LRTAP Protocol on Further Reduction of Sulfur Emissions (1994), Article 3, Paragraph 1
[7] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 16
[8] The Future We Want (Rio+20 Declaration) (2012), Paragraph 60
[9] IIASA Global Energy Assessment Summary (2012), p.xvii

"Governments at the appropriate level, with the cooperation of the relevant United Nations bodies and, as appropriate, intergovernmental and non-governmental organizations, and the private sector, should: […]

c.) *Promote the research, development, transfer and use of improved energy-efficient technologies and practices*, including endogenous technologies in all relevant sectors, giving special attention to the *rehabilitation and modernization of power systems*, with particular attention to developing countries; […]

i.) *Build capacity for energy planning and programme management in energy efficiency, as well as for the development, introduction, and promotion of new and renewable sources of energy;* […]

j.) *Promote appropriate energy efficiency and emission standards or recommendations at the national level*, aimed at the development and use of technologies that minimize adverse impacts on the environment;"[10]

"Take joint actions and improve efforts to work together at all levels to improve access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievement of the Millennium Development Goals, including the goal of halving the proportion of people in poverty by 2015, and as a means to generate other important services that mitigate poverty, bearing in mind that access to energy facilitates the eradication of poverty. This would include actions at all levels to:

a) Improve access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources, taking into account national specificities and circumstances, through various means, such as enhanced rural electrification and decentralized energy systems, *increased use of renewables, cleaner liquid and gaseous fuels and enhanced energy efficiency, by intensifying regional and international cooperation in support of national efforts*, including through capacity-building, financial and technological assistance and innovative financing mechanisms, including at the micro- and meso- levels, recognizing the specific factors for providing access to the poor"[11]

"Call upon Governments as well as relevant regional and international organizations and other relevant stakeholders to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions adopted by the Commission on Sustainable Development concerning energy for sustainable development at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. This would include actions at all levels to: […]

b.) *Integrate energy considerations, including energy efficiency, affordability and accessibility, into socio-economic programmes,* especially into policies of major energy-consuming sectors, and into the planning, operation and maintenance of long-lived energy consuming infrastructures, such as the public sector, transport, industry, agriculture, urban land use, tourism and construction sectors*;* […]

[10] Agenda 21 (1992), Chapter 9.12(c)(i)(j)

[11] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 9(a)

h.) *Establish domestic programmes for energy efficiency, including, as appropriate, by accelerating the deployment of energy efficiency technologies, with the necessary support of the international community;*

i.) *Accelerate the development, dissemination and deployment of affordable and cleaner energy efficiency and energy conservation technologies*, as well as the transfer of such technologies, in particular to developing countries, on favourable terms, including on concessional and preferential terms, as mutually agreed; […]

s.) *Strengthen national and regional energy institutions* or arrangements for enhancing regional and international cooperation on energy for sustainable development, in particular to assist developing countries in their domestic efforts to provide reliable, affordable, economically viable, socially acceptable and environmentally sound energy services to all sections of their populations;

t.) *Countries are urged to develop and implement actions* within the framework of the ninth session of the Commission on Sustainable Development, including through public-private partnerships, taking into account the different circumstances of countries, based on lessons learned by Governments, international institutions and stakeholders, including business and industry, *in the field of access to energy, including renewable energy and energy-efficiency and advanced energy technologies, including advanced and cleaner fossil fuel technologies*;"[12]

"We reaffirm support for the implementation of national and subnational policies and strategies, based on individual national circumstances and development aspirations, using an appropriate energy mix to meet developmental needs, including through *increased use of renewable energy sources and other low-emission technologies, the more efficient use of energy, greater reliance on advanced energy technologies, including cleaner fossil fuel technologies, and the sustainable use of traditional energy resources.* [...]We urge governments to create enabling environments that facilitate public and private sector investment in relevant and needed cleaner energy technologies."[13]

"We recognize that *improving energy efficiency, increasing the share of renewable energy and cleaner and energy-efficient technologies are important for sustainable development, including in addressing climate change*. We also recognize the need for energy efficiency measures in urban planning, buildings and transportation and in the production of goods and services and the design of products. We also recognize the importance of *promoting incentives in favour of, and removing disincentives to, energy efficiency and the diversification of the energy mix, including promoting research and development in all countries, including developing countries*."[14]

"Adopt patterns of production, consumption, and reproduction that safeguard Earth's regenerative capacities, human rights, and community well-being. […]

b.) *Act with restraint and efficiency when using energy, and rely increasingly on renewable energy sources such as solar and wind*."[15]

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[12] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 20(b)(h)(s)(t)

[13] The Future We Want (Rio+20 Declaration) (2012), Paragraph 127

[14] The Future We Want (Rio+20 Declaration) (2012), Paragraph 128

[15] The Earth Charter (2000), Paragraph 7(b)

i.) Energy Generation

IPCC

"Key mitigation technologies and practices currently available:

> *-Energy supply: improved supply and distribution efficiency, fuel switching from coal to gas*; nuclear power; […]
> *-renewable heat and power (hydropower, solar, wind, geothermal, and bioenergy)"*[16]

"*Renewable energy generally has a positive effect on energy security, employment and on air quality.* Given costs relative to other supply options, renewable electricity, which accounted for 18% of the electricity supply in 2005, can have a 30-35% share of the total electricity supply in 2030 at carbon prices up to 50 US$/t$CO_2$-eq"[17]

"There are multiple options for lowering GHG emissions from the energy system while still satisfying the global demand for energy services. Some of these possible options, such as *energy conservation and efficiency*, fossil fuel switching, *renewable energy* (RE)*, nuclear and carbon capture and storage (CCS) were assessed in the AR4. […] As well as having a large potential to mitigate climate change, RE can provide wider benefits. *RE may, if implemented properly, contribute to social and economic development, energy access, a secure energy supply, and reducing negative impacts on the environment and health.* Under most conditions, increasing the share of RE in the energy mix will require policies to stimulate changes in the energy system. Deployment of RE technologies has increased rapidly in recent years, and their share is projected to increase substantially under most ambitious mitigation scenarios. Additional policies would be required to attract the necessary increases in investment in technologies and infrastructure."[18]

> *See IPCC Renewable Energy Sources and Climate Change Mitigation (2011): Summary for Policy Makers Box SPM.1 for RE sources considered in the report

"An increasing number and variety of RE policies—motivated by many factors—have driven escalated growth of RE technologies in recent years. *Government policies play a crucial role in accelerating the deployment of RE technologies.* Energy access and social and economic development have been the primary drivers in most developing countries whereas secure energy supply and environmental concerns have been most important in developed countries. The focus of policies is broadening from a concentration primarily on RE electricity to include RE heating and cooling and transportation. *RE-specific policies for research, development, demonstration and deployment help to level the playing field for RE.*

Policies include regulations such as feed-in-tariffs, quotas, priority grid access, building mandates, biofuel blending requirements, and bioenergy sustainability criteria. Other policy categories are fiscal incentives such as tax policies and direct government

[16] IPCC Fourth Assessment Report (2007), Table 4.2
[17] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 10
[18] IPCC Renewable Energy Sources and Climate Change Mitigation (2011): Summary for Policy Makers, Part 2

payments such as rebates and grants; and public finance mechanisms such as loans and guarantees. Wider policies aimed at reducing GHG emissions such as carbon pricing mechanisms may also support RE.

[…]

The literature indicates that long-term objectives for RE and flexibility to learn from experience would be critical to achieve cost-effective and high penetrations of RE. This would require systematic development of policy frameworks that reduce risks and enable attractive returns that provide stability over a time frame relevant to the investment. *An appropriate and reliable mix of policy instruments, including energy efficiency policies, is even more important where energy infrastructure is still developing and energy demand is expected to increase in the future*."[19]

(For more detail on recommendation policy options for promoting renewable energy,, see full IPCC Renewable Energy Sources and Climate Change Mitigation (2011) report.)

Agenda 21

"Reducing the amount of energy and materials used per unit in the production of goods and services can contribute both to the alleviation of environmental stress and to greater economic and industrial productivity and competitiveness. Governments, in cooperation with industry, should therefore intensify efforts to *use energy and resources in an economically efficient and environmentally sound manner* by: […]

d. *Encouraging the environmentally sound use of new and renewable sources of energy*"[20]

"The objectives are to *extend the provision of more energy-efficient technology and alternative/renewable energy for human settlements* and to reduce negative impacts of energy production and use on human health and on the environment."[21]

"A comprehensive approach to human settlements development should include the *promotion of sustainable energy development* in all countries, as follows: […]

ii. Formulate national action programmes to promote integrated development of energy-saving and renewable energy technologies, particularly for the use of solar, hydro, wind and biomass sources;

iii. *Promote wide dissemination and commercialization of renewable energy technologies* through suitable measures, inter alia, fiscal and technology transfer mechanisms"[22]

[19] IPCC Renewable Energy Sources and Climate Change Mitigation (2011): Summary for Policy Makers, Part 7

[20] Agenda 21 (1992), Chapter 4.18(d)

[21] Agenda 21 (1992), Chapter 7.49

[22] Agenda 21 (1992), Chapter 7.51(i, ii)

"Governments at the appropriate level, with the cooperation of the relevant United Nations bodies and, as appropriate, intergovernmental and non-governmental organizations, and the private sector, should:

d.) *Promote the research, development, transfer and use of technologies and practices for environmentally sound energy systems, including new and renewable energy systems, with particular attention to developing countries*; […]

f.) *Review current energy supply mixes to determine how the contribution of environmentally sound energy systems as a whole, particularly new and renewable energy systems, could be increased in an economically efficient manner,* taking into account respective countries' unique social, physical, economic and political characteristics, and examining and implementing, where appropriate, measures to overcome any barriers to their development and use; […]

i.) *Build capacity for energy planning and programme management in energy efficiency, as well as for the development, introduction, and promotion of new and renewable sources of energy*;"[23]

"Governments at the appropriate level, with the cooperation of the relevant United Nations bodies and, as appropriate, intergovernmental and non-governmental organizations, and the private sector, should: […]

f.) *Support the promotion of less polluting and more efficient technologies and processes in industries, taking into account area-specific accessible potentials for energy, particularly safe and renewable sources of energy, with a view to limiting industrial pollution, and adverse impacts on the atmosphere*."[24]

Gleneagles Plan of Action

"*To respond to the scale of challenges we face, we need to diversify our energy supply mix, including increased use of renewables*. Fossil fuels will continue to be an important part of the global energy mix, and we will need to find ways to manage the associated air pollution and greenhouse gas emissions. *We need to capitalize on all the opportunities available to improve the efficiency along the entire process chain, from extraction, to energy generation and transmission, and to maximize the large and untapped potential of lower-emitting alternative sources of energy*."[25]

"We will *promote the continued development and commercialization of renewable energy* by: […]

b.) welcoming the work of interested parties, including in partnerships, to take forward the Johannesburg Plan of Implementation, including the Renewable Energy and Energy Efficiency Partnership (REEEP) and the Mediterranean Renewable Energy Partnership (MEDREP);

c.) working with developing countries to provide capacity-building assistance, develop policy frameworks, undertake research and development, and assess potential for renewable energy, including bioenergy;

[23] Agenda 21 (1992), Chapter 9.12(d)(f)(i)
[24] Agenda 21 (1992), Chapter 9.18(f)
[25] Gleneagles Plan of Action (2005), Paragraph 11

d.) launching a Global Bioenergy Partnership to support wider, cost effective, biomass and biofuels deployment, particularly in developing countries where biomass use is prevalent following the Rome International Workshop on Bioenergy;
e.) welcoming the establishment and further development of the range of IEA implementing agreements on renewable energy."[26]

IIASA

"The Global Energy Assessment (GEA) analysis demonstrates that *a sustainable future requires a transformation from today's energy systems to those with*: […]

(ii) *greater shares of renewable energies and advanced energy systems with carbon capture and storage (CCS) for both fossil fuels and biomass*."[27]

"*Renewable Energies are Abundant, Widely Available, and Increasingly Cost-effective:* The share of renewable energy in global primary energy could increase from the current 17% to between 30% to 75%, and in some regions exceed 90%, by 2050. If carefully developed, renewable energies can provide many benefits, including job creation, increased energy security, improved human health, environmental protection, and mitigation of climate change. The major challenges, both technological and economic, are:

- reducing costs through learning and scale-up;
- creating a flexible investment environment that provides the basis for scale-up and diffusion;
- integrating renewable energies into the energy system;
- enhancing research and development to ensure technological advances; and
- assuring the sustainability of the proposed renewable technologies.

While there remain sound economic and technical reasons for more centralized energy supplies, renewable energy technologies are also well-suited for off-grid, distributed energy supplies."[28]

"*Major Changes in Fossil Energy Systems are Essential and Feasible: Transformation toward decarbonized and clean energy systems requires fundamental changes in fossil fuel use, which dominates the current energy landscape. This is feasible with known technologies. […]*

- Growing roles for natural gas, the least carbon-intensive and cleanest fossil fuel, are feasible, including for shale gas, if related environmental issues are properly addressed."[29]

"*In aggregate, at least a 60–80% share of global primary energy will need to come from zero-carbon options by 2050; the electricity sector in particular will need to be almost completely decarbonized by mid-century* (low-carbon shares of 75–100%). Getting to that point requires major progress in several critical areas: […]

[26] Gleneagles Plan of Action (2005), Paragraph 16
[27] IIASA Global Energy Assessment Summary (2012), p.xv
[28] IIASA Global Energy Assessment Summary (2012), p.xv
[29] IIASA Global Energy Assessment Summary (2012), p.xvii

Renewables: *Strong renewable energy growth beginning immediately and reaching a global share of 30–75% of primary energy by 2050, with some regions experiencing in the high case almost a complete shift towards renewables by that time* […]
Natural Gas: *Natural gas acting as a bridging or transitional technology in the short to medium term and providing 'virtual' storage for intermittent renewables* […]
Energy Storage: *Rising requirement for storage technologies and 'virtual' systems (e.g., smart grids and demand-side management) to support system integration of intermittent wind and solar*"[30]

"The GEA highlights essential technology-related requirements for radical energy transformation: […]

- *rapid escalation of investments in renewable energies: hydropower, wind, solar energy, modern bioenergy, and geothermal, as well as the smart grids that enable more effective utilization of renewable energies*"[31]

"Conversion of primary energy to energy carriers such as electricity, hydrogen, liquid fuels and heat along with smart transmission and distribution systems are necessary elements of an energy system meeting sustainability objectives."[32]

"The GEA pathways show that *renewable energies can exceed 90% of projected energy demand for specific regions*.
The GEA pathways analysis indicates that *a significant increase in renewable energy supplies is technically feasible and necessary in order to meet the GEA goals*."[33]

"*The GEA pathways show that renewable energies can meet up to 100% of projected energy demand for specific regions. The GEA pathways analysis indicates that a significant increase in renewable energy supplies from 17% of global primary energy use in 2009 up to 30–75% and would result in multiple benefits*."[34]

IEA
"*To keep the door to the 2 °C target open, we propose a set of pragmatic policy actions that, without harming economic growth and using available technologies and policies, can result in a global peak in energy-related GHG emissions by 2020*. The four priority areas in our 4-for-2 °C Scenarios* are: *specific energy efficiency measures; limits to the use and construction of inefficient coal power plants*; minimizing methane releases to the atmosphere in oil and gas production; and a partial phase-out of fossil-fuel subsidies. […] *Energy efficiency accounts for 49% of the savings realized*"[35]

*"In the 4-for-2 °C Scenario, energy-related CO2 and CH4 emissions increase from 33.3 Gt in 2010 to 34.9 Gt in 2020 (measured on a CO2-eq basis) and decline thereafter. Emissions in 2020 are 3.1 Gt lower than the course on which we otherwise

[30] IIASA Global Energy Assessment Summary (2012), p.10
[31] IIASA Global Energy Assessment Summary (2012), p.8
[32] IIASA Global Energy Assessment Summary (2012), p.8
[33] IIASA Global Energy Assessment Summary (2012), p.18
[34] IIASA Global Energy Assessment Summary (2012), p.56
[35] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.43

appear to be set, delivering 80% of the abatement needed to be on track with a 2 °C trajectory"[36]

"In many countries, renewables deployment is driven by government targets. Examples include the targeted share of 20% in total energy demand by 2020 in the European Union; US state-level renewable portfolio standards, covering 30 states and the District of Columbia; existing capacity targets by technology type in China, India and Brazil and biofuels blending mandates in many countries. A wide variety of such policies and mechanisms are in place today. All are taken into account in the New Policies Scenario, the central scenario of [World Energy Outlook Report 2012 (WEO-2012)]. They include the enforcement and further strengthening of these policies where governments have announced this intention.
Renewable energy accordingly plays an important role in all our scenarios, in particular in power generation. Though not characterised specifically as one of the additional policies of the 4-for-2 °C Scenario, the share of renewables in global power generation increases from 20% today to 27% in 2020. This is two percentage points above the level reached in the New Policies Scenario, due to the proposed policy to reduce the use of inefficient coal-fired power generation and lower electricity demand from energy efficiency policies. In net terms, renewables meet about 60% of the increase in global electricity demand up to 2020 in the 4-for-2 °C Scenario, installed capacity reaching around 1 350 gigawatts (Gt) of hydropower, 580 Gt of wind, 265 Gt of solar photovoltaic, 135 Gt of biomass-fired power plants and 35 Gt of other renewables. The 4-for-2 °C Scenario sees cumulative investment in renewables of $2.0 trillion up to 2020, contributing to the reduction in renewable energy technology costs post-2020, thereby facilitating steeper emissions reductions then.

Increasing deployment of renewables is supported by subsidies, which help overcome deployment barriers. In power generation, these subsidies are set to increase to $142 billion in 2020 in the 4-for-2 °C Scenario, up from $64 billion in 2011. This is 5% over the level reached in the New Policies Scenario in 2020 (due to lower wholesale electricity prices from lower international fuel prices), but is offset by the wider economic gains achieved from lower fossil-fuel prices. Biofuels (mostly supported by blending mandates) received subsidies totalling $24 billion in 2011 these rise to $47 billion in 2020 in the 4-for-2 °C Scenario. The European Union, United States and China account for the bulk of renewables subsidies, today (85%) and in 2020 (77%)."[37]

"*In the power sector, for example, a profound change in the way electricity is generated is needed post-2020. In the 4-for-2 °C Scenario, the share of low-carbon technologies including renewables, nuclear and CCS, reaches 40% in 2020, up from 32% today, but this is still well short of the required level of almost 80% in 2035*, [... .] Achieving this target will require the use of all low-carbon technologies, with the largest contribution coming from increased use of renewables, as electricity output from hydro, wind,

[36] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.43
[37] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, Box 2.2, p.50

biomass, solar and other renewables combined in 2035 is over 4 000 terawatt-hours (Tth) (or almost 40%) higher than in the 4-for-2 °C Scenario (Figure 2.18)."[38]

Miscellaneous

"Each Party included in Annex I, in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall:

(a) Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as: […]

(iv) *Research on, and promotion, development and increased use of, new and renewable forms of energy*"[39]

"Call upon Governments as well as relevant regional and international organizations and other relevant stakeholders to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions adopted by the Commission on Sustainable Development concerning energy for sustainable development at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. This would include actions at all levels to: […]

c.) Develop and disseminate *alternative energy technologies with the aim of giving a greater share of the energy mix to renewable energies, improving energy efficiency and greater reliance on advanced energy technologies, including cleaner fossil fuel technologies*;

d.) Combine, as appropriate, the *increased use of renewable energy resources, more efficient use of energy, greater reliance on advanced energy technologies, including advanced and cleaner fossil fuel technologies, and the sustainable use of traditional energy resources, which could meet the growing need for energy services in the longer term to achieve sustainable development*;

e.) *Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies,* including fossil fuel technologies and *renewable energy technologies,* hydro included, and their transfer to developing countries on concessional terms as mutually agreed. With a sense of urgency, *substantially increase the global share of renewable energy sources* with the objective of increasing its contribution to total energy supply, recognizing the role of national and voluntary regional targets as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing countries' efforts to eradicate poverty, and regularly evaluate available data to review progress to this end; […]

t.) *Countries are urged to develop and implement actions* within the framework of the ninth session of the Commission on Sustainable Development, including through public-private partnerships, taking into account the different circumstances of countries, based on lessons learned by Governments, international institutions and stakeholders, including business and industry, *in the field of access to energy,*

[38] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.76

[39] Kyoto Protocol (1998), Article 2, Paragraph 1(a)(iv)

including renewable energy and energy-efficiency and advanced energy technologies, including advanced and cleaner fossil fuel technologies;"[40]

"We reaffirm support for the implementation of national and subnational policies and strategies, based on individual national circumstances and development aspirations, using an appropriate energy mix to meet developmental needs, including through *increased use of renewable energy sources and other low-emission technologies, the more efficient use of energy, greater reliance on advanced energy technologies, including cleaner fossil fuel technologies, and the sustainable use of traditional energy resources*. We commit to promoting sustainable modern energy services for all through national and subnational efforts, inter alia, on electrification and dissemination of sustainable cooking and heating solutions, including through collaborative actions to share best practices and adopt policies, as appropriate. *We urge governments to create enabling environments that facilitate public and private sector investment in relevant and needed cleaner energy technologies*."[41]

"We recognize that *improving energy efficiency, increasing the share of renewable energy and cleaner and energy-efficient technologies* are important for sustainable development, including in addressing climate change. We also recognize the need for energy efficiency measures in urban planning, buildings and transportation and in the production of goods and services and the design of products. We also recognize the importance of *promoting incentives in favour of, and removing disincentives to, energy efficiency and the diversification of the energy mix,* including promoting research and development in all countries, including developing countries."[42]

LRTAP establishes emissions limits for new stationary combustion sources of sulfur emissions, which would include many fossil fueled power stations: "Each Party, except those Parties subject to the United States/Canada Air Quality Agreement of 1991, shall as a minimum:

(a) Apply emission limit values at least as stringent as those specified in annex V to all major new stationary combustion sources [...]"[43]

ii.) Energy Consumption

Agenda 21

"Special attention should be paid to the demand for natural resources generated by unsustainable consumption and to the *efficient use of those resources consistent with the goal of minimizing depletion and reducing pollution.* Although consumption patterns are very high in certain parts of the world, the basic consumer needs of a large section of humanity are not being met. This results in excessive demands and unsustainable lifestyles among the richer segments, which place immense stress on the environment. The poorer segments, meanwhile, are unable to meet food, health care, shelter and

[40] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 20(c-e)(t)
[41] The Future We Want (Rio+20 Declaration) (2012), Paragraph 127
[42] The Future We Want (Rio+20 Declaration) (2012), Paragraph 128
[43] LRTAP Protocol on Further Reduction of Sulfur Emissions (1994), Paragraph 5(a)

educational needs. Changing consumption patterns will require a multipronged strategy focusing on demand, meeting the basic needs of the poor, and reducing wastage and the use of finite resources in the production process."[44]

"*Reducing the amount of energy and materials used per unit in the production of goods and services* can contribute both to the alleviation of environmental stress and to greater economic and industrial productivity and competitiveness. Governments, in cooperation with industry, should therefore *intensify efforts to use energy and resources in an economically efficient and environmentally sound manner* […]"[45]

"Achieving the goals of environmental quality and sustainable development will require *efficiency in production and changes in consumption patterns in order to emphasize optimization of resource use and minimization of waste*. In many instances, this will require reorientation of existing production and consumption patterns that have developed in industrial societies and are in turn emulated in much of the world."[46]

"In the years ahead, Governments, working with appropriate organizations, should strive to meet the following broad objectives: […]

a) To *promote efficiency in production processes and reduce wasteful consumption* in the process of economic growth, taking into account the development needs of developing countries"[47]

Gleneagles Plan of Action

"1. We will take forward actions in the following key areas:
-Transforming the way we use energy […]

2. *Improvements to energy efficiency have benefits for economic growth and the environment*, as well as co-benefits such as reducing greenhouse gas emissions, preventing pollution, alleviating poverty, improving security of energy supply, competitiveness and improving health and employment.

3. At Evian, *we agreed that energy efficiency is a key area for G8 action*. And following agreement at the Sea Island Summit in 2004, the 3Rs (Reduce, Reuse, Recycle) initiative was launched in Tokyo this April—an important step towards encouraging more efficient use of resources and materials, which increases economic competitiveness whilst decreasing environmental impacts."[48]

"To *encourage co-ordination of international policies on labeling, standard setting and testing procedures for energy efficiency appliances*, we will:

a. promote the application of the IEA's 1 Watt Initiative;

[44] Agenda 21 (1992), Chapter 4.5
[45] Agenda 21 (1992), Chapter 4.18
[46] Agenda 21 (1992), Chapter 4.15
[47] Agenda 21 (1992), Chapter 4.17(a)
[48] Gleneagles Plan of Action (2005), Paragraphs 1-3

b. ask the IEA to undertake a study to review existing global appliance standards and codes, building on its existing capacity on energy efficiency in appliances;
c. extend the use of clear and consistent labeling to raise consumer awareness of energy consumption of appliances;
d. work nationally and in co-operation with other countries to seek improvements in the efficiency and environmental performance of products in priority sectors; and
e. explore the potential to co-ordinate standards with other countries, building on the examples provided by existing international bodies."[49]

"We will:

a.) work with the multilateral development banks to expand the use of voluntary energy savings assessments as a part of major investments in new or existing projects in energy intensive sectors;
b.) invite the IEA to develop its work to assess efficiency performance and *seek to identify areas where further analysis of energy efficiency measures by industry sector could add value, across developed and interested developing countries*;
c.) develop partnerships, including sectoral and cross-border partnerships, with industry to reduce the greenhouse gas emissions intensity of the major industrial sectors of our economies; and
d.) continue to support the work of the UNFCCC clearing house on technology transfer TT:Clear in disseminating information on available technologies, and *cooperate further on sharing information on best practices and national policies to encourage the deployment of energy efficiency technologies*"[50]

Energy Charter Treaty

"In pursuit of sustainable development and taking into account its obligations under those international agreements concerning the environment to which it is party, each Contracting Party shall strive to minimize in an economically efficient manner harmful Environmental Impacts occurring either within or outside its Area from all operations within the Energy Cycle in its Area, taking proper account of safety. In doing so each Contracting Party shall act in a Cost-Effective manner. In its policies and actions each Contracting Party shall strive to take precautionary measures to prevent or minimize environmental degradation. The Contracting Parties agree that the polluter in the Areas of Contracting Parties, should, in principle, bear the cost of pollution, including transboundary pollution, with due regard to the public interest and without distorting Investment in the Energy Cycle or international trade. Contracting Parties shall accordingly: […]

(d) have particular regard to *Improving Energy Efficiency,* to developing and using *renewable energy sources,* to promoting the use of cleaner fuels and to employing technologies and technological means that reduce pollution; […]

(g) promote and co-operate in the research, development and application of *energy efficient and environmentally sound technologies, practices and processes* which will

[49] Gleneagles Plan of Action (2005), Paragraph 6
[50] Gleneagles Plan of Action (2005), Paragraph 9

minimize harmful Environmental Impacts of all aspects of the Energy Cycle in an economically efficient manner"[51]

"(1) *Contracting Parties shall co-operate and, as appropriate, assist each other in developing and implementing energy efficiency policies, laws and regulations*.
(2) *Contracting Parties shall establish energy efficiency policies and appropriate legal and regulatory frameworks which promote, inter alia*:

(a) *efficient functioning of market mechanisms* including market-oriented price formation and a fuller reflection of environmental costs and benefits;
(b) *reduction of barriers to energy efficiency, thus stimulating investments*;
(c) *mechanisms for financing energy efficiency initiatives*;
(d) *education and awareness*;
(e) *dissemination and transfer of technologies*;
(f) *transparency of legal and regulatory frameworks*.

(3) Contracting Parties shall strive to achieve the full benefit of energy efficiency throughout the Energy Cycle. To this end they shall, to the best of their competence, *formulate and implement energy efficiency policies and cooperative or coordinated actions based on Cost-Effectiveness and economic efficiency*, taking due account of environmental aspects.
(4) *Energy efficiency policies shall include both short-term measures for the adjustment of previous practices and long-term measures to improve energy efficiency throughout the Energy Cycle*."[52]

For further detail on financing issues, see the Energy Charter Treaty: Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA), Article 6 for Financing and Financial Incentives of energy efficiency and energy-related environmental protection investments.

"(1) In order to achieve the policy aims formulated according to Article 5, each Contracting Party shall *develop, implement and regularly update energy efficiency programmes best suited to its circumstances*.
(2) These programmes may include activities such as the:

(a) development of long-term energy demand and supply scenarios to guide decision-making;
(b) assessment of the energy, environmental and economic impact of actions taken;
(c) definition of standards designed to improve the efficiency of energy using equipment, and efforts to harmonize these internationally to avoid trade distortions;
(d) development and encouragement of private initiative and industrial cooperation, including joint ventures;
(e) promotion of the use of the most energy efficient technologies that are economically viable and environmentally sound;

[51] Energy Charter Treaty (1994), Article 19, Paragraph 1(d)(g)
[52] Energy Charter Treaty: Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) (1994), Article 3, Paragraphs 1-4

(f) encouragement of innovative approaches for investments in energy efficiency improvements, such as Third Party Financing and co-financing;
(g) development of appropriate energy balances and data bases, for example with data on energy demand at a sufficiently detailed level and on technologies for Improving Energy Efficiency;
(h) promotion of the creation of advisory and consultancy services which may be operated by public or private industry or utilities and which provide information about energy efficiency programmes and technologies, and assist consumers and enterprises;
(i) support and promotion of cogeneration and of measures to increase the efficiency of district heat production and distribution systems to buildings and industry;
(j) establishment of specialized energy efficiency bodies at appropriate levels, that are sufficiently funded and staffed to develop and implement policies.

(3) In implementing their energy efficiency programmes, Contracting Parties shall ensure that adequate institutional and legal infrastructures exist."[53]

"The signatories agree that *co-operation is necessary in the field of efficient use of energy and energy-related environmental protection*. This should include:

- ensuring, in a cost-effective manner, consistency between relevant energy policies and environmental agreements and conventions;
- ensuring market-oriented price formation, including a fuller reflection of environmental costs and benefits;
- the use of transparent and equitable market-based instruments designed to achieve energy objectives and reduce environmental problems;
- the creation of framework conditions for the exchange of know-how regarding environmentally sound energy technologies and efficient use of energy;
- the creation of framework conditions for profitable investment in energy efficiency projects."[54]

IIASA

"The Global Energy Assessment (GEA) highlights *essential technology-related requirements for radical energy transformation*:

- significantly *larger investment in energy efficiency improvements especially end-use across all sectors*, with a focus on new investments as well as major retrofits"[55]

"*Quickly improving energy efficiency through new investments and retrofits requires focused and aggressive policies that support rapid innovation through more stringent regulations of energy efficiency, fiscal incentives for new technologies, and pricing GHG emissions*. Combined with higher energy prices, a culture of conservation among

[53] Energy Charter Treaty: Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) (1994), Article 8
[54] Energy Charter Treaty: Concluding Document of the Hague Conference on the European Energy Charter (1994), Title II, Paragraph 7
[55] IIASA Global Energy Assessment Summary (2012), p.8

consumers and firms, and an increase in urban density societies can realize a dramatic increase in energy efficiency."[56]

"These cost factors and rebound effects mean that subsidies to encourage acquisition of energy-efficient devices are unlikely, on their own, to cause the dramatic energy efficiency gains called for in the Global Energy Assessment analysis. For these gains to be realized, carefully targeted policies are needed. For example, *strong efficiency regulations have proven effective*. These are updated regularly and have incentives to reward manufacturers who push technology designs toward advanced efficiency by using electricity tariffs that reward efficiency investments and conservation."[57]

"*Energy Efficiency is an Immediate and Effective Option*: Efficiency improvement is proving to be the most cost-effective, near-term option with multiple benefits, such as reducing adverse environmental and health impacts, alleviating poverty, enhancing energy security and flexibility in selecting energy supply options, and creating employment and economic opportunities. Research shows that required improvements in energy efficiency particularly in end-use can be achieved quickly. For example: […]
through a combination of increased energy efficiency and increased use of renewable energy in the industry supply mix, it is possible to produce the increased industrial output needed in 2030 (95% increase over 2005) while maintaining the 2005 level of GHG emissions."[58]
"The GEA analysis demonstrates that a sustainable future requires a transformation from today's energy systems to those with:

(i) *radical improvements in energy efficiency, especially in end use* […]. *Large, early, and sustained investments, combined with supporting policies, are needed to implement and finance change*. Many of the investment resources can be found through forward-thinking domestic and local policies and institutional mechanisms that can also support their effective delivery. Some investments are already being made in these options, and should be strengthened and widely applied through new and innovative mechanisms to create a major energy system transformation by 2050."[59]

Miscellaneous

"On the other hand, while energy efficiency, too, has been high on the policy agenda in recent years, existing and planned policies are likely to leave two-thirds of the global economically viable energy efficiency potential untapped. Therefore, *much wider adoption of efficiency measures will be necessary* to fulfill the energy efficiency expectations of a scenario consistent with the achievement of the international 2 °C climate target."[60]

[56] IIASA Global Energy Assessment Summary (2012), p.12
[57] IIASA Global Energy Assessment Summary (2012), p.12
[58] IIASA Global Energy Assessment Summary (2012), p.xvi
[59] IIASA Global Energy Assessment Summary (2012), p.xv
[60] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.45

"Each Party included in Annex I, in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall:

a) *Implement and/or further elaborate policies* and measures in accordance with its national circumstances, *such as*:

(i) *Enhancement of energy efficiency in relevant sectors of the national economy*"[61]

"Parties shall reduce and seek to eliminate unsustainable patterns of consumption and production. Such strategies shall be designed to reduce the use of non-renewable resources in the production process. To this end, the Parties shall: […]

b.) *ensure that all raw materials and energy are conserved and used as efficiently as possible in all products and processes*"[62]

"*Key mitigation technologies and practices currently available*:

Industry: *More efficient end-use electrical equipment*"[63]

"It is often *more cost-effective to invest in end-use energy efficiency improvement than in increasing energy supply* to satisfy demand for energy services. Efficiency improvement has a positive effect on energy security, local and regional air pollution abatement, and employment"[64]

2. Water conservation and efficiency

The Berlin Rules on Water Resources

"*States shall take all appropriate measures to manage waters sustainably*" where ""Sustainable use" means the integrated management of resources to assure efficient use of and equitable access to waters for the benefit of current and future generations while preserving renewable resources and maintaining non-renewable resources to the maximum extent reasonably possible."[65]

"1. Basin States shall in their respective territories *manage the waters of an international drainage basin in an equitable and reasonable manner having due regard for the obligation not to cause significant harm to other basin States*.

2. In particular, *basin States shall develop and use the waters of the basin in order to attain the optimal and sustainable use thereof and benefits therefrom*, taking into account the interests of other basin States, consistent with adequate protection of the waters."[66]

"1. Equitable and reasonable use within the meaning of Article 12 is to be determined through consideration of all relevant factors in each particular case.

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[61] Kyoto Protocol (1998), Article 2, Paragraph 1(a)(i)
[62] Draft International Covenant on Environment and Development, 4th Ed (2010), Article 32
[63] IPCC Fourth Assessment Report (2007), Table 4.2
[64] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 10
[65] The Berlin Rules on Water Resources (1994), Article 7
[66] The Berlin Rules on Water Resources (1994), Article 12

1. Relevant factors to be considered include, but are not limited to: […]
    f. *Conservation, protection, development, and economy of use of the water resources of the international drainage basin and the costs of measures taken to achieve these purposes*"[67]

"*States shall undertake prior and continuing assessment of the impact of programs, projects, or activities that may have a significant effect on the aquatic environment or the sustainable development of waters*."[68]

Miscellaneous

"Invites all Parties to enhance action on adaptation under the Cancun Adaptation Framework, taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances, by undertaking, inter alia, the following:

(a) *Planning, prioritizing and implementing adaptation actions*, including projects and programmes[1] (footnote 1: Including in the areas of *water resources;* health; agriculture and food security; infrastructure; socioeconomic activities; terrestrial, freshwater and marine ecosystems; and coastal zones) and actions identified in national and subnational adaptation plans and strategies, national adaptation programmes of action of the least developed countries, national communications, technology needs assessments and other relevant national planning documents"[69]

"The natural resources of the earth, including the air, *water*, land, flora and fauna and especially representative samples of natural ecosystems, *must be safeguarded for the benefit of present and future generations through careful planning or management*, as appropriate."[70]

"Natural resources shall not be wasted, but used with a restraint appropriate to the principles set forth in the present Charter, in accordance with the following rules: […]

(c) *Resources, including water, which are not consumed as they are used shall be reused or recycled*"[71]

"*All States*, according to their capacity and available resources, and through bilateral or multilateral cooperation, including the United Nations and other relevant organizations as appropriate, *could implement the following activities to improve integrated water resources management:* […]

l.) *Promotion of water conservation through improved water-use efficiency and wastage minimization schemes for all users, including the development of water-saving devices*"[72]

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[67] The Berlin Rules on Water Resources (1994), Article 13
[68] The Berlin Rules on Water Resources (1994), Article 29
[69] Cancun Agreements (2010), Paragraph 14
[70] Stockholm Declaration (1972), Principle 2
[71] World Charter for Nature (1982), Paragraph 10(c)
[72] Agenda 21 (1992), Chapter 18.12(l)

For more information regarding freshwater resources, see Agenda 21, Chapter 18: Protection of the quality and Supply of Freshwater Resources: Application of Integrated Approaches to the Development, Management and Use of Water Resources.

"Develop integrated water resources management and water efficiency plans by 2005, with support to developing countries, through actions at all levels to:

a. Develop and implement national/regional strategies, plans and programmes with regard to integrated river basin, watershed and groundwater management and *introduce measures to improve the efficiency of water infrastructure to reduce losses and increase recycling of water*;
b. Employ the full range of policy instruments, including regulation, monitoring, voluntary measures, market and information-based tools, land-use management and cost recovery of water services, without cost recovery objectives becoming a barrier to access to safe water by poor people, and adopt an integrated water basin approach;
c. *Improve the efficient use of water resources and promote their allocation among competing uses* in a way that gives priority to the satisfaction of basic human needs and balances the requirement of preserving or restoring ecosystems and their functions, in particular in fragile environments, with human domestic, industrial and agriculture needs, including safeguarding drinking water quality;
d. Develop programmes for mitigating the effects of extreme water-related events;
e. *Support the diffusion of technology and capacity-building for non-conventional water resources and conservation technologies*, to developing countries and regions facing water scarcity conditions or subject to drought and desertification, through technical and financial support and capacity-building;
f. *Support, where appropriate, efforts and programmes for energy-efficient, sustainable and cost-effective desalination of seawater, water recycling and water harvesting from coastal fogs in developing countries*, through such measures as technological, technical and financial assistance and other modalities;
g. Facilitate the establishment of public-private partnerships and other forms of partnership that give priority to the needs of the poor, within stable and transparent national regulatory frameworks provided by Governments, while respecting local conditions, involving all concerned stakeholders, and monitoring the performance and improving accountability of public institutions and private companies."[73]

"As various studies document, *the negative effects of climate change on water supply and on the effective enjoyment of the right to water can be mitigated through the adoption of appropriate measures and policies*."[74]

"The right to water is implicit in Article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR)[75], as interpreted by the Committee on Economic,

[73] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 26
[74] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 30
[75] International Covenant on Economic, Social and Cultural Rights, 6 I.L.M. 368 (1967).

Social and Cultural Rights (CESCR), which defines the right to water as water as "the right of everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses."" [76]

"In pursuing the objective of this Convention, the Parties shall: […]

d.) *promote cooperation among affected country Parties in the fields* of environmental protection and *the conservation of land and water resources, as they relate to desertification and drought*"[77]

"*The Parties shall, in particular, take all appropriate measures*: […]

(b) *To ensure that transboundary waters are used with the aim of ecologically sound and rational water management, conservation of water resources and environmental protection*; [78]

"In taking the measures referred to in paragraphs 1 and 2 of this article, the Parties shall be guided by the following principles: […]

(c) *Water resources shall be managed so that the needs of the present generation are met without compromising the ability of future generations to meet their own needs*."[79]

"Utilization of an international watercourse in an equitable and reasonable manner […]5 requires taking into account all relevant factors and circumstances, including: […]

(f) *Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect*"[80]

"Protect and restore the integrity of Earth's ecological systems, with special concern for biological diversity and the natural processes that sustain life. […]

e.) *Manage the use of renewable resources such as water*, soil, forest products, and marine life *in ways that do not exceed rates of regeneration and that protect the health of ecosystems*."[81]

"Parties shall take all appropriate measures to maintain and restore the quality of all forms of water, including both salt and fresh water, whether contained in the atmosphere, the oceans, in underground aquifers or watercourses such as lakes and rivers to meet basic human needs and as an essential component of aquatic systems. *Parties also shall take all appropriate measures, in particular through integrated conservation and management of water resources and appropriate sanitary measures, to ensure the*

[76] CESCR, General Comment No. 15: The Right to Water, E/C.12/2002/11 (2003), quoted in OHCHR Climate Change and the Human Rights to Water and Sanitation: Position Paper, p.9

[77] United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) (1994), Article 4, Paragraph 2(d)

[78] Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992), Paragraph 2(b)(c)

[79] Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992), Paragraph 5

[80] Convention on the Law of the Non-navigational Uses of International Watercourses (1997), Article 6, Paragraph 1(f)

[81] The Earth Charter (2000), Paragraph 5(e)

availability of sufficient quantities of water to satisfy basic human needs and to maintain aquatic systems."[82]

3. Provisions relating to specific regions

Small Island Developing Nations:

"Climate Change and Sea Level Rise: National Action, Policies and Measures:

viii.) *Promote a more efficient use of energy resources in development planning* and use appropriate methods to minimize the adverse effects of climate change on the sustainable development of those resources."[83]

"Energy Resources: National Action, Policies and Measures: […]

ii.) *Promote the efficient use of energy and the development of environmentally sound sources of energy and energy-efficient technologies*, paying special attention to the possibilities of using, where appropriate, economic instruments and incentive structures and the increasing economic possibilities of renewable sources of energy; […]

iv.) *Strengthen research capabilities and develop technologies to encourage the efficient utilization of non-renewable sources of energy*."[84]

"Energy Resources: National Actions, Policies and Measures:

(iii) *Establish and/or strengthen, where appropriate, research capabilities in the development and promotion of new and renewable sources of energy, including wind, solar, geothermal, hydroelectric, wave and biomass energy, and ocean thermal energy conversion*."[85]

"Energy Resources: Regional Action:

i.) *Establish or strengthen research and policy capabilities in the development of new and renewable sources of energy, including wind, solar, geothermal, hydroelectric, wave and biomass energy*."[86]

Asia:

"In preparing and implementing national action programmes, the affected country Parties of the region [Asia], consistent with their respective circumstances and policies, may, inter alia, as appropriate: […]

g.) *promote the integrated management of drainage basins, the conservation of soil resources, and the enhancement and efficient use of water resources*"[87]

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[82] Draft International Covenant on Environment and Development, 4th Ed (2010), Article 22

[83] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part IA(viii)

[84] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part VIIA(ii)(iv)

[85] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part VIIA(iii)

[86] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part VIIB(i)

[87] United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) (1994), Annex II, Article 4, Paragraph 1(g)

Latin America and the Caribbean:

"In the light of their respective situations, the affected country Parties of the region [Latin American and the Caribbean] may take account, inter alia, of the following thematic issues in developing their national strategies for action to combat desertification and/or mitigate the effects of drought, pursuant to article 5 of the Convention: […]

f.) rational management and conservation of soil resources and *exploitation and efficient use of water resources*"[88]

Africa:

"Deal effectively with energy problems in Africa, including through initiatives to: […]

j.) […] (ii) *Provide support to implement other initiatives on energy, including the promotion of cleaner and more efficient use of natural gas and increased use of renewable energy, and to improve energy efficiency and access to advanced energy technologies, including cleaner fossil fuel technologies, particularly in rural and peri-urban areas*"[89]

[88] United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) (1994), Annex III, Article 4, Paragraph 1(f)

[89] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 62(j(ii))

B. Phase-out of old highly polluting facilities

1. Closure or conversion to renewables

IEA

"To keep the door to the 2 °C target open, we propose a set of pragmatic policy actions that, without harming economic growth and using available technologies and policies, can result in a global peak in energy-related GHG emissions by 2020. The four priority areas in our 4-for-2 °C Scenarios are: specific energy efficiency measures; *limits to the use and construction of inefficient coal power plants*; minimizing methane releases to the atmosphere in oil and gas production; and a partial phase-out of fossil-fuel subsidies. […] *limitations on inefficient coal-fired power plants [account] for 21% [of the savings realized]*. […] Restrictions on coal use support the growth of renewables, which increase their share in power generation to 27% in 2020, up from around 20% today."[90]

"In the power sector, we first assume that a ban is introduced on the construction of new subcritical coal-fired power plants (although it does not apply to units already under construction). The means of implementing such a policy is likely to differ by market, but a variety of options is already available including: *the adoption of stringent energy efficiency or CO2 emissions standards for coal power plants; the adoption of air pollution standards or pricing the use of carbon, for example through an emissions trading scheme.* Second, for existing inefficient coal power plants, we assume that their level of operation is reduced to the extent achievable, with the constraint of maintaining adequate electricity supply. The impact of this assumption varies by region, reflecting differences in the power generation fleet, the quality of coal used and the level of electricity demand. Intervention for existing units is likely to take a more direct regulatory form, for example assigning power production limits to each generator according to the make-up of its power plant fleet (in liberalised markets), or allocating generation slots, renewing (or not) operational licences or altering the dispatch schedule to favour more efficient plants (in regulated markets)."[91]

"In the 4-for-2 °C Scenario, the use of the least efficient coal-fired power plants is reduced, relative to the New Policies Scenario. We assume a ban is introduced prohibiting the construction of new subcritical coal-fired power plants. Plants that have recently been built or are already under construction and have therefore yet to recover their investment cost, continue to operate, albeit at reduced levels. Those inefficient plants that have already repaid their investment costs are either retired or idled. *Possible levers to achieve this policy include:*

- *Adoption of energy efficiency or CO_2 emissions standards for coal-fired power plants.*
- *Adoption of air pollution standards.*
- *Pricing the use of carbon, for example through an emissions trading scheme.*

[90] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.43
[91] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.48

- *Assigning power production limits for each generator to incentivise the use of the most efficient plants (typically in liberalised markets).*
- *Allocation of generation slots, renewing (or not) operational licences or altering the dispatch schedule in favour of more efficient plants (typically in regulated markets).*"[92]

For more on this topic and country-specific analyses, see IEA: Redrawing the Energy Climate Map (2013), pp.59-62.

Miscellaneous

"*The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems*."[93]

"Governments at the appropriate level, with the cooperation of the relevant United Nations bodies and, as appropriate, intergovernmental and non-governmental organizations, and the private sector, should:

a.) In accordance with national socio-economic development and environment priorities, evaluate and, as appropriate, *promote cost-effective policies or programmes, including administrative, social and economic measures, in order to minimize industrial pollution and adverse impacts on the atmosphere*"[94]

"Reduce respiratory diseases and other health impacts resulting from air pollution, with particular attention to women and children, by: […]

c.) *Strengthening and supporting efforts for the reduction of emissions through the use of cleaner fuels and modern pollution control techniques*"[95]

"Many industrial facilities in developing countries are new and include the latest technology with the lowest specific emissions. However, *many older, inefficient facilities remain in both industrialized and developing countries. Upgrading these facilities can deliver significant emission reductions*"[96]

2. Carbon capture and sequestration

IIASA

"The GEA analysis demonstrates that a sustainable future requires a transformation from today's energy systems to those with: […]

(ii) *greater shares of renewable energies and advanced energy systems with carbon capture and storage (CCS) for both fossil fuels and biomass*."[97]

[92] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.58
[93] Stockholm Declaration (1972), Principle 6
[94] Agenda 21 (1992), Paragraph 9.18(a)
[95] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 56(c)
[96] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 13
[97] IIASA Global Energy Assessment Summary (2012), p.xv

"*Major Changes in Fossil Energy Systems are Essential and Feasible:* Transformation toward decarbonized and clean energy systems requires fundamental changes in fossil fuel use, which dominates the current energy landscape. This is feasible with known technologies.

- *CO_2 capture and storage (CCS), which is beginning to be used, is key. Expanding CCS will require reducing its costs, supporting scale-up, assuring carbon storage integrity and environmental compatibility, and securing approval of storage sites.*
- Co-processing of biomass and coal or natural gas with CCS, using known technologies, is important for co-producing electricity and low-carbon liquid fuels for transportation and for clean cooking. Adding CCS to such coproduction plants is less costly than for plants that make only electricity."[98]

"In aggregate, at least a 60–80% share of global primary energy will need to come from zero-carbon options by 2050; the electricity sector in particular will need to be almost completely decarbonized by mid-century (low-carbon shares of 75–100%). Getting to that point requires major progress in several critical areas: […]
Coal : A complete phase-out of coal power without CCS by 2050 […]
Carbon Capture and Storage: Fossil CCS as an optional bridging or transitional technology in the medium term unless there is high energy demand, in which case CCS may be essential. CCS technology offers one potentially relatively low-cost pathway to low carbon energy. CCS in conjunction with sustainable biomass is deployed in many pathways to achieve negative emissions and thus help achieve climate stabilization. "[99]

"*In industrial countries, where energy infrastructures are largely already in place, a high priority could be overhauling existing coal power plant sites to add additional capabilities (such as co-production of power and fuels) and CCS*. Simply switching from coal to natural gas power generation without CCS will not achieve the needed carbon emission reductions."[100]

"*Significant scale-up will be needed to achieve large reductions in CO_2 emissions through CCS.* A five- to ten-fold scale-up in the size of individual projects is needed to capture and store emissions from a typical coal-fired power plant. A thousand-fold scale-up in CCS would be needed to reduce emissions by billions of tonnes per year." [101]

For additional information regarding CCS, including worldwide storage capacity, costs, and access to capital, see IIASA Global Energy Assessment Summary (2012), p.58-59.

Miscellaneous
"Each Party included in Annex I, in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall:

[98] IIASA Global Energy Assessment Summary (2012), p.xvii
[99] IIASA Global Energy Assessment Summary (2012), p.10
[100] IIASA Global Energy Assessment Summary (2012), p.19
[101] IIASA Global Energy Assessment Summary (2012), p.58-59

(a) Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as: […]
(iv) *Research on, and promotion, development and increased use of, new and renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies*;"[102]

"*Key mitigation technologies and practices currently available: early application of carbon dioxide capture and storage (CCS)*"[103]

"*CCS in underground geological formations is a new technology with the potential to make an important contribution to mitigation by 2030*. Technical, economic and regulatory developments will affect the actual contribution"[104]

"*In relative terms, the largest scale-up, post-2020, is needed for CCS*, at seven times the level achieved in the 4-for-2 °C Scenario, or around 3 100 Tth in 2035, with installation in industrial facilities capturing close to 1.0 Gt CO2 in 2035. Projects in operation today in all sectors capture only 6 Mt CO2, implying a very rapid deployment of CCS in many applications."[105]

"*CCS deployment requires strong policy action, as present market conditions are insufficient and current CO2 pricing mechanisms have failed to provide adequate incentives to drive it.* Governments need to put in place incentive policies that support not only demonstration projects but also wider deployment. The optimal portfolio of incentive policies needs to evolve as the technology develops from being relatively untested at a large scale to being well-established. The incentive policy portfolio should initially be weighted towards technology-specific support, explicitly targeting the development of CCS into a commercial activity through the provision of capital grants, investment tax credits, credit guarantees and/or insurance. At the early stage, measures are needed to enable projects to move ahead in order to generate replicable knowledge and experience. Targeted sector-specific industrial strategies are then needed to move CCS from the pilot project phase to demonstration and then deployment phases. In the long term, a technology-neutral form of support, e.g. in the form of a CO2 price, allows the deployment of CCS to be considered in relation to other cost-effective abatement options."[106]

For more information on CCS, see IEA: Redrawing the Climate Energy Map (2013), pp.77-80.

"*We will work to accelerate the development and commercialization of Carbon Capture and Storage technology by:*

[102] Kyoto Protocol, Article 2, Paragraph 1(a)(iv)
[103] IPCC Fourth Assessment Report (2007), Table 4.2
[104] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 10
[105] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.77
[106] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, Box 2.4, p.79

a.) endorsing the objectives and activities of the Carbon Sequestration Leadership Forum (CSLF) and encouraging the Forum to work with broader civil society and to address the barriers to the public acceptability of CCS technology;
b.) inviting the IEA to work with the CSLF to hold a workshop on short-term opportunities for CCS in the fossil fuel sector, including from Enhanced Oil Recovery and CO_2 removal from natural gas production;
c.) inviting the IEA to work with the CSLF to study definitions, costs, and scope for 'capture ready' plant and consider economic incentives;
d.) collaborating with key developing countries to research options for geological CO_2 storage; and
e.) working with industry and with national and international research programs and partnerships to explore the potential of CCS technologies, including with developing countries.*"*[107]

[107] Gleneagles Plan of Action (2005), Paragraph 14

C. Energy efficiency improvements to existing buildings, facilities

IPCC

"Key mitigation technologies and practices currently available:
Buildings: Efficient lighting and day lighting; more efficient electrical appliances and heating and cooling devices; improved cook stoves, improved insulation; passive and active solar design for heating and cooling; alternative refrigeration fluids, recovery and recycling of fluorinated gases […]
Policies, measures and instruments shown to be environmentally effective: Appliance standards and labeling, building codes and certification, demand-side management programmes, public sector leadership programmes, including procurement, incentives for energy service companies"[108]

"*Energy efficiency options for new and existing buildings could considerably reduce CO_2 emissions with net economic benefit.* Many barriers exist against tapping this potential, but there are also large co-benefits (high agreement, much evidence).

- By 2030, about 30% of the projected GHG emissions in the building sector can be avoided with net economic benefit
- Energy efficient buildings, while limiting the growth of CO_2 emissions, can also improve indoor and outdoor air quality, improve social welfare and enhance energy security
- Opportunities for realising GHG reductions in the building sector exist worldwide. However, multiple barriers make it difficult to realise this potential. These barriers include availability of technology, financing, poverty, higher costs of reliable information, limitations inherent in building designs and an appropriate portfolio of policies and programs
- The magnitude of the above barriers is higher in the developing countries and this makes it more difficult for them to achieve the GHG reduction potential of the building sector"[109]

UNEP

"*In the building sector promising policies include:*
(i) building codes and
(ii) appliance standards.
The motivation for these policies has been mostly to reduce residential and private sector energy use and costs and to increase safety. "[110]

"*Best practice policies in the building sector: building codes*
Introduction:

[108] IPCC Fourth Assessment Report (2007), Table 4.2
[109] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 12
[110] UNEP Emissions Gap Report (2012), p.5

Building codes are regulatory instruments that set standards for specific technologies or energy performance levels and can be applied to both new buildings or to retrofits of existing buildings. The building sector contributes around 8% of global greenhouse gas emissions and approximately one third of all energy-related greenhouse gas emissions. In addition to the reduction potential for 2020 listed in Table 4.1, *the sector has been recognized as having the largest longer-term, cost-effective greenhouse gas mitigation potential of any industrial sector* (IPCC, 2007; Ürge-Vorsatz et al., 2012b). While there is extensive greenhouse gas mitigation potential in the building sector, buildings are long-lived. A combination of slow turnover and retrofit rates implies that the shorter term potential is significantly below the longer term potential. A recent scenario-based study (Ürge-Vorsatz et al., 2012b) estimates the global emission reduction potential to be approximately 2.1 GtCOe by 2020, but up to 9 GtCOe by 2050. To illustrate, this implies that *by 2050,* the building sector could consume 30% less energy compared to 2005, despite a close to 130% projected increase in built floor area over the same period. Figure 4.1 illustrates these scenarios.

"Lock-in" and urgency of action

The long-lived nature of buildings also implies that there is a risk of "locking in" energy inefficiencies resulting in emissions that are substantially higher than necessary. For instance, if policy development and reform continues at current rates […], it is estimated that emission reductions will be 1.6 $GtCO_2e$ in 2020 and 4.5 $GtCO_2e$ in 2050, in contrast to the 2.1 $GtCO_2e$ in 2020 and 9 $GtCO_2e$ in 2050 estimated to be technically and economically feasible. *The strength and appropriateness of building sector policies in place over the next few years will therefore determine total building emissions for several decades to come – pointing to the advantages of quick action.* If the building sector is to reduce emissions sufficiently to contribute to achieving the 2°C target, policy packages containing state of the art building codes may need to become mandatory over the next 10 years in all the major economies such as the USA, India, China and the European Union.

Policies that work

Building codes are an example of visible success in the field of climate-related policy-making. Few other areas exist where policies have been put in place over the last decade to achieve significant emission reductions, while providing the same or even increased service levels. Leading European countries have used the last 20 to 30 years to develop and increase the stringency of building energy policies. However, China has taken only a decade to develop and implement its first generation codes and under the 12^{th} five year plan is rapidly increasing the stringency of codes and mandating the application of energy efficiency standards to renovation projects. In the USA, two sets of codes are in place, but there is potential for further action. *Building codes that set minimum energy performance requirements have proven to be among the most effective policy tools for cost-effective energy savings and greenhouse gas reductions. To be most effective, they should be implemented as a core element of integrated packages of regulatory standards, financial incentives, and voluntary programmes*. In practice, building codes have proven more efficient than market-based instruments in the residential and commercial sectors, due to market imperfections such as owner-tenant and

builder-occupant split incentives; inadequate information and associated high transaction costs; risk aversion towards higher first-costs; first-cost psychology barriers; and other factors. In general, *effective policies for reducing greenhouse gas emissions from the building sector set targets for absolute energy performance for new buildings and occasionally for retrofits. Absolute targets provide a more certain policy environment for market transformation that can help drive demand for more energy efficient buildings.* Policy targets for mandatory energy-efficient renovation of existing buildings are under way within the European Union and in different parts of China and the USA. Although state-of-the-art, these targets have yet to become widely implemented in building codes, which implies that even in the most progressive jurisdictions, there is significant potential for scaling up mandatory energy efficient renovation to further reduce emissions. With regard to cost-effectiveness, very few studies exist that rigorously evaluate cost-effectiveness on a comparable basis. Available estimates however, show attractive ranges. For example, one study estimates that emission reductions from buildings in the EU region could have an average cost of less than 36.5 US$/tCO$_2$e with a cost range spanning –109 to 49 US$/tCO$_2$e. Generally, the overall cost-efficiency that can be achieved will be dependent on the design of the building code and how the code is implemented."[111]

Additional information regarding building codes can be found in the UNEP Emissions Gap Report (2012), sections "Drivers and co-benefits, lessons and scope for scaling up", and "Best practice policies in the building sector: appliance standards and labels."

IEA

"In a special focus on energy efficiency, the WEO-2012 identified an extensive range of measures, by country and by sector, capable of reducing energy consumption in a cost-effective manner. However, since implementation of some of the efficiency policies identified in WEO-2012 would depend upon the prior elimination of serious market barriers (which in practice could take considerable time), only a selected sub-set of the measures are adopted in 4-for-2 °C Scenario, namely:

(i) reducing energy use from new space and water heating, as well as cooling equipment;

(ii) more efficient lighting and new appliances; […].

Measures to meet the objectives are already widely deployed in many countries, using readily available technologies and methods."[112]

Key energy efficiency measures include:

- *More efficient heating and cooling systems in residential and commercial buildings through minimum energy performance standards (MEPS) for new equipment, and technology switching, such as through greater use of heat recovery and better use of automation and control systems.*
- *More efficient appliances and lighting in residential and commercial buildings.*

[111] UNEP Emissions Gap Report (2012), p.34

[112] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.47

- *Use of more efficient electric motor systems in industrial applications, such as pumping, compressing air, and other types of mechanical handling and processing.* […]"[113]

For additional information on country-specific efficiency information, progress reports, and recommendations (primarily about India and China), see IEA Redrawing the Energy Climate Map (2013), pp.54-56.

"*Efficient use of energy in buildings, including energy used for heating, cooling, appliances and lighting, has recently attracted considerable attention as policies in place or under consideration tap only around one-fifth of the economic potential*. In 2013, for example, the Major Economies Forum initiated a dialogue among its member countries with a view to their setting voluntary intensity targets for energy consumption in buildings. In terms of heating and cooling, *installing more efficient equipment (such as gas heating systems, heat pumps and high efficiency air-conditioners) is one of the best means of reducing emissions in the short term, although the potential to improve the building envelope is also vast*. Several countries have already adopted voluntary programmes, e.g. India or Brazil, or binding ones, such as the United States, to advance uptake of more efficient equipment.
[…]

There is considerable scope in all regions to reduce emissions stemming from the use of appliances and lighting. This is linked, in part, to their important share in overall electricity demand today: lighting and appliances alone are responsible for 37% of electricity demand in OECD countries and 26% in non-OECD countries. Due to the relatively short operating lifespan of the equipment concerned, MEPS for appliances and lighting are particularly effective and are already widely used in many countries. Most OECD countries have adopted such standards for a wide range of products, as has China. Russia is phasing out incandescent light bulbs (100 watts and above), while India is set to adopt mandatory standards and labelling for room air conditioners and refrigerators. At the Clean Energy Ministerial in New Delhi in April 2013, ministers highlighted the importance of the Superefficient Equipment and Appliance Deployment (SEAD) initiative as a means to progress quickly and cheaply towards a more sustainable future.
In the 4-for-2 °C Scenario, the contribution of appliances and lighting to additional energy efficiency-related savings is particularly large in the United States, at 44% in 2020. The bulk of these savings could be achieved by tightening the MEPS that already exist. Appliances and lighting are responsible for close to 40% of the efficiency-related savings in India, a high share that reflects the current dearth of efficiency standards. In absolute terms, the largest reductions are made in China (125 Mt CO_2-eq), followed by the United States (around 85 Mt) and the European Union (around 60 Mt), where we assume that the new EcoDesign Directive that covers fifteen product groups is further strengthened. Across all countries, there is still considerable potential to expand both the range of products that are covered by MEPS and the stringency of the standards."[114]

[113] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.53
[114] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.56-7

Gleneagles Plan of Action

"*To promote energy efficient buildings, we will*:

a.) *invite the International Energy Agency to review existing building standards and codes in developed and developing countries, develop energy indicators to assess efficiency, and identify policy best practices*;

b.) *encourage the work of existing partnerships such as the Renewable Energy and Energy Efficiency Partnerships in outreach to developing countries*; and

c.) *develop domestic guidelines or standards for the procurement and management of public buildings in our respective countries*."[115]

IIASA

"*Standards for building codes, heating and cooling, appliances, fuel economy, and industrial energy management are one of the most effective policy tools for improving energy efficiency and should be adopted globally*. These regulatory policies are most effective when combined with fiscal incentives and attention-attracting measures such as information, awareness, and public leadership programs."[116]

"*In the buildings sector, new and existing technologies as well as non-technological opportunities represent a major opportunity for transformative change of energy use*. Passive houses that reduce energy use for heating and cooling by 90% or more, for example, are already found in many countries. Increased investments in a more energy-efficient building shell are in part offset by lower or fully eliminated investments in heating/cooling systems, with energy costs for operation almost avoided, making these new options very attractive. Passive house performance is possible also for existing buildings, if it is included as a performance goal when major renovations are done. Energy Plus houses, delivering net energy to the grid over a year, have been constructed even in high latitudes. Building-integrated solar photovoltaics can contribute to meeting the electricity demand in buildings, especially in single-family homes, and solar water heaters can cover all or part of the heat required for hot water demand. However, requiring buildings to be zero-energy or net-energy suppliers may not be the lowest-cost or most sustainable approach in addressing the multiple GEA goals and typically may not be possible, depending on location.

Analysis carried out under the Global Energy Assessment (GEA) pathway framework demonstrates that a reduction of global final energy use for heating and cooling of about 46% is possible by 2050 compared with 2005 through full use of today's best practices in design, construction, and building operation technology and know-how. This can be obtained even while increasing amenities and comfort and simultaneously accommodating an increase in global floor area of over 126%.

There is, however, a significant risk of lock-in. *If stringent building codes are not introduced universally and energy retrofits accelerate but are not subject to state-of-the-art efficiency levels, substantial energy use and corresponding GHG emissions can be*

[115] Gleneagles Plan of Action (2005), Paragraph 5

[116] IIASA Global Energy Assessment Summary (2012), p.12

'locked-in' for many decades. This could lead to a 33% increase in global energy use for buildings by 2050 instead of a decrease of 46%. "[117]

"Policy portfolios tailored to different target groups and a specific set of barriers are needed. Nevertheless, *deep reductions in building-energy use will not be possible without ambitious and strictly enforced performance standards, including building codes for new construction and renovation as well as appliance standards*."[118]

Miscellaneous

"A comprehensive approach to human settlements development should include the promotion of sustainable energy development in all countries, as follows: […]

iv. *Carry out information and training programmes directed at manufacturers and users in order to promote energy-saving techniques and energy-efficient appliances*"[119]

[117] IIASA Global Energy Assessment Summary (2012), pp.12-13
[118] IIASA Global Energy Assessment Summary (2012), pp.53
[119] Agenda 21 (1992), Chapter 7.51(a(iv))

D. Conversion of vehicle fleets

1. Fuel Economy Standards

IEA

"The four policy measures adopted in the 4-for-2 °C Scenario are: […]

- *Targeted specific energy efficiency improvements in the* industry, buildings and *transport sectors*."[120]

"In a special focus on energy efficiency, the WEO-2012 identified an extensive range of measures, by country and by sector, capable of reducing energy consumption in a cost-effective manner. However, since implementation of some of the efficiency policies identified in WEO-2012 would depend upon the prior elimination of serious market barriers (which in practice could take considerable time), only a selected sub-set of the measures are adopted in 4-for-2 °C Scenario, namely: […]

(iv) *setting standards for new vehicles in road transport. Measures to meet the objectives are already widely deployed in many countries, using readily available technologies and methods*."[121]

"In the 4-for-2 °C Scenario, energy efficiency is the largest contributor to the reduction in global greenhouse-gas emissions, resulting in savings of 1.5 Gt CO2-eq in 2020, or almost half of the total abatement relative to the New Policies Scenario. As indicated above, while there is a raft of efficiency policies capable of reducing energy consumption and therefore emissions, we have focused on just four key measures on the basis that they can be quickly implemented and that the mechanics of implementation have already been developed in numerous countries. The selected policies are applied to new equipment and technologies: they exclude the early retirement of existing stock.

Key energy efficiency measures include: […]

- *Fuel-economy standards and fuel-economy labelling for new passenger light-duty vehicles (PLDVs) and freight trucks in road transport*."[122]

"Road transport, which is currently responsible for around 16% of CO_2 emissions from the energy sector, has received a lot of policy attention in recent years, as high oil prices and rising demand for mobility have strengthened the case for efficiency improvements. *Many governments have adopted fuel-economy policies in a bid to reduce the burden on consumers and the cost of oil imports. PLDV standards have been adopted most widely, including in many of the major car markets in OECD countries. Outside OECD countries, only China has adopted such standards, though India plans to do so.* Fuel-economy standards for trucks are also increasingly receiving the attention of policy makers and have been adopted in several OECD countries. Though essential to realising fuel efficiency in road transport, standards are and should be complemented by

[120] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.46
[121] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.47
[122] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.53

supporting policies to overcome the barriers associated with their deployment, such as information gaps. "[123]

† "Policies targeting road transport make up a smaller share of abatement, partly because of the lead times required for more efficient vehicles to penetrate the vehicle stock and because the New Policies Scenario takes into account the numerous policies already in place to improve efficiency in road transport (thus reducing the scope for further gains in the 4-for-2 °C Scenario)."[124]

Miscellaneous

"States shall:

a.) establish specific environmental standards, in particular environmental quality standards, *emissions standards, technological standards and product standards*, aimed at preventing or abating interferences with natural resources or the environment"[125]

"*Key mitigation technologies and practices currently available:*
More fuel-efficient vehicles; hybrid vehicles; cleaner diesel vehicles; biofuels

Policies, measures and instruments shown to be environmentally effective:
Mandatory fuel economy; biofuel blending and CO_2 standards for road transport"[126]

"There are multiple mitigation options in the transport sector, but their effect may be counteracted by growth in the sector. Mitigation options are faced with many barriers, such as consumer preferences and lack of policy frameworks (medium agreement, medium evidence).

- *Improved vehicle efficiency measures, leading to fuel savings, in many cases have net benefits* (at least for light-duty vehicles), but the market potential is much lower than the economic potential due to the influence of other consumer considerations, such as performance and size. There is not enough information to assess the mitigation potential for heavy-duty vehicles. Market forces alone, including rising fuel costs, are therefore not expected to lead to significant emission reductions"[127]

""Improve" policies that work: *Vehicle Performance Standards for New Light-duty Vehicles*

This section provides an overview of vehicle performance standards for new light-duty vehicles, which establish minimum requirements based on fuel consumption or greenhouse gas emissions per unit of distance travelled. A number of regulatory

[123] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.57
[124] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.54
[125] World Commission on Environment and Development, Our Common Future—Legal Principles (1987), Article 4
[126] IPCC Fourth Assessment Report (2007), Table 4.2
[127] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 11

approaches to reducing light-duty vehicle fuel consumption and greenhouse gas emissions have evolved through the last several decades, relying on different test procedures, formulas, performance-based attributes and baselines. Seven countries including Australia, Canada, China, the European Union, Japan, South Korea, and USA, have established or are in the process of revising light-duty vehicle fuel consumption or greenhouse gas emission standards.

These standards have a proven track record for achieving vehicle efficiency improvements. Approved and proposed vehicle performance standards are expected to reduce fuel consumption and greenhouse gas emissions of the new light-duty fleet in these countries by over 50% by 2025 from 2000 levels. Because these standards have been implemented at the national level, their effects on total greenhouse gas emission reductions are substantial. Adopted vehicle performance standards for the light-duty fleet are estimated to result in emission reductions of 0.8 $GtCO_2e$ globally in 2020. In the case of the USA, the standards targeting model years 2012–16 are expected to save each car owner about US$3,000 over the life of the vehicle. Vehicle performance standards also stimulate technology innovation by requiring automakers to build more efficient vehicles. Substantial improvements in vehicle efficiency can be realized through engine transmission and driveline improvements, hybrid systems, lightweight materials and better aerodynamics and rolling resistance."[128]

"The average fuel economy of the global light duty vehicle fleet can be improved by at least 50 per cent by 2050, relative to 2005 levels. But realizing this improvement will require a global approach – and this includes involving developing countries, only a handful of which currently have in place any policies on vehicle fuel efficiency. The Global Fuel Economy Initiative (GFEI) is acting now to help these countries evaluate and apply the wealth of knowledge and technology available to make their growth greener. Cutting fuel consumption in half by increasing fuel and vehicle efficiency would reduce global emissions of CO2 by over one gigatonne a year – effectively capping them at current levels – and would also cut oil import bills by over $400 billion (based on an oil price of $100 a barrel). […]*GFEI aims to encourage countries to commit to ambitions but achievable vehicle sector emissions reductions that will contribute to a 50 per cent improvement in vehicle efficiency worldwide by 2050: the 50 by 50 campaign.*"[129]

"Given the slower rate of improvement between 2005 and 2011, *average fuel economy from 2012 to 2030 needs to improve by 3% per year.* Reaching this target at a global level is ambitious but appears achievable. For example, the enacted fuel economy standards around the globe require rapid annual improvements, up to 4.7%. Such improvement rates will hopefully become evident in future updates, but in any case many countries do not yet have standards. In particular, non-OECD countries have not been making sufficient progress towards better fuel economy over the 6-year period, and as non-OECD market growth is increasing much faster than OECD markets, most focus in the near future should be placed in helping non-OECD countries to develop and deploy more stringent fuel economy policies. OECD countries are on the right track but need to

[128] UNEP Emissions Gap Report (2012), p.40
[129] 30 Ways in 30 Days UNEP: inspiring action on climate change and sustainable development (2011), p.33

slightly accelerate the trend to meet the GFEI target in 2030, which will be more and more challenging as the target gets closer. The technical potential to reach the GFEI target has been demonstrated, but policies are needed to ensure these technologies are widely adopted in the mass market."[130]

"Each Party included in Annex I, in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall:

(a) Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as: […]

(vii) *Measures to limit and/or reduce emissions of greenhouse gases not controlled by the Montreal Protocol in the transport sector*"[131]

"We support the development of sustainable transport systems, including energy-efficient multimodal transport systems, notably public mass transportation systems, *clean fuels and vehicles,* as well as improved transportation systems in rural areas."[132]

Policies, measures and instruments shown to be environmentally effective: taxes on vehicle purchase, registration, use and motor fuels; road and parking pricing investment in attractive public transport facilities and non-motorised forms of transport.[133]

"In the transport sector – A cluster of successful policies are described by the concept 'Avoid-Shift-Improve'.
These include: (i) transportation-related land use policies,
(ii) bus rapid transit, and
(iii) *vehicle performance standards* for new light-duty vehicles."[134]

""Improve" policies – aim and examples
These are policies aimed at improving the energy efficiency of vehicles and fuels through the introduction of new vehicle technologies and policies, including *vehicle performance standards*, voluntary programmes, fiscal mechanisms, *low carbon and alternative fuels*, *financial subsidies for advanced vehicle technologies, fleet scrappage programmes, amongst others.* The aim is to ensure that future vehicles and fuels are cleaner, and to encourage efficient vehicles."[135]

"We will encourage the development of *cleaner, more efficient and lower-emitting vehicles*, and promote their deployment, by:

a.) adopting ambitious policies to encourage sales of such vehicles in our countries, including making use of public procurement as appropriate to accelerate market development;

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[130] Global Fuel Economy Initiative (GFEI): International comparison of light-duty vehicle fuel economy: An update using 2010 and 2011 new registration data (2013), p.1
[131] Kyoto Protocol (1998), Article 2, Paragraph 1(a)(vii)
[132] The Future We Want (Rio+20 Declaration) (2012), Paragraph 133
[133] IPCC Fourth Assessment Report (2007), Table 4.2
[134] UNEP Emissions Gap Report (2012), Executive Summary, p.5
[135] UNEP Emissions Gap Report (2012), p.39

b.) asking the IEA to review existing standards and codes for vehicle efficiency and identify best practice;
c.) encouraging co-operation on technology research, development, and, where relevant, deployment in areas including cleaner gasoline and diesel technologies, biofuels, synthetic fuels, hybrid technology, battery performance and hydrogen-powered fuel cell vehicles;
d.) continuing our discussions on these issues at the United Kingdom's international conference in November on cleaner, more efficient vehicles; and
e.) raising consumer awareness of the environmental impact of their vehicle choices, including through clear and consistent labeling for relevant energy consumption, efficiency and exhaust emissions data, and encouraging the provision of clearer information on the result of driving behavior and choices for mode of transport."[136]

"There are still many opportunities to improve conventional vehicle technologies. The combination of introducing incremental efficiency technologies, increasing the efficiency of converting the fuel energy to work by improving drive train efficiency, and recapturing energy losses and reducing loads (weight, rolling, air resistance, and accessory loads) on the vehicle has the potential to approximately double the fuel efficiency of 'new' light-duty vehicles from 7.5 liters per 100 km in 2010 to 3.0 liters per 100 km by 2050.
The emergence of electric drive technologies such as plug-in hybrid electric vehicles allows for zero tailpipe emissions for low driving ranges, up to around 50 kilometers in urban conditions. All-electric battery vehicles can achieve a very high efficiency (more than 90%, four times the efficiency of an internal combustion engine vehicle but excluding the generation and transmission of the electricity), but they have a low driving range and short battery life. If existing fuel saving and hybrid technologies are deployed on a broad scale, fleet-average specific fuel savings of a factor of two can be obtained in the next decade."[137]

"Take joint actions and improve efforts to work together at all levels to improve access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievement of the Millennium Development Goals, including the goal of halving the proportion of people in poverty by 2015, and as a means to generate other important services that mitigate poverty, bearing in mind that access to energy facilitates the eradication of poverty. This would include actions at all levels to: […]
d.) *Support the transition to the cleaner use of liquid and gaseous fossil fuels, where considered more environmentally sound, socially acceptable and cost-effective*"[138]

For additional examples of domestic fuel economy standards, see: GFEI, FIA Foundation et. al., "50 By 50": Making Cars 50% More Fuel Efficient by 2050 Worldwide (2009).

[136] Gleneagles Plan of Action (2005), Paragraph 7
[137] IIASA Global Energy Assessment Summary (2012), p.15
[138] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 9(d)

2. Maritime and Aviation Emissions

"*The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively*."[139]

"*Resolves that States and relevant organizations will work through ICAO to achieve a global annual average fuel efficiency improvement of 2 per cent until 2020 and an aspirational global fuel efficiency improvement rate of 2 per cent per annum from 2021 to 2050, calculated on the basis of volume of fuel used per revenue tonne kilometre performed*" under the condition that "… the goals mentioned in paragraph 4 above would not attribute specific obligations to individual States, and the different circumstances, respective capabilities and contribution of developing and developed States to the concentration of aviation GHG emissions in the atmosphere will determine how each State may voluntarily contribute to achieving the global aspirational goals"[140]

In July 2011, the Marine Environmental Protection Committee of the International Maritime Organization added a new energy efficiency chapter to MARPOL Annex VI – Regulations on the prevention of air pollution from ships. The chapter includes requirements that will lead to significant reductions in fuel usage. The decision can be viewed at:
http://www.imo.org/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Breakthrought-at-MEPC-62.aspx

"We will:

a.) undertake a programme of collaborative work to explore and accelearate the potential for operational advances (including air traffic control and ground operations) that will continue to enhance safety, *improve fuel efficiency* and *reduce emissions in air transport*;
„[141]

"Aviation transportation presents unique challenges owing to the requirement for very high density fuels. Studies indicate that fuel efficiency of aviation can be improved by 40–50% by 2050 through a variety of means, including technology, operation, and management of air traffic. As aviation's growth rate is projected to be the highest of the transport sub-sectors, such efficiency improvements will not be enough to keep overall energy use in the sector from increasing; thus, *alternative low-carbon, high energy-density fuels will play a crucial role in decarbonizing emissions from aviation*.

In the maritime sector, a combination of technical measures could reduce total energy use by 4–20% in older ships and 5–30% in new ships by applying state-of-the-art knowledge, such as hull and propeller design and maintenance. Reducing the speed at which a ship

[139] Kyoto Protocol (1998), Article 2, Paragraph 2
[140] ICAO Assembly Resolution A37-19, Paragraph 4
[141] Gleneagles Plan of Action (2005), Paragraph 8

operates brings significant benefits in terms of lower energy use. For example, cutting a ship's speed from 26 to 23 knots can yield a 30% fuel saving."[142]

[142] IIASA Global Energy Assessment Summary (2012), p.51

E. Elimination of fossil fuel subsidies

IEA

"To keep the door to the 2 °C target open, we propose a set of pragmatic policy actions that, without harming economic growth and using available technologies and policies, can result in a global peak in energy-related GHG emissions by 2020. *The four priority areas in our 4-for-2 °C Scenarios*[143] *are*: specific energy efficiency measures; limits to the use and construction of inefficient coal power plants; minimizing methane releases to the atmosphere in oil and gas production; and *a partial phase-out of fossil-fuel subsidies*. […] *the partial phase-out of fossil-fuel subsidies [accounts] for 12% [of the savings realized]…*"[144]

"*Subsidies for fossil-fuel consumption lead to an inefficient allocation of resources and market distortion by encouraging excessive energy use.* While they may have well-intentioned objectives, social ones for example, in practice they have usually proven to be an unsuccessful or inefficient means of achieving their goals. Moreover, they invariably have unintended negative consequences, such as encouraging wasteful and inefficient consumption, thereby contributing to climate change. The latest IEA estimates indicate that fossil-fuel consumption subsidies amounted to $523 billion in 2011, up almost 30% on 2010 and six times more than the global financial support given to renewables. In those regions where the subsidies exist, this level of subsidy equates to an incentive of $110 per tonne CO_2 to consume fossil fuels. Fossil-fuel subsidies are often intended to improve access to modern energy services for the poor, but our analysis indicates that only 8% of the subsidy granted typically reaches the poorest income group. *Political support for fossil-fuel subsidy reform has been building in recent years, and G20 and APEC (Asia-Pacific Economic Cooperation) member economies have made commitments to phase out inefficient fossil-fuel subsidies and many are now moving ahead with implementation.*"[145]

For more information on fossil fuel subsidies and country-specific policies, see IEA: Redrawing the Energy Climate Map, pp.67-70.

† "Because of the social sensitivity of the issue (and because every country must consider its specific circumstances), there is a raft of key principles to be adhered to when implementing such reforms. For example, inadequate information about existing subsidies is frequently an impediment. *Before taking a decision about reform, governments must first precisely examine energy subsidies, including their beneficiaries, to identify low-income groups that depend on subsidies for access to basic energy services, and quantify their costs and benefits, in order to determine which subsidies are most wasteful or inefficient.* Making more information available to the general public,

[143] "In the 4-for-2 °C Scenario, energy-related CO2 and CH4 emissions increase from 33.3 Gt in 2010 to 34.9 Gt in 2020 (measured on a CO2-eq basis) and decline thereafter. Emissions in 2020 are 3.1 Gt lower than the course on which we otherwise appear to be set, delivering 80% of the abatement needed to be on track with a 2 °C trajectory"- IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.43

[144] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.43

[145] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.50

particularly about the budgetary burden of subsidies, is a necessary step in building support for reform.

While the removal of fossil-fuel subsidies tends to improve long-term economic competitiveness and fiscal balances, it may, nonetheless, have negative economic consequences in the short term, particularly for certain groups, and any such reform must be carried out in a way that allows both energy and other industries time to adjust. Governments may well be wise to dissociate themselves from direct responsibility for price-setting, either by liberalising energy markets, or, at least, by establishing automatic mechanisms for price changes."[146]

Miscellaneous

"Each Party included in Annex I, in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall:

(a) Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as: […]

(v) *Progressive reduction or phasing out* of market imperfections, fiscal incentives, tax and duty exemptions and *subsidies in all greenhouse gas emitting sectors that run counter to the objective of the Convention and application of market instruments*"[147]

"Call upon Governments as well as relevant regional and international organizations and other relevant stakeholders to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions adopted by the Commission on Sustainable Development concerning energy for sustainable development at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. This would include actions at all levels to: […]

q.) Take action, where appropriate, to *phase out subsidies in this area that inhibit sustainable development*, taking fully into account the specific conditions and different levels of development of individual countries and considering their adverse effect, particularly on developing countries"[148]

"*Countries reaffirm the commitments they have made to phase out harmful and inefficient fossil fuel subsidies that encourage wasteful consumption and undermine sustainable development*. We invite others to consider rationalizing inefficient fossil fuel subsidies by removing market distortions, including restructuring taxation and phasing out harmful subsidies, where they exist, to reflect their environmental impacts, with such policies taking fully into account the specific needs and conditions of developing countries, with

[146] IEA: Redrawing the Energy Climate Map (2013), Chapter 2, p.69
[147] Kyoto Protocol (1998), Article 2, Paragraph 1(a)(v)
[148] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 20(q)

the aim of minimizing the possible adverse impacts on their development and in a manner that protects the poor and the affected communities."[149]

"Policies, measures and instruments shown to be environmentally effective:
Reduction of fossil fuel subsidies"[150]

"Energy subsidies are pervasive and impose substantial fiscal and economic costs in most regions. […] *Removing these subsidies could lead to a 13 percent decline in CO_2 emissions and generate positive spillover effects by reducing global energy demand.*

Country experiences suggest there are six key elements for subsidy reform. These are:

(i) a comprehensive energy sector reform plan entailing clear long-term objectives, analysis of the impact of reforms, and consultation with stakeholders;
(ii) an extensive communications strategy, supported by improvements in transparency, such as the dissemination of information on the magnitude of subsidies and the recording of subsidies in the budget;
(iii) appropriately phased price increases, which can be sequenced differently across energy products;
(iv) improving the efficiency of state-owned enterprises to reduce producer subsidies;
(v) targeted measures to protect the poor; and
(vi) institutional reforms that depoliticize energy pricing, such as the introduction of automatic pricing mechanisms."[151]

"*Today we agreed: To phase out and rationalize over the medium term inefficient fossil fuel subsidies while providing targeted support for the poorest.* Inefficient fossil fuel subsidies encourage wasteful consumption, reduce our energy security, impede investment in clean energy sources and undermine efforts to deal with the threat of climate change."[152]

"*Inefficient fossil fuel subsidies encourage wasteful consumption, distort markets, impede investment in clean energy sources and undermine efforts to deal with climate change.* The Organization for Economic Cooperation and Development (OECD) and the IEA have found that eliminating fossil fuel subsidies by 2020 would reduce global greenhouse gas emissions in 2050 by ten percent. Many countries are reducing fossil fuel subsidies while preventing adverse impact on the poorest. Building on these efforts and recognizing the challenges of populations suffering from energy poverty, *we commit to*:

•*Rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption*. As we do that, we recognize the importance of providing those in need with essential energy services, including through the use of targeted cash transfers and other appropriate mechanisms. This reform will not apply to our support for clean energy, renewables, and technologies that dramatically reduce greenhouse gas emissions. We will have our Energy and Finance Ministers,

[149] The Future We Want (Rio+20 Declaration) (2012), Paragraph 225
[150] IPCC Fourth Assessment Report (2007), Table 4.2
[151] IMF: Energy Subsidy Reform: Lessons and Implications (2013), Executive Summary, p.1
[152] The G20 Pittsburg Leaders' Statement (2009), Paragraph 24

based on their national circumstances, develop implementation strategies and timeframes, and report back to Leaders at the next Summit. We ask the international financial institutions to offer support to countries in this process. *We call on all nations to adopt policies that will phase out such subsidies worldwide*."[153]

"*We welcome the progress report on fossil fuel subsidies, and we reaffirm our commitment to rationalize and phase out inefficient fossil fuel subsides that encourage wasteful consumption over the medium term while providing targeted support for the poorest.*"[154]

"*There remains scope in many emerging and developing countries for reducing energy subsidies, with sizable benefits for both public finances and efforts to reduce greenhouse gas emissions.* Fuel subsidies, valued at over $300 billion per annum, continue to create significant macroeconomic and fiscal vulnerabilities, particularly in low- and middle-income countries. They are widely recognized to be a badly targeted way of helping the poor: one recent review estimates that over 80 percent of the benefits from fuel subsidies commonly goes to the top three income quintiles. Such subsidies clearly create incentives for emissions-intensive energy use: the IEA (2009) estimates that their elimination could reduce greenhouse gas emissions by around 12 percent by 2050. The recent commitment by G-20 members to eliminate subsidies is an important step, both in itself and as an example for others."[155]

"*Inefficient fossil fuel subsidies that encourage wasteful consumption are economically costly to taxpayers, can damage the environment through increased emissions of greenhouse gases and other air pollutants, and by distorting the energy mix.* Several studies have also found that subsidies to fossil-fuel use tend to benefit high-income households more than the poor, due to the former's higher per capita consumption levels. According to the IEG study, the bottom 40% of the population in terms of income distribution received only 15-20% of the fuel subsidies in developing countries. However, a reform of inefficient fossil-fuel subsidies that encourage wasteful consumption may require some safety net to protect low-income households and other vulnerable populations that would otherwise benefit from such measures."[156]

"*Reflecting economic, social and environmental externalities in the market conditions is therefore a necessary first step to provide appropriate incentives for redirecting private sector investments. Such measures would include removal, or at least substantial reduction, of subsidies to fossil fuels without CCS*"[157]

[153] The G20 Pittsburg Leaders' Statement (2009), Paragraph 29-30
[154] G20 Los Cabos Summit Leaders' Declaration (2012), Paragraph 74
[155] IMF: Climate Policy and the Recovery (2009), p.9
[156] Joint report by IEA, OPEC, OECD and World Bank on fossil-fuel and other energy subsidies: An update of the G20 Pittsburgh and Toronto Commitments (2011), Paragraph 1.3
[157] IIASA Global Energy Assessment Summary (2012), p.11

"We also commit to *rationalise and phase out over the medium term fossil fuel subsidies that encourage wasteful consumption*, while recognising the importance of providing those in need with essential energy services."[158]

Note: this commitment was been reaffirmed by the APEC leaders in 2010 and 2011.

[158] Asia-Pacific Economic Cooperation (APEC) Forum, Leaders' Declaration (2009).

F. Reduction of deforestation

UNFCCC Agreements

"The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each Party included in Annex I."[159]

"*Encourages all Parties to find effective ways to reduce the human pressure on forests that results in greenhouse gas emissions, including actions to address drivers of deforestation*"[160]

"*Encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities,* as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances:

(a) Reducing emissions from deforestation"[161]

"Also requests developing country Parties, when developing and implementing their national strategies or action plans, to address, inter alia, *the drivers of deforestation and forest degradation, land tenure issues, forest governance issues, gender considerations and the safeguards identified in paragraph 2 of appendix I to this decision,* ensuring the full and effective participation of relevant stakeholders, inter alia indigenous peoples and local communities;"[162]

"In the development of its work programme, the Subsidiary Body for Scientific and Technological Advice is requested to:

(a) *Identify land use, land-use change and forestry activities in developing countries, in particular those that are linked to the drivers of deforestation and forest degradation, identify the associated methodological issues to estimate emissions and removals resulting from these activities, and assess the potential contribution of these activities to the mitigation of climate change, and report on the findings and outcomes of this work to the Conference of the Parties (COP) at its eighteenth session on the outcomes of the work referred to in this paragraph*"[163]

"Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia: […]

(b) Enhanced national/international action on mitigation of climate change, including, inter alia, consideration of: […]

[159] Kyoto Protocol (1998), Article 3, Paragraph 3
[160] Cancun Agreements (2010), Paragraph 68
[161] Cancun Agreements (2010), Paragraph 70(a)
[162] Cancun Agreements (2010), Paragraph 72
[163] Cancun Agreements (2010), Appendix II; later recalled in Durban Platform (2011), Paragraph 62

(iii) *Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries*"[164]

Bali Action Plan: Reducing emissions from deforestation in developing countries: approaches to stimulate action

" 1. Invites Parties to further strengthen and support ongoing efforts to *reduce emissions from deforestation and forest degradation* on a voluntary basis;

2. Encourages all Parties, in a position to do so, to support capacity-building, provide technical assistance, facilitate the transfer of technology to improve, inter alia, data collection, estimation of emissions from deforestation and forest degradation, monitoring and reporting, and address the institutional needs of developing countries to estimate and reduce emissions from deforestation and forest degradation;

3. Further encourages Parties to explore a range of actions, identify options and undertake efforts, including demonstration activities, to *address the drivers of deforestation relevant to their national circumstances, with a view to reducing emissions from deforestation and forest degradation and thus enhancing forest carbon stocks due to sustainable management of forests*;

4. Encourages, without prejudice to future decisions of the Conference of the Parties, the use of the indicative guidance provided in the annex to this decision as an aid in undertaking and evaluating the range of demonstration activities;

5. Invites Parties, in particular Parties included in Annex II to the Convention, to mobilize resources to support efforts in relation to the actions referred to in paragraphs 1-3 above;

6. Encourages the use of the most recent reporting guidelines as a basis for reporting greenhouse gas emissions from deforestation, noting also that Parties not included in Annex I to the Convention are encouraged to apply the Good Practice Guidance for Land Use, Land-Use Change and Forestry; […]"[165]

Agenda 21

"Governments at the appropriate level, with the cooperation of the relevant United Nations bodies and, as appropriate, intergovernmental and non-governmental organizations, and the private sector, should: […]

d.) *Promote sustainable management and cooperation in the conservation and enhancement, as appropriate, of sinks and reservoirs of greenhouse gases, including biomass, forests and oceans*, as well as other terrestrial, coastal and marine ecosystems."[166]

"*There are major weaknesses in the policies, methods and mechanisms adopted to support and develop the multiple ecological, economic, social and cultural roles of trees, forests and forest lands*. Many developed countries are confronted with the effects of air pollution and fire damage on their forests. More effective measures and approaches are

[164] Bali Action Plan (2007), Paragraph 1(a(iii))
[165] Bali Action Plan (2007), Decision 2, Paragraphs 1-6
[166] Agenda 21 (1992), Chapter 9.21(d)

often required at the national level to improve and harmonize policy formulation, planning and programming; legislative measures and instruments; development patterns; participation of the general public, especially women and indigenous people; involvement of youth; roles of the private sector, local organizations, non-governmental organizations and cooperatives; development of technical and multidisciplinary skills and quality of human resources; forestry extension and public education; research capability and support; administrative structures and mechanisms, including intersectoral coordination, decentralization and responsibility and incentive systems; and dissemination of information and public relations. This is especially important to ensure a rational and holistic approach to the sustainable and environmentally sound development of forests. *The need for securing the multiple roles of forests and forest lands through adequate and appropriate institutional strengthening has been repeatedly emphasized in many of the reports, decisions and recommendations of FAO, ITTO, UNEP, the World Bank, IUCN and other organizations.*"[167]

"*Governments at the appropriate level, with the support of regional, subregional and international organizations, should, where necessary, enhance institutional capability to promote the multiple roles and functions of all types of forests and vegetation inclusive of other related lands and forest-based resources in supporting sustainable development and environmental conservation in all sectors*. This should be done, wherever possible and necessary, by strengthening and/or modifying the existing structures and arrangements, and by improving cooperation and coordination of their respective roles."[168]

"*Governments should recognize the importance of categorizing forests, within the framework of long-term forest conservation and management policies, into different forest types and setting up sustainable units in every region/watershed with a view to securing the conservation of forests*. *Governments, with the participation of the private sector, non-governmental organizations, local community groups, indigenous people, women, local government units and the public at large, should act to maintain and expand the existing vegetative cover* wherever ecologically, socially and economically feasible, through technical cooperation and other forms of support."[169]

For additional information, refer to Agenda 21, Chapter 11: Combating Deforestation.

WSSD (2002)

"Mountain ecosystems support particular livelihoods and include significant watershed resources, biological diversity and unique flora and fauna. Many are particularly fragile and vulnerable to the adverse effects of climate change and need specific protection. *Actions at all levels are required to*: […]

[167] Agenda 21 (1992), Chapter 11.1
[168] Agenda 21 (1992), Chapter 11.3
[169] Agenda 21 (1992), Chapter 11.13

b.) *Implement programmes to address, where appropriate, deforestation*, erosion, land degradation, loss of biodiversity, disruption of water flows and retreat of glaciers"[170]

"Forests and trees cover nearly one third of the Earth's surface. *Sustainable forest management of both natural and planted forests and for timber and non-timber products is essential to achieving sustainable development as well as a critical means to eradicate poverty, significantly reduce deforestation,* halt the loss of forest biodiversity and land and resource degradation and improve food security and access to safe drinking water and affordable energy; in addition, it highlights the multiple benefits of both natural and planted forests and trees and contributes to the well-being of the planet and humanity. The achievement of sustainable forest management, nationally and globally, including through partnerships among interested Governments and stakeholders, including the private sector, indigenous and local communities and non-governmental organizations, is an essential goal of sustainable development. *This would include actions at all levels to*: […]

e.) *Develop and implement initiatives to address the needs of those parts of the world that currently suffer from poverty and the highest rates of deforestation and where international cooperation would be welcomed by affected Governments*"[171]

UN-REDD Programme 2011-2015 Strategy

"The goal of significantly reducing emissions from deforestation and forest degradation can best be achieved through a strong global partnership to create a REDD+ mechanism under the United Nations Framework Convention on Climate Change (UNFCCC). Such a partnership must be based on a commitment, on one hand, by developing countries to embark on low-carbon, climate resilient development, and on the other hand, by developed countries to provide predictable and significant funding as an incentive for reduced forest-based carbon emissions."[172]

"*It is estimated that a 25 per cent reduction in annual global deforestation rates could be achieved by 2015 if financing of US$22-38 billion were made available from 2010-2015 for results-based incentives and capacity building, complementing other bilateral and multilateral REDD+ efforts*."[173]

"Mission: *To support countries' efforts to reduce emissions from deforestation and forest degradation through national REDD+ strategies that transform their forest sectors so as to contribute to human well-being and meet climate change mitigation and adaptation aspirations.*"[174]

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[170] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 42(b)
[171] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 45(e)
[172] UN-REDD Programme 2011-2015 Strategy, p.1
[173] UN-REDD Programme 2011-2015 Strategy, p.2
[174] UN-REDD Programme 2011-2015 Strategy, p.6

Miscellaneous

"*We call for enhanced efforts to achieve the sustainable management of forests, reforestation, restoration and afforestation, and we support all efforts that effectively slow, halt and reverse deforestation and forest degradation, including promoting trade in legally harvested forest products.* We note the importance of such ongoing initiatives as reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. We call for increased efforts to strengthen forest governance frameworks and means of implementation, in accordance with the non-legally binding instrument on all types of forests in order to achieve sustainable forest management. To this end, we commit to improving the livelihoods of people and communities by creating the conditions needed for them to sustainably manage forests, including by strengthening cooperation arrangements in the areas of finance, trade, transfer of environmentally sound technologies, capacity-building and governance, as well as by promoting secure land tenure, particularly with regard to decision-making and benefit-sharing, in accordance with national legislation and priorities."[175]

"Policies, measures and instruments shown to be environmentally effective: *reduced deforestation*
Financial incentives (national and international) to increase forest area, to reduce deforestation and to maintain and manage forests; land-use regulation and enforcement[176]

"*Forest-related mitigation activities can considerably reduce emissions from sources and increase CO_2 removals by sinks at low costs*, and can be designed to create synergies with adaptation and sustainable development (high agreement, much evidence).

- About 65% of the total mitigation potential (up to 100 US$/t$CO_2$-eq) is located in the tropics and about 50% of the total could be achieved by reducing emissions from deforestation
- Climate change can affect the mitigation potential of the forest sector (i.e., native and planted forests) and is expected to be different for different regions and sub-regions, both in magnitude and direction
- Forest-related mitigation options can be designed and implemented to be compatible with adaptation, and can have substantial co-benefits in terms of employment, income generation, biodiversity and watershed conservation, renewable energy supply and poverty alleviation"[177]

Refer to UNEP Emissions Gap Report (2012), Chapter 4.3.4 for a discussion of deforestation policies and initiatives, focused particularly on Brazil's past strategies.

"Best practice policies to curb deforestation
[…]

[175] The Future We Want (Rio+20 Declaration) (2012), Paragraph 193
[176] IPCC Fourth Assessment Report (2007), Table 4.2
[177] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 15

Scope for scaling-up

The previous sections illustrate that policies to curb deforestation typically require cross-sector policy coordination involving multiple stakeholders. Similarly, a policy mix of incentives, disincentives, and appropriate enabling policies may be most appropriate. But which enabling factors are key to replicating and scaling-up successful policies?

First, countries may learn from the Brazilian experience, where the capacity to properly monitor deforestation was a key factor in reducing deforestation. Monitoring can be strengthened without major changes in regulation or political support, and requires mainly financial resources and technology transfer.

Second, to achieve large-scale results, countries need strong political commitment from the core of government. In both Costa Rica and Brazil, this provided the basis for developing and implementing comprehensive strategies across sectors and levels of government.

Third, […] *protected areas generally have an important impact on conserving forests, but they can be even more effective if they are positioned near deforestation frontiers or areas liable to future threats*. Protected areas with sustainable use of natural resources provide an interesting compromise between local livelihoods and environmental interests, and could therefore serve as an option in areas where there is conflicting interest between forest conservation and local livelihoods.

Fourth, *in Brazil, a sudden increase in enforcement of existing forestry laws triggered strong reactions from agricultural interests against the laws. To avoid a similar situation, countries may have to combine enforcement with new legislation and institutions.* Costa Rica's combination of incentives, disincentives and enabling measures is a noteworthy example of an easy-to-accept policy mix.

Fifth, *well-defined land tenure can provide an incentive for conserving forests.* Once stronger institutions and secure property rights to forestlands have been established, economic incentives for conservation in private properties may become nationally applicable, rather than restricted to pilot projects. To maximize effectiveness, PES schemes may target areas where deforestation risks and forest services such as medicinal plants, watershed protection, and lumber are most abundant.

Finally, *economy-wide policies can in some cases be one of the underlying causes of deforestation. While some land-clearing incentives, such as global commodity prices, are usually outside a particular government's control, others including taxes, subsidies, credit provision, and regulations, are not. Removing perverse national policy incentives may reduce both government budgets and forest pressures, resulting in a win-win situation* [...] ."[178]

"*New and additional financial resources should be provided to developing countries to enable them to sustainably manage, conserve and develop their forest resources, including through afforestation, reforestation and combating deforestation and forest and land degradation*."[179]

[178] UNEP Emissions Gap Report (2012), Chapter 4.3.4
[179] Rio Declaration (1992), Annex III, Paragraph 10

G. Technology transfer to developing countries

UNFCCC Agreements

"*All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:* […]

(c) *promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors*"[180]

"The developed country Parties and other developed Parties included in Annex II shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations under Article 12, paragraph 1. *They shall also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of implementing measures that are covered by paragraph 1 of this Article and that are agreed between a developing country Party and the international entity or entities referred to in Article 11, in accordance with that Article*."[181]

"*The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention*. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies"[182]

"The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties."[183]

"In the implementation of the commitments in this Article, *the Parties shall give full consideration to what actions are necessary under the Convention, including actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and/or the impact of the implementation of response measures*, especially on:

[180] UNFCCC (1992) Article 4, Paragraph 1(c)
[181] UNFCCC (1992) Article 4, Paragraph 3
[182] UNFCCC (1992) Article 4, Paragraph 5
[183] UNFCCC (1992) Article 4, Paragraph 7; also repeated in Durban Platform (2011), Paragraph 57

(a) Small island countries;
(b) Countries with low-lying coastal areas;
(c) Countries with arid and semi-arid areas, forested areas and areas liable to forest decay;
(d) Countries with areas prone to natural disasters;
(e) Countries with areas liable to drought and desertification;
(f) Countries with areas of high urban atmospheric pollution;
(g) Countries with areas with fragile ecosystems, including mountainous ecosystems;
(h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products; and
(i) Landlocked and transit countries.

Further, the Conference of the Parties may take actions, as appropriate, with respect to this paragraph."[184]

"*The Parties shall take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding and transfer of technology*."[185]

"*All Parties*, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, without introducing any new commitments for Parties not included in Annex I, but reaffirming existing commitments under Article 4, paragraph 1, of the Convention, and continuing to advance the implementation of these commitments in order to achieve sustainable development, taking into account Article 4, paragraphs 3, 5 and 7, of the Convention, *shall*: […]

(c) *Cooperate in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies, know-how, practices and processes pertinent to climate change, in particular to developing countries,* including the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain and the creation of an enabling environment for the private sector, to promote and enhance the transfer of, and access to, environmentally sound technologies"[186]

"In the context of the implementation of Article 4, paragraph 1, of the Convention, in accordance with the provisions of Article 4, paragraph 3, and Article 11 of the Convention, and through the entity or entities entrusted with the operation of the financial mechanism of the Convention, *the developed country Parties and other developed Parties included in Annex II to the Convention shall*: […]

[184] UNFCCC (1992) Article 4, Paragraph 8
[185] UNFCCC (1992) Article 4, Paragraph 9
[186] Kyoto Protocol (1998), Article 10(c)

(b) *Also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of advancing the implementation of existing commitments under Article 4, paragraph 1, of the Convention* that are covered by Article 10 and that are agreed between a developing country Party and the international entity or entities referred to in Article 11 of the Convention, in accordance with that Article."[187]

"Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia: […]

(d) *Enhanced action on technology development and transfer to support action on mitigation and adaptation, including, inter alia, consideration of*

(i) Effective mechanisms and enhanced means for the removal of obstacles to, and provision of financial and other incentives for, scaling up of the development and transfer of technology to developing country Parties in order to promote access to affordable environmentally sound technologies;

(ii) Ways to accelerate deployment, diffusion and transfer of affordable environmentally sound technologies;

(iii) Cooperation on research and development of current, new and innovative technology, including win-win solutions;

(iv) The effectiveness of mechanisms and tools for technology cooperation in specific sectors; "[188]

The Bali Action Plan: Decision 3/CP.13: Development and transfer of technologies under the Subsidiary Body for Scientific and Technological Advice established the Expert Group on Technology Transfer. For further details refer to original document.

Excerpts from Annex I: Recommendations for enhancing the implementation of the framework for meaningful and effective actions to enhance the implementation of Article 4, paragraph 5, of the Convention**.**[189] For full text, refer to original document.

"Based on lessons learned in the implementation of this theme, the following recommendations are made to enhance the implementation of this theme:

(a) Preparation of technical studies on barriers, good practice and recommendations for developing enhanced enabling environments that accelerate the development and transfer of environmentally sound technologies (ESTs), at the national and international levels. This should cover related trade issues, technology development (including endogenous technologies), and technology push and market pull factors for consideration by the SBSTA;

(b) *To encourage Parties to avoid trade and intellectual property rights policies, or lack thereof, restricting transfer of technology*;

[187] Kyoto Protocol (1998), Article 11, paragraph 2(b)
[188] Bali Action Plan (2007), Decision 1, Paragraph 1(d)(i, ii, iii, iv) (e)(i)
[189] Bali Action Plan (2007), Annex I, Paragraphs 1-24

(c) *To encourage Parties to make available through TT:CLEAR and other means information on ongoing and planned publicly funded research and development (R&D) activities where there are opportunities for non-Annex I Parties to jointly participate in such R&D activities*, along with the terms under which Parties might participate and the steps necessary to establish such a collaborative relationship;

(d) *Close cooperation with public and/or private partnerships that focus on improving enabling environments for accelerating development and transfer of ESTs* and which have been established in the context of processes such as the World Summit on Sustainable Development, the Group of Eight and other initiatives (Renewable Energy and Energy Efficiency Partnership, Johannesburg Renewable Energy Coalition, Carbon Sequestration Leadership Forum, and CTI and other International Energy Agency implementing agreements);

(e) *To encourage Parties to integrate the objective of technology transfer into national policies and to enhance the interaction between governments and the private sector*."[190]

"Activities relating to capacity-building are also listed under other sections of these recommendations. Based on lessons learned in the implementation of this theme, the following additional recommendations are made to enhance its implementation:

(a) *To encourage Parties, IGOs and other institutions and initiatives to support capacity building activities to promote technology transfer, at the regional and national levels*, that are targeted to respond to priority capacity-building needs identified by non-Annex I Parties in their TNAs, national communications and other national reports;

(b) The secretariat to prepare periodic reports containing information relating to capacity-building needs for the development, deployment, application and transfer of technologies from all relevant sources of information, such as national communications of non-Annex I Parties, reports of TNAs and National Capacity Self Assessment reports supported by the GEF for consideration by the SBSTA. To the extent possible those reports could identify key elements for successful capacity-building for development and transfer of technologies for both mitigation of and adaptation to climate change;

(c) To increase communication and outreach with regard to technology transfer activities under the framework and the work of the EGTT by creating learning centres (tools and methods) and partnership fairs (opportunities) in parallel with subsidiary body sessions and side events;

(d) *To encourage Parties, IGOs and other institutions and initiatives to organize training in management and operation of climate technologies*; to establish/strengthen relevant organizations/institutions in developing countries for capacity-building for technology transfer; to establish/strengthen training, expert exchange, scholarship and cooperative research programmes in relevant national and regional institutions in developing countries for transfer of ESTs; and to

[190] Bali Action Plan (2007), Decision 3, Annex I, Paragraph 12

organize seminars/training/workshops on capacity-building for adapting to the adverse effects of climate change."[191]

"*Innovative options for financing the development and transfer of technologies*
The recommended actions in this area are:

(d) *To encourage Parties to create an environment conducive for private sector investments* by providing such incentives as greater access to multilateral sources and other sources of targeted "smart" subsidy schemes that trigger private sector co-financing;

(e) *To encourage Parties to scale up and/or develop innovative public-private financing mechanisms and instruments that increase access to developing country project and business developers that play a role in the transfer, development and/or deployment of ESTs* […]"[192]

Refer to Annex II of the Bali Action Plan for details regarding the Expert Group on Technology Transfer.

"*We agree that developed countries shall provide adequate, predictable and sustainable financial resources, technology and capacity-building to support the implementation of adaptation action in developing countries*."[193]

"*Scaled up, new and additional, predictable and adequate funding as well as improved access shall be provided to developing countries, in accordance with the relevant provisions of the Convention, to enable and support enhanced action on mitigation, including substantial finance to reduce emissions from deforestation and forest degradation (REDD-plus), adaptation, technology development and transfer and capacity-building, for enhanced implementation of the Convention*."[194]

"2) Further affirms that:

(a) *Scaled-up overall mitigation efforts that allow for the achievement of desired stabilization levels are necessary, with developed country Parties showing leadership by undertaking ambitious emission reductions and providing technology, capacity-building and financial resources to developing country Parties*, in accordance with the relevant provisions of the Convention; […]

(c) *All Parties should cooperate, consistent with the principles of the Convention, through effective mechanisms, enhanced means and appropriate enabling environments, and enhance technology development and the transfer of technologies to developing country Parties to enable action on mitigation and adaptation*;"[195]

[191] Bali Action Plan (2007), Decision 3, Annex I, Paragraph 14
[192] Bali Action Plan (2007), Decision 3, Annex I, Paragraph 17
[193] Copenhagen Accord (2009), Paragraph 3
[194] Copenhagen Accord (2009), Paragraph 8
[195] Cancun Agreements (2010) (2010), Paragraph 1, 2(a)(c)

"*Invites all Parties to enhance action on adaptation under the Cancun Adaptation Framework*, taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances, *by undertaking, inter alia, the following*: […]

(g) *Research, development, demonstration, diffusion, deployment and transfer of technologies, practices and processes, and capacity-building for adaptation, with a view to promoting access to technologies, in particular in developing country Parties*"[196]

"*Requests developed country Parties to provide developing country Parties, taking into account the needs of those that are particularly vulnerable, with long-term, scaled-up, predictable, new and additional finance, technology and capacity-building*"[197]

"Developed countries should submit annual greenhouse gas inventories and inventory reports and biennial reports on their progress in achieving emission reductions, including information on mitigation actions to achieve their quantified economy-wide emission targets and emission reductions achieved, projected emissions and the provision of financial, technology and capacity-building support to developing country Parties; […]

(c) *Developed countries shall improve the reporting of information on the provision of financial, technology and capacity-building support to developing country Parties*;"[198]

"Recognizing that developing country Parties are already contributing and will continue to contribute to a global mitigation effort in accordance with the principles and provisions of the Convention, and could enhance their mitigation actions, depending on provision of finance, technology and capacity-building support by developed country Parties"[199]

"Decides that, in accordance with Article 4, paragraph 3, of the Convention, *developed country Parties shall provide enhanced financial, technological and capacity-building support for the preparation and implementation of nationally appropriate mitigation actions of developing country Parties and for enhanced reporting by these Parties*"[200]

"*Urges Parties, in particular developed country Parties, to support*, through multilateral and bilateral channels, the development of national strategies or action plans, policies and measures and capacity-building, followed by the implementation of national policies and measures and national strategies or action plans that could involve *further capacity-building, technology development and transfer and results-based demonstration activities,* including consideration of the safeguards referred to in paragraph 2 of appendix I to this decision, taking into account the relevant provisions on finance including those relating to reporting on support"[201]

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[196] Cancun Agreements (2010) (2010), Paragraph 14(g)
[197] Cancun Agreements (2010) (2010), Paragraph 18
[198] Cancun Agreements (2010) (2010), Paragraph 40(c)
[199] Cancun Agreements (2010) (2010), Paragraph 47
[200] Cancun Agreements (2010) (2010), Paragraph 52
[201] Cancun Agreements (2010) (2010), Paragraph 76

"Also urges developed country Parties to strive to implement policies and measures to respond to climate change in such a way as to avoid negative social and economic consequences for developing country Parties, taking into account Article 3 of the Convention, *and to assist these Parties to address such consequences by providing support, including financial resources, transfer of technology* and capacity-building, in accordance with Article 4 of the Convention, to build up the resilience of societies and economies negatively affected by response measures"[202]

"Confirming the importance of promoting and enhancing national and international cooperative action on the development and transfer of environmentally sound technologies to developing country Parties to support action on mitigation and adaptation now, up to and beyond 2012, in order to achieve the ultimate objective of the Convention, Recognizing that an early and rapid reduction in emissions and the urgent need to adapt to the adverse impacts of climate change *require large-scale diffusion and transfer of, or access to, environmentally sound technologies*,
Stressing the need for effective mechanisms, enhanced means, appropriate enabling environments and the removal of obstacles to the scaling up of the development and transfer of technology to developing country Parties,"[203]

"*Further decides to accelerate action consistent with international obligations, at different stages of the technology cycle, including research and development, demonstration, deployment, diffusion and transfer of technology* (hereinafter referred in this decision as technology development and transfer) *in support of action on mitigation and adaptation*"[204]

"*Encourages Parties*, in the context of Article 4, paragraphs 1(c) and 5, of the Convention and consistent with their respective capabilities and national circumstances and priorities, *to undertake domestic actions identified through country-driven approaches, to engage in bilateral and multilateral cooperative activities on technology development and transfer and to increase private and public research, development and demonstration in relation to technologies for mitigation and adaptation*"[205]

"Decides that the Climate Technology Centre shall facilitate a network of national, regional, sectoral and international technology networks, organizations and initiatives with a view to engaging the participants of the Network effectively in the following functions: […]

(b) *Stimulating and encouraging, through collaboration with the private sector, public institutions, academia and research institutions, the development and transfer of existing and emerging environmentally sound technologies*, as well as opportunities for North–South, South–South and triangular technology cooperation;

[202] Cancun Agreements (2010) (2010), Paragraph 89
[203] Cancun Agreements (2010) (2010), Paragraph 112
[204] Cancun Agreements (2010) (2010), Paragraph 115
[205] Cancun Agreements (2010) (2010), Paragraph 116

(c) *Facilitating a network of national, regional, sectoral and international technology centres, networks, organization and initiatives with a view to*: […]

(ii) *Facilitating international partnerships among public and private stakeholders to accelerate the innovation and diffusion of environmentally sound technologies to developing country Parties*;

(iii) *Providing, at the request of a developing country Party, in-country technical assistance and training to support identified technology actions in developing country Parties*"[206]

"Decides that capacity-building support to developing country Parties should be enhanced with a view to strengthening endogenous capacities at the subnational, national or regional levels, as appropriate, taking into account gender aspects, to contribute to the achievement of the full, effective and sustained implementation of the Convention, by, inter alia: […]

(e) *Supporting existing and emerging capacity-building needs identified in the areas of mitigation, adaptation, technology development and transfer, and access to financial resources*"[207]

See Appendix IV for Composition and Mandate of the Technology Executive Committee.
"Also reaffirming that, in accordance with Article 4, paragraph 3, of the Convention, developed country Parties shall provide enhanced financial, technology and capacity-building support for the preparation and implementation of nationally appropriate mitigation actions of developing country Parties,"[208]

"*Affirming that there is a need to give full consideration to what actions are necessary, including actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing country Parties arising from the impact of the implementation of response measures*; […]
Also reaffirming that developed country Parties are urged to strive to implement policies and measures to respond to climate change in such a way as to avoid negative social and economic consequences for developing country Parties, taking into account Article 3 of the Convention, and to assist these Parties to address such consequences *by providing support, including financial resources, transfer of technology and capacity-building, in accordance with Article 4 of the Convention, to build up the resilience of societies and economies negatively affected by response measures*"[209]

"*Invites Annex I Parties that are in a position to do so*, through multilateral agencies, including through the Global Environment Facility within its mandate, bilateral agencies and the private sector or through any further arrangements, as appropriate, *to make available the capacity- building, financial, technical and technology transfer assistance for Annex I Parties undergoing the process of transition to a market economy in order to assist these Parties in the development and implementation of their national low-carbon*

[206] Cancun Agreements (2010), Paragraph 123(b)(c(ii)(iii))
[207] Cancun Agreements (2010), Paragraph 130(e)
[208] Durban Platform (2011) (2011), Paragraph 31
[209] Durban Platform (2011) (2011), Paragraph 86

development strategies and action plans consistent with their national priorities and with their emission reduction targets"[210]

"*Each Annex II Party shall provide information on measures taken to promote, facilitate and finance the transfer of, access to and the deployment of climate-friendly technologies for the benefit of non-Annex I Parties, and for the support of the development and enhancement of endogenous capacities and technologies of non-Annex I Parties. Parties may also provide information on success and failure stories*."[211]

"*Each Annex II Party shall provide, in textual and tabular formats, information on measures and activities related to technology transfer implemented or planned since its last national communication or biennial report*. In reporting such measures and activities, Annex II Parties shall, to the extent possible, provide information on the recipient country, the target area of mitigation or adaptation, the sector involved and the sources of technology transfer from the public or private sectors, and shall distinguish between activities undertaken by the public and private sectors."[212]

See Annex III to the Durban Platform: UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention for more information on finance, technology and capacity-building needs and support received.

See Annex VII to the Durban Platform: "Terms of reference of the Climate Technology Centre and Network"

"Also decides that Parties' efforts should be undertaken on the basis of equity and common but differentiated responsibilities and respective capabilities, and *the provision of finance, technology transfer and capacity-building to developing countries in order to support their mitigation and adaptation actions under the Convention,* and take into account the imperatives of equitable access to sustainable development, the survival of countries and protecting the integrity of Mother Earth"[213]

"*Also agrees that the role of the Convention in promoting the implementation of approaches to address loss and damage associated with the adverse effects of climate change includes, inter alia, the following*: […]

(c) *Enhancing action and support, including finance, technology and capacity-building, to address loss and damage associated with the adverse effects of climate change*"[214]

"*Requests developed country Parties to provide developing country Parties with finance, technology and capacity-building, in accordance with decision 1/CP.16 and other relevant decisions of the Conference of the Parties*"[215]

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[210] Durban Platform (2011), Paragraph 168
[211] Durban Platform (2011), Annex I, Paragraph 21
[212] Durban Platform (2011), Annex I, Paragraph 22
[213] Doha Conference (2012), Decision 1, Paragraph 2
[214] Doha Conference (2012), Decision 3, Paragraph 5(c)

Stockholm Declaration

"*Environmental deficiencies generated by the conditions of under-development and natural disasters pose grave problems and can best be remedied by accelerated development through the transfer of substantial quantities of financial and technological assistance* as a supplement to the domestic effort of the developing countries and such timely assistance as may be required."[216]

"*Science and technology*, as part of their contribution to economic and social development, *must be applied to the identification, avoidance and control of environmental risks and the solution of environmental problems and for the common good of mankind*."[217]

"Scientific research and development in the context of environmental problems, both national and multinational, must be promoted in all countries, especially the developing countries. In this connection, the free flow of up-to-date scientific information and transfer of experience must be supported and assisted, to facilitate the solution of environmental problems; *environmental technologies should be made available to developing countries on terms which would encourage their wide dissemination without constituting an economic burden on the developing countries*."[218]

Agenda 21

"In the years ahead, Governments, working with appropriate organizations, should strive to meet the following broad objectives: […]

c.) To reinforce both values that encourage sustainable production and consumption patterns and *policies that encourage the transfer of environmentally sound technologies to developing countries*."[219]

"Reducing the amount of energy and materials used per unit in the production of goods and services can contribute both to the alleviation of environmental stress and to greater economic and industrial productivity and competitiveness. *Governments*, in cooperation with industry, *should therefore intensify efforts to use energy and resources in an economically efficient and environmentally sound manner by*: […]

c.) *Assisting developing countries to use these technologies efficiently and to develop technologies suited to their particular circumstances*;"[220]

"*Governments* at the appropriate level, with the cooperation of the relevant United Nations bodies and, as appropriate, intergovernmental and non-governmental organizations, and the private sector, *should*: […]

b.) *Facilitate at the international, regional, subregional and national levels access to and the transfer of safe, efficient, including resource-efficient, and less polluting*

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[215] Doha Conference (2012), Decision 3, Paragraph 8
[216] Stockholm Declaration, Principle 9
[217] Stockholm Declaration, Principle 18
[218] Stockholm Declaration, Principle 20
[219] Agenda 21 (1992), Chapter 4.17(c)
[220] Agenda 21 (1992), Chapter 4.18(c)

transport technologies, particularly to the developing countries, including the implementation of appropriate training programmes

c.) *Promote the research, development, transfer and use of improved energy-efficient technologies and practices*, including endogenous technologies in all relevant sectors, giving special attention to the rehabilitation and modernization of power systems, with particular attention to developing countries

d.) *Promote the research, development, transfer and use of technologies and practices for environmentally sound energy systems, including new and renewable energy systems, with particular attention to developing countries*"[221]

"*Governments* at the appropriate level, with the cooperation of the relevant United Nations bodies and, as appropriate, intergovernmental and non-governmental organizations, and the private sector, *should*: […]

b.) Encourage industry to increase and strengthen its capacity to develop technologies, products and processes that are safe, less polluting and make more efficient use of all resources and materials, including energy;

c.) *Cooperate in the development and transfer of such industrial technologies and in the development of capacities to manage and use such technologies, particularly with respect to developing countries*"[222]

See Agenda 21 Chapter 34 for "Transfer of Environmentally Sound Technology, Cooperation and Capacity Building".

"*Governments and international organizations should promote, and encourage the private sector to promote, effective modalities for the access and transfer, in particular to developing countries, of environmentally sound technologies by means of activities, including the following*:

a. Formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain;

b. Creation of favourable conditions to encourage the private and public sectors to innovate, market and use environmentally sound technologies;

c. Examination by Governments and, where appropriate, by relevant organizations of existing policies, including subsidies and tax policies, and regulations to determine whether they encourage or impede the access to, transfer of and introduction of environmentally sound technologies;

d. Addressing, in a framework which fully integrates environment and development, barriers to the transfer of privately owned environmentally sound technologies and adoption of appropriate general measures to reduce such barriers while creating specific incentives, fiscal or otherwise, for the transfer of such technologies;

e. In the case of privately owned technologies, the adoption of the following measures, in particular for developing countries:

[221] Agenda 21 (1992), Chapter 9.12(b)(c)(d)
[222] Agenda 21 (1992), Chapter 9.18(b)(c)

i. Creation and enhancement by developed countries, as well as other countries which might be in a position to do so, of appropriate incentives, fiscal or otherwise, to stimulate the transfer of environmentally sound technology companies, in particular to developing countries, as integral to sustainable development;
ii. Enhancement of the access to and transfer of patent protected environmentally sound technologies, in particular to developing countries;
iii. Purchase of patents and licences on commercial terms for their transfer to developing countries on non-commercial terms as part of development cooperation for sustainable development, taking into account the need to protect intellectual property rights;
iv. In compliance with and under the specific circumstances recognized by the relevant international conventions adhered to by States, the undertaking of measures to prevent the abuse of intellectual property rights, including rules with respect to their acquisition through compulsory licensing, with the provision of equitable and adequate compensation;
v. Provision of financial resources to acquire environmentally sound technologies in order to enable in particular developing countries to implement measures to promote sustainable development that would entail a special or abnormal burden to them;
vi. Development of mechanisms for the access to and transfer of environmentally sound technologies, in particular to developing countries, while taking into account development in the process of negotiating an international code of conduct on transfer of technology, as decided by UNCTAD at its eighth session, held at Cartagena de Indias, Colombia, in February 1992.

f. Improvement of the capacity to develop and manage environmentally sound technologies"[223]

WSSD (2002)

"Take joint actions and improve efforts to work together at all levels to improve access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievement of the Millennium Development Goals, including the goal of halving the proportion of people in poverty by 2015, and as a means to generate other important services that mitigate poverty, bearing in mind that access to energy facilitates the eradication of poverty. *This would include actions at all levels to*:

a.) *Improve access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources*, taking into account national specificities and circumstances, through various means, such as enhanced rural electrification and decentralized energy systems, increased use of renewables, cleaner liquid and gaseous fuels and enhanced energy efficiency, by intensifying regional and international cooperation in support of national efforts, *including through capacity-building, financial and technological assistance and*

[223] Agenda 21 (1992), Paragraph 34.18

innovative financing mechanisms, including at the micro- and meso- levels, recognizing the specific factors for providing access to the poor"[224]

"Call upon Governments as well as relevant regional and international organizations and other relevant stakeholders to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions adopted by the Commission on Sustainable Development concerning energy for sustainable development at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. *This would include actions at all levels to:* […]

i.) *Accelerate the development, dissemination and deployment of affordable and cleaner energy efficiency and energy conservation technologies, as well as the transfer of such technologies, in particular to developing countries, on favourable terms, including on concessional and preferential terms, as mutually agreed*"[225]

"*Improve water resource management and scientific understanding of the water cycle through cooperation in joint observation and research*, *and for this purpose encourage and promote knowledge-sharing and provide capacity-building and the transfer of technology*, as mutually agreed, including remote-sensing and satellite technologies, particularly to developing countries and countries with economies in transition."[226]

"Change in the Earth's climate and its adverse effects are a common concern of humankind. […]
Recalling the UN Millennium Declaration, in which heads of State and Government resolved to make every effort to ensure the entry into force of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, preferably by the tenth anniversary of the United Nations Conference on Environment and Development in 2002, and to embark on the required reduction of emissions of greenhouse gases, States that have ratified the Kyoto Protocol strongly urge States that have not already done so to ratify it in a timely manner. *Actions at all levels are required to*: […]

e.) *Develop and transfer technological solutions*[227]

"*The internationally agreed development goals*, including those contained in the Millennium Declaration and Agenda 21, as well as in the present plan of action, will *require significant increases in the flow of financial resources* as elaborated in the *Monterrey Consensus*, *including through new and additional financial resources, in particular to developing countries, to support the implementation of national policies and programmes developed by them, improved trade opportunities, access to and transfer of*

[224] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 9(a)
[225] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 20(i)
[226] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 28
[227] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 38(e)

environmentally sound technologies on a concessional or preferential basis, as mutually agreed, education and awareness-raising, capacity-building and information for decision-making and scientific capabilities within the agreed time frame required to meet these goals and initiatives."[228]

"*Promote, facilitate and finance, as appropriate, access to and the development, transfer and diffusion of environmentally sound technologies and corresponding know-how, in particular to developing countries and countries with economies in transition on favourable terms*, including on concessional and preferential terms, as mutually agreed, as set out in chapter 34 of Agenda 21, *including through urgent actions at all levels to*:

a. Provide information more effectively;
b. Enhance existing national institutional capacity in developing countries to improve access to and the development, transfer and diffusion of environmentally sound technologies and corresponding know-how;
c. Facilitate country-driven technology needs assessments;
d. Establish legal and regulatory frameworks in both supplier and recipient countries that expedite the transfer of environmentally sound technologies in a cost-effective manner by both public and private sectors and support their implementation;
e. Promote the access and transfer of technology related to early warning systems and to mitigation programmes to developing countries affected by natural disasters."[229]

"*Improve the transfer of technologies to developing countries, in particular at the bilateral and regional levels, including through urgent actions at all levels to*: […]

a.) Create partnerships conducive to investment and technology transfer, development and diffusion, to assist developing countries, as well as countries with economies in transition, in sharing best practices and promoting programmes of assistance, and encourage collaboration between corporations and research institutes to enhance industrial efficiency, agricultural productivity, environmental management and competitiveness;
b.) Provide assistance to developing countries, as well as countries with economies in transition, in accessing environmentally sound technologies that are publicly owned or in the public domain, as well as available knowledge in the public domain on science and technology, and in accessing the know-how and expertise required in order for them to make independent use of this knowledge in pursuing their development goals
c.) Support existing mechanisms and, where appropriate, establish new mechanisms for the development, transfer and diffusion of environmentally sound technologies to developing countries and economies in transition."[230]

[228] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 81
[229] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 105

The Future We Want (Rio+20 Declaration)

"We affirm that *green economy policies in the context of sustainable development and poverty eradication should*: […]

i.) *Contribute to closing technology gaps between developed and developing countries and reduce the technological dependence of developing countries, using all appropriate measures*"[231]

"*We emphasize the importance of technology transfer to developing countries*, and recall the provisions on technology transfer, finance, access to information and intellectual property rights, as agreed in the Johannesburg Plan of Implementation, in particular its call to promote, facilitate and finance, as appropriate, access to and the development, transfer and diffusion of environmentally sound technologies and corresponding know-how, in particular to developing countries, on favourable terms, including on concessional and preferential terms, as mutually agreed. We also take note of the further evolution of discussions and agreements on these issues since the adoption of the Johannesburg Plan of Implementation."[232]

"We recognize the importance of early warning systems as part of effective disaster risk reduction at all levels in order to reduce economic and social damages, including the loss of human life, and in this regard encourage States to integrate such systems into their national disaster risk reduction strategies and plans. *We encourage donors and the international community to enhance international cooperation in support of disaster risk reduction in developing countries, as appropriate, through technical assistance, technology transfer as mutually agreed, capacity-building and training programmes*. We further recognize the importance of comprehensive hazard and risk assessments, and knowledge- and information-sharing, including reliable geospatial information. We commit to undertake and strengthen in a timely manner risk assessment and disaster risk reduction instruments."[233]

"We underscore that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions. We recall that the United Nations Framework Convention on Climate Change provides that parties should protect the climate system for the benefit of present and future generations of humankind on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. We note with grave concern the significant gap between the aggregate effect of mitigation pledges by parties in terms of global annual emissions of greenhouse gases by 2020 and aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2° C, or 1.5° C above pre-industrial levels. *We recognize the importance of mobilizing funding from a variety of sources, public and*

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[230] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 106

[231] The Future We Want (Rio+20 Declaration) (2012), Paragraph 58(i)

[232] The Future We Want (Rio+20 Declaration) (2012), Paragraph 73

[233] The Future We Want (Rio+20 Declaration) (2012), Paragraph 187

private, bilateral and multilateral, including innovative sources of finance, to support nationally appropriate mitigation actions, adaptation measures, technology development and transfer and capacity-building in developing countries. In this regard, we welcome the launching of the Green Climate Fund, and call for its prompt operationalization so as to have an early and adequate replenishment process."[234]

"We note the importance of such ongoing initiatives as reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. We call for increased efforts to strengthen forest governance frameworks and means of implementation, in accordance with the non-legally binding instrument on all types of forests in order to achieve sustainable forest management. To this end, *we commit to improving the livelihoods of people and communities by creating the conditions needed for them to sustainably manage forests, including by strengthening cooperation arrangements in the areas of finance, trade, transfer of environmentally sound technologies*, capacity-building and governance, as well as by promoting secure land tenure, particularly with regard to decision-making and benefit-sharing, in accordance with national legislation and priorities."[235]

"We stress the importance of access by all countries to environmentally sound technologies, new knowledge, know-how and expertise. *We further stress the importance of cooperative action on technology innovation, research and development. We agree to explore modalities in the relevant forums for enhanced access to environmentally sound technologies by developing countries*."[236]

"*We underline the need for enabling environments for the development, adaptation, dissemination and transfer of environmentally sound technologies*. In this context, we note the role of foreign direct investment, international trade and international cooperation in the transfer of environmentally sound technologies. We engage in our countries as well as through international cooperation to promote investment in science, innovation and technology for sustainable development."[237]

For additional information, see "The Future We Want" Section VI. Means of Implementation—B. Technology.

BPOA

"Climate Change and Sea Level Rise: International Action: […]

v.) *Provide access to environmentally sound and energy-efficient technology to assist small island developing States in conserving energy*."[238]

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[234] The Future We Want (Rio+20 Declaration) (2012), Paragraph 191
[235] The Future We Want (Rio+20 Declaration) (2012), Paragraph 193
[236] The Future We Want (Rio+20 Declaration) (2012), Paragraph 270
[237] The Future We Want (Rio+20 Declaration) (2012), Paragraph 271
[238] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part IC(v)

"Natural and Environmental Disasters: International Action: *Improve access to technology and relevant training to assist with hazard and risk assessment and early warning systems*, and to assist with the protection of islands from environmental disasters consistent with national and regional strategies for disaster management."[239]

"*Facilitate the access to and development of environmentally sound technologies that are relevant to small island developing States, including coastal zone management and marine and ocean sciences,* using, inter alia, joint ventures, joint research and development programmes and financial mechanisms."[240]

Miscellaneous

"*States shall make available to other States, and especially to developing countries, upon their request and under agreed terms scientific and technical information and expertise, results of research programmes, training opportunities and specialized equipment and facilities which are needed by such other States to promote rational use of natural resources, and the environment or to prevent or abate interference with natural resources, and the environment, in particular in cases of environmental emergencies*."[241]

"*States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies*."[242]

"*There is high agreement and much evidence that all stabilisation levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialised in coming decades, assuming appropriate and effective incentives are in place for development, acquisition, deployment and diffusion of technologies and addressing related barriers*. Worldwide deployment of low-GHG emission technologies as well as technology improvements through public and private RD&D would be required for achieving stabilisation targets as well as cost reduction."[243]

"Human rights standards and principles are consistent with and further emphasize "the principle of common but differentiated responsibilities" contained in the United Nations Framework Convention on Climate Change. According to this principle, *developed country Parties (annex I) commit to assisting developing country Parties (non-annex I) in meeting the costs of adaptation to the adverse effects of climate change and to take full account of the specific needs of least developed countries in funding and transfer of technology.* The human rights framework complements the Convention by underlining that "the human person is the central subject of development", and that international

[239] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part IIC(ii)
[240] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part VIIIC(i)
[241] World Commission on Environment and Development, Our Common Future—Legal Principles (1987), Article 7(a)
[242] Rio Declaration on Environment and Development (1992), Principle 9
[243] IPCC Fourth Assessment Report (2007), p.68

cooperation is not merely a matter of the obligations of a State towards other States, but also of the obligations towards individuals."[244]

"*The Parties shall, consistent with their national laws, regulations and practices, facilitate the exchange of technologies and techniques, including those that increase energy efficiency, the use of renewable energy and the processing of low-sulphur fuels, to reduce sulphur emissions,* particularly through the promotion of:

(a) The commercial exchange of available technology;
(b) Direct industrial contacts and cooperation, including joint ventures;
(c) The exchange of information and experience;
(d) The provision of technical assistance."[245]

"Each Party shall take every practicable step, consistent with the programmes supported by the financial mechanism, to ensure:

(a) *that the best available, environmentally safe substitutes and related technologies are expeditiously transferred to Parties* operating under paragraph 1 of Article 5; and
(b) that the transfers referred to in subparagraph (a) occur under fair and most favourable conditions."[246]

"Adopt patterns of production, consumption, and reproduction that safeguard Earth's regenerative capacities, human rights, and community well-being. […]

c. *Promote the development, adoption, and equitable transfer of environmentally sound technologies*."[247]

"*Parties shall encourage and strengthen cooperation and establish joint research programmes and ventures for the development and use, as well as access to and transfer of, environmentally sound technologies on mutually agreed terms, with a view to accelerating the transition to sustainable development*."[248]

"*Parties shall cooperate in establishing, maintaining, and strengthening ways and means of providing new and additional financial resources, particularly to developing countries, for*:

(e) *making available, under favourable conditions, the transfer of environmentally sound technologies*."[249]

See ICHRP Technology Transfer Report for an analysis of technology transfer in international law and policy and an interpretation of the terms in UNFCCC documents. Available at:
http://www.ichrp.org/files/reports/65/138_ichrp_climate_tech_transfer_report.pdf

[244] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 87
[245] LRTAP Protocol on Further Reduction of Sulfur Emissions (1994), Article 3, Paragraph 1
[246] Montreal Protocol on Substances that Deplete the Ozone Layer (1987), Article 10A
[247] The Earth Charter (2000), Paragraph 7(c)
[248] Draft International Covenant on Environment and Development, 4th Ed (2010), Article 47
[249] Draft International Covenant on Environment and Development, 4th Ed (2010), Article 52

H. Mitigation and adaptation assistance to developing countries

UNFCCC Agreements

"The developed country Parties and other developed Parties included in Annex II shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations under Article 12, paragraph 1. *They shall also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of implementing measures that are covered by paragraph 1 of this Article and that are agreed between a developing country Party and the international entity or entities referred to in Article 11, in accordance with that Article.* The implementation of these commitments shall take into account the need for adequacy and predictability in the flow of funds and the importance of appropriate burden sharing among the developed country Parties."[250]

"*The developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects*."[251]

"*The Parties shall take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding* and transfer of technology."[252]

"In the implementation of the commitments in this Article, *the Parties shall give full consideration to what actions are necessary under the Convention, including actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and/or the impact of the implementation of response measures*, especially on:

(a) Small island countries;
(b) Countries with low-lying coastal areas;
(c) Countries with arid and semi-arid areas, forested areas and areas liable to forest decay;
(d) Countries with areas prone to natural disasters;
(e) Countries with areas liable to drought and desertification;
(f) Countries with areas of high urban atmospheric pollution;
(g) Countries with areas with fragile ecosystems, including mountainous ecosystems;
(h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products; and

[250] UNFCCC (1992) Article 4, Paragraph 3. This is reaffirmed in Durban Platform (2011), Paragraph 31
[251] UNFCCC (1992) Article 4, Paragraph 4
[252] UNFCCC (1992) Article 4, Paragraph 9

(i) Landlocked and transit countries.

Further, the Conference of the Parties may take actions, as appropriate, with respect to this paragraph."[253]

"In the context of the implementation of Article 4, paragraph 1, of the Convention, in accordance with the provisions of Article 4, paragraph 3, and Article 11 of the Convention, and through the entity or entities entrusted with the operation of the financial mechanism of the Convention, *the developed country Parties and other developed Parties included in Annex II to the Convention shall*: […]

(b) Also *provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of advancing the implementation of existing commitments under Article 4, paragraph 1, of the Convention that are covered by Article 10 and that are agreed between a developing country Party and the international entity or entities referred to in Article 11 of the Convention, in accordance with that Article*."[254]

"The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3."[255]

"Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia:

(e) *Enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation, including, inter alia, consideration of*:

(i) *Improved access to adequate, predictable and sustainable financial resources and financial and technical support, and the provision of new and additional resources, including official and concessional funding for developing country Parties*;

(ii) Positive incentives for developing country Parties for the enhanced implementation of national mitigation strategies and adaptation action;

(iii) Innovative means of funding to assist developing country Parties that are particularly vulnerable to the adverse impacts of climate change in meeting the cost of adaptation; […]

(vi) Financial and technical support for capacity-building in the assessment of the costs of adaptation in developing countries, in particular the most vulnerable ones, to aid in determining their financial needs;"[256]

[253] UNFCCC (1992) Article 4, Paragraph 8
[254] Kyoto Protocol (1998), Article 11, paragraph 2(b)
[255] Kyoto Protocol (1998), Article 12, paragraph 2
[256] Bali Action Plan (2007), Paragraph 1(e)(i, ii, iii, vi)

"*Scaled up, new and additional, predictable and adequate funding as well as improved access shall be provided to developing countries, in accordance with the relevant provisions of the Convention, to enable and support enhanced action on mitigation*, *including substantial finance* to reduce emissions from deforestation and forest degradation (REDD-plus), adaptation, technology development and transfer and capacity-building, for enhanced implementation of the Convention. *The collective commitment by developed countries is to provide new and additional resources, including forestry and investments through international institutions, approaching USD 30 billion for the period 2010-2012 with balanced allocation between adaptation and mitigation*. Funding for adaptation will be prioritized for the most vulnerable developing countries, such as the least developed countries, small island developing States and Africa. In the context of meaningful mitigation actions and transparency on implementation, developed countries commit to a goal of mobilizing jointly USD 100 billion dollars a year by 2020 to address the needs of developing countries.[257] This funding will come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance. New multilateral funding for adaptation will be delivered through effective and efficient fund arrangements, with a governance structure providing for equal representation of developed and developing countries. A significant portion of such funding should flow through the Copenhagen Green Climate Fund."[258]

"*We decide that the Copenhagen Green Climate Fund shall be established as an operating entity of the financial mechanism of the Convention to support projects, programmes, policies and other activities in developing countries related to mitigation including REDD-plus, adaptation, capacity building, technology development and transfer*."[259]

"Further affirms that:

(a) Scaled-up overall mitigation efforts that allow for the achievement of desired stabilization levels are necessary, *with developed country Parties showing leadership by undertaking ambitious emission reductions and providing technology, capacity-building and financial resources to developing country Parties*, in accordance with the relevant provisions of the Convention; […]

(d) *Mobilization and provision of scaled-up, new, additional, adequate and predictable financial resources is necessary to address the adaptation and mitigation needs of developing countries;*"[260]

"*Requests developed country Parties to provide developing country Parties, taking into account the needs of those that are particularly vulnerable, with long-term, scaled-up, predictable, new and additional finance, technology and capacity-building*, consistent with relevant provisions*, to implement urgent, short-, medium- and long-term adaptation*

[257] This commitment was later recognized in Cancun Agreements (2010), Paragraph 98 and reaffirmed in Doha Conference (2012), Decision 1, Section V, Paragraph 62

[258] Copenhagen Accord (2009), Paragraph 8

[259] Copenhagen Accord (2009), Paragraph 10

[260] Cancun Agreements (2010), Paragraph 2(a)(d)

actions, plans, programmes and projects at the local, national, subregional and regional levels, in and across different economic and social sectors and ecosystems."[261]

"*Decides that*, *in accordance with Article 4, paragraph 3, of the Convention, developed country Parties shall provide enhanced financial, technological and capacity-building support for the preparation and implementation of nationally appropriate mitigation actions of developing country Parties and for enhanced reporting by these Parties*"[262]

"Also *urges developed country Parties to strive to implement policies and measures to respond to climate change in such a way as to avoid negative social and economic consequences for developing country Parties*, taking into account Article 3 of the Convention, and *to assist these Parties to address such consequences by providing support, including financial resources, transfer of technology and capacity-building*,[263] in accordance with Article 4 of the Convention, to build up the resilience of societies and economies negatively affected by response measures;"[264]

"Takes note of the *collective commitment by developed countries to provide new and additional resources*, including forestry and investments through international institutions, approaching USD 30 billion for the period 2010–2012, with a balanced allocation between adaptation and mitigation; funding for adaptation will be prioritized for the most vulnerable developing countries, such as the least developed countries, small island developing States and Africa"[265]

"*Decides that,* in accordance with the relevant provisions of the Convention, *scaled-up, new and additional, predictable and adequate funding shall be provided to developing country Parties, taking into account the urgent and immediate needs of developing countries that are particularly vulnerable to the adverse effects of climate change*"[266]

"*Agrees that*, in accordance with paragraph 1(e) of the Bali Action Plan, *funds provided to developing country Parties may come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources*"[267]

"Takes note of the relevant reports on the financing needs and options for the mobilization of resources to address the needs of developing country Parties with regard to climate change adaptation and mitigation, including the report of the High-level Advisory Group on Climate Change Financing"[268]

"*Decides to establish a Green Climate Fund*, to be designated as an operating entity of the financial mechanism of the Convention under Article 11, with arrangements to be

[261] Cancun Agreements (2010), Paragraph 18
[262] Cancun Agreements (2010), Paragraph 52
[263] Also reiterated in Durban Platform (2011), Paragraph 86
[264] Cancun Agreements (2010), Paragraph 89
[265] Cancun Agreements (2010), Paragraph 95
[266] Cancun Agreements (2010), Paragraph 97
[267] Cancun Agreements (2010), Paragraph 99
[268] Cancun Agreements (2010), Paragraph 101

concluded between the Conference of the Parties and the Green Climate Fund to ensure that it is accountable to and functions under the guidance of the Conference of the Parties, to support projects, programmes, policies and other activities in developing country Parties using thematic funding windows"[269]

"Also *decides that financial resources for enhanced action on capacity-building in developing country Parties should be provided by Parties included in Annex II to the Convention and other Parties in a position to do so through the current and any future operating entities of the financial mechanism, as well as through various bilateral, regional and other multilateral channels*, as appropriate"[270]

"*Invites Annex I Parties* that are in a position to do so, through multilateral agencies, including through the Global Environment Facility within its mandate, bilateral agencies and the private sector or through any further arrangements, as appropriate*, to make available the capacity- building, financial, technical and technology transfer assistance for Annex I Parties undergoing the process of transition to a market economy in order to assist these Parties in the development and implementation of their national low-carbon development strategies and action plans consistent with their national priorities and with their emission reduction targets*"[271]

"Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia: […]

(c) Enhanced action on adaptation, including, inter alia, consideration of:

(i) *International cooperation to support urgent implementation of adaptation actions, including through vulnerability assessments, prioritization of actions, financial needs assessments, capacity-building and response strategies, integration of adaptation actions into sectoral and national planning, specific projects and programmes, means to incentivize the implementation of adaptation actions, and other ways to enable climate-resilient development and reduce vulnerability of all Parties*, taking into account the urgent and immediate needs of developing countries that are particularly vulnerable to the adverse effects of climate change, especially the least developed countries and small island developing States, and further taking into account the needs of countries in Africa affected by drought, desertification and floods"[272]

"Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia: […]

[269] Cancun Agreements (2010), Paragraph 102; see original text for technicalities of the Green Fund
[270] Cancun Agreements (2010), Paragraph 131
[271] Durban Platform (2011), Paragraph 168
[272] Bali Action Plan (2007), Paragraph 1(c(i))

(e) *Enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation, including, inter alia, consideration of*:

(i) Improved access to adequate, predictable and sustainable financial resources and financial and technical support, and the provision of new and additional resources, including official and concessional funding for developing country Parties;

(ii) Positive incentives for developing country Parties for the enhanced implementation of national mitigation strategies and adaptation action;

(iii) Innovative means of funding to assist developing country Parties that are particularly vulnerable to the adverse impacts of climate change in meeting the cost of adaptation;

(iv) Means to incentivize the implementation of adaptation actions on the basis of sustainable development policies;

(v) Mobilization of public- and private-sector funding and investment, including facilitation of climate-friendly investment choices;

(vi) Financial and technical support for capacity-building in the assessment of the costs of adaptation in developing countries, in particular the most vulnerable ones, to aid in determining their financial needs"[273]

See Bali Action Plan: Decision 6/CP.13: Fourth review of the financial mechanism and Annex: Additional guidelines for the review of the financial mechanism.[274]

"Also decides that Parties' efforts should be undertaken on the basis of equity and common but differentiated responsibilities and respective capabilities, and *the provision of finance, technology transfer and capacity-building to developing countries in order to support their mitigation and adaptation actions under the Convention*, and take into account the imperatives of equitable access to sustainable development, the survival of countries and protecting the integrity of Mother Earth"[275]

"Recalling decision 2/CP.17, in which developing country Parties were encouraged to develop low-emission development strategies, recognizing the need for financial and technical support by developed country Parties for the formulation of these strategies"[276]

"Also requests that the work programme consider possible elements of the mechanism referred to in paragraph 50 above, for example the following: […]

(i) A share of proceeds to cover administrative expenses and assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation"[277]

[273] Bali Action Plan (2007), Paragraph 1(e)
[274] Bali Action Plan (2007), Decision 6
[275] Doha Conference (2012), Decision 1, Paragraph 2
[276] Doha Conference (2012), Decision 1, Section II(B), Paragraph 18
[277] Doha Conference (2012), Decision 1, Section II(D), Paragraph 51(i)

"*Decides to extend the work programme on long-term finance for one year to the end of 2013, with the aim of informing developed country Parties in their efforts to identify pathways for mobilizing the scaling up of climate finance to USD 100 billion per year by 2020 from public, private and alternative sources in the context of meaningful mitigation actions and transparency on implementation, and informing Parties in enhancing their enabling environments and policy frameworks to facilitate the mobilisation and effective deployment of climate finance in developing countries*"[278]

"*Requests developed country Parties to provide developing country Parties with finance, technology and capacity-building, in accordance with decision 1/CP.16 and other relevant decisions of the Conference of the Parties*"[279]

"*Also urges developed country Parties to mobilize financial support for the national adaptation plan process for interested developing country Parties that are not least developed country Parties through bilateral and multilateral channels*, including through the Special Climate Change Fund, in accordance with decision 1/CP.16, as it urged developed country Parties to mobilize financial support for the national adaptation plan process for least developed country Parties in decision 5/CP.17, paragraph 21"[280]

WSSD (2002)

"Take joint actions and improve efforts to work together at all levels to improve access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievement of the Millennium Development Goals, including the goal of halving the proportion of people in poverty by 2015, and as a means to generate other important services that mitigate poverty, bearing in mind that access to energy facilitates the eradication of poverty. This would include actions at all levels to:

a.) *Improve access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources*, taking into account national specificities and circumstances, through various means, such as enhanced rural electrification and decentralized energy systems, increased use of renewables, cleaner liquid and gaseous fuels and enhanced energy efficiency, by intensifying regional and international cooperation in support of national efforts, *including through capacity-building, financial and technological assistance and innovative financing mechanism*s, including at the micro- and meso- levels, recognizing the specific factors for providing access to the poor; […]

g.) *Assist and facilitate on an accelerated basis, with the financial and technical assistance of developed countries, including through public-private partnerships, the access of the poor to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services*, taking into account the instrumental role of developing national policies on energy for sustainable development, bearing in mind that in developing countries sharp increases in energy services are required to improve the standards of living of their

[278] Doha Conference (2012), Decision 1, Section V, Paragraph 69; repeated in Doha Conference (2012), Decision 4, Paragraph 2
[279] Doha Conference (2012), Decision 3, Paragraph 8
[280] Doha Conference (2012), Decision 9, Paragraph 5

populations and that energy services have positive impacts on poverty eradication and improve standards of living."[281]

"Call upon Governments as well as relevant regional and international organizations and other relevant stakeholders to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions adopted by the Commission on Sustainable Development concerning energy for sustainable development at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. This would include actions at all levels to: […]

j.) *Recommend that international financial institutions and other agencies' policies support developing countries, as well as countries with economies in transition, in their own efforts to establish policy and regulatory frameworks which create a level playing field between the following: renewable energy, energy efficiency, advanced energy technologies, including advanced and cleaner fossil fuel technologies, and centralized, distributed and decentralized energy systems*; […]

s.*) Strengthen national and regional energy institutions or arrangements for enhancing regional and international cooperation on energy for sustainable development, in particular to assist developing countries in their domestic efforts to provide reliable, affordable, economically viable, socially acceptable and environmentally sound energy services to all sections of their populations*"[282]

"Call upon Governments as well as relevant regional and international organizations and other relevant stakeholders to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions adopted by the Commission on Sustainable Development concerning energy for sustainable development at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. This would include actions at all levels to: […]

n.) *Utilize financial instruments and mechanisms*, in particular the Global Environment Facility, within its mandate, *to provide financial resources to developing countries, in particular least developed countries and small island developing States, to meet their capacity needs for training, technical know-how and strengthening national institutions in reliable, affordable, economically viable, socially acceptable and environmentally sound energy*, including promoting energy efficiency and conservation, renewable energy and advanced energy technologies, including advanced and cleaner fossil fuel technologies"[283]

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[281] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 9(a)(g)

[282] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 20(j)

[283] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 20(n)

"An integrated, multi-hazard, inclusive approach to address vulnerability, risk assessment and disaster management, including prevention, mitigation, preparedness, response and recovery, is an essential element of a safer world in the twenty-first century. Actions are required at all levels to: […]

c.*) Strengthen the institutional capacities of countries and promote international joint observation and research, through* improved surface-based monitoring and increased use of satellite data, dissemination of technical and scientific knowledge*,* and *the provision of assistance to vulnerable countries*;

d.) *Reduce the risks of flooding and drought in vulnerable countries by*, inter alia, promoting wetland and watershed protection and restoration, improved land-use planning, improving and applying more widely techniques and methodologies for assessing the potential adverse effects of climate change on wetlands and, as appropriate, *assisting countries that are particularly vulnerable to those effects*;"[284]

"Recalling the United Nations Millennium Declaration, in which heads of State and Government resolved to make every effort to ensure the entry into force of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, preferably by the tenth anniversary of the United Nations Conference on Environment and Development in 2002, and to embark on the required reduction of emissions of greenhouse gases, States that have ratified the Kyoto Protocol strongly urge States that have not already done so to ratify it in a timely manner. Actions at all levels are required to: […]

c.) *Provide technical and financial assistance and capacity-building to developing countries and countries with economies in transition in accordance with commitments under the Convention*, including the Marrakesh Accords"[285]

"Agriculture plays a crucial role in addressing the needs of a growing global population and is inextricably linked to poverty eradication, especially in developing countries. Enhancing the role of women at all levels and in all aspects of rural development, agriculture, nutrition and food security is imperative. Sustainable agriculture and rural development are essential to the implementation of an integrated approach to increasing food production and enhancing food security and food safety in an environmentally sustainable way. This would include actions at all levels to: […]

e.) *Support the efforts of developing countries to protect oases from silt, land degradation and increasing salinity by providing appropriate technical and financial assistance*"[286]

"Small island developing States are a special case both for environment and development. Although they continue to take the lead in the path towards sustainable

[284] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 37(c)(d)
[285] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 38(c)
[286] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 30(e)

development in their countries, they are increasingly constrained by the interplay of adverse factors clearly underlined in Agenda 21, the Programme of Action for the Sustainable Development of Small Island Developing States and the decisions adopted at the twenty-second special session of the General Assembly.

This would include actions at all levels to:

a.) *Accelerate national and regional implementation of the Programme of Action, with adequate financial resources*, including through Global Environment Facility focal areas, transfer of environmentally sound technologies and assistance for capacity-building from the international community […]
h.) *Extend assistance to small island developing States in support of local communities and appropriate national and regional organizations of small island developing States for comprehensive hazard and risk management, disaster prevention, mitigation and preparedness, and help relieve the consequences of disasters, extreme weather events and other emergencies*;
i.) *Assist small island developing States in mobilizing adequate resources and partnerships for their adaptation needs relating to the adverse effects of climate change, sea level rise and climate variability*, consistent with commitments under the United Nations Framework Convention on Climate Change, where applicable"[287]

"Deal effectively with natural disasters and conflicts, including their humanitarian and environmental impacts, recognizing that conflicts in Africa have hindered, and in many cases obliterated, both the gains and efforts aimed at sustainable development, with the most vulnerable members of society, particularly women and children, being the most impacted victims, through efforts and initiatives, at all levels, to:

a. *Provide financial and technical assistance to strengthen the capacities of African countries, including institutional and human capacity, including at the local level, for effective disaster management, including observation and early warning systems, assessments, prevention, preparedness, response and recovery*"[288]

"*The internationally agreed development goals, including those contained in the Millennium Declaration and Agenda 21, as well as in the present plan of action, will require significant increases in the flow of financial resources as elaborated in the Monterrey Consensus, including through new and additional financial resources, in particular to developing countries*, to support the implementation of national policies and programmes developed by them, improved trade opportunities, access to and transfer of environmentally sound technologies on a concessional or preferential basis, as mutually agreed, education and awareness-raising, capacity-building and information for decision-

[287] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 58(a)(c)(h)(j)
[288] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 65(a)

making and scientific capabilities within the agreed time frame required to meet these goals and initiatives."[289]

"Achieving sustainable development includes actions at all levels to: […]

k) *Assist African countries in mobilizing adequate resources for their adaptation needs relating to the adverse effects of climate change, extreme weather events, sea level rise and climate variability, and assist in developing national climate change strategies and mitigation programmes, and continue to take actions to mitigate the adverse effects on climate change in Africa*, consistent with the United Nations Framework Convention on Climate Change"[290]

"Make full and effective use of existing financial mechanisms and institutions, including through actions at all levels to: […]

d.) Encourage the private sector, including transnational corporations, private foundations and civil society institutions, to provide financial and technical assistance to developing countries"[291]

"*Assist developing countries, through international cooperation, in enhancing their capacity in their efforts to address issues pertaining to environmental protection,* including in their formulation and implementation of policies for environmental management and protection, including through urgent actions at all levels to:

a. Improve their use of science and technology for environmental monitoring, assessment models, accurate databases and integrated information systems;
b. Promote and, where appropriate, improve their use of satellite technologies for quality data collection, verification and updating, and further improve aerial and ground-based observations, in support of their efforts to collect quality, accurate, long-term, consistent and reliable data;
c. Set up and, where appropriate, further develop national statistical services capable of providing sound data on science education and research and development activities that are necessary for effective science and technology policy-making."[292]

OHCHR

"International cooperation to promote and protect human rights lies at the heart of the Charter of the United Nations. The importance of such cooperation is explicitly stated in provisions of the International Covenant on Economic, Social and Cultural Rights, the Convention on the Rights of the Child, the Convention on the Rights of People with Disabilities and in the Declaration on the Right to Development. According to CESCR

[289] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 81
[290] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 62
[291] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 86
[292] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 110

and the Committee on the Rights of the Child, the obligation to take steps to the maximum of available resources to implement economic, social and cultural rights includes an obligation of States, where necessary, to seek international cooperation. *States have also committed themselves not only to implement the treaties within their jurisdiction, but also to contribute, through international cooperation, to global implementation. Developed States have a particular responsibility and interest to assist the poorer developing States*."[293]

"Human rights standards and principles are consistent with and further emphasize "the principle of common but differentiated responsibilities" contained in the United Nations Framework Convention on Climate Change. According to this principle, *developed country Parties (annex I) commit to assisting developing country Parties (non-annex I) in meeting the costs of adaptation to the adverse effects of climate change* and to take full account of the specific needs of least developed countries in funding and transfer of technology. The human rights framework complements the Convention by underlining that "the human person is the central subject of development," and that international cooperation is not merely a matter of the obligations of a State towards other States, but also of the obligations towards individuals."[294]

"Global warming can only be dealt with through cooperation by all members of the international community. Equally, *international assistance is required to ensure sustainable development pathways in developing countries and enable them to adapt to now unavoidable climate change.* International human rights law complements the United Nations Framework Convention on Climate Change by underlining that international cooperation is not only expedient but also a human rights obligation and that its central objective is the realization of human rights."[295]

Miscellaneous

"In the developing countries most of the environmental problems are caused by under-development. Millions continue to live far below the minimum levels required for a decent human existence, deprived of adequate food and clothing, shelter and education, health and sanitation. Therefore, the developing countries must direct their efforts to development, bearing in mind their priorities and the need to safeguard and improve the environment. For the same purpose, *the industrialized countries should make efforts to reduce the gap themselves and the developing countries*."[296]

"*Resources should be made available to preserve and improve the environment, taking into account the circumstances and particular requirements of developing countries and any costs which may emanate from their incorporating environmental safeguards into their development planning and the need for making available to them, upon their request, additional international technical and financial assistance for this purpose*."[297]

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[293] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 85
[294] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 87
[295] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 99
[296] Stockholm Declaration (1972), Principle 4
[297] Stockholm Declaration (1972), Principle 12

"*Funds, programmes and administrative structures necessary to achieve the objective of the conservation of nature shall be provided*."[298]

"*The developmental and environmental objectives of Agenda 21 will require a substantial flow of new and additional financial resources to developing countries*, in order to cover the incremental costs for the actions they have to undertake to deal with global environmental problems and to accelerate sustainable development."[299]

"*We emphasize the need to address the challenge of access to sustainable modern energy services for all, in particular for the poor, who are unable to afford these services even when they are available. We emphasize the need to take further action to improve this situation, including by mobilizing adequate financial resources*, so as to provide these services in a reliable, affordable, economically viable and socially and environmentally acceptable manner in developing countries."[300]

"We underscore that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions. We recall that the United Nations Framework Convention on Climate Change provides that parties should protect the climate system for the benefit of present and future generations of humankind on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. We note with grave concern the significant gap between the aggregate effect of mitigation pledges by parties in terms of global annual emissions of greenhouse gases by 2020 and aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2° C, or 1.5° C above pre-industrial levels. *We recognize the importance of mobilizing funding from a variety of sources, public and private, bilateral and multilateral, including innovative sources of finance, to support nationally appropriate mitigation actions, adaptation measures, technology development and transfer and capacity-building in developing countries*. In this regard, we welcome the launching of the Green Climate Fund, and call for its prompt operationalization so as to have an early and adequate replenishment process."[301]

For more information on financial support for developing countries, see The Future We Want Section VI. Means of Implementation- A. Finance for finance mechanisms for sustainable development in general .

"Climate Change and Sea Level Rise: International Action: […]

iii.) *Provide improved access to financial and technical resources for monitoring variability and change of climate and sea level rise, for assessing the impacts of climate change, and for developing and implementing response adaptation*

[298] World Charter for Nature (1982), Paragraph 17
[299] Agenda 21 (1992), Chapter 1.4
[300] The Future We Want (Rio+20 Declaration) (2012), Paragraph 126
[301] The Future We Want (Rio+20 Declaration) (2012), Paragraph 191

strategies in a timely manner, recognizing the specific vulnerabilities and disproportionate cost borne by small island developing States;

vii.) *Provide improved access to financial and technical resources to assist small island developing States, which are particularly vulnerable to the adverse effects of climate change, in meeting the costs associated with the development of national and regional strategies, measures and methodologies to facilitate adequate adaptation to climate change*."[302]

"*The International community and especially the industrialized nations have [a] special obligation to assist developing countries which will be very negatively affected by changes in the atmosphere* although the responsibility of many of them for the process may only be marginal today."[303]

"Without prejudice to the international obligations of each State, *the signatories acknowledge and will promote the following principles*: […]

d.) The principle that countries to which decisions taken to protect the atmosphere shall prove to be an abnormal or special burden, in view, inter alia of the level of their development and actual responsibility for the deterioration of the atmosphere, *shall receive fair and equitable assistance to compensate them for bearing such burden*. To this end mechanisms will have to be developed"[304]

"*Parties shall cooperate in establishing, maintaining, and strengthening ways and means of providing new and additional financial resources, particularly to developing countries, for*:

(a) environmentally sound development programmes and projects;
(b) capacity building and enhancement of relevant institutions;
(c) measures to address major environmental problems of global concern, and measures to implement this Covenant, where such measures would entail special or abnormal burdens due to the lack of sufficient financial resources, expertise or technical capacity;
(d) compensation for binding commitments to forego the economic use of specific natural resources where such use would endanger the environment; and
(e) making available, under favourable conditions, the transfer of environmentally sound technologies."[305]

For recommendations regarding the Green Fund, see IMF: Financing the Response to Climate Change. Available at: http://www.imf.org/external/pubs/ft/spn/2010/spn1006.pdf

[302] Barbados Program of Action (BPOA) (1994): Report of the Global Conference on the Sustainable Development of Small Island Developing States, Part IC(iii)(vi)(vii)
[303] Hague Declaration on the Environment (1989)
[304] Hague Declaration on the Environment (1989)
[305] Draft International Covenant on Environment and Development, 4th Ed (2010), Article 52

I. Acceptance of climate-displaced persons

OHCHR

"*Human rights guarantees in the context of climate change include*:

(a) adequate protection of housing from weather hazards (habitability of housing);

(b) access to housing away from hazardous zones;

(c) *access to shelter and disaster preparedness in cases of displacement caused by extreme weather events*;

(d) *protection of communities that are relocated away from hazardous zones, including protection against forced evictions without appropriate forms of legal or other protection, including adequate consultation with affected persons*."[306]

"The inundation and disappearance of small island States would have implications for the right to self-determination, as well as for the full range of human rights for which individuals depend on the State for their protection. The disappearance of a State for climate change-related reasons would give rise to a range of legal questions, including concerning the status of people inhabiting such disappearing territories and the protection afforded to them under international law (discussed further below). *While there is no clear precedence to follow, it is clear that insofar as climate change poses a threat to the right of peoples to self-determination, States have a duty to take positive action, individually and jointly, to address and avert this threat. Equally, States have an obligation to take action to avert climate change impacts which threaten the cultural and social identity of indigenous peoples*."[307]

"*Persons affected by displacement within national borders are entitled to the full range of human rights guarantees by a given State, including protection against arbitrary or forced displacement and rights related to housing and property restitution for displaced persons. To the extent that movement has been forced, persons would also qualify for increased assistance and protection as a vulnerable group in accordance with the Guiding Principles on Internal Displacement.* However, with regard to slow-onset disasters and environmental degradation it remains challenging to distinguish between voluntary and forced population movements."

† "*Persons moving voluntarily or forcibly across an international border due to environmental factors would be entitled to general human rights guarantees in a receiving State, but would often not have a right of entry to that State*. Persons forcibly displaced across borders for environmental reasons have been referred to as "climate refugees" or "environmental refugees". The Office of the United Nations High Commissioner for Refugees, the International Organization for Migration and other humanitarian organizations have advised that these terms have no legal basis in international refugee law and should be avoided in order not to undermine the international legal regime for the protection of refugees. "[308]

[306] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 38
[307] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 41
[308] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 58

"*The Representative of the Secretary-General on human rights of internally displaced persons has suggested that a person who cannot be reasonably expected to return (e.g. if assistance and protection provided by the country of origin is far below international standards) should be considered a victim of forced displacement and be granted at least a temporary stay*."[309]

† "One possible scenario of forcible displacement across national borders is the eventual total submergence of small island States. Two working papers of the Sub-Commission on the Promotion and Protection of Human Rights point to some of the human rights issues such situations would raise, such as the rights of affected populations vis-à-vis receiving States and possible entitlement to live in community. Human rights law does not provide clear answers as to the status of populations who have been displaced from sinking island States. Arguably, *dealing with such possible disasters and protecting the human rights of the people affected will first and foremost require adequate long-term political solutions, rather than new legal instruments*."[310]

"Climate change-related conflicts could be one driver of forced displacement. In such cases, in addition to the general human rights protection framework, other international standards would be applicable, including the Guiding Principles on Internal Displacement, international humanitarian law, international refugee law and subsidiary and temporary protection regimes for persons fleeing from armed conflict. Violent conflict, irrespective of its causes, has direct implications for the protection and enjoyment of human rights."[311]

"*In some cases, States may have an obligation to protect individuals against foreseeable threats to human rights related to climate change, such as an increased risk of flooding in certain areas*. In that regard, the jurisprudence of the European Court of Human Rights gives some indication of how a failure to take measures against foreseeable risks could possibly amount to a violation of human rights. The Court found a violation of the right to life in a case where State authorities had failed to implement land-planning and emergency relief policies while they were aware of an increasing risk of a large-scale mudslide. The Court also noted that the population had not been adequately informed about the risk."[312]

"The Committee on Economic, Social and Cultural Rights identifies four types of extraterritorial obligations to promote and protect economic, social and cultural rights. Accordingly, *States have legal obligations to*:

- Refrain from interfering with the enjoyment of human rights in other countries
- Take measures to prevent third parties (e.g. private companies) over which they hold influence from interfering with the enjoyment of human rights in other countries

[309] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 59
[310] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 60
[311] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 63
[312] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 74

- *Take steps through international assistance and cooperation, depending on the availability of resources, to facilitate fulfilment of human rights in other countries, including disaster relief, emergency assistance, and assistance to refugees and displaced persons*

Ensure that human rights are given due attention in international agreements and that such agreements do not adversely impact upon human rights"[313]

Miscellaneous

"Invites all Parties to enhance action on adaptation under the Cancun Adaptation Framework, taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances, by undertaking, inter alia, the following: […]

(f) *Measures to enhance understanding, coordination and cooperation with regard to climate change induced displacement, migration and planned relocation, where appropriate, at the national, regional and international levels*"[314]

"*Acknowledges the further work to advance the understanding of and expertise on loss and damage*, which includes, inter alia, the following: […]

(vi) *How impacts of climate change are affecting patterns of migration, displacement and human mobility*"[315]

Proposed Convention on Climate Displaced Persons:

"Definition and designation of climate change displaced persons (CCDPs)

Proposals for definitions of "climate change displaced persons" have advanced a range of strategies for addressing the question of how to distinguish forced from voluntary migration in cases of gradual environmental degradation. In our view, prospective migration based on the likely consequences of climate change (that is, "voluntary migration") is as coerced as migration in response to climate change impacts that immediately render a particular area uninhabitable. In other words, population movements based on the conclusion that a region will no longer be habitable in the future also constitute "forced" migration. The important question *then* becomes institutional rather than definitional and is focused on constructing and administering a set of processes to determine the likely contribution of climate change to both prospective and responsive climate change movements.

Rather than assigning rights and protections on the basis of the individual satisfaction of definition-based criteria, we propose more workable (in our view) *en masse* designations of the status of CCDPs through a process of request and determination by States and Convention institutions. Such an approach would nevertheless require a definition of CCDPs because, as Castles observes, "we cannot get around definitional categories… easily, for definitions are crucial in guiding the policies

[313] OHCHR Report on the Relationship Between Climate Change and Human Rights (2009), Paragraph 86
[314] Cancun Agreements (2010), Paragraph 14(f)
[315] Doha Conference (2012), Decision 3, Paragraph 7(vi)

of governments and international agencies towards mobile people." We propose, then, the following CCDP definition:

> *CCDPs are groups of people whose habitual homes have or will become temporarily or permanently uninhabitable as a consequence of a climate change event.*

A "climate change event" is defined as "sudden or gradual environmental disruption that is very likely caused by human-induced climate change."

Under our Convention assistance and protection would not be triggered solely by fulfilling the requirements of a definition, but rather through an international process of status designation informed by scientific studies, affected communities, States, and international institutions."[316]

† "Both the Refugee Convention and customary international law recognize that, in certain circumstances, the international community is responsible for the provision of rights and assistance to persons displaced across international borders and unable to rely on their own nation for protection. Again, however, there currently exists no provision in international law for most persons migrating across borders as a consequence of climate change.

Doherty and Giannini identify the Refugee Convention as a useful model for what kinds of human rights protections to include in a new instrument for CCDPs because it provides the "most comprehensive codification of the rights of refugees yet attempted on the international level. We endorse Docherty and Giannini's argument that any treaty for CCDPs should be premised on the rights and protections that States *have already agreed to accord to traditional refugees.* As such, our Convention would guarantee a range of civil, political, economic, social, and cultural rights, based on a principle of non-discrimination. Further, CCDPs should be guaranteed a minimum standard of treatment at least equivalent to aliens in the host country. However, analogously to the Refugee Convention, certain rights should be afforded to CCDPs at the same level as those enjoyed by nationals in the host country, and, in some cases, rights should be afforded based on an absolute standard, rather than being contingent on existing rights in host nations. Rights relating to movement are especially significant to CCDPs, and in particular, CCDPs should enjoy the right to non-refoulement, a core principle of refugee law under Article 33 of the Refugee Convention. In the context of the new instrument, non-refoulement would prohibit the forcible return of a refugee to a situation in which "climate-induced environmental change would threaten the refugee's life or ability ot survive."

Following the Refugee Convention, the rights of CCDPs displaced across international borders should expand on an incremental basis, with further rights accruing the longer that CCDPs remain in a host nation. Adoption of the Refugee Convention model of a gradually deepening set of rights enables the Convention to flexibly adapt to changing environmental conditions and scientific knowledge. As proposed by Docherty and Giannini, those displaced across borders would remain eligible for assistance until they acquired a new nationality, voluntarily returned to their home country, or refused to return when it was safe for them to do so.

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[316] CCDP Convention (2012) , Section 3.4

Any instrument for CCDPs should ensure that basic survival needs are met. Again, a duty of international cooperation and assistance, based on the principle that climate change is a global problem, is equally applicable to CCDPs who cross borders *and* to those who remain within their own states."[317]

"*There is much scope for preventive policies, with the aim of reducing the need to migrate by ensuring an acceptable livelihood in established homelands*. First of all, we need to expand our approach to refugees in general in order to include environmental refugees in particular. We cannot continue to ignore environmental refugees simply because there is no institutionalised mode of dealing with them. If official standing were to be accorded to these refugees, this might help to engender a recognised constituency for e.g. those 900 million people who endure desertification, 4 million of whom have become environmental refugees in the Sahel alone. While desertification entrains costs of $42 billion a year just through the loss of agricultural produce, the United Nations' Anti-Desertification Action Plan would cost no more than $22 billion a year. Yet the amount subscribed so far falls far short of the target, ostensibly on the grounds that arid-land dwellers have no constituency and hence lack political leverage.

Secondly, *we need to widen and deepen our understanding of environmental refugees by establishing the root causes of the problem--not only environmental causes but associated problems such as security concerns, plus the interplay of the two sets of forces*. There are many conceptual grey areas as concerns proximate and ultimate causes, the contributory roles of population pressures and poverty, the linkages to ethnic tensions and conventional conflict, and so lengthily forth.

Consider too the root causes of famine. If a famine has been human-made, it can be human-unmade, whereas natural factors can only be managed and accommodated. Just as the recurrent droughts in Sub-Saharan Africa cannot all be blamed on climate, so the recurrent famines cannot all be blamed on drought--and the same must apply, to some degree at least, to droughts (plus desertification) in Central Asia. Drought has often served to trigger famines by disrupting the social, economic and political processes that would normally ensure sufficient access or entitlement to food.

Probably most important of all is that there can be little progress except within an overall context of what has come to be known as Sustainable Development. This applies notably to reliable access to food, water, energy, health and other basic human needs--lack of which is behind many environmental refugees' need to migrate. In big picture terms, sustainable development represents a sound way to pre-empt the environmental refugee issue in its full scope over the long run. As a prime mode to tackle the issue, then, there would be a handsome payoff on investment to foster Sustainable Development in developing countries through greater policy emphasis on environmental safeguards, together with efforts to stem associated problems such as poverty, population and landlessness.

Let us conclude this paper with an unusually pragmatic mode of promoting Sustainable Development, whether in the Horn of Africa or Central Asia, whether in the Himalayan foothills or the borderlands of the Caucasus mountains. A prime way to tackle desertification, salinization, in fact several sorts of land degradation, is through planting trees for shelter belts, to retain soil moisture, and to resist soil erosion. Certain types of

[317] CCDP Convention (2012), Section 3.6.

trees offer additional benefits, e.g. leguminous species add nitrogen to infertile soils, or they supply built-in insecticides, or they offer industrial timber. Probably the biggest benefit lies with reforestation in montane areas, in order to rehabilitate hydrological systems and watershed functions, and thus avoiding floods and drying-outs for river systems downstream. All in all, and in whatever part of the world, restoring tree cover almost always presents an exceptional win-win outcome."[318]

"Deal effectively with natural disasters and conflicts, including their humanitarian and environmental impacts, recognizing that conflicts in Africa have hindered, and in many cases obliterated, both the gains and efforts aimed at sustainable development, with the most vulnerable members of society, particularly women and children, being the most impacted victims, through efforts and initiatives, at all levels, to: […]

b.)*Provide support to African countries to enable them to better deal with the displacement of people as a result of natural disasters and conflicts and put in place rapid response mechanisms*"[319]

[318] Environmental Refugees: An Emergent Security Issue (2005)

[319] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 65(b)

J. Promote sustainable consumption patterns

Miscellaneous

"To achieve sustainable development and a higher quality of life for all people, States should *reduce and eliminate unsustainable patterns of production and consumption* and promote appropriate demographic policies."[320]

"Encourage and promote the development of a 10-year framework of programmes in support of regional and national initiatives to accelerate the *shift towards sustainable consumption and production* to promote social and economic development within the carrying capacity of ecosystems by addressing and, where appropriate, delinking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes and reducing resource degradation, pollution and waste. All countries should take action, with developed countries taking the lead, taking into account the development needs and capabilities of developing countries, through mobilization, from all sources, of financial and technical assistance and capacity-building for developing countries. This would require actions at all levels to:

a) Identify specific activities, tools, policies, measures and monitoring and assessment mechanisms, including, where appropriate, life-cycle analysis and national indicators for measuring progress, bearing in mind that standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries;
b) Adopt and implement policies and measures aimed at promoting sustainable patterns of production and consumption, applying, inter alia, the polluter-pays principle described in principle 16 of the Rio Declaration on Environment and Development;
c) Develop production and consumption policies to improve the products and services provided, while reducing environmental and health impacts, using, where appropriate, science-based approaches, such as life-cycle analysis;
d) Develop awareness-raising programmes on the importance of sustainable production and consumption patterns, particularly among youth and the relevant segments in all countries, especially in developed countries, through, inter alia, education, public and consumer information, advertising and other media, taking into account local, national and regional cultural values;
e) Develop and adopt, where appropriate, on a voluntary basis, effective, transparent, verifiable, non-misleading and non-discriminatory consumer information tools to provide information relating to sustainable consumption and production, including human health and safety aspects. These tools should not be used as disguised trade barriers;
f) Increase eco-efficiency, with financial support from all sources, where mutually agreed, for capacity-building, technology transfer and exchange of technology

[320] Rio Declaration (1992), Principle 8

with developing countries and countries with economies in transition, in cooperation with relevant international organizations."[321]

"In principle, countries should be guided by the following basic objectives in their efforts to address consumption and lifestyles in the context of environment and development:

a. All countries should strive to *promote sustainable consumption patterns*;
b. *Developed countries should take the lead in achieving sustainable consumption patterns*;
c. *Developing countries should seek to achieve sustainable consumption patterns in their development process*, guaranteeing the provision of basic needs for the poor, while avoiding those unsustainable patterns, particularly in industrialized countries, generally recognized as unduly hazardous to the environment, inefficient and wasteful, in their development processes. This requires enhanced technological and other assistance from industrialized countries."[322]

"In the years ahead, Governments, working with appropriate organizations, should strive to meet the following broad objectives: […]

b. To *develop a domestic policy framework that will encourage a shift to more sustainable patterns of production and consumption*;
c. To *reinforce both values that encourage sustainable production and consumption patterns* and policies that encourage the transfer of environmentally sound technologies to developing countries."[323]

"We recognize that *urgent action on unsustainable patterns of production and consumption where they occur remains fundamental in addressing environmental sustainability*"[324]

"We recall the commitments made in the Rio Declaration, Agenda 21 and the Johannesburg Plan of Implementation on sustainable consumption and production and, in particular, the request in chapter III of the Johannesburg Plan of Implementation to encourage and promote the development of a ten-year framework of programmes. We recognize that *fundamental changes in the way societies consume and produce are indispensable for achieving global sustainable development*."[325]

"There is also high agreement and medium evidence that *changes in lifestyle, behaviour patterns and management practices can contribute to climate change mitigation across all sectors*. Examples that can have positive impacts on mitigation include changes in consumption patterns, education and training, changes in building occupant behaviour, transport demand management and management tools in industry."[326]

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[321] Johannesburg Plan of Implementation of the World Summit of Sustainable Development (WSSD) (2002), Paragraph 15
[322] Agenda 21 (1992), Paragraph 4.8
[323] Agenda 21 (1992), Paragraph 4.17
[324] The Future We Want (Rio+20 Declaration) (2012), Paragraph 61
[325] The Future We Want (Rio+20 Declaration) (2012), Paragraph 224
[326] IPCC Fourth Assessment Report (2007), p.59

"Changes in lifestyle and behaviour patterns can contribute to climate change mitigation across all sectors. Management practices can also have a positive role (high agreement, medium evidence).

- Lifestyle changes can reduce GHG emissions. Changes in lifestyles and consumption patterns that emphasize resource conservation can contribute to developing a low-carbon economy that is both equitable and sustainable
- Education and training programmes can help overcome barriers to the market acceptance of energy efficiency, particularly in combination with other measures
- Changes in occupant behaviour, cultural patterns and consumer choice and use of technologies can result in considerable reduction in CO_2 emissions related to energy use in buildings
- Transport Demand Management, which includes urban planning (that can reduce the demand for travel) and provision of information and educational techniques (that can reduce car usage and lead to an efficient driving style) can support GHG mitigation
- In industry, management tools that include staff training, reward systems, regular feedback, documentation of existing practices can help overcome industrial organization barriers, reduce energy use, and GHG emissions"[327]

"Technology, income levels, and lifestyles are causing important changes in both direct and indirect energy requirements of households. While energy efficiency through technological improvement is helping, energy use and GDP growth have not really been decoupled in many countries. Lifestyle changes are essential to realize the full benefits of the technical potential.

In the short term, for incremental changes it is advantageous to consider consumers as shoppers and purchasers in a marketplace. By controlling information, education, and so on, what people buy can be influenced to achieve the desired outcome. In the medium term, an approach that relies on human well-being in terms of sustainable development, on Millennium Development Goal indicators, and on the triple bottom line (with more emphasis toward environmentalism) can have a moderate dampening effect on energy use.

In the longer term, an ecological footprint index and the criterion of 'sufficiency' provide promising policy options in individualistic liberal societies for increasing sustainability in the energy system and motivating the adoption of a new value system. A human well-being indicator needs to evolve beyond GDP and the Human Development Index to reflect responsible individual and community behavior, sufficiency, happiness, and social ecosystem balance. Transformational change in the social fabric that places individual and community actions in the proper context has a role to play in reaching a low-energy path.

Despite health alerts and religious taboos, meat consumption has increased due to the aggressive marketing strategies of producers and distributors, creating an association between wealthy people's diet and meat consumption. There is a lack of awareness that a

[327] IPCC Fourth Assessment Report (2007), Summary for Policymakers: Mitigation, Paragraph 7

reduction in per capita meat consumption, especially in industrial countries, could reduce numerous health risks as well as global energy use and GHG emissions.
Education systems in modern societies can promote the virtues of going beyond classical humanistic contents of individual freedom and dignity and instead emphasize more collective aspects. The role of the state is to ensure adoption of a rights-based policy line that can make the duty to 'do no harm' a global right that matches the right to not be harmed. Governance that evolves organically can shape the course of action that involves the state and various communities such as non-government organizations, corporations, communities, civil society, and religious institutions.
Formal, informal, ethical, public, and mass media systems of education could generate social values that redefine modernism through more cultural diversity and local specificities instead of homogenization. Responsible individual and community behavior that justifies sufficiency in liberal societies needs broader and faster dissemination through investments in various institutions."[328]

"*Parties shall reduce and seek to eliminate unsustainable patterns of consumption and production.* Such strategies shall be designed to reduce the use of non-renewable resources in the production process. To this end, the *Parties shall*:

(a) *collect and disseminate information on consumption patterns and develop or improve methodologies of analysis*;
(b) *ensure that all raw materials and energy are conserved and used as efficiently as possible in all products and processes;*
(c) *require reusing and recycling of materials to the fullest extent possible;*
(d) *promote product designs that increase reuse and recycling and as far as possible eliminate waste*;
(e) facilitate the role and participation of consumer organizations in promoting more sustainable consumption patterns;
(f) *mandate that economic enterprises adopt corporate social responsibility programmes that moderate consumption and contribute to social and environmental well-being*; and
(g) *ensure that sufficient product information is made available to the public to enable consumers to make informed environmental choices*."[329]

[328] IIASA Global Energy Assessment Summary (2012), p.71
[329] Draft International Covenant on Environment and Development, 4th Ed (2010), Article 32