

Network of Regional Governments for Sustainable Development



REGIONAL SUSTAINABLE DEVELOPMENT ADDRESSING CLIMATE CHANGE

a report from the

*Network of Regional Governments
for Sustainable Development (nrg4SD)*

to be presented at the

*United Nations Framework Convention on Climate Change
(UNFCCC)*

*Eleventh Session of the Conference of the Parties (CoP 11)
First Meeting of the Parties of the Kyoto Protocol (MoP1)*

Montréal, Québec
December 2005



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The Network of Regional Governments for Sustainable Development-nrg4SD is composed of Regional Governments and Associations of Regional Governments, which are considered as bodies that are “in touch”, efficient and representatives of strategic territorial extensions. The mission of the Network is a commitment to Sustainable Development world-wide, following the criteria established in the Gauteng Declaration of the 31st of August 2002, during the Johannesburg World Summit for Sustainable Development (WSSD).

The Network has the following basic objectives: (i) to represent Regional Governments at a global level; (ii) to promote Sustainable Development at the regional government level throughout the world; (iii) to share information and experience concerning Sustainable Development policies with Regional Governments throughout the world; (iv) to promote understanding, collaboration and association between its members; (v) to seek international recognition of the contribution to Sustainable Development made by Regional Governments and (vi) to obtain representation at International Organizations and National Governments.

All Regions and/or Associations of Regional Governments that agree to the Gauteng Declaration of the 31st of August 2002 can be Members of the Network of Regional Governments for Sustainable Development-nrg4SD, subject to approval by the Steering Committee. In addition, stakeholders can participate as Associate Members, with a right to be heard but without voting rights. The term Region is understood in a broad sense as a territory where a system of government exists which is the major and first level of political subdivision, above the municipal level, within a state that is represented in the United Nations Organization. The term stakeholders shall be understood in a broad sense that includes non-governmental organizations, universities and academic institutes, trade unions, trade associations and others.

For more information:

www.nrg4sd.net

Ms Izaskun Iriarte
nrg4SD Secretariat
Forondako Atea 9-11
E-01010 VITORIA-GASTEIZ
Tel.: + 34 945 01 98 13
Fax: + 34 945 01 69 70
e-mail: izaskun-iriarte@ej-gv.es and
nrg-is@ej-gv.es



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Summary

The first part of the report, “Case Studies within nrg4SD” gathers the contributions of the regional governments of the Andalusia, Basque Country, Flanders, Goiás, North Rhine-Westphalia, São Paulo, Wales and Western Australia.

Andalusia presents the main contents of the Andalusia Strategy for Climate Change, pointing out the main measures to be undertaken by different Ministries of the Andalusia Regional Government. A reference is also made to the GHG emissions inventory in Andalusia, the website and the public awareness campaigns, the Think-Tank, the inventory of carbon sinks, the monitoring indicators and the next Andalusia Climate Change Action Plan.

In the framework of the Kyoto flexible mechanisms and the European legislation in this field, the Basque Government proposes the creation of a regional legal structure to coordinate Basque Industry’s CO₂ demands with the CO₂ supply by enhancing partnerships within the Network of Regional Governments for Sustainable Development. The Basque Government also presents its approach on the Greenhouse Gas emissions in the Basque Country, the implications of the EU ETS for the Basque industry, its Sustainable Development and Climate Change Mitigation Policies and on the nrg4SD potential in climate change mitigation.

The Flemish contribution introduces the Flemish Climate Conference started on June 2005 to pave the way for the 2006-2012 Flemish climate policy plan and for a sustainable low-carbon Flemish society. The Flemish Climate Conference is the framework for the Flemish government, social partners, environmental associations and other organization to work together on a new kind of climate policy. This article summarizes the results of the working groups, and the recommendations to the Flemish government for the new climate policy plan and for the next stage of the Climate Conference.

The Brazilian State of Goiás presents two case studies on the use of waste for energy generation in productive processes, reducing emissions CO₂ from displaced fossil fuels, in line with the guidelines of the Clean Development Mechanisms.

Being the first power-generating State in Germany, the Government of North Rhine-Westphalia presents its system of matched measures in the fields of facilitation, consultation, further training and promotion with the purpose to support climate protection by means of renewable energy and efficient power technologies.

In its contribution São Paulo goes through the different regional initiatives to combat climate change, its important experience in using and producing renewable energies, linking these issues also with achievement of the Millennium Development Goals and the promotion of partnerships both with developed and developing regions.

The National Assembly for Wales exposes its new policies and programs about efficient, economical and environmentally acceptable energy generation from renewable and no-renewable sources, aimed at breaking the current link between increasing prosperity and raising CO₂ emissions.

Finally, Western Australia Government presents its Greenhouse Strategy which establishes research programs to better adapt to the changing climate, delivers greenhouse-related policy commitments and creates a Greenhouse Unit to enable Western Australian interests to be represented nationally and internationally.

The second part of the report, “Cross-cutting issues” includes the proposals made by the UNCCD, the State of Sao Paulo and the region of Tuscany on climate change related topics having influences worldwide.

Bearing in mind the main impacts of global warming on dry lands, the effects of desertification on the ecosystems and society, and that climate change and desertification are processes that feed each other, the UNCCD highlights the need of long-term mitigation and rehabilitation strategies to prevent or minimise desertification in drylands.

The Brazilian State of Sao Paulo proposes that developing countries without renewable energies take advantage and move directly to the cleaner options, instead of learning by doing or accepting obsolete technologies, as to promote sustainable development in their rural areas and considering that where deforestation is a reality, dominant wood-based fuels can not be taken as an environmentally sound source of energy.

In the framework of the mechanisms to reduce emissions developed since the adoption in 1997 of the Kyoto Protocol, the Brazilian Government proposes to increase the use of new renewable sources to 10% as a share of world energy matrix by 2010, understanding that renewable energies are advantageous for sustainable development but also for enhancing the equity between the rich and the poor.

São Paulo introduces the role of regional governments in relation to the Clean Development Mechanisms (CDM) and, explaining the CDM process, pays a special attention to the CDM opportunities in São Paulo and highlights the importance of voluntary regional initiatives in this field in sectors like renewable energies.

Lastly, and within the context of the EU Emissions Trading Scheme, the region of Tuscany presents a proposal to develop the capacity of Regional Governments to

broaden the scope of application of emissions trading through articles 24 and 28 of the Directive of new sectors and clusters of small and medium enterprises.

1. Foreword

Since the agreement on the United Nations Framework Convention on Climate Change (UNFCCC) was signed in 1992, addressing climate change has become one of the priorities of the global agenda on sustainable development. Precisely, now, that thanks to the recent ratification of the Kyoto Protocol by the Russian Federation, this Protocol will enter into force on 17 February 2005.

The Eleventh Conference of Parties of the United Nations Framework Convention on Climate Change (COP 11) and the First Meeting on of the Parties to the Kyoto Protocol (MOP1) taking place in Montréal, from 28th November to 9th December 2005 is an historic milestone for the development of the United Nations Framework Convention on Climate Change and for the work to be done.

Conscious of the important role of regional governments in mitigating climate change at the sub-national level, the regional governments¹ and associations of regions of the Network of Regional Governments for Sustainable Development (nrg4SD)² want to contribute actively at the COP11/MOP1 by introducing, in a side-event of this COP, different regional contributions and by releasing this report, where some regional governments of nrg4SD present their actions, experiences and proposals to combat the adverse effects of climate change.

Nrg4SD was formed by the regional governments that attended the Johannesburg World Summit on Sustainable Development, to share information and experience about sustainable development policy-making at the regional level of governance. Moreover, nrg4SD promotes understanding, collaboration and partnerships in sustainable development and seeks greater international recognition of the importance of the contribution which regions make to sustainable development.

¹ For the purposes of nrg4SD the term Regional Governments will be understood as the level of governance of the territorial political subdivision immediately below the central government of a member State of the United Nations and above the municipal level.

² All information on nrg4SD and its activities is available in English, Spanish and French at <http://www.nrg4sd.net/>

Working together in partnership is a key activity of the global network nrg4SD and, as a result of that, many of nrg4SD member regions and associations of regions have shown their clear commitment to collaborate at the international level in combating climate change, involving both developed and developing regions.

This report is the second edition of the report “Regional Sustainable Development addressing Climate Change” launched by nrg4SD for the CoP10 held in Buenos Aires in December 2004, including new contributions such as those from Andalusia, Basque Country, Flanders, North Rhine Westphalia, São Paulo and Wales.

The report and gathers the contributions of the regional governments of Andalusia, the Basque Country, Flanders, Goias, North Rhine Westphalia, São Paulo, Tuscany, Wales and Western Australia in addressing climate change at the sub-national regional level with a view to identifying common grounds to tackle the problem of climate change and the increasing emissions of greenhouse gases. Moreover, the report also includes a contribution of the United Nations Convention to Combat Desertification (UNCCD).

2. Case Studies within the nrg4SD

The Case Studies aim to show regional initiatives addressing the mitigation of the negative effects of Climate Change. Also, views and proposals for cooperation and policies are presented in this Chapter.

2.1. Andalusia: Climate change policy in Andalusia: towards the Andalusia Climate Change Action Plan³

Background

Climate change is potentially the biggest environmental problem facing mankind worldwide. After years of debate as to the scientific evidence for it, this phenomenon prompts virtual unanimity as to the need to take steps to avoid what could be very grave consequences for the planet's natural systems and the administration of socioeconomic systems.

The intensification of the so-called global warming due to the increasing concentration of greenhouse gases is causing an increased heating of the lower atmosphere and the oceans, melting the ice of glaciers and polar icecaps, in a relatively rapid and irreversible process at our timescales.

In 2001, the Intergovernmental Panel on Climate Change (IPCC) published its third assessment report on developments in the climatic system over the last 140 years, in which, among other changes, it is clearly noticeable how towards the end of the 19th century the falling trend for the average temperature in the northern hemisphere reverses in a meaningful correlation with the rise in build-ups of CO₂ in the atmosphere as a result of the increasing use of fossil fuels. The fourth assessment report, currently under development, will soon provide further evidences of how the climate change phenomenon is evolving.

At the moment, there are decreasing scientific uncertainties and, in any case, practically all the simulation models used predict rises in temperature of between 1.4 and 6 degrees by the year 2100 according to the scenarios for future emissions.

Once emitted, CO₂ can remain in the atmosphere for long periods of time (up to 200 years in some cases) and other greenhouse gases, such as some CFCs, do not disappear until after several thousand years have passed. This is the reason why the gases emitted today will affect the climate for over 100 years. Hence, the urgent measures towards the mitigation of emissions, together with the development of adaptation strategies, are key steps to take in order to facilitate solving the problem throughout the 21st century.

For all these reasons, within the framework provided by the international accords on climate change, and in the exercise of their authority, governments must take measures in the short, medium and long term under a holistic approach in order to cover both the adaptation to any unavoidable changes that may occur and to make all the means available to us to mitigate their effects.

³ By Pedro Lara Almuedo, climate change technical consultant at the Technical Secretariat of the Andalusian Regional Government Climate Change Strategy

In this context, the Kyoto Protocol represents an effective tool to cut down emissions of the six gases responsible for global warming, in particular CO₂, particularly once it has come into effect early this year after Russia Government's ratification.

At the Gothenburg European Council meeting in June 2001 it was agreed that the struggle to combat climate change was a fundamental priority of the European Union's sustainable development strategy. Already in the year 2000 the Commission had engineered an European Climate Change Programme (ECCP) to define and prepare common, community-wide policies and measures, which was favourably received at the Conference held in Brussels in July 2001, and in the first half of 2002 endorsement of the Kyoto Protocol concluded with approval for the wording of the text and ratification in the 15 Member States. Furthermore, the Second European Climate Change Programme, with renewed aims and strength, has just been launched in October 2005.

In Kyoto, the EU had committed itself to worldwide reduction of 8% of CO₂ equivalent in the 2008-2012 period on the levels seen in 1990. In 1999 greenhouse gas emissions in the European Union fell by 4% with respect to 1990, even though the forecasts applied by the Member States and the Commission reveal that, without implementing any further policies and given all the uncertainty about economic growth in the forthcoming years, emissions would only reach stabilisation with respect to the year of reference without the committed reduction being achieved.

At the European Council in June 1998, a policy agreement was reached about the "share-out of the burden" among the EU Member States. Spain's commitment was specified to allow an increase of its emissions up to no more than 15% with respect to the year of reference.

Nonetheless, this undertaking comes in contrast to the harsh reality regarding the increases in the level of greenhouse gases, which, without a doubt, have been spectacular. In 2000 this level was 33.7% higher than the emissions in the reference year of 1990, having risen by more than the rate of economic growth and making it hard for Spain to meet the targets set as a country and in the context of the EU.

The Spanish Government has to date only taken administrative initiatives such as modifying the composition of the National Climate Council or setting up the Spanish Climate Change Office, and up to now there is no Spanish Strategy approved. However, some measures been taken in a bid to offset the trend taken by the indicators in relation to the scenario established at Kyoto, although the key sectors responsible for the majority of the emissions (the so-called "diffuse" sectors) still need to be further addressed.

The Andalusian Regional Government is aware that reducing our emissions is probably the biggest challenge facing Spanish environmental policy, but also that there is no better opportunity to make progress towards achieving genuine stability for our economy and our productive infrastructure than by modernizing our technology and making it more competitive.

It is considered crucial that, while the Spanish Strategy for Climate Change is being developed, an urgent action plan should be implemented, featuring specific measures and bearing in mind that certain decisions by central government which could

jeopardise the future Strategy in the medium to long term ought to be analysed in the light of the Kyoto undertakings.

Central Government should also put forward the criteria for setting up targets for reducing emissions of greenhouse effect gases, not only for industrial sectors but also nationwide, and promote a framework agreement and negotiation among the Autonomous Communities.

For all these reasons, as a member of the Plenary Session of the National Climate Council and the Standing Committee entrusted with preparing the Spanish Strategy for Climate Change, the Andalusia Regional Government considers necessary under the framework of the provisions of Royal Decree 1188/2001 of 2 November, whereby the composition and duties of the National Climate Council are regulated, to adopt the set of measures outlined in this Resolution in order to express the clear desire of the Andalusia Government to help towards honouring the pledges made by the Spanish Government on this issue.

By virtue of this, and at the proposal of the Regional Ministers at the Departments of the Environment, Employment and Technological Development, Agriculture and Fisheries, Public Works and Transport, Education and Science, and Health, and under the provisions of article 26.15 of Law 6/1983 of 21 July of the Government and Administration of the Autonomous Community, and having sat in deliberation at its meeting of 3 September 2002, the Andalusia Governing Council resolved to approve the adoption of an Autonomic Strategy for Climate Change, consisting of the set of measures outlined below, to be put into effect by the various Departments of the Andalusia Regional Government by way of a contribution on the part of this Autonomic Community to the Spanish Strategy for Climate Change.

The Andalusia Climate Change Strategy

1. The Department of the Environment acts for and on behalf of the Andalusian Regional Government at the Plenary Sessions and on the Standing Committee of the National Climate Council, as well as the tasks of coordinating and fomenting this Autonomic Strategy for Climate Change. By way of specific measures within the sphere of its duties are to be found the following:

The establishment of a Monitoring Panel for the Andalusian Strategy for Climate Change and a Technical Secretariat.

Proposing guidelines on environmental quality.

Preparing an inventory of emissions and gas depletion zones in Andalusia, keeping up with the methodology used by the IPCC.

Propose emission reductions according to the best techniques available.

Working together within the Andalusia Regional Government's City 21 sustainability programme.

Enhance policies for forest conservation, restoration and appropriate, sustainable ordered and multi-functional exploitation of the Mediterranean forests.

Develop further policies to protect soil and control erosion and desertification processes.

Mapping of the effects of climate change on the various ecosystems using Andalusia's Environmental Information Network.

Consideration in the environmental planning of future scenarios for climate change.

Establishment of a system of climate change indicators according to EuroStat guidelines.

Integration of the weather observation networks run by the National Meteorology Institute, the Department of Agriculture and Fisheries and the Department of the Environment itself.

2. The Department of Employment and Technological Development is concluding arrangements for the approval of the 2002-2006 Andalusia Energy Plan. Among its objectives are included several precautionary measures which can be incorporated within the Strategy for Climate Change so that Andalusia meets its commitments after the coming into effect of the Kyoto Protocol:

Fomenting of renewable energies with the target of 15% in the year 2010 of the primary energy consumed in Andalusia coming from renewable sources, with the following objectives:

Installing 100 MW to generate high temperature solar thermal energy within the period the Plan is in effect and 230 MW up to 2010.

Installing 936,000 m² of solar panels in the 2000-2010 period to generate low temperature solar thermal energy.

Installing 4.3 MWp in the 2000-2010 period of photovoltaic and microwind energy.

Installing 16.4 MWp in the 2000-2006 period of photovoltaic energy hooked up to the grid.

As regards the various processes of biomass conversion, the following targets have been considered: generation of electrical power, achieving 250 MW in the year 2010; thermal end uses, reaching 649,000 tep in the year 2010; producing biofuels, attaining 210,000 tep in the year 2010.

Installing wind farms with installed power of 2,700 MW in the year 2006.

The use of fuels or systems and processes which are more efficient will allow a saving of 1,549.6 ktep in the year 2010 via the encouragement of co-generation facilities, substitution of fuels by natural gas, acting within the services and residential sectors, acting within the transport sector, acting within the industrial sector.

Regulation proposals aimed at encouraging the use of renewable energies as well as energy saving and efficiency: Bill on Energy Saving and Efficiency and the

Promotion of the use of Renewable Energies, Energy Agency Creation Bill, and Draft Decree regarding the obligatory use of solar energy in the residential and services sector.

Infrastructure for generating, transmitting and distributing electrical power with the following targets: to rebalance the generation rate on Andalusian territory, propitiate an adequate transmission and distribution structure and install high performance, low environmental impact stations.

Gas piping and distribution infrastructure to make new combined cycle stations possible and use them in industrial, domestic and commercial applications.

3. Within the ambit of the policies to adapt European farming to climate change and those of the Common Agricultural Policy, the Department of Agriculture and Fisheries will contribute towards the Strategy objectives with the following measures:

Fomenting systems, methods and practices for extensive crop farming which are also environmentally friendly.

Stepping up support for the modernising of irrigation systems, improving the quality and saving water.

Collaborating in the use of biomass as a renewable energy, both using cultures and through the appropriate use of the waste biomass.

Fostering the enhancement of gas depletion capacity in the territorial areas within its authority.

4. Within the context of its duties, the Department of Public Works and Transport will contribute to the Strategy's objectives using the following means:

Establishing precautionary measures in preparing organisational plans for the territory to reduce the need for private transport.

Facilitating standards in the preparation of urban regulations to foment energy efficiency.

Encouraging the development of newly constructed housing which is energy efficient and the improvement of energy efficiency within the framework of the Andalusian Housing and Land Development Plans.

Incorporating energy assessments into infrastructure and public works projects.

Developing policies to support public transport.

Promoting and furthering policies towards the sustainable management and more efficient use of water.

5.- Within the context of the action plans in its sphere of duties, the Department of Education and Science will contribute to the Strategy's objectives by conducting awareness and citizen involvement campaigns in collaboration with the Department of

the Environment and the Department of Employment and Technological Development towards fostering the saving, efficiency and promotion of renewable energies among the various social agents.

6.- Within its sphere of authority and the scope of the recommendations in the ACACIA (2000) Report deputed by the European Commission and those of the European Centre for Health and the Environment from the European Regional Office of the World Health Organisation, the Department of Health will contribute to the Andalusian Regional Government's Climate Change Strategy via the following measures: Pursuing a programme of monitoring the health effects of climate change, including both the effects in terms of infectious diseases and those relating to environmental problems, and enhancing epidemiological monitoring systems.

GHG emissions inventory in Andalusia

The Regional Government of Andalusia has developed extensive inventories of GHG emissions, having data available for the years 1990, 1995 and 2000. Figure 1 illustrates the recent evolution of GHG emissions in Andalusia according to annual data for the period 1990-2001 by the Spanish Ministry of the Environment in 2003. This inventory is being updated on an annual basis with a permanent improvement approach.

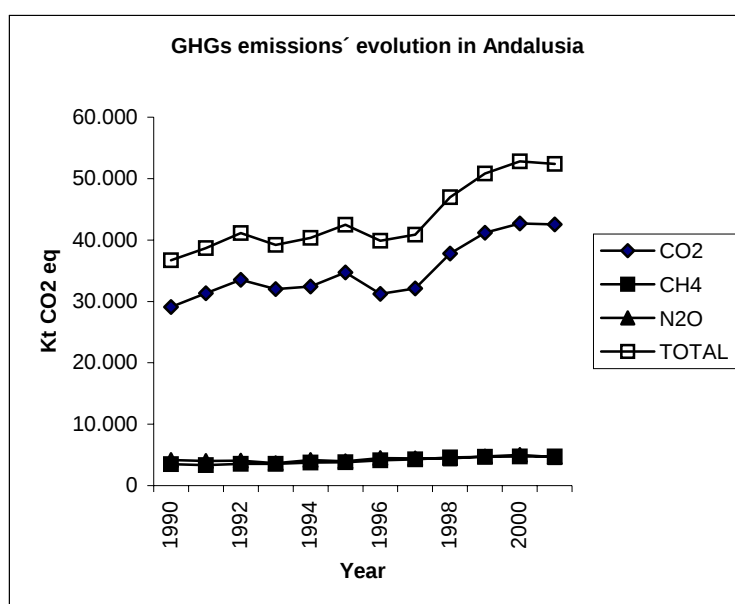


Figure 1. GHGs emissions' evolution in Andalusia for the period 1990-2001

Website and public awareness campaigns

With the intention of providing with updated information about climate change to the general public, the Andalusian Climate Change Strategy counts on an specific section within the Department for the Environment of the Andalusian Regional Government website. This website includes general contents about the climate change phenomenon, wide background information, the description of the Andalusian Climate Change Strategy itself, the regulatory and legislative framework at international, national and regional level, particular data on greenhouse gases

emissions for Andalusia, a considerable collection of reports and documentation of interest and links to further information that can be accessed at:

http://www.cma.junta-andalucia.es/medioambiente/EstcambioClimatico/indice_cambioclimatico.html

Nonetheless, a new website is currently under construction, and the new contents will be migrated to:

<http://www.cma.junta-andalucia.es/medioambiente/site/aplica/medioambiente/site/web/menuitem.a5664a214f73c3df81d8899661525ea0/?vgnnextoid=ef1cbc2b0ec34010VgnVCM1000000624e50aRCRD&vgnthirdoid=b1d28c1035664010VgnVCM1000000624e50aRCRD>

Furthermore, with the aim of promoting public awareness of the climate change issue and the need to promote CO₂ emissions mitigation actions among Andalusians, the Technical Secretariat of the Andalusian Climate Change Strategy started its first public campaign during the summer of 2005 with the particular aim of raising awareness towards reducing the use of private transportation (mainly cars) and increasing the use of public transport systems in the cities (mainly buses). For this double purpose 5,000 units of sun reflecting panels for cars (a very popular item used during summer time in Spain to prevent cars parked in non shadowed spots from excessive heat inside the vehicles) and 5,000 units of bus pass protectors were delivered, having both different messages for the public in an attractive graphic design.

Think-tank

Since its launching in 2002, the Andalusian Regional Government Climate Change Strategy, together with its Technical Secretariat, is supported by a think-tank composed by 27 experts in different fields directly related with climate change. The think-tank members range from university researchers to energy agencies representatives and technicians of varied backgrounds. Among its main objectives, this think-tank is responsible for assessing the evolution of GHGs emissions, elaborating reports about the impacts of climate change on the natural and socioeconomic systems, recommending mitigation actions to the different public authorities and promoting public awareness.

Inventory of carbon sinks

As an additional line of action, and considering the important role of the natural ecosystems of Andalusia as CO₂ sinks, several studies are being developed in order to assess the capacity for carbon capture and storage of our natural systems. Among these studies, the carbon storage capacity of the main 22 forest tree species have been already estimated. This research has been carried out within the context of the development at a regional level of a carbon sink inventory in forest ecosystems.

In order to share the results of this first stage with the scientific community and with the authorities directly or indirectly involved in this work and to promote the exchange of knowledge on this relevant topic, a technical seminar was organized for this purpose in the city of Cordoba on the 11th November 2005.

Monitoring indicators

With the aim of evaluating the performance of the Andalusian Climate Change Strategy, a system of monitoring indicators was initially designed by the Technical Secretariat and later agreed by all the different Departments of the Andalusian Regional Government involved in the Climate Change Strategy. This system, composed by a set of 53 indicators, follow the internationally wide-accepted DPSIR framework. At the moment, a report to present their performance is being developed.

Within the next stage of the Andalusian Climate Change Strategy, in the context of a Climate Change Action Plan with a clear CO₂ emission mitigation purpose, this set of indicators will be rebuilt into an updated, more-developed version to be presented at the beginning of 2006.

Presence at the international level

From the Andalusian Regional Government Climate Change Strategy, the presence at the international level is being promoted in order to participate in any interesting initiative regarding climate change. Just as examples, we can mention the active participation in the European Greenweek 2005, the WWF 2005 international seminar on the impacts of climate change on the Mediterranean, and the EU stakeholder meeting for the launching of the II European Climate Change Programme in October 2005. Furthermore, our presence at the COP11 held in Montreal in December 2005 is confirmed, and we are currently working towards ensuring our participation in the Working Group on Impacts and Adaptation within the II European Climate Change Programme.

Future steps: towards the new Andalusia Climate Action Plan

Being a pioneer Regional Government in Spain, Andalusia was the first in launching in 2002 a Climate Change Strategy at the regional level with the consensus of the 6 Departments of the Regional Government of Andalusia with direct competences in fields related to climate change. This first stage has been very useful for building up and consolidating a framework from which all efforts to tackle climate change in Andalusia can be coordinated.

Continuing with the different synergies that have been created in this first “ice-breaking” stage, a new phase of work has been initiated with the elaboration of the Andalusia Climate Change Action Plan, to be presented at the beginning of 2006. This new plan, which roots in the present Climate Change Strategy, builds on the existing contents in order to stress mitigation efforts and goes beyond a mere declaration of principles into developing a set of well-defined mitigation actions, with individual objectives, expected results, monitoring indicators, schedule of implementation and assigned budget. In addition, a set of descriptive GHG emissions and energy intensity scenarios are being developed.

Furthermore, and as an example of the political willingness to take action on climate change in Andalusia, the number of Departments included in the Climate Change Strategy has been increased from 6 to 8, with the incorporation of the Department for Economy and Taxation and the Department of Tourism, Commerce and Sports. This

will allow a more widely integrated effort to reduce GHGs emissions in order to mitigate the climate change phenomenon in Andalusia.

Finally, the Regional Government of Andalusia will shortly start to develop the Andalusia Climate Change Adaptation Plan, trying to first understand how climate change is affecting our society and what is the nature and range of its impacts to then go one step beyond mitigation and allow the adaptation of our natural and socioeconomic systems to the current and expected impacts of climate change in Andalusia.

2.2 Basque Country, Euskadi: the Basque Carbon Fund⁴

A public initiative promoted by the Basque Government in favour of the environment, the Basque industry and development cooperation.

Background

The **Kyoto Protocol**, developed in the United Nations Framework Convention on Climate Change, is the first attempt to place quantitative restrictions on the continual increase in Greenhouse Gases emissions (hereinafter, GGs) and above all, CO₂. The Protocol intends to mark a point of reflection in development to date, forcing a change in production methods and consumption at a global level, which would guarantee the end of the climate change threat caused by human action in this industrial age.

The scheme established for this purpose is complex. The idea is to impose a “net” limit to developed countries’ emissions and those of countries undergoing the process of transition to a market economy. In summary, it could be described as follows:

$$\text{Emissions for the period 2008-2012} = (1990 \text{ emissions} * \text{Permitted development}) + \text{Credits from flexible mechanisms}$$

That is, the average emissions from a country in the period 2008-2012 may not exceed its emissions from 1990 plus (or minus) the increase (or reduction) that the Protocol allows for each country.

In order to avoid the situation where a rigid application of this rule may mean excessive limitations, and bearing in mind that, for global warming purposes it is indifferent whether the emission is produced in one country or another, so-called flexibility mechanisms are allowed. Through these, a country with limits may acquire reductions carried out in other countries or buy the rights to emission from countries that have a margin to do so.

The **flexible mechanisms** admitted by the Protocol (and excluding carbon sinks) are the joint implementation and clean development mechanisms and the trading of emission units. The first refer to reductions in countries without quantitative reduction limits and the second to reductions in countries with quantitative reduction limits. The emissions trade refers to the possibility of buying allowances between developed countries without the need for reduction projects.

The **European Union** has not only taken on the reduction commitment by ratifying the Kyoto Protocol, it has also developed legislation (Directive 2003/87/EC) in which each country’s commitment is transferred to its industrial sector, allowing emission

⁴ By Sabin Intxaurreaga Mendibil, Minister for Planning and the Environment of the Basque Government.

rights to be purchased between the affected industrial installations. Likewise, it is developing legislation which will allow industrial installations to use clean development mechanisms and joint implementation mechanisms to relax their limitations.

The **Basque Government** has not eluded the challenges that the climate change or greenhouse gases restriction policies may suppose.

- With regard to the first: the Basque Environmental Strategy for Sustainable Development has established the limiting of influence in climate change as one of its objectives. The Basque Government has also proposed the objective of fulfilling the objectives on the reduction of GGs emissions agreed in the Kyoto Protocol for the year 2012, and setting different commitments for this purpose.
- With regard to ongoing policies, the Basque Government considers that the European Union's decision to lead this process can only be considered as positive, and in accordance with the development model based on the Welfare State. Nevertheless, it is important that in its operating mechanisms, its possible repercussions in terms of distortion of the competition between member States and delocalisation are taken into account, combining the fulfilment of the Kyoto objectives with the maintenance of economic growth and job creation.

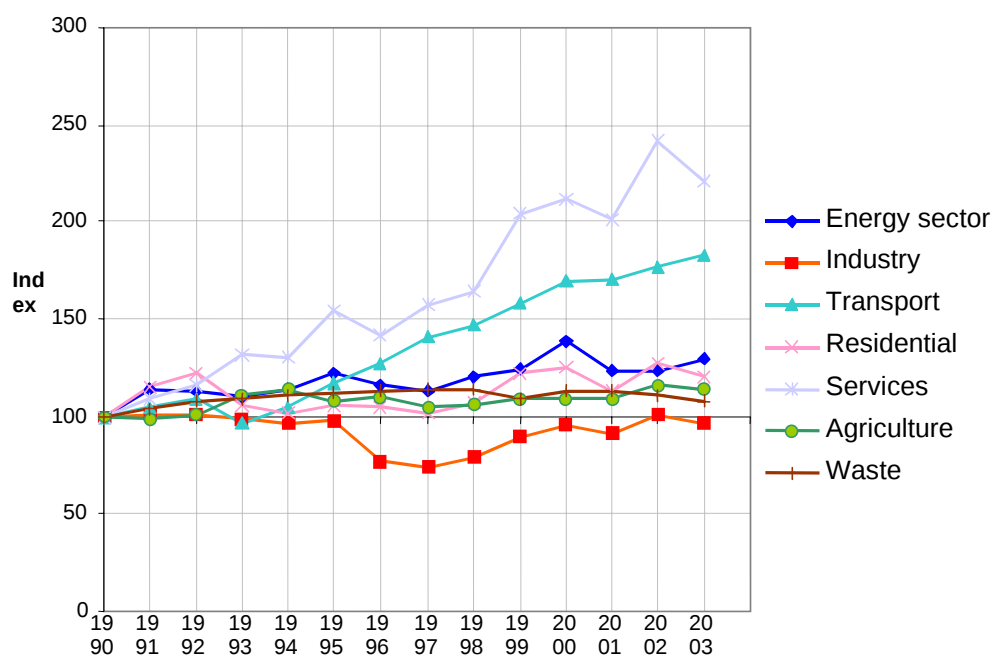
Greenhouse gas emissions in the Basque Country

In the framework of the obligations that both Europe (8% reduction) and Spain (maximum increase of 15%) have acquired with the Kyoto Protocol, the Basque Government's objective is to limit the increase in GGs to 15% on the base year. This objective was met until the year 1999 in which, due to significant economic growth (increase in the GDP of 48% until 2002), the emissions started to outrun the planned growth path. According to data from our most recent inventory (2003), the increase on 1990 is 28% above the 1990 emissions.

Although this increase is the smallest of all the Spanish Autonomous Communities, which as a whole have grown around 40%, the excess emissions will require allowances to be acquired through the flexibility mechanisms (CDM and JI) of approximately the equivalent of two and a half million tons of CO₂ every year within the period 2008-2012.

The main part of the deviation came about in the years 1999 and 2000, with the emissions having been established since then. The total of this deviation is due to sector 1 IPCC energy, which includes both stationary and mobile (transport) fuel processes.

In a sector distribution of the deviations, it is transport, both of goods and passengers, and transformation of energy that has most contributed to the deviation of the Kyoto objectives. To be specific, the transport sector's growth for the period 1990-2003 was 85% and the energy transformation's growth was 102%.



On the other hand, industrial emissions diminished 25% in the same period.

Development of GG emissions by industrial sectors in the Basque Country 1990/2003

Installations affected by the Emissions Trading Directive in the Basque Country Autonomous Community.

In accordance with the latest Allocation Plan drawn up by the Spanish Government, in the Basque Country there will be a total of 73 installations affected by emissions trading. A slightly smaller figure is foreseeable, due to some adjustments in the iron and steel industry and in the cogeneration sectors and paper industries.

	Affected installations
Electricity generation installations	5
Large co-generations	10
Refineries	1
Iron and steel industry	18
Cement	3
Lime	2
Fried products	1
Glass	3
Pulp, paper and cardboard	30
TOTAL	73

The scarcity of emission rights is generalised, although not pronounced. That is, practically all companies will have to acquire rights or credits, although in most cases the figures will not be critical.

The existence of an important local medium-sized industry without a multinational base offers the disadvantages that the introduction of flexible mechanisms may entail, in the absence of compensatory measures. The joint implementation and clean development mechanisms mean a clear competitive advantage for industries with multinational infrastructure, which may obtain cheap credits from their installations in third countries.

CO2 emission reduction investment in third countries, Basque Carbon Fund.

As we indicated above, in order to allow industrial installations to avail themselves of the flexible mechanisms in the framework of the Emissions Trade established by the European Directive 2003/87, the European Parliament and the Council are working on a Directive proposal to implement and coordinate these instruments with Directive 2003/87.

Both mechanisms are based on carrying out projects in third countries and allow the creation of credits when the projects carried out in these countries have entailed a reduction in the emissions that would not have happened if the project had not been carried out. The projects must produce real, quantifiable, long-term benefits with regard to the mitigation of climate change and contribute to the fulfilment of the sustainable development objectives of the country where the project has been carried out.

The proposal intends to transfer, albeit with limitations, the Kyoto flexible mechanisms to the European market. The European Union were to organise these mechanisms in such a way that, should the Kyoto Protocol not enter into force, they themselves would assume responsibility for their operation, aside from the United Nations Framework Convention on Climate Change.

Through these mechanisms, the industry's annual costs of fulfilment could be reduced by between 25% and 60%, according to a Study carried out for the European Commission by the Institute of Energy Policy and Economics of the University of Grenoble.

The predictions included in the aforementioned study do actually reveal the possible mass introduction of credits from JI/CDM projects, which could mean 85% of the total credits created. The study also determines that countries with a greater capacity to supply credits will be China, countries from the former USSR, and others from Africa and Asia. There is also evidence of a high potential of credit creation in Latin American countries.

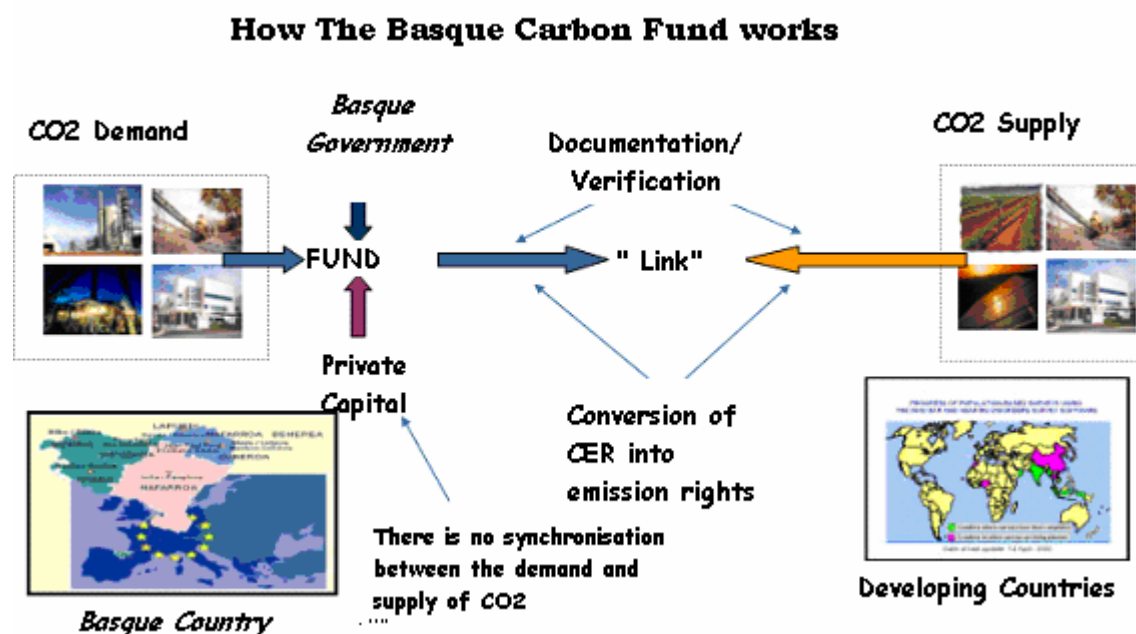
In the light of the fact that these mechanisms could mean both an opportunity as well as a threat to Basque industry in the absence of compensatory mechanisms, the Basque Government has decided to take on the creation of a Basque carbon fund to help its industry to access these mechanisms.

The idea is to create a legal structure that will coordinate Basque industry's CO₂ demands with the CO₂ supply from flexible mechanisms. In order to do so, the participation of the financial sector is considered to be crucial in order to guarantee

financial assistance to match the supply and the demand of these mechanisms when needed.

One of the fund's main assets would be the prior existence of projects that the different departments of the Basque Government are carrying out in other countries. At this regard, a special mention should be made to the different agreements that, in the framework of the Network of Governments for Sustainable Development (nrg4SD), the Basque Government maintains with other regional governments which might also wish to convert environmental recovery actions in exchangeable carbon credits. Through these cooperation agreements the Basque Government has committed its support to environmental recovery actions on clean production, environmental repair and access to good practice and environmental management systems. The Basque Government also contributes with its sound and successful experience on voluntary environmental agreements, based on the positive collaboration and trustworthy relationship between all parties involved, i.e. public entities and the Basque industry.

The fund's plan could be summarised in the following diagram:



2.3. Basque Country, Euskadi: Climate Change Mitigation Policies⁵

Being part of Europe and having a relevant industrial past, the Basque Country's position with regard to climate change is complex. In order to face this challenge, the Basque Country has developed (and still developing) a wide range of policies to ensure sustainable development and to contribute to climate change mitigation. These policies do not only facilitate the integration of Basque installations in the EU ETS, but are also geared to reduce emissions in other sectors such as transport, residential or building sectors.

Within this context, the nrg4sd network (wherein the Basque Country has already developed successful programmes in Asia and Latin America) could play a key role in the establishment of more effective regional mitigation strategies and in the consolidation of better functioning carbon markets. At the beginning of the XXI century, the regions have an unavoidable commitment in the battle against climate change.

Concerning the role of the regional governments in the mitigation of climate change, the Basque Government would like to comment on the following items:

1. The Basque Country and its Greenhouse Gas emissions.
2. The implications of the EU ETS for the Basque industry.
3. The Basque Government's Sustainable Development and Climate Change Mitigation Policies.
4. Nrg4SD's potential in climate change mitigation.

1. The Basque Country and its Greenhouse Gas emissions.

The Basque Country's situation in terms of GHG emissions is the following:

- o The Basque Country (a region whose industrial past can be traced back to over 150 years) is a region where GHG emissions are capped: on the one hand, its emissions are capped by the Kyoto Protocol; on the other, its industry is part of the European Union's Emission Trading Scheme.
- o The Basque Country's emissions are above the established targets: by applying the IPCC methodology for calculating the emissions (2002 inventory), the Basque Country has increased its emissions by 34% with respect to 1990 (base year), drifting away from the targets for both the European Union (-8%) and Spain (+15%).
- o On the other hand, this figure (34%) does not reflect the Basque Country's commitment towards an own electricity generation through non GHG-intensive technologies. Therefore, if emissions related to imported electricity are accounted both in 1990 and in 2005, the Basque Country would have only increased its emissions by 22%.

⁵ By Esther Larrañaga Galdos, Minister for Environment and Planning of the Basque Country.

- o There has been an important change in the sectoral distribution of GHG emissions: although the industry's contribution to the regional GDP is still high, the industrial sector has reduced its emissions by 26%, and currently represents the 3rd source of emissions. Conversely, the first two emission sources, energy and transport, have grown very quickly (92% for the transport sector and 129% for the energy sector).

2. The implications of the EU ETS on the Basque industry.

The implications of the Basque industry's participation in the EU ETS could be summarized as follows:

- o **Advocacy of the equity principle and of the autonomous competences to avoid any market distortions of the EU ETS:** because allocations made on historical emissions ("grandfathering") lead to market distortions, carbon asset allocations should follow fairer criteria (such as "benchmarking"). On the other hand, the respect for regional competences is essential to ensure that efficient measures are taken to control GHG emissions.
- o **Basque Industry's shortage for the first EU ETS period.** Despite having better ratios of CO₂ equivalent per unit of output than many European regions and States, the Basque Industry has been allocated less European Union Allowances (EUAs) than required in 2005-2007 (this is so because the 2005-2007 allocation has been based on the "grandfathering" principle). If no mitigation initiatives are undertaken, 5 million extra EUAs will be needed to cover the difference between assigned EUAs and foreseen emissions.
- o The Basque Government has **plans to support the SME to improve its purchasing power** (and thereby its competitiveness) in the primary and secondary carbon markets. Currently, there are several barriers (such as high transaction costs) which prevent small industries from entering the carbon markets. A Basque Carbon Fund is being designed to provide Basque SMEs with an aggregation pool and a shared purchasing and investment facility.

3. The Basque Government's Sustainable Development and Climate Change Mitigation Policies.

The Basque Government's policies for sustainable development and for climate change mitigation can be summarized as follows:

- o Early inclusion of climate change as a cornerstone and **one of the 5 specific goals of the "Basque Environmental Strategy for Sustainable Development 2002-2020"**. This has implied not only the development of a first GHG inventory, but also a horizontal integration of climate change in all major policy documents related to GHG-intensive sectors (energy, transport, industry and residential).
- o **Development of strategic frameworks** and specific instruments to reduce GHG emissions in the industrial sector: establishment of Environmental Voluntary Agreements (2003-2006) and development of several initiatives to improve environmental management standards (clean technology database 2003-2006, green certification programmes, etc.).
- o **Recent establishment of the "Basque Climate Change Office"**, aimed at ensuring that both internal policies (i.e. the "Basque Environmental Strategy for Sustainable Development 2002-2020") and international agreements (such as the Gauteng Agreement which established the nrg4sd) related to climate change

mitigation are implemented. The office will also contribute to the integration of the Basque industry in the EU ETS (legislation enforcement, advocacy of fairer allocation criteria, linking to primary carbon markets, etc.).

- o There are plans to establish a **Basque Plan against Climate Change**, this being a priority for the coalition executive for its current term 2005-2008.

4. Nrg4SD's potential in climate change mitigation.

The Basque Government's perspective on the regions' and the nrg4sd network's potential for climate change mitigation is the following:

- o **The regions have competitive advantages in climate change mitigation:** in a context where the subsidiarity principle and the regional exercise of competences is being increasingly recognized, the regions can play a very important role in catalyzing action by local public and non-public stakeholders.
- o **The nrg4sd network has an untapped potential for:**
 - o Multilateral and bilateral fund mobilization and advocacy in international negotiations on climate change.
 - o Promotion of sustainable development policies with particular emphasis on climate change (Voluntary Agreements with productive sectors, non GHG-intensive technology transfer, establishment of performance indicators, dissemination of best practices, etc.).
 - o Consolidation of primary and secondary carbon markets by developing carbon aggregation pools at offer and demand level, and by advocating a fair allocation criterion in secondary markets.
 - o Promotion of regional policies able to attract foreign investment, technological innovation and sustainable development (information and experience sharing, technology transfer programmes, etc.).

Within this context, the Basque Country:

- o Has established several agreements with South American and South East Asian regions in the areas of Voluntary Agreements and technical assistance. These agreements could be the framework for specific GHG emission reduction initiatives.
- o Has developed an extensive and replicable experience in areas such as sustainable development policies or government-industry Environmental Voluntary Agreements, and therefore can provide the necessary human, technical and financial capacity for programme and project development.

2.4. Flanders: The Flemish Climate Conference

“ 365 proposals for Flemish Climate Policy”

The Flemish Climate Conference is the framework for the Flemish government, social partners, environmental associations and other organisations to work together on a new kind of climate policy. Leadership, creativity, interaction, co-operation and broad public support are leading principles.

In the first stage of the conference, mixed working groups prepared 365 proposals for Flemish climate policy. Subsequently civil society organizations drew up an interim balance of the Climate Conference. It describes the Climate Conference and the results of the working groups. In addition it contains recommendations to the Flemish government for the new Flemish climate policy plan and for the next stage of the Climate Conference. This paper is a summary of this interim report.

The Conference

The Flemish Climate Conference started on June 6, 2005 to pave the way for the 2006-2012 Flemish climate policy plan and for a sustainable low-carbon Flemish society.

The slogan of the Conference, “The climate is changing. Are you?” indicates why climate policy needs this sort of broad consultation process: the transition to a low-carbon economy is a social transition process that requires the active effort of all parties in society. Only with consultation and dialogue will we be able to achieve the desired results.

As all countries and regions in the world, Flanders is undoubtedly facing an enormous challenge. If we are to limit the effects of climate change and the risks related to extreme climate phenomena, the increase in global temperature needs to be restricted to approximately 2° C above pre-industrial levels. This requires far-reaching reductions in greenhouse gas emissions. In order to drastically cut these emissions, we need to bring about a fundamental change in our energy supply and consumption, and therefore in our current ways of living, working, doing business, consumption, entertainment and mobility. It has proven difficult to make substantial progress with regard to climate policy. Such far-reaching, long-term changes require new types of policies in which leadership, creativity, interaction, co-operation and broad public support are leading principles.

On June 6, 2005, at the onset of the Climate Conference, Flemish Minister for environmental affairs Peeters and the civil society organizations represented in

SERV⁶ and MiNa-Council⁷ therefore made a commitment to work together on a new approach to Flemish climate policy. The Flemish Climate Conference is the framework in which this co-operation between the Flemish Government, civil society organizations (employers, trade unions and environmental associations, etc.) and other actors is organized.

The objectives of the Climate Conference were laid down in a declaration of intent signed by all parties involved. On the one hand, the parties committed to explore new measures and solutions to problems in the existing climate policy, and on the other, to allow for the continuous development of a long-term strategy. A steering group⁸ laid down the rules. The main aim of the Climate Conference is to organize interaction and dialogue between the numerous organizations, experts and the government. The participants are consulted for their expertise, they are not bound by the viewpoints of their organization; the conference does not have any decision-making powers; and there will be benchmarking points for reports, evaluation and modifications.

One of these benchmarking points was the conclusion of the first stage of the Climate Conference on the 15th of September 2005 so as to incorporate the first results in the Flemish climate policy plan for 2006-2012. During this first stage a large number of working groups actively discussed the eight themes which were agreed at the onset of the Climate Conference (strategy, agriculture and forests, innovation, transport, buildings, renewable energy, industry, good governance). They discussed, papers drawn up by the Flemish administration or the secretariats of SERV or MiNa-Council. Each of these working groups drew up a report. All discussion papers and reports of working groups are available on the website of the Flemish Climate Conference.

On the 18th of October 2005, **civil society organizations that signed the declaration of intent** drew up **an interim balance of the results of the** Flemish Climate Conference. It consists of recommendations for the new climate policy plan and for the next stage of the Climate Conference.

According to the interim balance, the working groups produced a **wealth of proposals**, 365 to be precise. They range, from very concrete measures which can be implemented immediately to ideas that need further developing; from proposals with an immediate effect to longer-term measures; from technical interventions to strategic and administrative measures; from actions which can be undertaken in the Flemish environmental and energy policy itself to measures which require action by other policy areas and policy levels; and from instruments for government application to initiatives for other actors. This wealth of proposals would not have existed without the Climate Conference. The amount of kilo tons of CO₂ equivalents resulting from these measures, is not known yet.

⁶ Social and Economic Council of Flanders

⁷ Environment and Nature Council of Flanders

⁸ The steering group consisted of representatives of the signatories of the declaration of intent: The cabinet of minister Kris Peeters, Trade unions: ABVV, ACV, ACLVB; Employers: Boerenbond (representing farmers), UNIZO (representing SME and self employed), VOKA (representing enterprises and companies); Environmental ngo's: Bond Beter Leefmilieu, Natuurpunt; VVSG and VVP (representing Flemish provinces and cities, the administrative Task Force on climate policy and the secretariats of the SERV and MiNa Council).

The Climate Conference also produced new **creative ideas** (see [box](#) below). Policy preparation traditionally focuses on extending existing ideas into the future, remedying existing problems through known technologies, within the set regulatory framework and assumed preconditions (such as cost effectiveness), and within the existing division of competences. The interaction between a broad range of participants at the Climate Conference has yielded refreshing approaches and insights.

Illustrative examples of new creative ideas resulting from the Flemish Climate Conference

- “Benchmarking of energy consumption on the invoice: the energy invoice indicates the energy consumption level and puts it in a green, orange or red zone (linked to reference values): a sort of Energy Mass Index. For those who are in the red zone, a green number is introduced for advice.”
- “Encouraging heat storage: asphalt collectors (which combine heat supply for buildings with a longer life span of the road surface, e.g. as a result of cooling in summer and thawing in winter), storage in bore holes and heat pumps are interesting technologies for residual heat storage.”
- “The promotion of training on environmentally-friendly driving styles for employees. They constitute a very large target group which can be reached through the (many) company cars in Flanders.”
- “The creation of scale effects by clustering enterprises. This can be achieved by promoting joint investment in existing concentrations of horticultural businesses under glass, and by developing new industrial estates. This clustering is possible both within the sector of horticulture under glass, and across sectors: for example, fermenting the grass mown on the roadside verges or other forms of organic waste producing heat with the resulting bio-gas in a combined heat and power station and using the heat in a horticultural firm under glass; the clustering of horticultural firms under glass and pig farms with the related processing of manure, so that it is possible to recoup the residual heat, and possibly the gases, from the fermentation of manure for heating and CO₂ fertilization in the greenhouses.”
- “Combining efforts in communication, advice and support towards small businesses through specific programmes for energy saving in processes which occur in many different sectors, e.g. motors (to drive pumps, ventilators, aggregates or compressors), compressed air; heating, cooling, insulation...”

Furthermore, the Climate Conference provided ample opportunity for positioning and debate on more **strategic issues**. This had thus far been experienced as an important deficit in Flemish climate policy. The activities on subjects such as flexible mechanisms, post-2012 and better governance were highly popular, and resulted in (fairly) **new insights** and future-oriented policy ideas. There was even a **breakthrough** in the debate on buildings.

However, the Climate Conference did not by far deal with all relevant subjects. Some discussions did not lead to a consensus on concrete measures and actions. But this was to be expected: Climate change is a complex policy problem with many unknowns and uncertainties, high stakes and significant differences of opinion. Consequently it would not be realistic to expect a broad support of civil society to be created for all these issues in just several weeks. But even in this respect the Climate Conference

brought significant added value: it created the **dynamics** needed to open certain issues for discussion. The exchange of ideas, knowledge and vision at the conference resulted in a better understanding of different prevailing viewpoints. It opened possibilities for further dialogue between government, civil society organizations and other actors, encouraged co-operation between different government departments, and raised civil society awareness. This way, the Climate Conference created new policy **networks** and partnerships, and contributed to **capacity building and strengthening of public support**. These effects may be less tangible, but they could prove extremely valuable in the future.

The Flemish Climate Conference produced a lot of valuable material. Particularly taking into account the context and preconditions in which it took place. After all, this was the first time that such a consultation process took place. The time available for the first phase was short because of the timing of the new climate policy plan. Therefore there was little time to develop a real long-term vision for the future. There were no social and technological analyses of scenarios, the information on costs and benefits was limited, the experience with target group consultation was small and some of the actors were not sufficiently involved. This clearly shows that the full potential of an initiative such as the Climate Conference could not yet be achieved. Though not ideal, the climate conference should be seen as a **growth process**, in which we must try to turn past experiences into improvements for the future. We will come back to this in part 5.

A different perspective of the reports of the working groups

The reports of the working groups contained 365 proposals for measures and actions. In the context of this paper it is impossible to discuss all. Therefore we will look at them from a different angle, clustering them around key “horizontal” aspects of climate policy.

This will show that we can achieve a lot more with (better) **implementation** of already existing measures and ideas. Most proposals relate to the implementation and execution stage of climate policy. This means that there are many “mature” proposals that probably require little discussion and could quickly produce results. It also means that a great deal of attention is required for the way in which climate measures are put into practice and for the removal of obstacles in the implementing stage. These obstacles can mainly be attributed to a lack of information (knowledge), attention (willingness) and financial possibilities (ability) to implement climate measures at target group level. The proposals emphasize the need for removing *financial obstacles* and mainly for better *communication*. It is striking that every working group proposes measures aimed at better communication.

The second emphasis is on more **co-operation**. Again it is striking that every working group explicitly asked for *co-operation with other policy areas* in Flanders, or proposed measures which require this. The same applies for co-operation with the federal government and the other regions. The reports clearly show that the Belgian federal government has competences that are extremely important for Flemish climate policy such as product policy, fiscal policy, traffic legislation and, partially, energy policy. Co-ordination between the Flemish and federal governments was also asked in

the field of flexible mechanisms and international policy (for example, international negotiations). Another ubiquitous question concerns co-operation with local governments, as this level represents the most direct link between government and citizens. Consequently they play a crucial role in policy implementation and in increasing public support. Last but not least, the reports show that co-operation should not only be improved and extended at the intergovernmental level. All working groups proposed creating closer contact between governments and numerous social actors through networks that focus on knowledge building and dissemination.

A third group of proposals concerns the development of climate policy strategies, in particular by means of **policy innovations**. This implies that a creative dialogue was possible in many working groups, which led to quite a large number of new ideas (see above, box), although these were not necessarily all worked out in the same detail. In addition, many proposals focus on **amending current policies**. Many of the reports mention similar obstacles in existing policies: legal insecurity because of numerous changes in regulations, in particular in the area of renewable energy promotion, the system of green power certificates, the complex and sometimes conflicting rules regarding the cultivation of energy crops and the use of biomass as a source of energy, the modalities of the energy performance regulation (which still has to be partly worked out) and the energy performance certificate, the poorly co-ordinated and financially inadequate support measures and the way in which public service obligations of network managers are implemented.

Finally, there are relatively fewer proposals on **policy-oriented** aspects, such as developing a long-term vision, generating a climate policy information and knowledge base, strengthening climate policy transparency, improving the regulatory process and monitoring policies. This was somehow not unexpected. After all, the working groups were explicitly instructed to focus on measures and actions that were as concrete as possible during this first stage of the conference. Therefore most working groups did not devote much time to the actual process of policy formulation. However, this does not mean that these proposals should be considered less important, as, strikingly, they were made by virtually every working group and therefore amount to a considerable number.

Based on the information of the many working groups, the civil society organizations that signed the declaration of intent formulated the following strategic recommendations and priorities.

Strategic recommendations for the Flemish climate policy plan

1. Great potential in buildings and mobility must be used	The Climate Conference produced a very large number of “ripe” measures for buildings and mobility , on which there is broad consensus and which could be implemented in fairly short term. Furthermore, buildings and households are sectors with great potential for emission reductions that has not yet been sufficiently accessed. This means that priority should be given to measures related to buildings and mobility.
2. More and better	Great advantages can still be achieved with more and better

information, communication, and awareness raising are of key importance 3. More co-operation with other areas of competence and other policy levels is essential 4. Pricing measures and “smart financing” require more attention 5. An integrated policy is necessary for the development and promotion of renewable energy sources	information, communication and awareness raising. These are extremely important for raising and maintaining support for an ambitious climate policy, and to inform target groups about the measures which they can or must take. They are an absolute condition for progress in climate policy and for policy instruments to work well. However, the key message is that we need a new communication approach: awareness-raising needs to be facilitated through mass media, but also and more importantly by means of custom-made information disseminated through networks in which the various target groups can be found (for example, environmental concern at the office, schools, intermediaries such as architects and suppliers, employers, trade unions, NGOs, etc.). Climate policy is not solely a concern for the minister of Environment or Energy. If we want to achieve real breakthroughs, co-operation with other areas of competence and other policy levels is essential and offers many unused opportunities. Such measures have been proposed not only by environment and energy officials, but also by representatives from other policy areas, revealing the great potential for real progress here. However, more and better co-operation cannot only be achieved bottom-up. It remains a sizeable administrative and political challenge. It requires requiring the strengthening of the horizontal and vertical co-ordination mechanisms, and of the co-ordination structures within the Flemish Government in general and in climate policy in particular. Pricing measures and “smart financing” are important climate policy instruments. In the long term, the environmental effects (of production, transport, etc.) of all energy users should be internalized in the market price of goods and services. In the short term, there is a need for stable financing of climate policy, guaranteed for a sufficiently long period (independently of government terms). In this respect, it is important to check the potential role of economic instruments. In addition, new financial support mechanisms for target groups need to be developed. Examples include higher subsidies for energy- saving investments, the direct payment of subsidies at the counter, third party financing, etc. Finally, the existing economic instruments in all policy areas need to be screened for their climate and environmental friendliness. This screening needs to pay particular attention to all kinds of subsidies and exemptions to taxes and charges. There is a clear need for integrated policies for the development and promotion of renewable energy sources. They still have a significant technical potential in Flanders. This potential can only be fully used with an integrated approach, taking into account security of supply, the right to affordable energy for everyone and the impact on the economy. With a better co-ordination of policy measures, greater coherence at the different
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6. Strong interaction with innovation policy is necessary	planning and government levels, and a stable framework of regulations, it is possible to achieve advantages of scale and learning effects, and eventually reductions of costs. The rising fossil fuel prices will ensure that in future the economic potential of renewable energy will increase. This integrated policy has to build on the recent “green energy power” action plan of the Flemish Government.
7. The government must lead by example	The link with innovation policy is very important. The contribution of Flemish innovation policy to achieving the climate objectives must follow two tracks. On the one hand, short and medium-term activities promoting energy efficiency, rational energy use, renewable energy technologies and improving traditional energy production. On the other hand, medium-term and long-term efforts regarding the development of new energy vectors and increasing energy efficiency. Therefore the parties support the proposal to draw up a “strategic research memorandum of energy technologies for Flanders”, in which Flanders chooses for “breakthrough technologies”, taking into account the long-term climate and energy objectives, but also factors such as the available critical mass in research institutions, the absorption capacity of industry and the international context. Drawing up this strategic research memorandum requires a cross-sector approach and close consultation with the “field” (industry, the market and society). For its part, climate policy must tackle the many non-technological obstacles to market introduction of renewable energy technologies that will (probably) be profitable within the foreseeable future. In order to promote interaction between energy, climate and innovation policy, one option is to consider establishing an “Energy technology platform” focusing on sustainable energy systems for Flanders. This technology platform should be a cross-sectoral initiative with contributions from all administrations concerned and supported by the entire Flemish Government.
8. Local governments should implement an active policy	The government should lead by example. Government purchases, and especially the rules for such purchases are just one example of how the government can do this. Other examples include strict energy efficiency requirements for government buildings or buildings subsidized by the government, a fixed percentage of innovative buildings (low or passive energy) for social housing, the accommodation of Flemish government departments, education buildings, public swimming pools, and care homes, working with construction teams and construction co-ordinators in large projects, opting for recognized and certified contractors, etc. The government, both Flemish and local should make this a priority.

9. Administrative measures are essential	Many projects (both large and small-scale projects) only have a chance of success when local government actively co-operates. They must implement an active policy with regard to energy-saving and renewable energy, and play an important role in providing information.
10. The government must invest in networks	A Flemish climate policy plan cannot depend merely on a series of emission reduction measures. Together with these measures, attention must be given to administrative measures (governance). For measures related to better governance which need to be elaborated by other policy areas, the climate policy plan must contain the necessary “hyperlinks”. Climate policy must give priority to (1) improving the quality of the regulatory process by applying the principles of a good regulation (including regulatory impact assessments) to all climate measures, (2) ensuring transparency and possibilities for participation with regard to climate policy, (3) gaining experience with new instruments for policy development (future-projections, ex ante evaluation, (new) participation techniques and procedures...), and (4) strengthening co-ordination mechanisms for climate policy with a view to greater co-ordination and a far reaching integration of climate objectives in all policy areas.
11. Flexible mechanisms will be needed to supplement national measures	Finally, the role of the government as a “change agent” is emphasized. The reports of the working groups clearly show a demand for investment in co-operation with various actors and in closer contacts between governments and civil society actors on the basis of networks focusing on knowledge building, the dissemination of knowledge and dialogue. The reports contain numerous examples and suggestions to be worked out in detail.
This requires a policy plan	It is felt that the above-mentioned ten general recommendations form a good starting point for reducing the estimated policy gap of 23.93 Mton of CO₂-eq in the period 2008-2012. In the short term these proposals can supplement the measures already taken and planned. But, these extra measures will probably not be sufficient for Flanders to reach its Kyoto targets. In order to remove the policy gap, the use of flexible mechanisms will be necessary in addition to domestic measures. However, Flemish climate policy should try to respect the general principle that all available reduction measures in Flanders cheaper than use of flexible mechanisms must be implemented, limiting the use of flexible mechanisms to a minimum.
12. The climate plan should already	The use of flexible mechanisms requires a dynamic policy plan, laying down strategic choices. This plan must stipulate matters such as the way in which the government will purchase and finance credits, the design of the regulatory framework and the processes for the creation and elaboration of the flexmex policy. Consultation of civil society organizations on this matter is

contain a strategy with concrete actions to prepare for the post-2012 period A transitional policy for sustainable energy systems has a central place in this	essential. More co-ordination, support and co-operation within Belgium and Europe are necessary for the purchase of project-related credits (joint tenders), to determine the conditions for these credits and the conditions for the use of flexmex by industry. Finally, further research and discussion is needed on the possibilities and effects of various financing mechanisms. According to the IPCC, new efforts will be required after 2012 in the light of a necessary global long-term strategy in order to restrict the increase in temperature to approximately 2°C above pre-industrialization levels. In the context of international negotiations on climate policy after 2012, Flanders must actively strive for a global strategy to achieve this 2 ° C objective. In order to restrict the effects of climate change and in order to be a credible negotiating partner at the international level, Flanders will also need to implement an effective climate policy at the local level. Therefore the Flemish climate policy plan must be based on clear objectives with a view to the effective achievement of the Kyoto commitment. At the same time the climate plan should take into account the objectives for the medium and long term still to be determined. This means that the climate policy plan for 2006-2012 should already contain a strategy with concrete actions to prepare for the period after 2012. In this context, the parties support the demand for a ‘sustainable energy systems transition plan for 2050’. The Government of Flanders must actively contribute to an enabling environment which will lead to new technological and social innovations with considerable potential for emission reductions. It is essential to tackle the current patterns of production and consumption in a fundamental way. This requires a suitable range of instruments, including economic instruments, and specific policy development, which focuses on the exploration of the future, scenario analysis, vision development, public support base building, etc.
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The follow-up of the Climate Conference

The Climate Conference has led to a broad and creative dialogue on Flemish climate policy. It is important to continue this process, firstly because of the results achieved with this innovative and participatory form of policy development (see chapter 2). Furthermore, a new dynamic process has started in many areas, and networks have been created. In their final report, most working groups asked to continue activities on some of the subjects. This clearly shows the further potential of this initiative.

However, it is extremely important to learn from the experience and make necessary adjustments. After all, the process was not ideal. In future a number of areas and principles will need closer monitoring.

The parties to the Flemish Climate Conference would like to put emphasis is on the following points:

- The constructive co-operation and dialogue on climate policy between organizations, advisory councils, scientists, specialists, etc. and the government must be maintained and qualitatively improved.
- Continuing the dynamic process of the Climate Conference does not mean that the Conference or the working groups should become permanent additional forums for consultation. Certain activities can also be organized under the heading of the Climate Conference depending on demand or need. In this way the necessary room will be left for the network function of the Climate Conference, inter alia with regard to buildings, innovation policy, flexmex, post-2012 and better governance.
- The Climate Conference and the activities of the working groups should be well co-ordinated with already existing consultation structures, such as the advisory councils and the target group policy of the environmental administration. In this way we can avoid work being duplicated and ensure a realistic time allocation for the parties concerned.
- The success of the Climate Conference can only be consolidated if there is commitment on the part of the civil society organizations and of the government. Only this way can we reach a constructive dialogue. This implies a large degree of openness and willingness of all parties to debate important policy choices.
- The above implies that there is still need for clear objectives, a supported agenda, realistic timing and good co-ordination of the activities in the follow-up stage. This can best be achieved on the basis of mutual consultation between representatives of the government, organizations and advisory councils.

Samenstelling:

Administratie Milieu- Natuur- Land en Waterbeheer (AMINAL)

(Luc Bas, Patricia Grobben, Marjolijn Gijssels)

Sociaal-economische raad Vlaanderen

(Annemie Bollen, Peter Van Humbeeck)

Milieu en Natuur raad van Vlaanderen

(Bert De Wel)

Verantwoordelijke uitgever:

Jean-Pierre Heirman
Directeur-Generaal AMINAL
Koning Albertstraat 20, bus 8
1000 Brussel
België
Uitgave november 2005

2.5. Goiás: Use of Bioenergy for Clean Development Mechanism⁹

The State of Goiás, Brazil has two case studies to present to the nrg4SD. These use in its productive process techniques that support to the guidelines proposed in the CDM, Clean Development Mechanism, through the use of wastes for energy generation, reducing CO₂ emissions from displaced fossil fuels.

The first case is the company named Brazil Verde, located in Ipameri. It is a reforestation company whose production is destined mainly to packaging and pallets for transportation of mechanical parts. Production process generates a large volume of wastes, until then discarded.

This waste, after having size reduction, was utilized as biofuel for ovens in steel industries located in the neighbor state of Minas Gerais. The company has invested in machinery, construction to protect from moisture and transportation elements for the ground material to the trucks. Such elements and process management guaranteed to the generated wastes to have low moisture content, allowing good combustion conditions. From the reduced waste generation, the company has increased its revenues with the sales of byproducts.

The second case study is the energy co-generation project from the company Jalles Machado, a sugar and alcohol producer located in Goianésia, 170 km from the State capital, Goiânia. Goianésia has 49,724 inhabitants and an economy based in agriculture. The Jalles Machado plant was pioneer in the state to apply solid wastes management for improving air quality and producing clean energy. During the production of alcohol and sugar, the plant obtains as byproduct the sugarcane bagasse, which corresponds to 25% of the total weight of the green sugarcane plant and to one third of its energy content. It is common to use bagasse for the plant own energy needs, with very little attractiveness for commercial scale generation. Also the sugar manufacturers' culture is more related to working only with the sugar and the alcohol business, for two products that can be stocked and with great production variation. These are not the characteristics of the electricity market, which needs a constant production. In the contrary, electricity cannot be stored or utilized for speculation. Thus, plants generating energy only for subsistence represents a disadvantage to the country, due to the wasted potential.

The most known technology for energy generation from biomass is the Rankine cycle, where the turbine receives the hot gases generated during the combustion. Residual heat supplies the productive processes, such as boilers in the sugar and alcohol industries. The Jalles Machado sugarcane mill cogeneration process produces electricity which is interconnected to the Brazilian grid. The project is divided in three different stages. In the first, the generation capacity was increased through a new counter pressure generator, which in 2001 allowed selling 3,877 MWh. The second was the substitution of the boiler for

⁹ By Alessandro Belisário, Public Manager of Goiás State; Hugo Araújo Godinho, Natural Resources Manager of Goiás State; and Osmar Pires Martins Jr., President of the Goiás State Environmental Agency.

another more efficient, resulting in more 8,985 MWh of sales. In the last phase it was installed a 28 MW counter pressure generator and another 42 kgf/cm² high efficiency boiler, substituting the previous 21 kgf/cm² one.

Due to the increase in the electricity demand and to the privatization of the hydroelectric sector, it has been observed in the country an increased electricity production based on fossil fuels, mainly natural gas. Thus, this project collaborates for the reduction of greenhouse gas - GHG - emissions, operating in the margin of the Brazilian electric grid, postponing the needs for thermoelectric fossil fueled plants.

Another activity related with the decreased GHG emissions in Jalles Machado plant is the substitution of diesel motors used in the irrigation of sugarcane plantations - a need of this sector - by other electric, utilizing the surplus from cogeneration in an economically feasible way. This project has started on April 2001, with an estimated 25 years lifespan. In the first seven years, a reduction of 13.75 tons of CO₂ was foreseen from this project, plus 116.85 tons of CO₂ estimated reductions from the electricity biomass cogeneration displacing oil fuels.

These cases are just some of the initiatives from the productive sector in the State of Goiás, which aims at adapting its practices to a sustainable development model, more specifically committed to the CDM foreseen in the Kyoto Protocol. Finally, such practices join economical objectives with the environmental conservation, providing social returns.

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2.6. North Rhine-Westphalia: Climate Protection in NRW¹⁰

With a population of 18 million North Rhine-Westphalia (NRW) is the most populous state in Germany, and it is the energy centre of the Federal Republic¹¹. This is why NRW is firmly committed to protecting the climate.

As early as in 1992, when the Rio conference was held, NRW was the first state in Germany to submit a climate protection report which has continuously been implemented ever since. With the **Climate Protection Strategy NRW 2001**, North Rhine-Westphalia has undertaken to contribute towards realising the Federal Government's promise to reduce greenhouse gas emissions in Germany by 21 per cent compared to the 1990 reference level in the period from 2008 to 2012. In an effort to achieve that objective, NRW implements, at state level, the measures and targets set by the Federal Government, and takes additional measures geared towards specific regional aspects.

The following is an outline of the most crucial activities North Rhine-Westphalia is undertaking to protect the climate.

1. Establishing networks and forums for offering information and advice

In NRW, a system of dovetailed initiatives focussing on coordination, advice, continuing training and promotional activities has been set up which is unparalleled in Germany and which is designed to help make progress with the protection of our climate by using energy-efficient technologies and renewable sources of energy.

In a move to facilitate networking of the stakeholders and the coordination of the various activities, the NRW government has set up the "**NRW State Initiative on Future Energies**", a prototype institution that aims to exploit and enhance the research and development potential of innovative energy technologies and services, especially in the fields of biomass, solar energy, geothermal heat, methane from coal mines, and fuel cell, hydrogen and power plant technologies.

In 1990, the North Rhine-Westphalia government established the '**Energy Agency**' which has been tasked to provide information and advice to the public sector and specific target groups. The Energy Agency chiefly gives counsel about energy issues to firms and local authorities, whereas the **NRW Consumer Centre** offers information and advice on energy and climate protection matters to the general public.

2. Promoting energy efficiency initiatives launched by local authorities and industry

¹⁰ By Ernst Christoph Stolper, Director General of the Department "Basic Issues, Cross-sectoral Environmental Affairs, Sustainable Development" of the Ministry Of Environment and Conservation, Agriculture and Consumer Protection.

¹¹ For comparison: NRW, with its population of 18 million, has more inhabitants than Belgium (some 10 million), Austria (some 8 million), Portugal (some 10 million), Sweden (some 9 million) and the Netherlands (some 16 million).

In an effort to help local authorities in North Rhine-Westphalia realise their potential for saving energy and reducing greenhouse gas emissions, some 330 **local clean energy initiatives** have been sponsored in NRW since 1982. With the **Programme for Action 2000plus**, "Local Framework for Action on Energy in NRW", those promotional activities have been developed into a pinpointed programme for action that is designed to provide impetus for energy-saving activities at the local level. Although the programme is specifically geared towards public sector buildings under local government control, it has an indirect impact on other energy consuming sectors such as industry, small and medium-sized business and private households which are to be motivated by local government action.

Under its programme to promote **energy efficiency initiatives in industry**, the North Rhine-Westphalia government actively supports studies carried out by individual businesses and efforts aimed at enhancing energy efficiency in selected sectors of industry. By offering comprehensive information about the technical bases of and organisational approaches to saving energy the programme aims to enable decision-makers in industry and at the local government level to identify and realise their organisations' potential for a more rational use of energy and for innovation and hence the advantages of cutting costs, broadening skills and safeguarding jobs.

3. Promoting renewable sources of energy and a more efficient use of energy

The North Rhine-Westphalia government has set itself three aims: fostering a more efficient generation and use of energy, realising the full potential for saving energy, and stepping up progress in using and developing renewable energy sources.

In 1987, the government launched the **REN Programme** to promote the development, demonstration, generation and use of renewable sources of energy and energy-efficient technologies. Under that programme, some € 640 million have so far been paid out to sponsor more than 51,000 individual projects, triggering private sector investment projects totalling some € 3.2 billion in the energy sector. In 2002, over 2,100 North Rhine-Westphalia-based firms with some 15,000 employees achieved sales worth approx. € 3 billion in the renewable energies sector alone.

3.1. Renewable sources of energy

When it comes to using **wind energy**, North Rhine-Westphalia, thanks to some 2,290 wind energy units with an aggregate installed power of 2,050 MW, is one of the leading states in Germany (current to 12/2004). In the fields of **photovoltaics**, **biomass** and **solar energy**, too, NRW figures among Germany's top performers.

More than 10,500 photovoltaic installations and over 26,000 solar thermal units have been sponsored under the REN Programme in North Rhine-Westphalia (current to 12/2004).

The NRW government commissioned a scientific **study of the geothermal power potential** in North Rhine-Westphalia in a move to give an impetus to a more widespread **use of geothermal energy**. In 2004, the results of the study, i.e digital geothermal maps and other detailed information about the structure of the area's crust, were published on CD-ROMs which are now available to all those who intend to construct or have constructed a house or other building in North Rhine-Westphalia. The two largest housing estates in Europe that use this highly innovative source of

energy are currently under construction in Dortmund and Schwerte. Geothermal heat is also used by numerous public buildings in this state.

In addition to the REN Programme an initiative to promote the use of wood as a source of energy, the **Wood Sales Promotion Guideline (Hafö)**, was started in 1998. 3,700 advanced wood-fired heating systems had been sponsored under that programme by the middle of 2005. The CO₂ emissions from a single-family home can be reduced by some 5 tonnes per annum by substituting wood pellets for fuel oil. Thanks to the broad-based "**wood pellets campaign**" the number of wood pellet-fired heating systems has increased fifteen-fold over the past few years in NRW, i.e. from 200 in 2001 to 3,200 in 2005 (current to 7/2005).

According to estimates published by the North Rhine-Westphalia Chamber of Agriculture and the Biogas Trade Association, some 140 **biogas units** were in operation in NRW at the end of 2004. All the signs are that the number of biogas plants will increase to up to 240 before the end of 2005. **Biomass heating and power stations** with an output of up to 20 MW have been completed or are under construction in North Rhine-Westphalia.

In addition to the biogas plants, there are also **sewage gas and land-fill gas units** that generate electrical power from biomass. Altogether, the output of Germany's 268 land-fill gas and 217 sewage gas plants amounts to some 310 MW.

3.2. Efficient use of energy

Given that numerous power supply companies and energy-intensive industrial plants are based in North Rhine-Westphalia, the state plays a prominent part in **developing the combined production of heat and power**.

This is the reason why the NRW government takes great efforts to help modernise combined heat and power production and safeguard and step up cogeneration.

The state government and the companies involved have jointly launched a **programme for the modernisation of existing lignite-fired power plants** in North Rhine-Westphalia. Capital spending under the initiative totals some € 10 billion. Upon completion of the scheme, specific CO₂ emissions (i.e. CO₂ per tonne of lignite used) will be cut by 27 per cent - compared with the 1990 reference level - by the year 2030. In the context of the modernisation programme, two new lignite power stations with optimised plant technology will be built while six older units with an installed capacity of 150 MW each will be decommissioned.

Methane that is released when hard coal is mined (CH₄ emissions) poses both a safety risk and a risk to our climate. Methane from coal mines accounts for 15 per cent of all methane emissions in Germany. NRW is blazing a trail - at the global level - in developing technologies for using methane from mines, which goes for methane from mines that have been closed down and for methane from hard coal mines that are still operated. Today, there are some 120 methane power plants with an aggregate installed power of 150 MW in North Rhine-Westphalia. Thanks to the systematical use of methane from coal mines, 3.6 million tonnes of CO₂ equivalents were saved in 2004 alone.

4. Realising the potential for saving energy in buildings

In the year 2001, an **agreement on the reduction of CO₂ emissions from buildings** was concluded between the government and major North Rhine-Westphalia-based construction and housing companies with a view to realising the potential for saving energy in buildings. The agreement is intended to reduce emissions from existing buildings and state property by 10 per cent before the end of 2005 (compared with the level of emissions in 2000) by improving structural heat insulation, modernising space and water heating systems and using roofs for obtaining solar energy.

Another project, **50 Solar Housing Estates in NRW**, was initiated in 1997 with the aim of ensuring efficient use of resources from the outset, i.e. while planning towns and buildings. The solar housing estates, which focus on the active and passive use of solar energy, are designed to contribute towards protecting the climate and towards promoting the large-scale introduction of solar energy applications on the market. The programme offers financial support and advice and assistance to local councils and property developers with regard to both construction projects and the sanitation of existing buildings with a view to saving energy. With 38 solar housing estates, North Rhine-Westphalia holds the top position in Europe in terms of 'building with the sun'.

5. Reducing greenhouse gases in the waste management sector

By **discontinuing the tipping of untreated municipal waste** and **capturing the residual land-fill gas** methane emissions are intended to be reduced by 84 per cent in North Rhine-Westphalia by the year 2010, which corresponds to a reduction in the amount of 6.2 million tonnes of CO₂ equivalents.

6. Transport

The transport sector has a very large potential for protecting the climate, considering that it accounts for 25 per cent of all CO₂ emissions in Germany. NRW's efforts especially focus on reducing the consumption of traditional fuels by using biofuels such as bio-diesel, rape oil and bio-ethanol.

The European Union has set itself the aim to increase the **proportion of biofuels in total fuel consumption** by 5.75 per cent before the end of 2005. Against that background, tax exemptions have been introduced in Germany for all types of biofuels – i.e. pure biofuels and biofuels mixed with traditional fuels - in order to create conditions favourable to an increase in the use of biofuels, which has already started to bear fruit in North Rhine-Westphalia, too.

Bio-diesel fuel currently is the only biofuel that has been introduced on the market on a larger scale. Germany's overall output capacity amounted to 1.3 billion litres in 2004. Some 3.7 per cent of the aggregate German fuel needs could be met after completion of the planned additional production facilities. NRW accounts for the largest share in the production and consumption of bio-diesel fuel in Germany: There are three plants with a total production capacity of 250,000 tonnes of bio-diesel fuel per annum, which means that, already today, some 4.3 per cent of the diesel fuel consumption in NRW could be replaced by bio-diesel fuel that is produced in this state.

A "**Fuels of the Future Competence Network**" has been set up in North Rhine-Westphalia in an effort to give a boost to future-oriented and innovative fuels in NRW

by fostering and coordinating competence in a broad range of fields including plant engineering and construction, materials flow organisation and logistics, optimisation of the methods of cultivating energy crops, certification and standardisation of new fuels, and by creating favourable overall conditions for the future.

In order to promote the use of low-impact fuels obtained from regenerative raw materials, the North Rhine-Westphalia Environment Ministry sponsors the retrofitting of fleets of vehicles used by public authorities that have opted for bio-ethanol or pure rape oil-fuelled cars.

Moreover, the North Rhine-Westphalia government advocates the introduction of an obligation to mix biofuels with traditional fuels, i.e. ethanol would have to be mixed with petrol and bio-diesel with conventional diesel fuel. At the same time, the proportion of the biofuels that are to be added should be increased above the present level of 5 per cent.

7. Climate Monitoring

The NRW government is currently developing a state-wide **climate monitoring** scheme that enables emission trends to be continually monitored and progress with achieving reduction targets to be checked.

Climate Protection Policy in North Rhine-Westphalia – Measures and Programmes

Measures/Programmes	Targets
North Rhine-Westphalia Climate Protection Strategy - specific quality and action-related targets, quantitative specifications and measures for all levels of action of climate protection in NRW. Some of these measures are:	North Rhine-Westphalia helps achieve the federal government's aim to reduce CO₂ emissions by 21 % compared with the 1990 reference level by 2012. The Strategy includes measures with a reduction potential of approx. 32 million tonnes of CO₂ equivalents compared with the 1990 reference level.
Establishing various energy forums and advisory centres: NRW State Initiative on Future Energies (1996), Energy Agency North Rhine-Westphalia (1990), and energy-related advice offered by the North Rhine-Westphalia Consumer Centre	Networking of the stakeholders in the fields of renewable energies and climate protection; high-quality advice on energy-related matters; raising the awareness of consumers in the fields of energy saving and climate protection
REN Programme: more than 51,000 projects sponsored with approx. € 640 million since 1987, triggering investment projects in the amount of approx. € 3.2 billion.	Promoting the use and development of renewable energies by means of pilot projects and general support.
Wood Sales Promotion Guideline (Hafö): More than 3,900 modern wood-fired heating systems sponsored since 1998.	Sponsoring wood chip and pellet systems.
Approx. 330 local energy efficiency initiatives sponsored in NRW since 1987	Promoting local energy efficiency initiatives to improve the efficient use of energy at the local levels
Supporting a more efficient use of energy by companies through industry-specific energy efficiency initiatives	By implementing the industry-specific energy efficiency initiatives emissions will be reduced by approx. 1.5 million tonnes of CO₂ equivalents by 2010.
NRW is blazing a trail – internationally – in developing technologies for using coal mine methane.	Thanks to the systematic use of methane from coal mines, 3.6 million tonnes of CO₂ equivalents were saved in 2004.
The Power Station Modernisation Programme agreed upon in 1994 taps an enormous CO₂ reduction potential.	Upon completion of the scheme, specific CO₂ emissions per tonne of lignite used will be cut by 27 per cent - compared with the 1990 reference level - by the year 2030.
Stepping up the use of co-generation by industry and the public sector	Reduction of CO₂ emissions by 5.2 million tonnes by 2010
Discontinuing the dumping of untreated municipal waste and capturing landfill gas on existing landfills	Reduction of methane emissions by 84 per cent by 2010 (corresponds to 6.7 million tonnes of CO₂ equivalents)
Promoting the production and use of biofuels	Already today, some 4.3 per cent of the diesel fuel consumption in NRW can be replaced by bio-diesel fuel that is produced in this state.

2.7. São Paulo: actions and contribution on climate change and sustainable development¹²

Introduction

Within the Climate Regime, as a developing country, Brazil does not have specific emission reduction obligations. Notwithstanding, as a signatory of the United Nations Framework Convention on Climate Change (UNFCCC), the country is committed to develop national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol; to formulate and implement regional programmes containing measures to mitigate climate change; and to promote and cooperate in the development of clean technologies.

Thus, there are two beliefs that must be reconsidered in Brazil: first, the idea that climate change is merely a scientific and environmental concern, as if the subject does not encompass any political and economic aspects. Second, that climate change is basically an industrialised countries problem, in which Brazil doesn't need to develop any mitigation commitment, notably considering the high levels of GHG emission owing to deforestation in the country.

It's important to point out that Brazil can be seriously affected by climate change impacts. According to the 3rd IPCC's Synthesis Report (2001, p. 271), the greenhouse effect tends to intensify natural climate events such as El Niño e La Niña, provoking higher occurrence of dry periods. In this way, global warming can be expected to increase the risk of biodiversity loss and higher periods of drought and, consequently, the intensification of poverty conditions, social-economic problems, reduction of crop yields by shortening the crop cycle, affecting directly the Brazilian agriculture sector, which is considered one of the most important in country economy.

The perspective of increase in Brazil's contribution to global warming and the predicted negative impacts caused by this event justify not only the country participation in the international global warming negotiations under the UNFCCC umbrella, but also regional initiatives. In such context the State of São Paulo should assume a central role. Considering this background, the purpose of this article is to present a general view of São Paulo contribution to national GHG emission, the opportunities for Climate Change policies and call São Paulo to take the lead in the national process of establishing such policies.

¹² By Fernando Rei, Oswaldo Lucon, Suani Teixeira Coelho and José Goldemberg, Sao Paulo Environmental Secretariat

São Paulo Contribution to National GHG Emissions

São Paulo is the most industrialised and urbanised state in the country due to its historical development, playing a central role in Brazilian economy. With a population of almost 35 million inhabitants, that corresponds to 22% of Brazil, most of which living in the three biggest metropolitan regions – Santos, Campinas and São Paulo city –, the state accounted for 35.5% of Brazilian GNP and 11% of the South American GNP (SMA, 2002), which represented US\$231,2 billion in 2000.

The high level of urbanisation and industrialisation in the State demands growing consumption of energy and natural resources, particularly considering the perspectives of continuous economic growth in the next years, that means a high contribution in the regional GHG emissions. The perspective of increase in the economic activity based on fossil fuel consumption, especially in the industry and transport sectors, is matter of concern if real efforts of mitigating Climate Change are to be pushed forward.

In 2000, the state of São Paulo participation in the total national energy consumption was 26.8%, the highest one compared with other states. This significant consumption is due to particularly two sectors: the industrial, contributing with 34.4% of the state energy consumption, and transport, participating with 30.2%. The industrial sector increased its energy demand in 2.7% during the period between 1980-2000 and the transport sector energy consumption increased 4.2% between 1993-2000. In 2001, 13 millions of vehicles circulated in the state of São Paulo. Only in the metropolitan region of São Paulo city, there are almost 7 millions of vehicles, one of the highest global rates.

Industrial energy demand is provided from several sources. Fuel oil, diesel, LPG and process residuary fuels are important sources for process heat, with natural gas gaining significant participation more recently. The highest amount of electricity is generated by hydro power plants, but there is also some thermo power plants, using fossil fuels and sugar cane bagasse. The reduction of hydroelectric potential in the State tends to yield diversification of primary sources, being of great potential the increased participation of sugarcane biomass in cogeneration plants within the sugarcane agroindustry and natural gas in thermoelectric and cogeneration plants. In the transport sector, the major part of the energy comes from fossil fuels, specially diesel and gasoline. Despite a decrease in the numbers of ethanol-powered vehicles, gasoline, however, is a blend with sugarcane ethanol in the proportion of 25% ethanol – 75% gasoline. Natural gas participation in transport has also increased through passenger cars and public transport utilities.

As the two major energy consumers in the State, and considering the strong participation of fossil fuels in this consume, industry and transport sectors justify their important contribution to GHG emissions. In fact, household, commercial and agriculture sectors, together, don't represent more than 5% of total emissions, while industry and transport were responsible for almost 70 MtCO₂ in 2000.

With little tradition in cattle breeding, the State of São Paulo counted with an estimated herd of 16.2 million head in 1994, against a national estimate of 233.9

million, making the state emissions in this sector small when compared to the rest of the country. The same is not true for the agricultural sector, strongly characterized by the presence of sugarcane culture, in which the pre-harvest burning of cane fields is still a very common practice, resulting in significant emissions of CH₄ e N₂O (Macedo, Leal e Silva, 2004).

Originally compounded by two main biomes – Atlantic Rainforest (81%) and Cerrado (12%) – the state forests have suffered drastic devastation, mainly in the 1970's and 1980's, owing to the expansion of urban agglomerates, agriculture and intense industrialization process. Nowadays, the Atlantic Rainforest remainders are found in an extremely critical situation, corresponding to some 7% of the original area. Nevertheless, for the first time since the beginning of monitoring activities, there was an observed reversion situation on the deforestation. This is a sign that federal and state policies aiming at forest conservation and recovery are being effective, as discussed ahead.

For those reasons, the State of São Paulo is the major GHG emitter in the country, contributing with almost 40% of total national emissions, being undoubtedly revealed its co-responsibility in the prosecution of adequate policies to confront the climate change challenge.

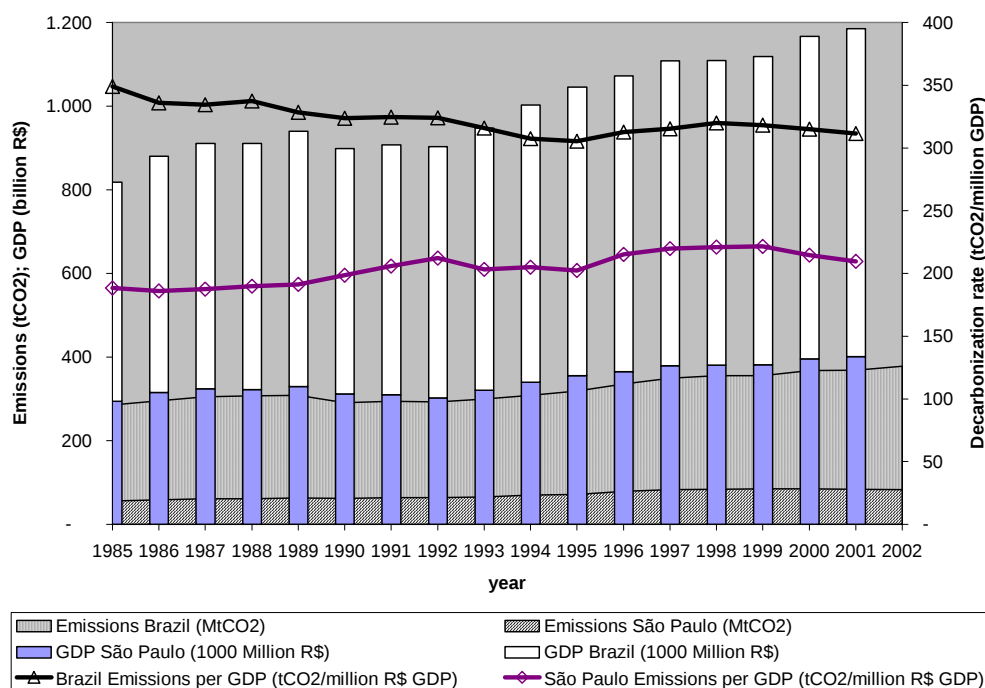
Mitigation Initiatives in the State of São Paulo

Taking into account São Paulo contribution to national GHG emissions, as well as its economic and political importance in Brazilian context, and considering the dynamic inherent to climate change that presupposes the inter-relation among several different environmental, socio-economic and political aspects, it should be expected that São Paulo had an adequate climate change policy.

Historically the growth in GHG emissions in Brazil is 2% per year. Although precise numbers for this growth rate do not exist for São Paulo it is estimated to be 1% per year.

Economic growth in Brazil (as measured by GDP) is 3% per year and in São Paulo at 3%. The issue here is not reduce economic growth to reduce GHG emissions but how to promote economic growth and at the same time reducing GHG emissions.

Figure 1 shows the evolution of the carbon index for Brazil and São Paulo.



Source: authors calculations based on: Brazilian Energy Balance 2002, São Paulo State Energy Balance 2002, Central Bank National Report 2001 and SEADE 2002.

In fact, the State has continuously played a central role in facing this problem. A great evidence of this was the establishment, in 1996, of PROCLIMA, the state climate change program. São Paulo has also promoted a series of policies and programmes with leadership at national level, providing positive consequences in the mitigation of Climate Change, such as the ozone depletion controlling program, new vehicle emissions controlling program and the promotion of Clean Production Environmental Chambers, co-ordinated by CETESB.

Besides these programmes, the State of São Paulo has progressively developed the necessary legal framework to regulate the use and exploitation of state natural resources, with direct positive consequences in climate change mitigation. It can be cited: (a) the delimitation and creation of several preservation areas and conservation units localized in the Atlantic Rainforest; (b) legislation with incentives to the recomposition in riparian forests; (c) legislation phasing out the sugar cane burning practices.

We list here a number of measures that are being taken to accelerate decarbonization. Some of them could be used to generate CDM credits. For others this might be some difficult because of problems in defining the baselines.

1. Waste Management Sector

São Paulo has considerable participation in methane emissions generated by anaerobic digestion of solid waste and liquid effluents due to its elevated population and industrial activity. The estimated methane emission in São Paulo, taking into account generation of 20,000 t/day of domestic solid residues, is approximately 7 kg CH₄/inhabitant.year, superior to the national value. Despite the fact that around 95% of the

population in urban areas is attended by waste collection services, in the majority of the municipal districts the incorrect disposal in open areas still prevail, aggravating methane emissions from decomposition.

Integrating domestic solid waste management policies and climate change mitigation measures, improving the waste disposal areas and landfills, and using the landfill gas to generate energy are measures to reduce such emissions.

The disposal of urban waste in sanitary landfills allows the generation of electricity burning methane, which is then converted into CO₂. An example is "Aterro Bandeirantes". Avoiding the emission of 40 thousand tones of CH₄ per year has the net effect of reducing CO₂ emissions (as measured by GWP¹³) by a factor 21. The potential of electricity production on São Paulo State landfills can reach 340 MW in the year 2006.

2. Transportation Sector

It is important to encourage the gradual substitution of heavy fossil fuels by other less pollutant fuels, such as the alcohol and natural gas, using the alcohol produced in the state and the existing distribution of natural gas.

It can be mentioned the case of São Paulo city, where the public transportation system is testing less pollutant technologies such as hybrid diesel-electric. Light vehicles are witnessing a booming use of gasoline-ethanol flexible fuel vehicles (vehicles which can run on any blend of gasoline/alcohol).

The expansion of sugarcane planted area in São Paulo is estimated to enhance in 50% of 2003/2004 season, reaching 4 million hectares until 2010/2011 season, which corresponds to a ethanol production about 13 billion litres.

This expansion occurred without deforestation, with sugarcane replacing other crops and cattle regions.

Each fleet of 1,000 diesel buses emits 100 ktC per year. A hybrid technology can abate part of such emissions generating credits. An ethanol vehicle reduces 1 tC/year when replacing gasoline car. Furthermore, the Brazilian market of flex fuel vehicles – light vehicles able to run with pure alcohol, pure gasoline or any blend of alcohol-gasoline (gasohol) is growing since its introduction, in May 2003, nowadays the sales of these vehicles represents about 20% of the market share.

Other systemic approaches that could save fossil fuels are rapid transit corridors, according to a study developed by the National Public Transportation Association due to traffic jams the operational costs of buses in São Paulo City increase about 16% (IPEA/ANTP, 1998).

¹³ An index representing the combined effect of the differing times greenhouse gases remain in the atmosphere and their relative effectiveness in absorbing outgoing infrared radiation. (source: http://unfccc.int/essential_background/glossary/items/2639.php#G)

3. Industrial Sector

Another option corresponds to strengthening Clean Production initiatives, in order to implement mitigation actions in the industrial sector, prescribing the intelligent use of natural resources, the identification of wastes, the productive process evaluation and fuels substitution for cleaners and renewable ones. In order to achieve this goal, environmental education and awareness about the necessity to establish rational consumption paths are necessary, principally in the highest levels of administration.

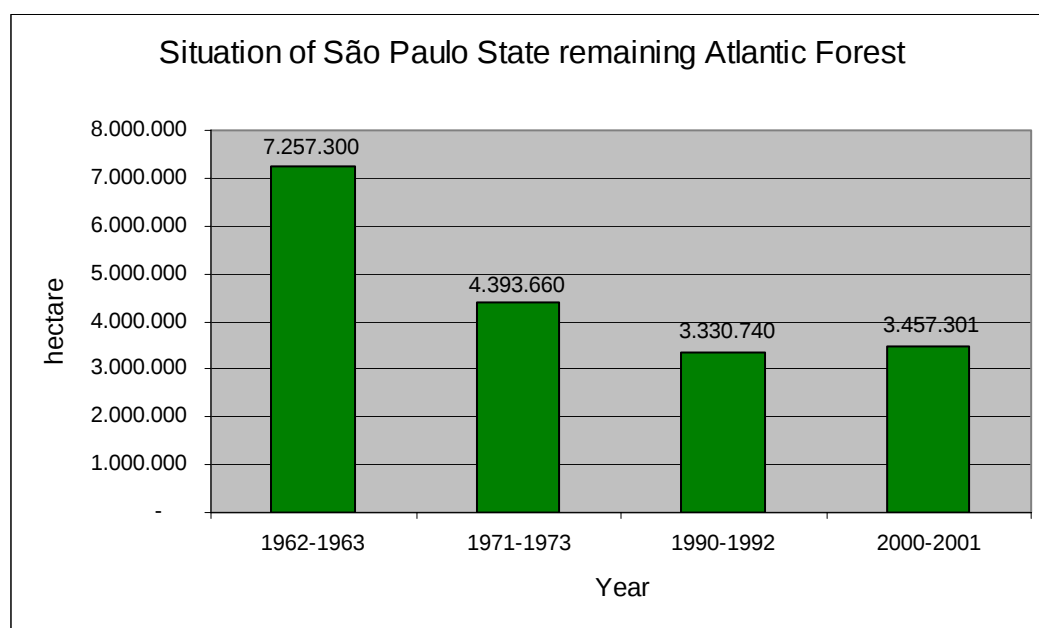
The first initiative on emission compensation implemented in São Paulo State in 2002 was the application of a governmental decree which allowed a petrochemical industry, installed in the metropolitan region of São Paulo City, to enlarge its productive area.

The recent emission offset legislation in São Paulo State - Decree 48.523/2004 allows sustainable economic development. The Decree permits new licences due to emission compensation in the non attainment areas, the abatement credits must be issued by the Environmental Agency (CETESB). This mechanism is a CDM-like system, applied to NO_x, PM, SO₂ and CO. The air quality targets will be applied in license renewing, orienting economic activities towards cleaner production and fuels.

4. Land Use, Agriculture and Forest Sectors

São Paulo is emphasising forestation projects, notably considering its social benefits. Indeed, according to Cerri et al. (2000), the potential to recompose original vegetation, in São Paulo, was estimated in 18,500 km², which could result in 92.5 MtC sequestration during a period of 20 years.

Figure 2 below represents the lost of São Paulo State original Atlantic Forest. It can be noted, during the last years, a slight alteration on the deforestation tendency (3.8% growth).



Source: São Paulo (Estado), 2003

The mitigation strategies would be essentially the to establishment of incentives to recuperate degraded agricultural area; to implement recomposition of riparian forests (in São Paulo State there is 1 million hectares of deforested riparian forests, which could capture about 80 million tonnes of carbon in 30 years) the and other vegetal areas; to provide hydrological watersheds management plants, to carry out environmental management instruments, including: rural planning, integrated soil, water and air conservation measures, environmental education, rural cooperatives. Due to the ethanol expansion, sugarcane cultures is expected to grow more 50% by the next 2-4 years – this is a challenge for land use management.

5. Electricity

São Paulo State is promoting the use of renewable energy, taking into account the state biomass potential 3,500 MW (CENBIO, 1999). This is the case of cogeneration by sugar-cane bagasse. Producing annually 200 millions tonnes of sugar-cane, São Paulo has the potential to obtain 10TWh/year using the sugar-cane bagasse. The biomass use promotes the decentralized generation of energy and produces a positive effect creating jobs, specially in rural areas.

After all, considering that the policies and directives presented require wide and effective participation of the whole society, especially the direct involved sectors, and taking into account that this involvement presupposes commitment from the industrial sector and awareness of the population about the seriousness, consequences and responsibilities related to climate change, it behoves the State the fundamental role of conducting this process.

Final remarks

Amongst the challenges for São Paulo, there are those related to achieving the Millennium Development Goals in its own territory, as well as in Brazil as a whole. Several initiatives may also address the mitigation of emissions of greenhouse gases. For example, improved transportation systems reduce local air pollution. Better waste management allows more landfills to recover methane and reduces waste dump sites. Access to energy reduces unsustainable fuelwood use.

São Paulo has a leadership position in the field of renewable energies. In the State was first conceived the so-called Brazilian Energy Initiative, the proposal for a global 10% share of renewable energy by 2010. It was first approved in May 2002 by the Environmental Ministers of the Latin America and Caribbean Regions, then officially taken and discussed at the 2002 Johannesburg World Summit for Sustainable Development (WSSD) as a mandatory multilateral Type I initiative. Although the WSSD final Plan of Implementation does not explicitly mention this target, the Initiative was crucial to creating the momentum for the relationship among the issues of Energy, Environment and Development.

São Paulo also participates in several Type II voluntary initiatives proposed at the WSSD, such as the Renewable Energy and Energy Efficiency Partnership (REEEP), the Global Network for Energy and Development (GNESD), the International Atomic Energy Agency (IAEA) Initiative for Modelling Sustainability Country Profiles, the Johannesburg Renewable Energy Coalition (JREC) and the Network of Regional Governments for Sustainable Development (nrg4SD).

In the Bonn Renewables 2004 Conference, a major event proposed by the German Prime Minister Gerhard Schroeder in the closing of the 2002 WSSD, the nrg4SD has promoted a side-event, hosted by the Government of North Rhine- Westphalia.

In this side event was discussed how to increase cooperation - and how to measure it. São Paulo has contributed with ambitious proposal: "to increase, from 2004 to 2010, by 2% the share of renewable energies in the joint balance of the nrg4SD participating regions, based on the International Energy Agency criteria for the Total Primary Energy Supply - TPES"

The advantages reflect in a huge potential for cooperation, either with more developed regions (North-South and South-North) or with developing (South-South). In terms of North-South, São Paulo could cooperate in terms of technology transfer and capacity building on subjects like polluted sites, air pollution management or biodiesel technology. South-North cooperation could be, for example, expanding the use of sugarcane ethanol in vehicles. South-South is mainly in terms of information exchange, capacity building and technology transfer.

Such initiatives at State, Province or other sub-national levels can be implemented in a fast way, helping achieving the objectives of the Kyoto Protocol.

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Acknowledged the contributions of Kamyla Cunha, Rodrigo Leme, Dione Pradella, João Wagner Alves and Patricia Guardabassi.

2.8. Wales: Climate Change¹⁴

Introduction

Man-made greenhouse gas emissions are now having a noticeable effect on the earth's climate. In Wales the 1990s was the warmest decade since records began in the 1660s. Some Climate Change cannot now be avoided – the greenhouse gases that have already accumulated in the atmosphere mean that we cannot avoid some rise in temperature - but we can act to limit its effects by reducing further greenhouse gas emissions. At Kyoto in 1997 the world's developed countries agreed to reduce their combined emissions of the six main greenhouse gases by 5.2% below 1990 levels over the period 2008-2012. The gases covered by the so called Kyoto Protocol include Carbon Dioxide, Methane, Nitrous Oxide, Hydro fluorocarbons, Perfluorocarbons and Sulphur Hexafluoride.

The European Union agreed to a cut of 8% to be met jointly, which after redistribution led to the UK agreeing to a cut of 12.5 %. The UK also set a domestic goal of an additional reduction in carbon dioxide emissions to 20% below 1990 levels by 2010.

The National Assembly for Wales is committed to playing its part in developing and delivering a climate change program which meets the Kyoto target and moves the UK towards its domestic goal of a 20% reduction in carbon dioxide emissions by 2010.

The Assembly does not underestimate the size of this challenge. It is aware of the problems facing Wales, the rest of the UK and the world if action is not taken to deal with the causes of climate change – views reinforced by recent weather events. But it cannot operate alone. Its contribution will build on the partnerships that it has developed with business, local government, the Environment Agency, and the voluntary sector, with action being taken on the basis of who does what best.

The Assembly has a duty under section 121 of the Government of Wales Act 1998 to promote sustainable development. It is the only Government in Europe to have such a constitutional duty. Sustainable Development provides a framework for the development of policies and actions across the Assembly. Wales' wildlife, habitats, landscapes and historic buildings are important to its prosperity, well being and culture, and need to be treasured, managed and protected in a way that does not hinder economic or social development. Where possible, policies will be developed which deliver effective protection of the Welsh environment and contribute to tackling global environmental threats such as climate change.

For a long time the prosperity of Wales has been well below the UK and European averages. The Assembly is addressing this problem. Through the use of European Regional Development Funding (ERDF), it is aiming to achieve higher rates of economic growth over the coming decade. Environmental sustainability is one of the

¹⁴ By the Welsh Assembly Government

cross cutting themes which has been built into the Welsh ERDF program. Action plans put forward for funding under the program will be assessed against criteria such as their contribution to reducing carbon dioxide emissions, reducing traffic growth and contributing to a wide range of environmental targets. Priority for ERDF funding will be given to those projects that deliver economic prosperity while contributing to the overall environmental objectives of the program. The challenge is to accelerate the rate of economic growth whilst protecting the environment and improving the quality of life for those who live and work in Wales.

It is now commonly accepted that increasing prosperity leads to a rise in consumer demand for goods and services, which is ultimately linked to increasing carbon dioxide emissions. For future development in Wales, this link needs to be broken. From the energy perspective, this means focusing on efficient, economical and environmentally acceptable energy generation from renewable and non-renewable sources. Advanced information and communication technologies offer the opportunity to develop a knowledge-driven economy and to minimize environmental impacts. Current policies and programs are focusing on working with industry to ensure the most effective and environmentally sound use of existing and future technologies.

Impacts of climate change in Wales

The UK Climate Change Impacts Programme has produced scenarios for changes in Wales over the period up to 2080. These show that on average, Wales will be 1.5° C to 4.5° C warmer than at present and that there will be:

- a rise in sea level;
- increased rainfall and greater inflow to estuaries and the sea;
- changes of rainfall pattern during the year - wetter winters and drier summers; and
- increased evapotranspiration.

The scale of future climate change is uncertain, making adaptation planning difficult. It is important to plan to adapt both for extreme events as well as the changes in average conditions. The rate of climate change is also likely to be a key factor in determining the ability of natural ecosystems to adapt and survive. In October 2004 in Cardiff DEFRA launched a new cross-regional research programme to provide detailed quantitative information for six topics:

- planning, land-use and the built environment;
- business;
- water, particularly extreme events;
- countryside and rural economy
- quantifying the costs of climate change; and
- guidelines for adaptation.

Sector-based assessments are needed to ensure that we manage adaptation to climate change. The work will include assessing climate change vulnerabilities and opportunities for transport; public health; housing and other construction including the public sector estate; infrastructure; land-use planning; agriculture, forestry, fisheries and food; nature conservation; and business support and economic development.

Large areas of Wales are protected because of their sensitive ecosystems and landscapes. For example, there are over 1,000 Sites of Special Scientific Interest (SSSIs) covering about 10.7% of Wales, together with three National Parks and five Areas of Outstanding National Beauty covering 25% of Wales. The northward migration of species sensitive to climate change can only occur to other favourable habitats where corridors exist for migration. The impact of climate change on natural ecosystems could include the loss of arctic alpine plants such as the rare Snowdon Lily. Sea level rise could impact on natural habitats in estuaries, saltmarshes and sand dunes. About 550 km of the Welsh coastline is designated as Heritage Coast. Although Biodiversity Action Plans have been initiated in Wales, in many cases understanding of the sensitivity of species and habitats to climatic change is poor, making it difficult to predict the impacts or manage the consequences.

Economic impacts will depend to some extent on the effect climate change has elsewhere. For example, impacts on the tourist industry will depend on the effects of climate change on other popular holiday destinations. Climate change could make some areas of Wales more favourable for arable crops, but less favourable for dairy farming. Insurance costs could rise in areas susceptible to storm and flood damage. Much of the population and existing industrial development in Wales could be affected as it is located along the southern and northern coasts. Sea level rise, increased intensity of rainfall and increased frequency of storms could all have a strong cumulative effect on these areas.

Water resources are also likely to be a significant issue, particularly with the demand for summer supplies increasing and the prospect of reduced seasonal rainfall. Balancing water supply and water demand will require careful planning to maintain river flows while preventing the drying out of wetlands and the potential damage to the biodiversity of protected sites in Wales.

Following an initial scoping study in 1999-2000, a further study has been published to select indicators of climate change in Wales. Further work is underway to assess impacts on biodiversity particularly in upland areas.

Raising awareness

The Assembly will continue to develop its Business and Environment campaign and will be pressing messages for energy saving, recycling and cutting down on unnecessary car use. Keep Wales Tidy and Going for Green promote community action that can include measures that reduce carbon dioxide emissions. Their Sustainable Communities initiative incorporates measures like traveling sensibly and practices such as composting waste rather than landfill in an overall more sustainable lifestyle. Setting targets for carbon dioxide reductions are intrinsic parts of the Sustainable Communities projects.

Work to tackle and adapt the changes brought about by climate change will be progressed by further developing the partnerships with other organisations that have already been established by the Welsh Assembly Government.

The Air and Environment Quality Branch, part of Environment Protection and Quality Division in the Welsh Assembly Government, oversees climate change policy in Wales. It is committed to raising awareness of climate change; to improving the

understanding of its impacts; and to progressing measures aimed both at tackling emissions and adapting to some of the unavoidable consequences.

The Welsh Assembly Government issues a twice-yearly Climate Change Newsletter giving a quick synopsis of initiatives that the Assembly is taking forward in Wales. The newsletter can be found at:

<http://www.countryside.wales.gov.uk/fe/master.asp?n1=366&n2=588&n3=671>

Action on adaptation

Flooding and other natural hazards

One of the most likely effects to which Wales will have to adapt in the future is sea level rise. The low lying, urbanised coasts and estuaries of south and northeast Wales are most at risk from coastal flooding. Recent estimates indicate that some 39,000 properties may be at risk from coastal flooding. Current projections estimate that around the Welsh coast, increases will be in the range of 11 to 71 cm by 2080 slightly more in the south than the north. An allowance of 5 mm per annum over the life of a scheme is now built into all new coastal defenses where appropriate, or otherwise the defenses are constructed to enable increases in height to be incorporated in the future.

In addition to sea level rise Wales' 1300km coastline is expected to be subject to increased storminess. As well as increasing the risk of flooding of low-lying areas, such events will increase the rates of erosion. Most at risk will be the soft natural shoreline, which makes up 25% of the coast and the further 30%, which is artificially protected by some 380kms of man-made coastal defence structures.

Beyond the life of these existing coastal defences, reducing the risk of flooding and coastal erosion by building new larger and higher defences may not be sustainable. More radical measures may be needed and, in part to address this issue, Shoreline Management Plans have been prepared for the Welsh coastline. These will help to identify those lengths of coastline where it may not be sustainable to defend. This policy is likely to be most effective where plans can be made for the long term future, where just allowing nature to take its course and retreating the defended line may be the most appropriate option. By undertaking these plans, those responsible for land use planning will be able to avoid new development in "at risk" areas. Local authorities and land owners will be able to plan for the future knowing what are the most likely scenarios. Shoreline Management Plans will be reviewed regularly by local authorities to ensure that the latest information on climate change is used in the decision making process.

While there are predictions of increases in inland rainfall over winter months, the effect of extreme weather conditions that lead to flooding is uncertain. At present, the guidance provided requires designers to include a 20% increase in peak flood flows when making allowance for climate change and increased fluvial flooding. A significant amount of work has been undertaken through the Foresight project to understand the impact of climate change and economic growth on flood risk, which is estimated to increase by up to 27 times by the 2080s dependent on economic growth. This work has highlighted the importance of recognizing that not only will rivers and watercourses be affected but severe localised storms will put pressure on the drainage infra structure with flooding from sewer and drainage systems becoming more

common.

The Welsh Assembly Government has consulted on its key outcomes for flood and coastal defence as part of its Environment Strategy. These outcomes focus firstly on information and awareness in the public so that with flood warning and assistance they are able to respond and have some resilience to flooding when it occurs, and secondly on the provision of appropriate measures to manage flood risk. These measures would be developed both strategically for a catchment through a robust catchment management plan and in detail so that an individual property would be resilient to flood risk. Catchment Flood Management Plans will enable land use planners to avoid inappropriate development in the most vulnerable flood plain areas; they will allow land use management and flood plain storage to be brought together to best effect, recognizing that farming and agriculture is an important part of the rural economy.

Finally recognizing the need to respond more effectively to these challenges the Welsh Assembly Government has been re-organizing its administrative arrangements. These new arrangements include removing a tier of administration and directly funding the work by the Assembly. The boundary of the Environment Agency's Flood Risk Management Wales (Regional Flood Defence Committee) is also being amended to align with the England/Wales boundary which will allow policies determined by the Assembly Government to be delivered more consistently across Wales.

In Wales, increased rainfall could also have an effect on land stability. There are numerous relict landslips left after the last glaciation, many of which are active or only marginally stable. Research has been undertaken to enable an assessment to be made of the potential for land slipping in the South Wales coalfield valleys.

A demonstration project has been established in the Rhondda valley in South Wales. The land slipping research has been integrated with the planning system to enable investigations to be targeted at vulnerable areas so that unstable areas can be avoided when development takes place. This work will hopefully be extended to other valleys in South Wales.

Land Use

The potential effects of climate change must be considered and built into all aspects of the planning process so that it is sufficiently responsive to cope with the impacts of change as they arise. Climate change considerations will therefore need to be more fully integrated into the Assembly's land use planning guidance.

Current land use planning policy is contained in 'Planning Policy Wales' (March 2002) which provides the strategic policy framework for the effective preparation of local planning authorities' development plans. It establishes climate change as an important consideration, stating that special attention should be given to minimising and managing risks associated with climate change.

Planning Policy Wales is supplemented by a series of topic based Technical Advice Notes (Wales) (TANs). Those, which cover topics of particular relevance to climate change, are TAN14, *coastal protection*, which provides technical guidance on coastal

flood risk and coastal defenses, and TAN15, *development and flood risk*. Following the review of planning policy guidance, the technical guidance contained in TANs is to be revised to reflect changes to the policy document and the effects of climate change. TANs currently under review include:

- TAN 5, *biodiversity and planning*, which will include guidance on how land use can help address impacts on biodiversity due to climate change; and
- TAN 18, *transport*, which will set out guidance on the relationship between land use planning and accessibility/transport.

The commitments in the Assembly's Sustainable Development Action Plan – see below – are supported by national and area specific commitments in the Assembly Government's Spatial Plan *People, Places, Futures*.

There are national level objectives in the Plan to:

- Manage the environment comprehensively with respect to its distinctive characteristics, so that it contributes to sustainable development, including maintaining soil carbon, reducing contamination, managing diffuse pollution sources to water, protecting landscapes and enhancing habitats;
- Integrate spatial management and development of the marine and coastal environment and our inland waters to make use of Wales' maritime potential (including renewable energy potential) in a sensitive and sustainable manner;
- Reduce Wales' contribution to climate change by for example, increasing its share of renewable energy in those areas best suited to provide it and by increasing energy efficiency in industry, housing and transport as well as by protecting existing carbon sinks;
- Work to help the environment, economy and society adapt to climate change's potential impacts, including flood risk; and
- Tackle existing infrastructure constraints, supporting the sustainable futures of communities by investment in our infrastructure: in water, sewerage, waste and energy for example.

Moving to a low carbon economy

Climate change is the greatest international sustainable development challenge, with enormous consequences for our future lives and livelihoods if we fail to address it. Climate change in many ways goes to the heart of the way we live because it is influenced by our use of energy, natural resources and land in modern society and economy. The goal now is to move towards a 'low-carbon' economy. We also need to take action that allows us to adapt to the effects of climate change in its many guises, be it flooding, storm damage, sea level rise or pressure on water resources.

We are working with the UK Government and the other devolved administrations on the review of the UK climate change programme. Although Wales has traditionally been heavily dependent on energy for its industries, it has tremendous natural potential for renewable and alternative energy. We have already set a target of having 4TWh of our electricity generated from renewable sources by 2010 as part of our contribution to the international goal of reducing emissions by 60% by 2050

To meet planning policy needs, a Technical Advice Note on Renewable Energy has been issued, setting out guidelines on areas for renewable development, and their design.

Moving to a low carbon economy is not enough on its own. It is also vital to conserve Wales' current natural stores of carbon. The overwhelming majority of this – over 350 million tonnes – is in the soil, particularly peaty upland soils, and is at risk of being released to the atmosphere if it dries out.

Addressing climate change is one of the key challenges identified in the Assembly's Sustainable Development Action Plan. Many of the commitments in it relate to mitigating the effects of climate change by moving towards a 'low carbon' economy. These include:

- implementing the Energy Efficiency Action Plan across all sectors by **November 2004**. *This has been completed. Energy Savings Wales was launched in October 2004.*
- driving forward our clean energy policies in Wales, by publishing by **December 2004** and implementing a clean energy action plan, which will include establishing an increased role for Wales in developing next generation renewables technologies. *The Energy Route Map, to be published in 2006, will set out our objective for a clean energy agenda, including the development of renewable energy. Clear targets for producing 4twh (approximately 10%) of energy from renewable sources by 2010 and 7twh (approximately 20%) by 2020 are already in place.*
- developing community renewables and innovative energy projects through stakeholders and agencies with the benefit of European funding support by **January 2005**. *A number of community renewable projects have now been funded through the Objective 1 programme.*
- with Carbon Trust Wales, WDA and others, implementing a step change in the adoption of the latest energy efficiency techniques, and small scale renewable energy generation in buildings of all types in Wales. This will build on the Carbon Trust's study of the profile of energy use and carbon emissions in Wales, due in **spring 2005**. *Additional funds have been secured to ensure that the work of the Carbon Trust in Wales can continue to support the uptake of energy efficiency practices. Their future activities will be guided in part by the results of the energy use and carbon emissions profile that they are currently evaluating.*
- with DTI, Carbon Trust and others, strengthening the knowledge/research base in Wales for emerging marine energy and hydrogen economy systems, including participating in a renewables strategic environmental assessment of Welsh waters – by **mid 2005**. *Discussions are underway with partners on the scope of the work necessary and we hope to have a timetable for the various work streams early in 2006.*
- ensuring that our developing policies on farming, forestry and the countryside, help to conserve the carbon stored in Welsh soils. *Research – due for completion in November 2006 – is in progress to develop guidelines on land-use for conservation of carbon stocks in soils. The guidelines will then be considered for implementation under the CAP reform and agri-environment policy.*
- ensuring that lighting for trunk roads employs renewable technologies to deliver at least 20% energy saving. *A two year contract (2005-07) is in place for the supply of 100% green energy for all Assembly street lighting, as part of the Wales Street-lighting Energy Purchase consortium.*

- commissioning a study to explore the feasibility of offsetting the carbon generated by induced traffic arising from Assembly road schemes. *A study has been commissioned.*

2.9. Western Australia: Greenhouse Strategy¹⁵

What is the greenhouse effect?

The 'enhanced greenhouse effect' is an alteration of the world's climate system caused by increasing levels of certain gases in the Earth's atmosphere. Scientists believe the enhanced greenhouse effect is already causing higher average air temperatures in the lower atmosphere, changed rainfall patterns and rising sea levels resulting from warmer oceans and ice melting from glaciers and Arctic and Antarctic ice sheets. Climate changes due to the enhanced greenhouse effect are often referred to as 'global climate change' or 'global warming'.

Atmospheric concentrations of greenhouse gases have increased significantly since the Industrial Revolution about 250 years ago. Australia emits about one per cent of global emissions, a small proportion of the total, but one of the highest on a per capita basis. Western Australia emits about 12 per cent of Australia's emissions with emissions increasing at about 2.8 per cent per year since 1990. Most of Western Australia's greenhouse gas emissions result from fossil fuel use and livestock production.

Over the last decade the Western Australian Government, industry and community have worked together to significantly reduce land clearing, conserve remnant vegetation and undertake revegetation works. As a result the land use change and forestry sector in Western Australia changed from being a net emitter of greenhouse gases into a net sink between 1990 and 2002. The contribution of this sector in offsetting a portion of the State's emissions as organic carbon sinks will continue to be important for some decades.

What impact will the greenhouse effect have on Western Australia?

Impacts of global climate change are difficult to predict at a sub-continental or regional level or for particular time scales. However, international global climate models suggest that as atmospheric greenhouse gas concentrations continue to rise, Western Australia will become warmer and rainfall patterns will change. The South West is likely to receive less rainfall.

These changes to the State's climate could directly affect agriculture, forestry, health, biodiversity, water resources, energy demand and tourism. There could be indirect but significant impacts on fisheries and industrial development.

What is being done about the greenhouse effect?

International agreements aim to limit atmospheric greenhouse gas concentrations to levels below those at which unacceptable impacts would occur. The Kyoto Protocol assigns emission targets to developed nations, including Australia. Australia's Kyoto emission target is not greater than 108 per cent of the nation's 1990 emissions on

¹⁵ By the Western Australian Government.

average between 2008 and 2012. Although the Federal Government has stated it will not ratify the Kyoto Protocol, it has indicated the 108 per cent target will be achieved.

What is Western Australia's position on Kyoto Protocol ratification?

The Western Australian Government recognises the significant weaknesses and limitations of the Kyoto Protocol, yet believes the Protocol represents an essential step towards the global approach necessary to prevent dangerous climate change.

The Western Australian Government calls upon the Federal Government to ratify the Kyoto Protocol and will support national measures to meet the Kyoto Protocol target that recognise Western Australia's circumstances and interests.

What does the Western Australian Greenhouse Strategy outline?

In 2002, Western Australia established a Greenhouse Task Force to prepare a Western Australian Greenhouse Strategy to ensure the State's industry and community could contribute to reducing global greenhouse emissions and effectively respond to any opportunities and challenges generated by climate change.

The Task Force consulted with industry, the community and Western Australian Government agencies in preparing the Strategy.

The final Western Australian Greenhouse Strategy provides a comprehensive response to the greenhouse issue.

The Strategy is based on leadership, research, and public and industry engagement. It establishes research programs to enable the State to better adapt to the changing climate, delivers the Western Australian Government's greenhouse-related policy commitments and establishes a Greenhouse Unit in the Department of the Premier and Cabinet to enable Western Australian interests to be represented nationally and internationally. The Greenhouse Unit will coordinate implementation of the Strategy and enable the State to more effectively develop and advocate State greenhouse and climate change policy initiatives.

Western Australia's Greenhouse Strategy defines several objectives for its strategic response to global climate change. The objectives of the Strategy are to:

- maximise opportunities for a sustainable future for Western Australians;
- create voluntary market-based measures to enable all emitters to access least-cost greenhouse emissions abatement initiatives;
- establish a realistic and effective long term commitment to addressing climate change;
- ensure all sectors contribute to solutions; and
- enable Western Australia to contribute to national and international solutions on a cost-effective and equitable basis.

The Strategy will be reviewed in 2008. The eight main elements of the Strategy follow.

1. Government leadership

The Western Australian Government will work to minimise its own contribution to climate change by demonstrating emission reductions, thereby helping industry and the community to determine and implement effective responses.

Targeted purchasing by the Western Australian Government will help generate desired market opportunities.

The existing *Energy Smart Government* program aims to achieve a 12 per cent reduction in stationary energy (or non-transport energy) use in Government agencies by 2006-07, using 2001-02 as the base year.

The Strategy commits the Western Australian Government to purchasing the equivalent of five per cent of its electricity from cost effective renewable sources by 2006-07.

Government agencies and trading enterprises will annually report greenhouse gas emissions to the Western Australian Greenhouse Gas Inventory from 2005-06 and from 2006-07 lodge greenhouse gas estimates for the coming year and develop strategies to minimise anticipated emissions.

New Western Australian Government housing will aim to exceed minimum energy efficiency requirements.

2. Reducing greenhouse emissions

It is important that greenhouse gas emission reductions are achieved across all sectors. Action is needed to increase awareness and engagement, and establish programs that will yield short, medium and long-term emission reduction benefits.

The industry and electricity sectors together are responsible for producing about 57 per cent of the State's greenhouse gas emissions. The Strategy aims to encourage the development of market-based mechanisms in these sectors to achieve lowest cost emission reductions and protect Western Australia's economic and environmental interests. As larger markets offer greater opportunities for more cost effective options to be realised, the Strategy strongly emphasises the value of a national approach to addressing greenhouse gas emissions and the importance of access to international market opportunities. There are several actions to enable major Western Australian greenhouse gas emitters to prepare for such market-based mechanisms:

The Strategy will require major industrial emitters to report greenhouse gas emissions annually to a Western Australian Greenhouse Gas Inventory, lodge greenhouse gas emission estimates for the coming year, and develop strategies to minimise anticipated emissions. This will involve public reports every three years and triennial audits.

A Greenhouse Abatement Fund to hold and deal with organic sequestration rights and credits generated by Government institutions will be created.

A Greenhouse Registry with the ability to certify and document organic sequestration claims and emission reductions by industry and Western Australian Government institutions will be established.

The Western Australian Government will support the development of confident and viable national and international trading markets. Western Australia will determine its own preferred emission abatement framework that best suits the State's circumstances and promote this in any national negotiations.

The Strategy promotes the expansion of the sustainable energy sector and industries based on renewable energy sources in Western

Australia. It includes a range of mechanisms aimed at developing a competitive renewable energy sector that capitalises on the opportunities and resources in Western Australia, while working within the framework created by the Commonwealth Government Mandatory Renewable Energy Target (MRET) scheme. An increase in the MRET is supported.

Waste management produces about 2.5 per cent of the State's emissions. Enhanced implementation of the *Strategic Direction for Waste management in Western Australia* and targeted research on waste separation options are supported.

Energy use in households and commercial operations is responsible for generating about 16 per cent of Western Australia's greenhouse gas emissions. The Strategy outlines a series of actions and proposals to reduce energy demand and greenhouse gas emissions from these activities by increasing energy efficiency of buildings and appliances.

Transport generates about 16 per cent of Western Australia's greenhouse gas emissions. The Strategy aims to reduce transport emissions through travel demand management programs such as the *TravelSmart* initiative, traffic management strategies, investment in infrastructure that will promote energy efficient transport options such as the new MetroRail Project in Perth's southern suburbs, fuel efficiency and low greenhouse gas emission fuels. The Strategy also includes actions for further integration of land use and transport planning.

Agriculture produces about 28 per cent of Western Australia's greenhouse gas emissions. The Strategy outlines actions to investigate emissions from agriculture to enable producers and land managers to develop and implement focused and efficient actions to reduce the emissions associated with their business practices. Many agricultural practices that reduce greenhouse gas emissions also promote increased productivity and sustainability. The Strategy supports development and promotion of low emission agricultural practices.

3. Carbon sequestration

Carbon sequestration resulting from plantation establishment, revegetation or increased soil carbon can offset greenhouse gas emissions from fossil fuel use or other sources. These activities can also generate other benefits, including salinity and erosion control and biodiversity protection. The value of rights arising from organic carbon sequestration could promote revegetation.

The Strategy contains a series of actions aimed at promoting nationally consistent carbon rights legislation, more accurate and efficient carbon accounting for plantations and revegetation, and revegetation which delivers a range of natural resource management benefits beyond carbon sequestration.

Geological sequestration of carbon dioxide is an emerging option for storing carbon dioxide removed from a natural gas stream or an industrial waste stream. It offers significant promise for reducing the net greenhouse gas emissions from an operation. The Strategy includes actions to investigate several technical, regulatory and risk-management issues associated with geological sequestration and promote community and stakeholder knowledge about it.

4. New opportunities

Global climate change will generate new opportunities for Western Australia's businesses and residents. Some of these opportunities are being pursued, such as revegetation for organic carbon sequestration, while others will only become evident as climate conditions evolve. The Strategy includes actions to help enable Western Australia to take advantage of new opportunities.

5. Adaptation

Global climate change is already occurring and is projected to continue for many years, even if greenhouse gas emissions were immediately and significantly reduced. A vast range of impacts are likely, affecting community health, regional water resources, biodiversity and climate dependent industries such as agriculture, forestry and fisheries.

The Strategy contains a set of projects to generate and communicate information to enable Western Australia to prepare for unavoidable changes to the State's climate conditions. Projects include continuation of the Indian Ocean Climate Initiative and investigating biodiversity impacts and farming and forestry system requirements of future climate scenarios.

6. Local government and community involvement

Local governments and community groups can make significant contributions to address the greenhouse effect. The effectiveness of such groups arises from their capacity to make decisions and to take direct action on matters affecting their own responsibilities. Many local governments are involved in Local Agenda 21 programs or are members of the Cities for Climate Protection (CCP™) campaign.

The Strategy contains actions to encourage local governments to participate in greenhouse initiatives.

7. Research

The Strategy is based on a philosophy of informed action. Research forms a major part of every element of the Strategy. The Strategy gives responsibility for monitoring international, national and Western Australian climate change research activities and findings and recommending further research to the Greenhouse Unit.

8. National and international representation

Global climate change is already being addressed by international agreements to which nations, including Australia, are parties. These agreements can affect Western Australia in many ways, including our industrial development opportunities and the value of our carbon sequestration initiatives. The Strategy includes actions to ensure the State's circumstances are recognised when Australia negotiates international agreements or develops national greenhouse policies, and when international rules are formed for matters associated with global climate change.

3. Cross-Cutting Issues

After the 2002 Johannesburg World Summit for Sustainable Development and with the proximity of the Kyoto Protocol entering into force, discussions on sustainability have broadened at all levels.

The following papers are some contributions from the nrg4Sd Regions for the debate.

3.1. United Nations Convention to Combat Desertification, UNCCD: the inter-relationship between greenhouse gas emissions and desertification¹⁶

Introduction

Desertification and climate change are supposed to be inter-related phenomena. One of the impacts which global warming may have on the surface of the Earth is to exacerbate the world-wide problem of desertification. In the other hand, desertification can improve the climate variability at regional level and maybe the climate change at global level. A decrease in the total amount of precipitation in arid and semi-arid areas could increase the total area of drylands and thus the total amount of land potentially at risk to desertification. In addition, desertification may enhance regional warming, through a variety of climate feedbacks.

The inter-relationship between desertification and greenhouse gas emissions is the main concern of this paper.

General overview on the issues regarding desertification and climate change

Land degradation occurs all over the world, but it is only referred to as desertification when it takes place in drylands. This is because these areas are especially prone to more permanent damage as different areas of degraded land spread and merge together to form desert-like conditions.

Drylands cover over 30% of the total land area around the world (6,150 million hectares). Drylands are defined as those areas where precipitation is low and where rainfall typically consists of short, erratic, high-intensity storms. Almost 70% of these drylands are affected by land degradation, which support more than 1,5 billion people.

Traditional farming and grazing techniques, suitable for wetter regions, are becoming increasing less sustainable owing to inadequate precipitation in these areas. Desertification was defined by the international community as the degradation of land in arid, semi-arid, and dry sub-humid areas caused primarily by human activities and climatic variations. This definition is part of the UN Convention to Combat Desertification and does not refer to the expansion of existing deserts. It occurs because dryland ecosystems, which cover over one third of the world's land area, are extremely vulnerable to over-exploitation and inappropriate land use. Poverty, political instability, deforestation, overgrazing, and bad irrigation practices can all undermine the land's productivity.

¹⁶ by Heitor Matallo Jr, UNCCD.

The impacts of desertification on the ecosystems and society

As mentioned before desertification can undermine the land's productivity as well as improve the vulnerability of the communities living in the dryland areas, particularly the poor population. As main impacts of desertification process in the communities we can mention the following:

a) Desertification reduces the land's resilience to natural climate variability. Soil, vegetation, freshwater supplies, and other dryland resources tend to be resilient. They can eventually recover from climatic disturbances, such as drought, and even from human-induced impacts, such as overgrazing. When land is degraded, however, this resilience is greatly weakened. This has both physical and socio-economic consequences.

b) Soil becomes less productive. Exposed and eroded topsoil can be blown away by the wind or washed away by rainstorms. The soil's physical structure and biochemical composition can change for the worse. Gullies and cracks may appear and vital nutrients can be removed by wind or water. If the water table rises due to inadequate drainage and poor irrigation practices, the soil can become waterlogged, and salts may build up. When soil is trampled and compacted by cattle, it can lose its ability to support plant growth and to hold moisture, resulting in increased evaporation and surface run-off.

c) Vegetation becomes damaged. The loss of vegetation cover is both a consequence and a cause of land degradation. Loose soil can sandblast plants, bury them, or leave their roots dangerously exposed. When pastures are overgrazed by too many animals, or by inappropriate types, edible plant species may be lost, allowing inedible species to invade.

d) Some of the consequences are borne by people living outside the immediately affected area. Degraded land may cause downstream flooding, reduced water quality, sedimentation in rivers and lakes, and siltation of reservoirs and navigation channels. It can also cause dust storms and air pollution, resulting in damaged machinery, reduced visibility, unwanted sediment deposits, and mental stress. Wind-blown dust can also worsen health problems, including eye infections, respiratory illnesses, and allergies. Dramatic increases in the frequency of dust storms were recorded during the Dust Bowl years in the US, in the Virgin Lands scheme area in the former USSR in the 1950s, and in the African Sahel during the 1970s and 1980s.

e) Food production is undermined. Desertification is considered a major global environmental issue largely because of the link between dryland degradation and food production. A nutritionally adequate diet for the world's growing population implies tripling food production over the next 50 years. This will be difficult to achieve even under favorable circumstances. If desertification is not stopped and reversed, food yields in many affected areas will decline. Malnutrition, starvation, and ultimately famine may result. The relationship between soil degradation and crop yields, however, is seldom straightforward. Productivity is affected by many different factors, such as the weather, disease and pests, farming methods, and external markets and other economic forces.

f) Desertification contributes to famine. Famine typically occurs in areas that also suffer from poverty, civil unrest, or war. Drought and land degradation often help to trigger a crisis, which is then made worse by poor food distribution and the inability to buy what is available

Considering the improvement of the drylands vulnerability it can be said that it requires flexibility to be able to adapt to natural changes in climatic conditions.

In the past a range of techniques has been employed to protect valuable water resources, vegetation, soil quality and crops. However, economic and political pressures as well as changing cultures, population sizes and trends towards more settled communities have resulted in increasing mismanagement of land and the failure to adapt to fluctuations in climate.

This often leads to the adoption of land use practices unsuitable for the existing climatic regimes, or the over-intensification of existing practices until they become damaging to the land.

Over cultivation of crops and excessive tilling of the land leads to exhaustion of soil nutrients. The pressure to exploit the land in this way can be brought about by increases in food demand due to an increasing population, and monetary pressures such as the development of a cash-crop economy.

Soils, especially those of a sandy nature exploited in this way can become prone to wind erosion, whilst overcultivation of clay soils may well cause water erosion leading to land degradation. Low levels of technical know-how can often be a major cause behind poor land management practices such as irrigation. Poverty and underdevelopment are also major factors that contribute to desertification. This does not mean however that this process couldn't be found in developed countries as Spain, Australia and the United States.

Greenhouses gas emissions, the climate change phenomenon and the impacts on environment and society

Climate change is an integral part of the earth's climate system. In the past, particularly during the Pleistocene ice age, agriculture was considered impossible because climate was cold, variable and very dry over large areas and the atmospheric levels of CO₂ were low. During the Holocene more appropriate conditions for agriculture arose, particularly referred to the improvement of the CO₂ and the stabilization of the climate. This atmospheric warming during the transition from Pleistocene to Holocene is considered as a "natural warming"¹⁷.

The principal reason for humanity to be concerned about global warming is that it is now occurring during our lifetimes, rather than at the geological timescales of the past. Industrial revolution is considered as the "turning point" for the manmade environmental conditions for the new era of global warming. Of course there are

¹⁷ Approximately every 100,000 years Earth's climate warms up temporarily. These warm periods, called **interglacial periods**, appear to last approximately 15,000 to 20,000 years before regressing back to a cold ice age climate. At year 18,000 and counting our current interglacial vacation from the Ice Age is much nearer it's end than it's beginning. (Source: Global warming: a chilling perspective)

different views of the impacts of the global warming on the planet, namely positive and negative views.

The main impacts of the global warming in the different aspects of the environment and society are:

a) Agriculture - The increasing human population has led to a rise in the demand for food. As more land comes under agricultural cultivation there will be more pressure on natural ecosystems. Climate change will affect agricultural yield directly because of alterations in temperature and rainfall, and indirectly through changes in soil quality, pests, and diseases. In particular, the yield of cereals is expected to decline in many parts of the world. In the higher latitudes (in the northern countries) agriculture will benefit with the rise in temperature as the winter season will be shorter and the growing seasons longer. This will also mean that pests that will move towards the higher latitudes as the temperatures rise.

b) Weather - A warmer climate will change rainfall and snowfall patterns, lead to increased droughts and floods, cause melting of glaciers and polar ice sheets, and result in accelerated sea-level rise. Rising warmth will lead to an increase in the level of evaporation of surface water; the air will also expand and this will increase its capacity to hold moisture. This, in turn, will affect water resources, forests, and other natural ecological systems, agriculture, power generation, infrastructure, tourism, and human health. An increase in the number of cyclones and hurricanes over the last few years has been attributed to changes in temperature.

c) Sea level rise - Coastal areas and small islands are among the most densely populated parts of the world. The heating of oceans, and melting of glaciers and polar ice sheets, is predicted to raise the average sea level by about half a meter over the next century. Sea-level rise could have a number of physical impacts on coastal areas, including loss of land due to inundation and erosion, increased flooding, and salt-water intrusion. These could adversely affect coastal agriculture, tourism, freshwater resources, fisheries and aquaculture, human settlements, and health. Rising sea levels threaten the survival of many low-lying island nations, such as the Maldives and Marshall Islands.

d) Health - Infectious disease is the second major threat that global warming poses to human health. As temperatures rise, disease-carrying mosquitoes and rodents move into new areas, infecting people and other living bodies in their habitat. Scientists at the Harvard Medical School have linked recent US outbreaks of dengue ("breakbone") fever, malaria, hantavirus and other diseases to climate change.

e) Forests and wildlife - Ecosystems sustain the earth's entire storehouse of species and genetic diversity. Plants and animals in the natural environment are very sensitive to changes in climate. The ecosystems that are most likely to be affected by this change are the ones in the higher latitudes, the tundra forests. Polar regions will feel the impact of warming more than others. Interiors of continents will experience more warming than the coastal regions.

f) Marine life - Corals are known as the tropical forests of the oceans and sustain diverse life forms. As ocean waters in the tropics become warmer, the damage to coral reefs seems to be increasing. These corals are very sensitive to changes in water

temperature, which causes bleaching. Zooplanktons, small organisms that float on the sea surface are declining in numbers, reducing the number of fish and sea birds that feed on these organisms.

Unless we slow and ultimately reverse the buildup of greenhouse gases, we will have decades, not millennia, to try to adapt to radical changes in weather patterns, sea levels and serious threats to the environment and the economy. Increased flooding, storms and agricultural losses could devastate our economy. Plants and animals that cannot adapt to new conditions will be come extinct.

Conclusion: The impacts of global warming on drylands

It is supposed that global warming would affect drylands in different ways. As mentioned before we have here different views (negative as well as positive) on the impacts climate change would provoke on drylands.

For some of authors, climate change contributes to increase greenhouse gas concentrations in the atmosphere. In doing so, it is expected to increase the variability of weather conditions and extreme events. Many dryland areas face increasingly low and erratic rainfalls, coupled with soil erosion by wind and the drying up of water resources through increased regional temperatures. This enhanced variability will place greater strain on already stressed environments.

It is supposed that in the areas under desertification the soils are exposed due to an intensive process of deforestation. As a result, more CO₂ is released to the atmosphere, the soil temperature is increased and the level of evapo-transpiration is intensified. This process can change the weather at local level and for this reason some regions in the tropics and subtropics are affected by a higher frequency of droughts.

There is another interpretation of this phenomenon as a helpful process that contributes to the rehabilitation of the drylands. The explanation is based on the relationship of the biomass productivity and the rise of CO₂ concentration. Some research data shows that the rise of CO₂ concentration is accompanied by the rise of biomass. The researchers found that the doubled CO₂ (from 350 ppm to 700 ppm) significantly increased the total biomass from 25 percent to 70 percent depending upon plant type.

As we can notice, there is no consensus about this issue. However, the general perception shared by the scientific community as well as the users of natural resources is that we are facing a great deal: desertification and climate change are processes that are feeding each other and getting worse all around the world. Despite the inability to quantify accurately all the feedback mechanisms involved in the complex interactions between desertification processes, greenhouse gas emissions, and global climate change, our understanding of many of these interactions is improving. According to available data, we know that savanna fires presently account for about 30 percent of the total carbon and 20 percent of the total nitrogen emissions from global biomass burning. Drylands burning is thought to contribute around 10 percent of total gross global emissions of these two elements.

Dryland deforestation and accelerated soil loss from wind and water erosion are also reducing the ability of dryland ecosystems to store carbon, further contributing to the cumulative build-up of atmospheric carbon dioxide as well as reducing soil-moisture storage capacity. Unless effective long-term measures to control desertification are taken, global warming and increased evaporation are likely to affect the water balance in dryland regions. If local and regional soil moisture levels decline as a result of higher temperatures and higher rates of evapo-transpiration, the inevitable result will be a progressive decline in plant biomass. To avoid these global effects (not to mention the local ones, such as food insecurity), long-term mitigation and rehabilitation strategies are needed throughout the world's drylands to prevent or minimize desertification.

The IPCC third assessment report points out in general terms the relevance of agriculture and forestation as important means for carbon emissions mitigation. In this context we can assume the role of drylands to the mitigation process since it represents one third of total area of the planet and the area affected by desertification is around 25% of this figure. Measures for restoring areas affected by desertification could be very substantive in terms of carbon sequestration.

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3.2. Sao Paulo: Leapfrogging the energy ladder¹⁸

Wood-based fuels are the dominant source of energy for over 2 billion people, particularly in households in developing countries, where the dependence on such fuels is much greater, as much as up to 80 percent in some subregions of Africa (FAO, 2003). Wood and charcoal are vital to the nutrition of poor rural and urban households in developing countries. They are often essential for industrial and sub-industrial production, as well as to generate electricity.

Although in developed societies woodfuel can be considered an environmentally sound source of energy with a nearly closed carbon cycle, this is not what happens in most of the world, where deforestation is a reality. Also, firewood indoor use in primitive devices is a major cause of pollution, causing serious hazards to the human health, particularly to the most exposed: women, small children and the elderly.

However, firewood is very cheap - often free. Gathering fuelwood is in many cases time consuming for the poorer, which are the most affected by the problems related to this energy source. With better incomes, consumers shift to modern energy carriers or to more convenient and energy-efficient conversion devices (Figure 1).

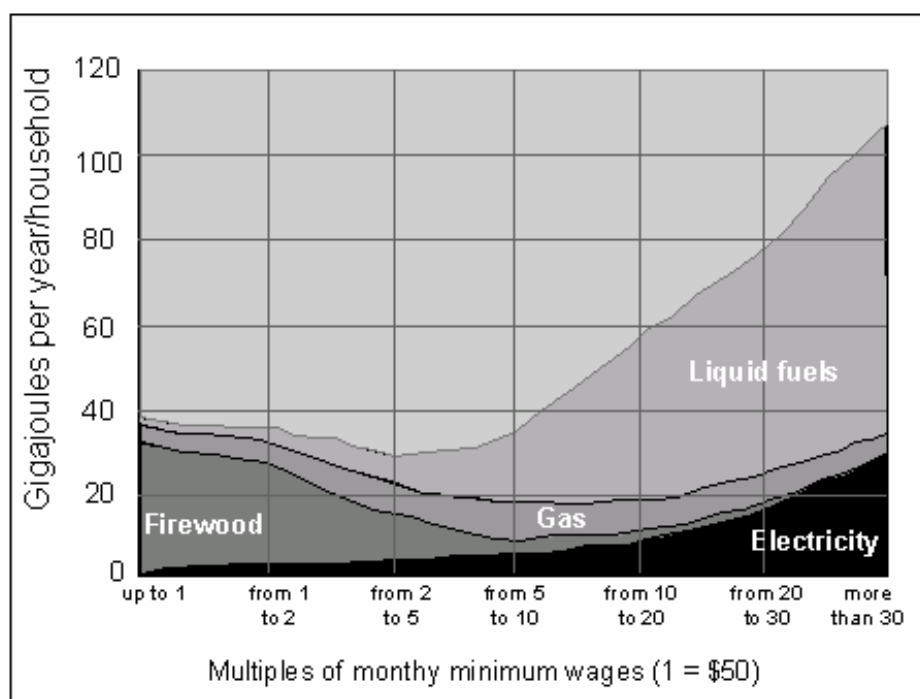


Figure 1. Energy use according to family income in Brazil. Source: : UNDP, UNDESA and WEC (2004)

For cooking and other heating purposes, the lowest rungs on the energy ladder involve use of dung or crop residues, with fuelwood, charcoal, kerosene, and liquefied

¹⁸ by Oswaldo Lucon and Suani Teixeira Coelho, Sao Paulo Environmental Secretariat.

petroleum gas (LPG) or natural gas representing successively higher rungs. For lighting, the lowest rung is represented by fire, followed in turn by liquid-fuelled (such as kerosene) lamps, gas lanterns, and electric bulbs. To do mechanical work, consumers shift from human and animal energy to diesel fuel and electricity as soon as they become available, because they are almost always more cost-effective. Often a synergy between modern energy carriers and more efficient end-use devices occurs.

The concept of leapfrogging is a key strategy for promoting sustainable development in rural areas of developing countries. It involves skipping rungs to reach the top positions of the energy ladder, through introducing modern energy carriers more rapidly than the expected *business-as-usual*. It involves providing:

- (a) improved technologies and cleaner fuels for cooking (Figure 2)
- (b) rural electricity - grid-based or decentralized - at sufficiently low cost, improving life quality, providing better paying jobs and helping to stem migration to urban settlements.
- (c) liquid fuels and electricity to mechanise agriculture;

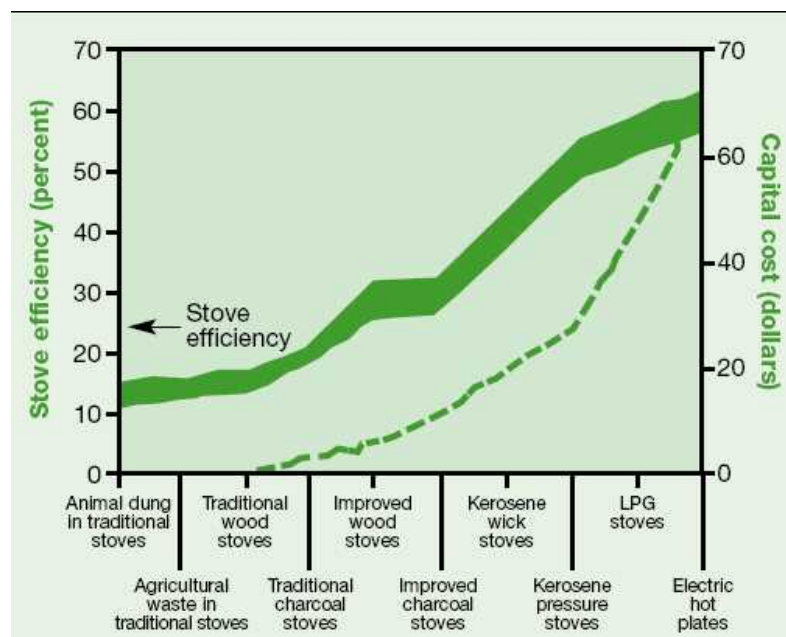


Figure 2 - Cooking stoves *leapfrogging* (or climbing the energy ladder efficiently through learning from the other countries experiences). Source: UNDP, UNDESA and WEC (2002)

Although non-renewable, fossil fuels such as kerosene and LPG are an important step in the ladder which produces fewer greenhouse gas emissions per unit of energy service than biomass fuels primitively used. The amount of LPG needed to support cooking for the current unserved population of 2 billion is trivial at the global level. The cooking needs of the 2 billion people not served by modern fuels correspond to about 120 million tonnes of oil equivalent of LPG a year—which equals 1 percent of global commercial energy consumption or 3 percent of global oil consumption. This is less than is currently lost flaring natural gas in oil fields and refineries.

Leapfrogging this step, the use of kerosene and LPG can then be substituted total or partially by biogas (obtained from the digestion of suitable biomass feedstocks by anaerobic bacteria), producer gas systems, reforested charcoal burned in modern devices, vegetable oils or even, according to the case, more advanced options.

At the top of the energy ladder, electricity is highly efficient and convenient for several applications like lighting, communication, refrigeration and mechanization. But it has to be made available at a compatible cost for the most needing ones. In many cases, large scale infrastructures for electricity production (such as large hydro plants), transmission and distribution cannot provide such benefit without heavy subsidies that overburden the society as a whole. In this case, it is more recommendable to stay a little bit behind in the ladder (with, for example, LPG).

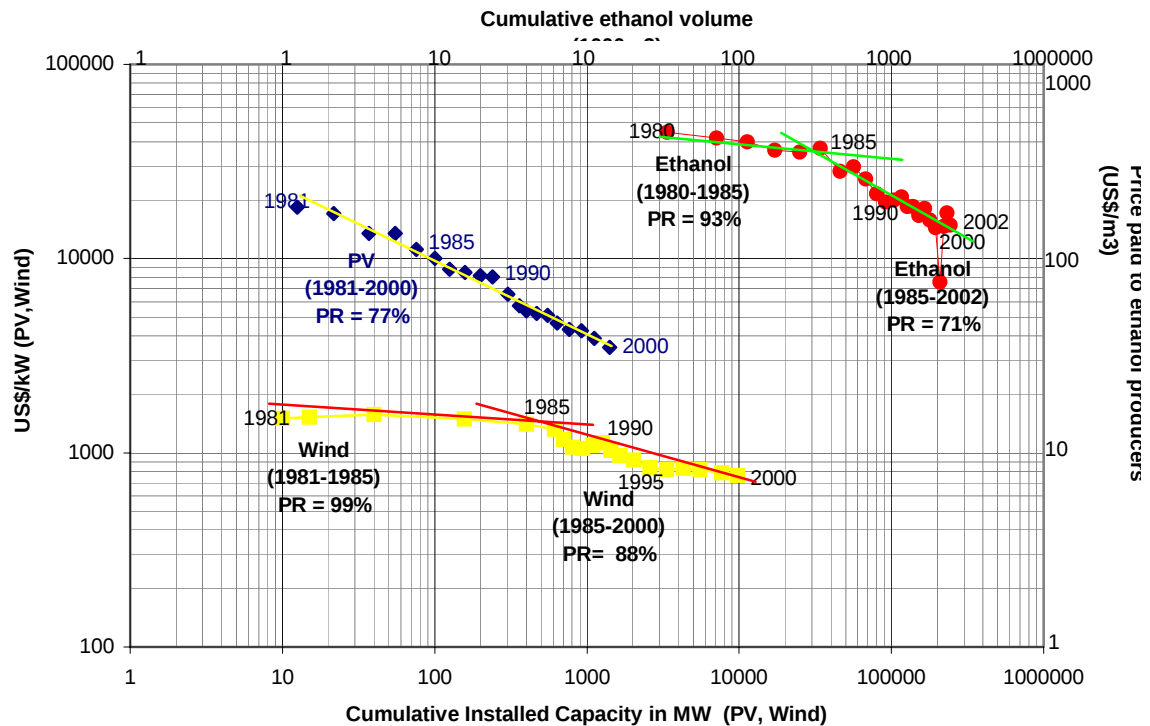
The *leapfrogging* concept it is also applicable to transportation. A country that has leaded gasoline and high sulfur fuels can skip the stages of cleaner fossil fuels (less polluting but still net carbon emitters) to renewable fuels (which also saves carbon releases to atmosphere), or in even a step forward to efficient public transportation in a systemic approach. Ethanol, for example, has achieved a stage of development which allows competitiveness in Brazil. This is the result of adequate policies and investments that allowed high amounts of fuel to be produced, decreasing their costs and making them comparable to those from gasoline (see Annex 1).

Although energy efficiency improvements can be achieved also with fossil fuels, there are obvious limitations in terms of carbon emissions, not to mention long-term security of supply. Anyway, some countries are investing huge amounts of resources in R&D for cleaner coal or ultra-low sulfur diesel. Developing countries without renewable resources can take advantage and move directly to the cleaner options, instead of learning by doing and accepting passively obsolete technologies.

Leapfrogging is not an imposition of technologies from the developed to the developing. On the contrary, such initiatives have to be connected very closely with the economic potentialities of each region. It involves benchmarking a process that succeeded in the past 50 years in countries that achieved successful rural development: fuelwood burning was first improved, then replaced by kerosene, then by liquefied petroleum gas (LPG), then shifted to other forms of energy like electricity.

Supplying modern energy services to the 2 billion people who still cook with traditional solid fuels and lack access to electricity is probably one of the most pressing problems facing humanity today. Renewables play an important role in this challenge and it is very difficult to tackle the problem without the support from developed nations. As happened with the Brazilian ethanol, the development of other technologies require incentives and commitments - both in the supply and in the demand sides - that act direct and positively in their learning curves (Figure 3).

Figure 3. Experience Curves for Photovoltaics, Windmills, Gas Turbines, and Ethanol Production (UNDP, UNDESA and WEC, 2004)



Acting on the learning curve requires high levels of production and consumption. Relating to leapfrogging, this can be achieved through:

- channelling resources to R&D;
- through cooperation (*ie*, at low cost and without creating dependency), providing to the developing countries access to these technologies;
- expanding consumption markets in developed countries through free trading (*ie*, lifting barriers to environmentally sound energies);
- information exchange, networking and enhanced capacity building (to raise awareness and to combat myths against modern renewable energy sources) and, most of all;
- access to patient capital.

Technological developments alone will not improve access or promote greater equity. New institutional measures are also needed, including financing to cover the initial capital costs of devices and equipment. Energy initiatives will be most successful when integrated with other policies that promote development. And because local populations will ultimately use, maintain, and pay for energy services, they should be involved in making decisions about energy systems.

Annex - CASE STUDY: The Brazilian Ethanol Learning Curve

Ethanol is produced through the fermentation of agricultural products such as sugarcane, corn, and manioc, among others. Most of ethanol produced in the world is from sugarcane, mainly in Brazil. The Brazilian Alcohol Program (PROALCOOL) was established in 1975 for the purpose of reducing oil imports by producing ethanol from sugarcane and presented positive environmental, economic and social aspects. It has become the most important biomass energy program in the world. In the 1975-2002 period, production of ethanol raised from 0.6 to 12.6 million cubic meters, with an increasing productivity of sugarcane crops. In Brazil, ethanol is used in cars as an octane enhancer and oxygenated additive to gasoline (blended in a proportion of 20 to 26% anhydrous ethanol in a mixture called gasohol) or in dedicated hydrated ethanol engines. Local air pollution improved significantly with the adoption of ethanol. Lead and aromatic hydrocarbons (like benzene) were eliminated and the sulphur content reduced, as well as carbon monoxide emissions. Acetaldehydes from alcohol are 100 times less toxic than gasoline's formaldehydes. Only in the year 2000, 9.2 million tonnes of carbon dioxide were avoided due to the gasoline replacement by ethanol. Since February 1999, prices are not controlled by the government and hydrated ethanol is sold for 60 to 70 percent of the price of gasohol at the pump station, without subsidies, due to significant reductions in production costs. The Brazilian ethanol is already competitive internationally with the gasoline (Rotterdam prices). In US, ethanol made from corn is also used as a high-octane fuel in vehicles. There, a similar program is being started and the number of vehicles using ethanol is increasing. But because ethanol in Brazil is produced from sugarcane, it presents the lowest production cost in the world. This is due not only to high agricultural and industrial productivity, but also to the extremely favorable energy balance of the alcohol production (11:1), compared to the corn ethanol from the US (1.8:1). Even so, because of support from corn-growing states and the U.S. Departments of Energy and Agriculture, ethanol fueled vehicles are increasing. Auto-manufacturers began in 1997 to produce flexible fuel cars and pickup trucks that could use any blend of ethanol or gasoline. The consumer can freely choose which fuel will use. In Brazil, the flexible fuel fleet is booming and the technology can be considered mature at practically no extra cost. Ethanol production generates 36 more jobs per unit of energy produced than coal, 50 than hydropower and 152 than the oil industry. A job can be created in the ethanol industry in Brazil worth around US\$ 15k, one of the lowest industrial costs in the country (Goldemberg, Coelho, Nastari and Lucon, 2004).

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3.3. Sao Paulo: From Johannesburg to the CoP10: addressing the unsustainable use of fuelwood¹⁹

The United Nations Framework Convention on Climate Change was opened for signature at the Rio de Janeiro in June 1992 and entered into force in 1994. To achieve the Convention's objectives, the Kyoto Protocol was adopted in December 1997, committing Annex I Parties to individual, legally-binding targets to limit or reduce their greenhouse gas emissions, adding up to a total cut of at least 5% from 1990 levels in the "commitment period" 2008-2012. Targets cover emissions of the six main greenhouse gases, namely carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). Accounting all changes in emissions and removals by "sinks", activities of afforestation, deforestation and reforestation, which emit or remove carbon dioxide from the atmosphere, are also covered by the so-called LULUCF (land use, land-use change and forestry) sector.

Innovative mechanisms were conceived under the Protocol to help the developed countries (Annex I Parties) to reduce the costs of meeting their emission targets by achieving or acquiring reductions more cheaply in other countries than at home. One of these, the clean development mechanism (CDM), also aims to assist developing countries in achieving sustainable development by promoting environmentally-friendly investment in their economies from industrialized country governments and businesses.

In order to enter into force, the Protocol must still be ratified by Parties to the Convention which accounting for 55% of carbon dioxide emissions from this group in 1990, but most Annex I Parties have been reluctant to do so. By 2005 the Annex I Parties were expected by the Protocol to have made demonstrable progress in meeting their commitments. However, the complexity in mechanisms and negotiations have sensibly delayed these achievements. While some nations feel threatened by the potential economic repercussions of response measures, other are highly vulnerable to the adverse effects of climate change and require a prompt international response.

At the tenth anniversary of the Convention, a tentative to bring the Protocol into force was made in time for the World Summit on sustainable Development (WSSD) in Johannesburg. At this conference was clear that the humanity could not wait for the results of Kyoto. There was a clear sense of urgency in broadly addressing the global sustainability problems, even beyond climate change. For this reason and for the first time, energy was treated as a special chapter in the debated agenda.

The Brazilian Government took, first successfully to the Latin American and the Caribbean regions, then to the rest of the world, an ambitious proposal: an increase of "the use of new renewable sources to 10% as a share of world energy matrix by

¹⁹ by Oswaldo Lucon, Suani Teixeira Coelho and José Goldemberg, Sao Paulo Environmental Secretariat.

2010". Such modern sources included sustainable hydropower, geothermal energy, wind energy, all forms of solar energy, marine energy and modern biomass (*ie*, excluded fuelwood from deforestation).

Compared to the complexity of Kyoto mechanisms, this commitment is clear and straightforward. More than this, it is destined to the rich and to the poor. Modern renewable energy sources are the key not only for the Kyoto Protocol, but also for sustainable development in a broader sense: they enhance diversity in energy supply markets; secure long-term sustainable energy supplies; reduce local and global atmospheric emissions; create new employment opportunities offering possibilities for local manufacturing and enhance security of supply since they do not require imports that characterize the supply of fossil fuels.

During the 2002 WSSD, the discussion on renewable energy faced not only strong opposition from some countries (like the US, Japan and the OPEC, which large consumers and producers of fossil fuels), but also some doubts among countries. Developing countries, especially African, feared that targets and timeframes for renewable energy would interfere in their autonomy for burning woodfuels. Meanwhile, Scandinavian nations stated that all their woodfuel could be considered renewable energy, for it comes from planted forests.

This problem persists: there is no current energy database distinguishing sustainable from unsustainable fuelwood. The International Energy Agency (IEA) describes with good precision the shares of fossil and nuclear fuels. Geothermal, wind and solar renewable sources are allocated in an unique category, as well as the hydro data which do not distinguish by plant size. This however is satisfactory for carbon emission matters; the greatest difficulty is in the category named *combustible renewables and waste (CRW)*, encompassing both renewable and non-renewable (therefore unsustainable) shares of the biomass sources. Globally, combustible renewables and wastes (CRW) represented 11% of the total 415 EJ of world primary energy supply in 2000 (IEA, 2002). Non-renewable biomass is basically woodfuel from deforestation, leading to significant net carbon emissions - and other severe environmental impacts.

Also, the United Nations' Food and Agriculture Organization (FAO) has established a wood energy information system with statistics of consumption, yet without the percentage of such fuels that comes from renewable and sustainable practices.

The information provided by FAO on deforestation does not allow the allocation for sustainable energy use. However, it permits some rough estimations for carbon emissions from deforestation and comparisons with fossil fuel burning and other industrial activities, as those shown in the Table 1. Countries are displayed in four rankings:

- 1) an estimate for carbon emissions from net deforestation²⁰: a list where large developing countries with tropical forests are unfortunately in the first positions;

²⁰ two important observations: (1) in fact, a good part of this wood is not burned, but used for other purposes; even so, carbon will be released during the life cycle and not replaced and; (2) this consideration does not addresses biodiversity, since it does not segregate native forests replaced by monocultures

- 2) emissions from fossil fuel burning, fossil fuel burning, gas flaring and cement production: the most known (and well accepted) list
- 3) the added carbon emissions from the previous categories: to note the relevance of deforestation in some cases and;
- 4) an also ranked index of deforestation over total emissions by country: although seeming not too much important in terms of global carbon emissions, this index shows clearly the which countries need assistance to change their unsustainable needs of fuelwood.

Under the Convention on Climate Change, parties should act to protect the climate system “on the basis of equality and in accordance with their common but differentiated responsibilities and respective capabilities.” This includes two fundamental elements: (1) the common responsibility of States for the protection of the environment, or parts of it, at the national, regional and global levels and; (2) the need to take into account the different circumstances, particularly each State’s contribution to the evolution of a particular problem and its ability to prevent, reduce and control the threat (CISDL, 2004).

However, this principle should not be used by any country - developing or developed - to justify inaction. This is in practice what is happening: while some countries account carbon emissions since the 1700’s, others avoid changing their present unsustainable and voracious consumption patterns. While some countries expect huge donations for costly infrastructure (and in many cases corruption), other are providing "petty" assistance, hidden behind pilot projects with expected self-replicability.

There is no other answer to this, but strong commitments, at all levels. The best, surely desirable, would be at country level, followed by international banks and other development organisms. Unfortunately, in many cases countries stick to the need of consensual positions, which weakens the final compromises.

But there are solutions. One of these are the Renewable Portfolio Standards, targets and timetables for renewable energy adopted voluntarily, such as those adopted by the European Union, the Latin American and Caribbean region, China or even the state of Texas in the US. The other is *leapfrogging*, or climbing the energy ladder skipping intermediate levels. This one is specially important to countries where deforestations rapidly advances.

Another important win-win solution is the open trading of biofuels, a cleaner form of energy that can be produced specially in tropical countries, replacing oil imports throughout the world. Biofuels for internal use are also an interesting example of *leapfrogging*, when they replace deforested wood and fossil fuels.

The need for a consensus affected severely the WSSD Final Plan of Implementation, which intended to provide a *top-down* solution to achieve the Millennium Development Goals through the so-called Type I Initiatives. Now, the hope now is in the Type II voluntary partnerships, such as the Network of Regional Governments for Sustainable Development (nrg4SD).

Encompassing both developed and developing regions, the Network can be a powerful instrument to provide tangible collaboration to achieve sustainable development and to combat climate change.

Table 1: Estimates of carbon emissions by country, 2000

Country	(1) C emissions from deforestation (kt Ceq)	(2) C emissions from fossil fuel burning, cement production and gas flaring (kt Ceq)	(3) =(1)+(2) Total C emissions (kt Ceq)	(4) = (1)/(3) share of deforestation in total	(5) Ranking position according to (1)	(6) Ranking position according to (2)	(7) Ranking position according to (3)	(8) Ranking position according to (4)
United States	-10476	1528796	1518320	-1%	101	1	1	86
China	-27542	761586	734045	-4%	102	2	2	96
Russian Fed	-1890	391664	389774	0%	98	3	3	82
Japan	-66	323281	323215	0%	79	4	4	74
India	-694	292265	291572	0%	92	5	5	80
Germany	0	214386	214386	0%	62	6	6	61
Brazil	120645	83930	204575	59%	1	18	7	35
UK	-323	154979	154656	0%	81	7	8	79
Mexico	8519	115713	124232	7%	11	11	9	53
Canada	0	118957	118957	0%	63	8	10	62
Indonesia	44608	73572	118180	38%	2	21	11	41
South Korea	45	116543	116588	0%	60	10	12	60
Italy	-555	116859	116304	0%	91	9	13	81
Saudi Arabia	0	102168	102168	0%	64	12	14	63
Australia	4019	94094	98113	4%	22	14	15	54
France	-1426	98917	97491	-1%	97	13	16	88
Ukraine	0	93551	93551	0%	65	15	17	64
South Africa	162	89323	89485	0%	57	16	18	58
Iran	0	84689	84689	0%	66	17	19	65
Poland	-423	82245	81822	-1%	85	19	20	83
Spain	-516	77220	76704	-1%	90	20	21	84
Turkey	-407	60468	60061	-1%	84	22	22	85
Venezuela	12699	43054	55753	23%	7	25	23	49
Thailand	812	54216	55028	1%	47	23	24	56
Malaysia	12146	39414	51560	24%	8	26	25	47
North Korea	0	51544	51544	0%	67	24	26	66
Argentina	4845	37715	42560	11%	18	29	27	51

Country	(1) C emissions from deforestation (kt Ceq)	(2) C emissions from fossil fuel burning, cement production and gas flaring (kt Ceq)	(3) =(1)+(2) Total C emissions (kt Ceq)	(4) = (1)/(3) share of deforestation in total	(5) Ranking position according to (1)	(6) Ranking position according to (2)	(7) Ranking position according to (3)	(8) Ranking position according to (4)
Egypt	-53	38817	38764	0%	78	27	28	77
Netherlands	-15	37900	37885	0%	75	28	29	75
Czech Rep	-31	32416	32385	0%	77	31	30	76
Uzbekistan	0	32376	32376	0%	68	32	31	67
Kazakhstan	-1076	33099	32024	-3%	95	30	32	94
DR of Congo	29925	494	30419	98%	3	84	33	1
Pakistan	263	28604	28867	1%	55	33	34	57
Nigeria	18308	9866	28174	65%	5	53	35	29
Belgium	25	27905	27930	0%	61	34	36	59
Colombia	9310	15955	25265	37%	9	48	37	43
Peru	16476	8063	24539	67%	6	56	38	26
Greece	-188	24455	24268	-1%	80	35	39	87
Algeria	-506	24404	23898	-2%	89	36	40	90
Philippines	2537	21160	23697	11%	30	38	41	52
Romania	-465	23548	23083	-2%	86	37	42	89
Zambia	22126	498	22624	98%	4	82	43	2
Sri Lanka	516	20834	21350	2%	50	39	44	55
Iraq	0	20834	20834	0%	69	40	45	68
Israel	0	17221	17221	0%	70	41	46	69
Singapore	0	16115	16115	0%	71	46	47	70
Austria	-500	16607	16107	-3%	88	42	48	93
UA Emirates	0	16079	16079	0%	72	47	49	71
Portugal	-470	16330	15860	-3%	87	43	50	92
Libya	-25	15591	15566	0%	76	50	51	78
Chile	-1340	16239	14899	-9%	96	44	52	98
Vietnam	-858	15683	14825	-6%	94	49	53	97
Norway	-380	13623	13243	-3%	82	51	54	91
Ecuador	5172	6946	12118	43%	16	57	55	40
Cote d'Ivoire	8613	2859	11472	75%	10	60	56	18
Bulgaria	-380	11556	11176	-3%	83	52	57	95
Belarus	-5120	16144	11024	-46%	100	45	58	101
Bolivia	7366	3020	10386	71%	13	59	59	23
Myanmar	7367	2497	9864	75%	12	63	60	19
Cameroon	7271	1785	9056	80%	14	65	61	16
Zimbabwe	4480	4040	8520	53%	20	58	62	38
Guatemala	5009	2698	7707	65%	17	61	63	28
Cuba	-798	8437	7639	-10%	93	55	64	99
New Zealand	-2116	8752	6636	-32%	99	54	65	100
Madagascar	5675	619	6294	90%	15	81	66	7
Panama	4186	1729	5915	71%	21	67	67	24
Nicaragua	4709	1020	5729	82%	19	77	68	15
Sudan	2877	1425	4302	67%	27	71	69	27

Country	(1) C emissions from deforestation (kt Ceq)	(2) C emissions from fossil fuel burning, cement production and gas flaring (kt Ceq)	(3) =(1)+(2) Total C emissions (kt Ceq)	(4) = (1)/(3) share of deforestation in total	(5) Ranking position according to (1)	(6) Ranking position according to (2)	(7) Ranking position according to (3)	(8) Ranking position according to (4)
Ghana	2640	1609	4249	62%	28	68	70	33
Uganda	3708	416	4124	90%	24	88	71	9
Benin	3413	442	3855	89%	25	86	72	11
Liberia	3724	109	3833	97%	23	98	73	3
Kenya	1116	2553	3669	30%	41	62	74	46
Guyana	3099	436	3535	88%	26	87	75	12
Angola	1674	1747	3421	49%	35	66	76	39
Mongolia	1200	2046	3246	37%	40	64	77	42
Nepal	2126	928	3054	70%	31	79	78	25
Botswana	1859	1051	2910	64%	33	76	79	31
Honduras	1549	1307	2856	54%	37	72	80	36
Paraguay	1814	999	2813	64%	34	78	81	30
Malawi	2538	209	2747	92%	29	93	82	4
Tanzania	1365	1175	2540	54%	38	74	83	37
Ethiopia	790	1522	2312	34%	48	69	84	44
PNew Guinea	1639	662	2301	71%	36	80	85	22
Belize	1899	213	2112	90%	32	92	86	8
Senegal	338	1140	1478	23%	53	75	87	48
Uruguay	0	1476	1476	0%	73	70	88	72
Sierra Leone	1251	154	1405	89%	39	94	89	10
Guinea	998	353	1351	74%	42	89	90	20
Togo	814	490	1304	62%	46	85	91	32
Kyrgyzstan	0	1266	1266	0%	74	73	92	73
Mozambique	880	322	1202	73%	44	91	93	21
Cambodia	966	145	1111	87%	43	96	94	13
C. African Rep.	848	74	922	92%	45	99	95	5
Mali	767	152	919	83%	49	95	96	14
Namibia	219	497	716	31%	56	83	97	45
Laos	411	113	524	78%	52	97	98	17
Somalia	501	na	501	na	51	102	99	102
Niger	62	323	385	16%	59	90	100	50
Chad	328	34	362	91%	54	101	101	6
Guinea-Bissau	110	72	182	60%	58	100	102	34

(1) Carbon from **deforestation** was estimated by multiplying the annual change (in 1000 ha.) in forestries by the amount of wood biomass in forests (tonnes/ha) for each country (FAO, 2004) , by 25% (ie, considering 50% of dry wood with 50% of carbon contained)

(2) Carbon from **fossil fuel burning, gas flaring and cement production**, from Gregg Marland et. al, 2004

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3.4. CDM opportunities in São Paulo²¹



Introduction: the Challenges at CoP11

Global warming is known to be caused by the accumulation of certain gases in the atmosphere, known popularly as greenhouse gases or GHGs. Main activities that emit GHGs are burning of fossil fuels and biomass, organic matter decay, industrial activities, refrigeration processes, use of propulsors, expanded foams and solvents and the usage of fertilizers. To control GHG anthropogenic emissions was signed in 1992 the United Nations Framework Convention on Climate Change²² (UNFCCC). The UNFCCC's Conference of the Parties (CoP) represents the supreme body responsible for reviewing the implementation of the Convention. The COP has met regularly since 1995 in one after another of the participating countries. The 3rd COP session in 1997 led to the adoption of the Kyoto Protocol²³. The Protocol came into effect on February 16, 2005, 90 days after Russian ratification, condition for parties responding for at least 55% of global emissions. The 11th COP session will be held in Montreal, Canada, from November 28 to December 9, 2005.

The Kyoto Protocol's first commitment period (2008-2012), aims at reducing emissions of greenhouse gases (GHG²⁴) in industrialized nations—through targets which correspond on average to a 5% reduction over the amount of gases emitted in

²¹ A report for the Network of Regional Governments for Sustainable Development (www.nrg4SD.net), for the UNFCCC's CoP 11 Nrg4SD side-event, Montreal, December 2005. Authors (based on material provided by BM&F): José Goldemberg, Suani Teixeira Coelho, Oswaldo Lucon. Secretaria de Meio Ambiente do Estado de São Paulo (*São Paulo State Environment Secretariat*). Av. Prof. Frederico Hermann Jr. 345 054889-900 São Paulo SP Brazil www.ambiente.sp.gov.br

²² Full text at http://unfccc.int/essential_background/convention/background/items/2853.php

²³ Full text at http://unfccc.int/essential_background/kyoto_protocol/background/items/1351.php.

²⁴ Are regulated carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbon (HFC), perfluorocarbon (PFC), and sulfur hexafluoride (SF₆).

1990 on a country by country basis—and to establish a sustainable development model for emerging countries. For the second period, which begins after 2012, emission reduction targets have not yet been set. At CoP1, the Berlin Mandate has established that emission reduction targets for developing (non-annex I) countries would be discussed in 10 years time, *ie*, at CoP11 in 2005. A lot of debate will challenge the CoP11. The major global emitter, the United States, has not ratified the Kyoto Protocol but is a signatory to the UNFCCC. The country states that “common but differentiated responsibilities” does not mean inaction.

The role of regional governments: São Paulo

Although decisions are made at national level, regional and other subnational voluntary actions can add to the compliance of the UNFCCC’s objectives, specially by strengthening the existing flexibility mechanisms.

Flexibility mechanisms are technical operational arrangements regulated by the Kyoto Protocol which allow countries or companies to use carbon credits, thus creating additional facilities that the parties listed on Annex B can use to help meet their emission reduction commitments and encouraging emerging countries to reach an adequate model of sustainable development.

There are two types of carbon markets within the Kyoto Protocol: Markets based on credits generated by emission reduction projects (Clean Development Mechanism and Joint Implementation Projects), and allowance markets. A GHG allowance market is a trading system which is more applicable to the Annex B countries since it relates to the limits set on total GHG emissions within a determined geographical area. For example, the government of an Annex B country establishes maximum limits of allowed emissions for various industrial sectors in that country. In this context, companies are allowed to sell their spare allowance to other companies that have failed to achieve their reduction targets. The first model of this system to enter into force worldwide was the European Emissions Trading Scheme (EU ETS), which went on stream on January 1, 2005, in line with the Kyoto Protocol propositions. The Certified Emission Reduction (CER) market is related to the purchase and sale of CERs, which can also be traded by companies established in Annex B countries as a means to abate their emission reduction targets.

The Network of Regional Governments for Sustainable Development - Nrg4SD - regions can contribute to both of these markets.

São Paulo has experience and projects to offer, specially in the areas of biofuels and forestry recovery. Ranked alongside entire nations on the basis of carbon dioxide (CO₂) emissions, excluding land use change, the state of São Paulo would be the 39th largest source of emissions. But greenhouse gas emissions per capita and emissions per unit of economic activity have been declining in the state of São Paulo since 1999. Programs and policies are helping the state to limit GHG emissions in the region, with local co-benefits:

- the use of ethanol blended in gasoline (gasohol) resulted in avoided emissions of nearly 7 million tons of CO₂ (t CO₂) in São Paulo state in 2003; the biofuel costs less than gasoline today, without subsidies, reducing also air pollution;

- the national electricity conservation program (PROCEL) resulted in significant avoided investments in power plants and GHG emissions savings, with an overall benefit-cost ratio of 12:1;
- landfill methane gas emissions are generating energy, replacing fossil fuels;
- a program for recovery of the potential 1 million hectares of riparian deforested areas is undergoing, in order to reduce up to 180 million tCO₂eq in 20 years, plus recovering ecosystems and protecting water bodies.

São Paulo believes that a good option would be introducing in CDM sectoral and voluntary projects, like energy intensity reduction targets, transport-based systemic projects like urban metro and global widespread deployment of biofuels and other renewables, among others.

More than complying more ambitious and realistically with the Kyoto targets, renewable energies are well-known for their connection with the Millenium Goals and the 2002 WSSD Plan of Implementation.

The CDM Process

The concept underlying the Clean Development Mechanism (CDM) is that of the voluntary reduction of GHG emissions or their sequestration from the atmosphere by a company based in a developing country, creating credits which can be traded in the global carbon market with industrialized countries (or with their companies) in need of these “credits” to meet their Kyoto Protocol targets. This flexibility mechanism, therefore, enables countries to reduce their global GHG emissions while also providing an attractive alternative method to foster sustainable development in the emerging market countries. To be recognized under the Kyoto Protocol and generate carbon credits (Certified Emission Reductions, or CERs²⁵): (1) the project participant (i.e. a company) must prepare a Project Design Document (PDD); (2) the Designated Operational Entity must validate the methodology used in the PDD; (3) the Designated National Authority must approve the proposed project; (4) the project activity must then be registered with the CDM Executive Board; (5) the project participant must carry out the monitoring of the CDM activity; (6) the Designated Operational Entity performs the verification and certification of the GHG emission reduction resulting from the project; and then the CDM Executive Board issues the CERs. The Project Design Document (PDD)²⁶ is a document prepared by the CDM participant (a company) containing a general description of the project, the crediting period, the baseline and monitoring methodologies, the calculation of GHG emission reductions by sources, environmental impacts, stakeholders’ comments and information on public funding sources from Annex I parties for the project. The baseline²⁷—or reference scenario—of a CDM project comprises the current level and the evolution of GHG emissions which might occur if the CDM activity were not implemented. CDM projects have a predetermined crediting period. In the case of afforestation and reforestation projects, a maximum of 20 years—renewable two

²⁵ The CER is a unit issued by the CDM Executive Board as a result of the CDM project activities. One CER represents the non-emission or sequestration of one tonne of carbon dioxide equivalent from the atmosphere.

²⁶ PDD forms are available at <http://cdm.unfccc.int/Reference/Documents>

²⁷ An updated list of approved baseline methodologies can be found at <http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>

times at the most—or a maximum of 30 years without the possibility of renewal. For CDM projects which pertain to other sectoral scopes, a maximum of 7 years—renewable two times at the most—or a maximum of 10 years without renewal.

CDM Projects in Brazil

Proposed CDM projects should be validated, verifying and the GHG reductions resulting from project-based activities certified by a Designated Operational Entity (DOE), recognized by the Designated National Authority²⁸ (DNA) and established in the country²⁹. The DNA only receives for approval projects which were previously validated by an accredited DOE³⁰. Project registration by the CDM Executive Board represents the formal acceptance and recognition as a validated CDM activity³¹. After implementation, CDM projects must be monitored. The consistency of the data collated in the monitoring report must be verified and certified by the DOE and further submitted to the CDM Executive Board, thus allowing the corresponding CERs to be issued.

The Brazilian Carbon Market (MBRE³²) is a set of institutions, regulations, project registration systems, and trading centers undergoing implementation in Brazil, aiming to stimulate the development of CDM projects through an organized online environment for emissions trading. The BM&F Carbon Facility³³ is an electronic system for the collation of data related to DOE validated CDM projects, and projects which are still undergoing validation/certification. Qualified investors who have pre-registered at BM&F can express their interest in purchasing carbon credits to be generated from CDM projects. To register a project in the BM&F Carbon Facility, the applicant should access the BM&F Internet system and after the registration is approved, fill out and submit the online project registration form. In the case of projects which are already validated under the Kyoto Protocol, they should be submitted by using the aforementioned online forms, and include their respective Project Design Documents and Validation Reports. Also through the BM&F Carbon Facility, governmental agencies, multilateral entities, NGOs, investment funds, and companies can express their interest in the purchase of CERs in the forward and option markets, after approved the online registration.

CER trades must follow market principles of transparency and equitable practice. In the first phase, CERs will be traded in the forward and option markets through

²⁸ The Designated National Authority (DNA) of the Clean Development Mechanism is a governmental body formally appointed by a country in order to approve projects proposed in its territory within the CDM scope - a basic requirements for the project to be submitted to the CDM Executive Board. In Brazil, the DNA is an Interministerial Committee for Global Climate Change composed of the Chief of Staff of the President of the Republic and the following Brazilian Ministries: Sciences and Technology (the Committee coordinator); Foreign Affairs; Agriculture, Livestock and Supply; Transportation; Mines and Energy; Planning, Budget and Management; Environment; Development, Industry and Foreign Trade; Municipalities; and Finance.

²⁹ The updated list of DOEs accredited by the CDM Executive Board can be obtained at <http://cdm.unfccc.int/DOE/list>

³⁰ Submission rules are described in Resolution No. 1, of September 11, 2003, of the Brazilian Interministerial Committee for Global Climate Change. This regulatory instrument is available at <http://www.mct.gov.br/clima/comunic/pdf/Resolucao01ing.pdf>. The updated list of projects approved by the Brazilian DNA is at <http://www.mct.gov.br/clima/ingles/cigmc/projaprov.htm>

³¹ An updated list of registered projects can be downloaded from <http://cdm.unfccc.int/Projects/registered.html>

³² *Mercado Brasileiro de Redução de Emissões*, established by the Brazilian Mercantile & Futures Exchange (BM&F) and the Rio de Janeiro Stock Exchange (BVRJ) in partnership with the Brazilian Ministry of Development, Industry and Foreign Trade (MDIC).

³³ The BM&F Carbon Facility is available at <http://www.bmf.com.br/2004/pages/MBRE2/conheca.asp>

electronic registration of Emission Reduction Purchase Agreements. The first stage of the Brazilian Carbon Market launched in mid-September 2005 is the implementation of the BM&F Carbon Facility. The second stage of the organization of the Brazilian Carbon Market entails the set up of a carbon credit trading environment in the option, forward and spot markets. This phase will be gradually implemented towards the end of 2005. This trading system will be operational by the first trimester of 2006.

CONCLUSION

At CoP11, crucial decisions are needed to preserve the reliability of the Kyoto Protocol. A necessary step is to extend beyond 2005 the acceptance of CDM projects and to extend beyond 2012 Kyoto target compliances. To keep up with the accelerated pace of the threats posed by climate change, other measures could be increasing GHG emission reduction targets for Annex I and accepting as GHG transactions voluntary reductions from all countries.

With the support from the Network of Regional Governments for Sustainable Development (Nrg4SD), voluntary regional initiatives in sectors like renewable energies can accelerate this process, moving beyond *business-as-usual* and creating the necessary caveats for realistic commitments based upon targets and timetables. Online tools are being developed to speed up this process.

3.5. Tuscany: a Pilot Initiative of Regional Governments to Broaden the Scope of EU Emissions Trading³⁴

The EU's Institutions and its Member States have undertaken a number of actions to build the legislative framework and the economic environment which can make the Kyoto Protocol's commitments become operational. Among such actions, the establishment of an EU Emissions Trading Scheme (EU-ETS) is especially relevant, in that it is designed to set in motion a major market mechanism which will mobilize large-scale private sector financing for the abatement of GHG emissions. The EU Directive No. 2003/87 sets the rules of the EU's Emissions Trading Scheme.

Regional governments have a key role not just in legislating on environmental matters, but also on the hands-on implementation of environmental policies, which may prove especially relevant in addressing climate change. This is most important where such policies require a high degree of cooperation by the public, which is required to change its behaviour and consumer patterns for the project to ultimately succeed. These institutions have the capability to develop and implement effective policies which may lead to GHG abatements in the major sectors which are presently not covered under the EU's emission trading Directive.

The present proposal is designed to develop the capacity of Regions to broaden the scope of application of emissions trading within the EU and outside its boundaries through the "opting in" under article 24, and "grouping" under 28 of the Directive of new sectors and clusters of small and medium entities. In particular the project is intended to reach the following objectives by the 1st of January 2008:

- *Knowledge of the feasibility of opting in for priority sectors;*
- *Knowledge and forecasting ability on the market for CERs and ERUs;*
- *Capability to monitor emissions of the priority sectors and to certify abatements;*
- *An enabling legislative and public consensus on the initiative;*
- *Significant pilot applications with extra-European regions.*

There are obstacles, however, which need to be overcome before the "opting in" of such sectors can take place. We can envisage four factors of a certain relevance:

- *Certification and monitoring;*
- *Deployment and diffusion of appropriate technologies and best practices;*
- *Risks and Penalties;*
- *Market uncertainties.*

In developing the present project, the Regions concerned will pool their financial resources, technical know how and best practices, to multiply results and obtain

³⁴ By the Government of Tuscany Region

economies of scale. They will together pursue access to state of the art technologies and efficient models of intervention.

The project will be implemented in three phases, starting in September 2004 and ending in December 2007, and nine clusters of activities will be promoted. The project will be directed by a Steering Committee, composed of representatives of the participating regions and it will be managed by a Project coordinator, will have a focal point in each Region.

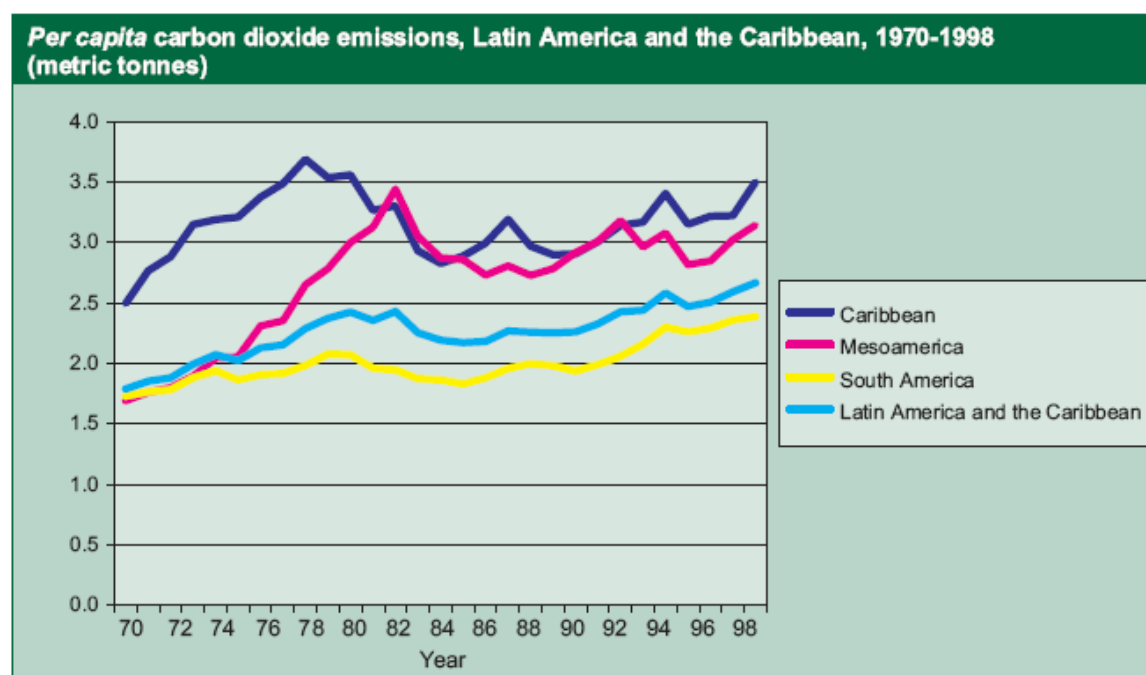
Thus the project will support the Regional governments in defining their strategy and policy options in readiness for the Directive deadline, and in the process develop, deploy and diffuse technical knowledge and best practices to reduce GHG emissions. Outside the EU, the project will create new employment opportunities, transfer of new technologies and improvement of professional skills.

Important social benefits are also expected in terms of poverty alleviation, and the initiative will contribute to diminish the risk of social conflict caused by competition for scarce natural resources.

3.6. United Nations Environment Programme, UNEP: Climate Change in Latin America and the Caribbean: Opportunities and Challenges³⁵

Climate change is an acute threat to Latin America and the Caribbean given the vulnerability of its environment (both natural and urban) and high poverty levels.

In the mid-1990s, preliminary estimates indicated that the Latin America and Caribbean region was responsible for approximately 11 per cent of global carbon dioxide emissions, with 4.3 per cent of emissions coming from industry and 48.3 per cent from land use changes. Regional methane emissions from anthropogenic sources (mainly livestock farming and the production and consumption of fossil fuels) represented 9.3 per cent of the world total (WRI and others, 1996). Average *per capita* carbon dioxide emissions in the region were 2.7 tonnes in 1998, very much below the 10.2 tonnes calculated for high-income economies (19.4 tonnes in North America, 7.5 tonnes in Europe and Central Asia and 7.4 tonnes in Western Asia) and also lower than the world average of 3.9 tonnes (UNEP, 2002d).



Source: UNEP, 2002d, compiled from data provided by CDIAC, based on net fossil fuel combustion and UN population data.

These estimates indicate that Mexico and Brazil are among the 20 main carbon dioxide-emitting countries in the world, in order of magnitude, while Venezuela, Argentina, Colombia and Chile are among the top 60 emitting countries (Marland and

³⁵ By Cristina Montenegro and Ricardo Sanchez, UNEP Regional Office for Latin America and the Caribbean

Boden, 2000a). As to *per capita* emissions, several nations and territories in the Caribbean (the US Virgin Islands, the Netherlands Antilles, Aruba, Trinidad and Tobago, the Cayman Islands and Bermuda), as well as Venezuela, all oil producers, are among the 60 main emitting countries (Marland and Boden, 2000b). Due to the relatively small population in the Caribbean, this *per capita* contribution is not a significant percentage of the total volume.

Deforestation is considered to be the main source of atmospheric emissions in Latin America and the Caribbean, particularly due to processes occurred in the Amazon basin; (UNEP, 1999c; COPPE, 2002). Large cities in the region, as well as many medium-sized cities, also emit greenhouse gases, mainly generated by motor transport and industrial production. Although carbon dioxide is generally the main greenhouse gas, if total greenhouse gases are estimated in carbon dioxide equivalent units, methane is more important in countries such as Argentina, Chile and Uruguay (UNFCCC and SBI, 2000). More than 71 per cent of methane emissions in South America and 48 per cent in Mexico come from livestock.

In any case, emission estimates are only approximate because it is difficult to obtain reliable and comparable data from most countries in the region (UNEP 1999a, UNFCCC and SBI 2000). Identification of specific emission factors for particular systems or regions is still preliminary and the characteristics of the forestry situation and changes in land use are hard to define. In general, few data are available, and information has to come from diverse statistics and even anecdotal evidence. Furthermore, there is a widespread lack of monitoring infrastructure, except in some large metropolitan areas. In many countries carbon emissions could be greatly reduced, by taking advantage of renewable biomass energy sources and establishing carbon sinks by means of forest conservation programmes and reforestation.

Present models indicate that rising global temperatures may affect climate conditions such as rainfall, wind speed and frequency of extreme climatic events (storms, torrential rains, hurricanes and drought). There are also potential impacts on human disease and death rates related to climate change. Increased temperatures may cause more tension from heat, as well as the spread of tropical diseases by vector insects on higher land and an increased incidence of diseases such as malaria, schistosomiasis, dengue fever, yellow fever and cholera (IPCC, 2001; McCarthy and others, 2001).

On a regional scale, climate change would also affect ecosystems, water resources, agriculture and coastal systems in Latin America and the Caribbean (IPCC, 1997). Ecosystems such as forests and grasslands, mountain systems and transition zones are particularly vulnerable. An exceptionally serious problem would be the continued deforestation in the Amazon, as mentioned above, which would have a significant impact on the global carbon cycle. Changes in the water cycle would especially endanger arid and semi-arid zones, as well as hydroelectric energy generation, cereal and livestock production in places such as Costa Rica, Panama, the lower slopes of the Andes, Chile and Argentina.

A change, namely a decrease, in precipitation pattern would have an adverse effect on crop production in the region and may cause a slow change in the spectrum of species in the borders of the Amazonian forest in Brazil, with an increase in the frequency of savanna-type species, better adapted to a drier climate. The decrease in the area and

volume of mountain glaciers is already being observed, and it is predicted to become more intense in the future.

Greenhouse gas emissions in carbon dioxide equivalent terms (100 year horizon)				
	Emissions	Global warming potential (100- year horizon)	Relative total	Relative contribution (%)
Latin America (27)				
CO ₂	1,088,795.0	1	1,088,795.0	45.0
CH ₄	42,690.5	23	981,882.3	40.6
N ₂ O	1,184.6	296	350,653.4	14.5
Caribbean (11)				
CO ₂	23,561.0	1	23,561.0	15.3
CH ₄	856.0	23	19,688.0	12.8
N ₂ O	372.7	296	110,307.4	71.8
Mesoamerica (6)				
CO ₂	444,493.0	1	444,493.0	77.4
CH ₄	4,914.0	23	113,022.0	19.7
N ₂ O	57.6	296	17,037.8	3.0
South America (10)				
CO ₂	620,741.0	1	620,741.0	36.7
CH ₄	36,920.5	23	849,172.3	50.2
N ₂ O	754.4	296	223,308.3	13.2

Source: UNFCCC, 2002c; CETESB, 2002; COPPE, 2002; EMBRAPA, 2002a, 2002b; Perdomo and others, 1995

Coastal systems in many countries in the region could shrink and lose biodiversity, with damage to the infrastructure and salinization problems. About 60 per cent of the regional population lives less than 100 kilometers from the coast (Cohen and others, 1997), and many of the region's large metropolitan areas are highly vulnerable to a rise in sea level including, obviously, the main ports and coastal cities.

The small island states in the Caribbean are in the greatest threat of socio- economic and environmental losses even though they contribute very little to regional greenhouse gas emissions, and much less to global emissions.

Impacts and vulnerability of the region

Having in mind the regional context, the following issues of concern are still to be properly addressed from a regional point of view:

- The magnitude and rate of climate change in different parts of the region;
- The relative vulnerability of ecological and socio-economic systems to climate change and respective impacts;
- The identification and implementation of feasible adaptation and mitigation options and the capacity of the region to generate adequate options; and
- The effective role of regional and international cooperation.

Latin America and the Caribbean have actively contributed to the development of the international regime on climate change. The 33 nations of Latin America and the Caribbean had ratified, by September 2000, the UN Framework Convention on

Climate Change (UNFCCC). Of these 33 nations, 24 had ratified the Kyoto Protocol by November 2002 (UNFCCC, 2002a).

Diversified, but equivalent, policy options and institutional arrangements have been put into place by countries of the region that may have an important impact in reducing emissions. Many countries have improved their legal framework to comply with UNFCCC issues, particularly on air pollution and forestry-related issues. In the Caribbean, 10 countries have established mechanisms to coordinate their activities to adapt to global climate change. Innovative economic instruments are also being promoted including trading transferable greenhouse gas mitigation certificates and imposing green taxes on petrol (UNEP, 2000).

The Latin American and Caribbean Initiative for Sustainable Development (ILAC) adopted by countries in the region at the World Summit on Sustainable Development (Johannesburg, 2002) has set the goal of increasing renewable energy use to 10 per cent of total energy consumption before 2010 (UNEP/ROLAC, 2002).

Latin American and Caribbean countries maintain a variety of positions regarding the role that carbon sinks can or should play in implementing the Kyoto Protocol, as well as in relation to adaptation (predicted impacts of climate change can be the object of adaptation measures to a certain extent such as in the case of agriculture) or mitigation measures. In spite of that, the region has engaged in the process of developing projects for the addressing emissions of greenhouse gases and for submission to the UNFCCC under the Clean Development Mechanism.

Regional perspectives

It is reasonable to assume that as the international climate regime evolves convergence of objectives and concerted actions at regional level can also be improved to address adaptation and mitigation of greenhouse gases emission and the phase out of substances that damage the ozone layer in the region.

This process encompasses not only strengthened communication and cooperation among government agencies, private initiative, international organizations and civil society but also technology exchange and the promotion of effective financial and technical assistance mechanisms.

A better assessment of regional and sub-regional vulnerabilities as well as full understanding of the impacts of climate change in the cases where adaptation is not possible are key development factors for countries in this region. The pooling of existing scientific capabilities and facilities in the region, by strengthening existing cooperative mechanisms, can be helpful in the development of policies and measures for enabling Latin America and the Caribbean to face climate change and other development challenges.

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4. Conclusion

According to the Gauteng Declaration³⁶, the founding Charter of the global Network of Regional Governments for Sustainable Development (nrg4SD), the members of the Network are committed to sustainable development as outlined in the Agenda 21 and the Rio Declaration, and the United Nations' Millennium Declaration and each and every region in the world should contribute to sustainable development, as described in the 27 Principles of the Rio 1992 Declaration³⁷.

Nrg4SD has already undertaken some important initiatives with an especial impact in the field of climate change such as: (a) the process to agree on a limited set of common regional indicators level with a view to identify where actions are more effective; (b) nrg4SD policy papers on renewable energies and Sustainable Forest Management; (c) installation of a nrg4SD-website on renewable energies (www.regional-renewables.org), (d) participation in the REN21 network (Renewable Energy Policy Network for the 21st Century) and membership of the REN21 Steering Committee, (e) participation in Renewables 2004 (Bonn) and BIREC 2005 (Beijing), (f) the organization of technical visits to North Rhine Westphalia and Bilbao; (g) debating strategies for the EU and their effects on developing regions and (h) a pilot initiative of regional governments to broaden the scope of EU emissions trading.

This report aims to be a "living document" where new contributions from different regions will be included. At the same time, it is considered as a crucial source of information for future proposals of action promoted by nrg4SD and addressed not only to its members but also to the local, national and international level with a view to create all synergies possible for achieving the common goal of addressing climate change and, ultimately, ensuring the sustainable development in the world.



³⁶ <http://www.nrg4sd.net/ENG/Network/Documents/gauteng.htm>

³⁷ The Rio Principles can be summarized as: (1) human beings are central in sustainable development; (2) sovereignty of States; (3) equity in the right to development, both for present and future generations; (4) environmental protection considered together with development; (5) cooperation amongst States; (6) priority to the needs of most vulnerable developing nations; (7) common but differentiated responsibilities to conserve, protect and recover Earth's ecosystems; (8) reduction and elimination of unsustainable production and consumption patterns; (9) cooperation for knowledge and technology exchange; (10) full public participation and access to information; (11) effective environmental legislation, reflecting the applicable environmental/developmental context; (12) cooperation for an open economic system based on sustainable development; (13) the polluter pays principle; (14) prevention against transfers of harmful economic activities or products; (15) the precautionary principle; (16) internalization of externalities; (17) impact assessment; (18) notification of disasters; (19) information for harmful products and activities; (20) wide women participation in the process; (21) youth mobilization; (22) indigenous communities effective participation; (23) protection to the oppressed; (24) protection against conflicts; (25) peace and sustainable development are independent and inseparable; (26) peaceful resolution of disputes under the UN Charter; (27) good faith and partnership for development.

**Network of Regional Governments
for Sustainable Development**

