



Energy Security for Sustainable Development in the Americas



Organization of
American States

Executive Secretariat for Integral Development

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Introduction

At the First Summit of the Americas hosted in Miami in 1994, the Heads of State recognized that access to sustainable energy is indispensable to social and economic development and established the *Partnership for Sustainable Energy Use*¹. Subsequent Summits maintained a focus on energy as a critical theme in the pursuit of sound economic growth and environmental sustainability. Further, at the 37th OAS General Assembly held in Panama City in 2007, the Member States unequivocally recognized as an essential goal, the need to generate and strengthen regional markets for the use of cleaner and renewable energy, as well as the exchange of information and experiences pertaining to sustainable energy for achieving sustainable development within the Hemisphere. In anticipation of the Fifth Summit of the Americas, the issues surrounding sustainable energy are even more relevant today and warrant aggressive responses from the heads of State.

The numerous challenges confronting the Americas in the energy sector are further exacerbated by the global financial crisis—hemispheric sustainable energy is an increasingly difficult challenge. The crisis is impacting the energy markets at all levels and is perceived as a threat to the region's energy security. For consumers, the ability to pay for energy services has been significantly reduced as a result of job losses and loss of income. For energy producers and investors, deteriorating debt and equity markets have made accessing capital for new investments in energy supplies more difficult. Numerous energy projects have been suspended or canceled as a result of the crisis. Examples include over CAN\$60 billion in delayed or canceled oil sands projects in Canada; the downsizing or cancelling of major wind farm and ethanol projects in the United States, and the suspension of over US\$125 million in energy investments planned for 2009 in Brazil. On the positive side, reduced global demand for oil and the consequent drop in oil prices over the past six months have benefitted consumers. However oil producers in the region have suffered significant reductions in revenue.

While the countries of the hemisphere boast unique energy production capabilities and consumption patterns (the section below provides a summary of key energy-related statistics throughout the region), there are a number of common challenges that confront them such as:

- Access to modern energy services
- Link between energy and climate change
- Energy supply reliability
- Energy price volatility

This policy brief examines several of these challenges, particularly in the context of the current economic crisis. In response to each of these challenging issues, a number of policy and development alternatives are suggested.

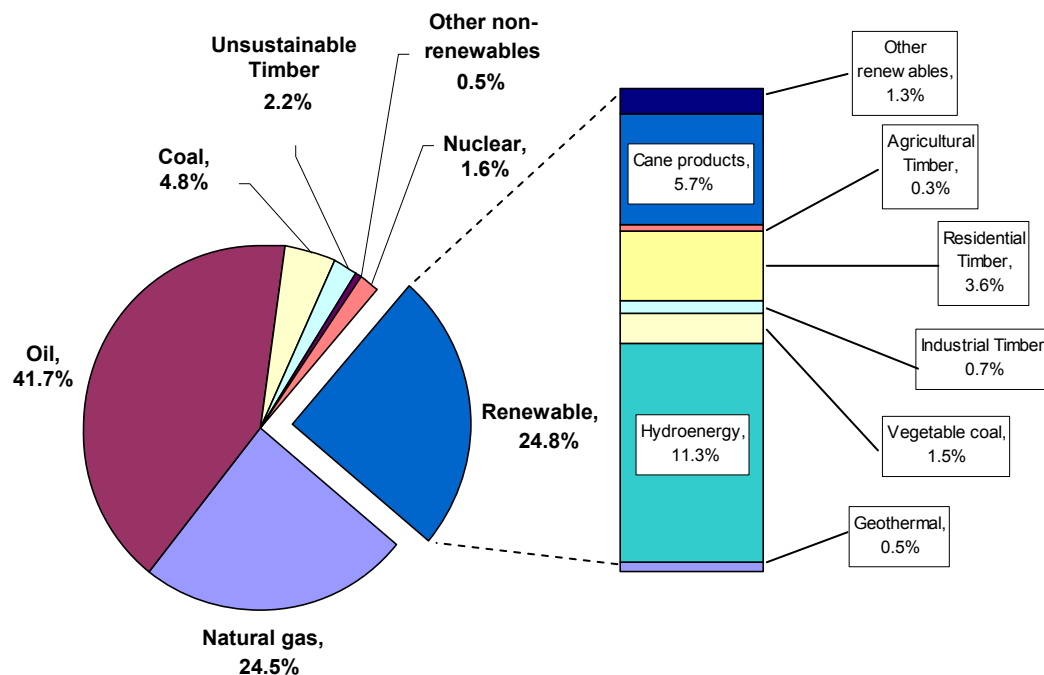
¹ See http://www.summit-americas.org/Miami_Summit/Energy_Eng.htm

The Current State of Energy in the Americas

Summary²

Fossil fuels, including oil, natural gas and coal, are the dominant source of energy for the region, accounting for 71% of the energy supply. The export of oil and gas is also an important source of foreign exchange for Latin America and the Caribbean region. However, the global financial crisis has caused a sharp decline in oil prices, thus greatly reducing the income of the region's oil exporting countries. The projections for the next 25 years suggest that oil, gas, and large-scale hydropower will continue to dominate the region's energy supply. The projection of renewable energy remains relatively smaller in comparison. The graphic below shows the composition of the energy supply of Latin America and the Caribbean region for the year 2004.

Energy supply Latin America and the Caribbean - 2004³



Data released by the Latin American Energy Organization (OLADE) reveals that, in 2006, the Americas consumed more than 6,000 TWh of electricity. According to the International Energy Agency (IEA), over the next 30 years this rate of consumption is expected to grow by a yearly rate of 1.1% in North America and 2.4% in Latin America and the Caribbean region. The International Energy Agency (IEA) forecasts a three-fold increase in electricity generation and a doubling of capacity, requiring investment of over US\$1 trillion to meet electricity demand in Latin America by 2030. At the current expansion rates, the IEA estimates that Latin America will have to invest at least the equivalent of 1.5% of its total gross domestic product per year by

² A complete set of global statistics on energy can be downloaded from http://www.iea.org/textbase/nppdf/free/2008/key_stats_2008.pdf

³ ECLAC (2006): 'Renewable Energy Sources in LAC: 2 years after Bonn'

2030—approximately 50% more than average energy investment requirements worldwide—in expanded energy supply and infrastructure to supply energy demand.⁴

With regard to the specific sector of electricity, in the five-year period between 2003 and 2007, the countries of the Americas augmented their electric power installed capacity by an average of 9.4%, thus contributing approximately an extra 90 gigawatts of installed capacity to the region's electric grid. Belize's installed capacity increased by 35.5%, the highest growth rate for the 2003/2007 period, whereas Colombia's decreased by almost 7%.⁵ In Latin America electricity generation is in most cases dominated by large scale hydropower (59%), natural gas, oil, and diesel (31%), and nuclear energy (7%). In the Caribbean region, almost all of the electricity produced and consumed comes from thermal plants using imported oil and diesel (93%) for power generation. In the case of North America, in Canada 57% of electricity generation comes from large scale hydropower, 26% from thermal, and 15% from nuclear. In the United States, electricity generation is dominated by thermal energy (70%) predominantly from coal, and nuclear (20%). Hydropower represents 7% of the total electricity generation. In Central America, about 10% of the electricity generation comes from non-hydro renewable resources—geothermal, cogeneration, and wind. Yet hydropower occupies almost 50% of the power supply.

It is estimated that some 50 million people (10% of the population) do not have access to modern and reliable electricity services. Most of these people live in rural and remote areas. In some countries of the region, the percentage of the rural population with no access to electricity ranges from 20% to as much as 90%. Renewable energy technologies offer a solution in areas where extending the power grid is difficult and financially prohibitive. These dispersed approaches to electrification offer cost effective solutions for countries working to improve the infrastructure for rural and indigenous communities, and thus reduce rural poverty.

The region demands ever increasing energy supplies to sustain economic growth and development. However, energy resources are under great pressure. Current energy generation and consumption patterns pose a serious threat to the environment, particularly with regard to CO₂ emissions. Increasingly, the governments of the Americas are becoming aware of the fact that energy paradigms need to be revised to adequately respond to the challenge of supplying reliable energy to their populations. In this regard, a myriad of concerns relating to energy arise as crucial for the region.

⁴ Please see annex 1 for more energy statistics of the countries of the Americas

⁵ Idem

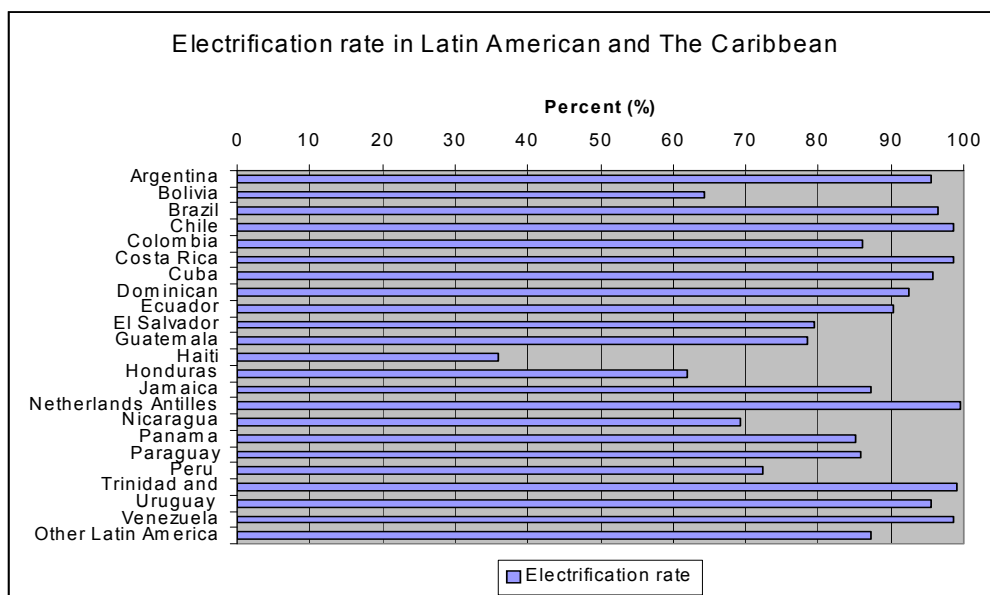
I. Challenges to Energy Sustainability

Access to Modern Energy Services

Access to modern energy services emphasizes the availability of energy that is widespread (or universal), diverse, reliable, secure, and affordable. Access to modern energy is fundamental to provide for basic social needs, propel economic growth and fuel human development. Energy in its many forms, whether electricity, steam, or fuels for transportation, is the single most important input—after human innovation and creativity—to building a dynamic, vibrant society. Lack of, or inadequate, access to energy has a direct impact on a number of issues that include, but are not limited to: low levels of industrial and agricultural productivity; poor human and environmental health; deficient education; unsound water management practices; unreliable communication services; and insufficient access to information.

For many decades, the countries of the Americas have been striving to provide universal access to reliable energy services. At several Summits of the Americas, the Heads of State stressed the issue of access to energy as a key priority linked to poverty alleviation, job creation, environmental sustainability, and the promotion of democracy. Without adequate access to modern, affordable and reliable commercial energy, poor countries are trapped in a vicious circle of poverty, social instability, and underdevelopment.

Rural electrification policies are effective at moving forward universal electrification. These types of policies are of particular importance for the region considering that an estimated 10% of the population in Latin America and the Caribbean do not have access to modern electricity services. Expanding energy services in rural settings requires the escalation of energy infrastructures and, in most cases, the implementation of off-grid schemes. Renewable energy technologies play a fundamental role in rural electrification.



Biomass is a major source of energy in the Americas. Wood, manure and waste from harvests are important sources of energy for cooking and heating. The World Health Organization

estimates that in Latin America, approximately 30,000 people die annually of respiratory infections caused by indoor air pollution. Sound practices relating to the sustainable use of biomass in its solid and liquid forms should be promoted. The nations of the Hemisphere have a considerable potential to produce ethanol and biodiesel in ways that promote rural development and support economic growth while ensuring the long-term improvement of food security. Biofuels may impact positively on climate change if they are produced in a sustainable fashion. They can also help to expand access to reliable energy services. However, issues such as land use planning and biodiversity protection have to be kept under constant review.

The global financial crisis puts further pressure on the many challenges that affect the region's energy sector. Global recession hits both energy producers and consumers, particularly the poor which may be unable to afford these services. Assistance geared toward the payment of energy services is needed to support impoverished communities. Assistance may be structured in the form of focalized subsidies.

Finally, given the particularly higher scarcity of energy in parts of the Hemisphere, its efficient use is a priority which should always be contemplated in any policy, law, program or initiative seeking to advance the access to energy. Improved management of energy systems is fundamental as energy cannot be wasted. Energy wasted because of aging energy infrastructure, or outdated technologies (e.g., old refrigerators, inefficient light bulbs, etc.) are issues that must be swiftly addressed through standardization, labeling policies, and low-cost investments on energy efficiency technologies.

Policy Responses

- Advancement of rural electrification policies and schemes
- Promotion of best practices relating to the sustainable use of biomass
- Development of sustainable biofuel programs
- Payment mechanisms that support access to energy services for the poor
- Advancement of energy efficiency policies and regulations as a cross-cutting theme linked to access to modern energy
- Identification and promotion of best practices on improved accessibility and affordability of modern energy services

II. Link between Energy and Climate Change

The energy and transport sectors are the largest contributors to global greenhouse gas (GHG) emissions caused by the combustion of fossil fuels. These two sectors combined account for 70% of total GHG emissions released into the atmosphere. According to World Bank, the energy sector alone causes 59% of global GHG emissions. At the accumulated rate of 145% between 1970 and 2004, the energy sector is also the fastest growing GHG contributor, followed by the transport sector (120%); the industry sector (65%); the land use, land change and forestry sector (40%); the agriculture sector⁶ (27%); and the buildings sector⁷ (26%).⁸ Conversely, the energy sector is extremely vulnerable to impacts associated with climate change. The close link between energy and climate change has grave consequences for economic growth and environmental sustainability.

Carbon dioxide (CO₂) is the most common type of GHG. In 2005, 8.1 billion metric tons of energy-related CO₂ emissions originated in the Americas, of which 7 billion originated from North America and Mexico. The Latin America and the Caribbean region represents 8.5% of the world's population and account for about 12% of global GHG emissions. CO₂ emissions released into the atmosphere as a result of the combustion of fossil fuels increased from 760 million tons in 1980 to 1,327 million tons in 2005. According to data released by the IEA, this represents an average annual growth rate of 2.3%. At the regional level, total CO₂ emissions originating from the transport sector almost doubled between 1980 and 2005, from 251 million tons to 453 million tons. This represents an average annual growth rate of 2.4%. Conversely, the energy sector accounts for 26% of the region's total CO₂ emissions.

In its Fourth Assessment Report on Climate Change, the Intergovernmental Panel on Climate Change (IPCC) concluded that global temperatures increased by about 0.74°C (0.56°C to 0.92°C) since the 19th century as a result of human induced GHG emissions. The same trend is observed in the Americas. According to some studies, failure to curb man-induced GHGs may result in annual costs estimated at 5 to 20% of the world's gross domestic product in climate change risks.

The spiraling relation between energy and climate change has a direct impact on a number of issues that include, but are not limited to:

- Collapse of electric lines caused by strong winds, storms, and hurricanes, resulting in power shortages and blackouts;
- Fluctuation in the availability of water for commercial, residential, or agricultural uses caused by climate change-induced variations in hydrological cycles. This in turn affects the availability of water to be used by power generators in cooling processes;
- Severe damage, destruction, and death caused by storms and hurricanes, resulting in direct losses to the energy industry;
- Increased frequency and intensity of flooding caused by severe weather events which disrupt the supply of energy and damage or destroy energy generation, distribution, transmission and transportation facilities; and

⁶ Percentage based on the analysis of the 1970 to 1990 period

⁷ Idem

⁸ Data from the UN Intergovernmental Panel on Climate Change

- Droughts and reduced precipitation rates which decrease the water levels of hydroelectric power plants' reservoirs, hence affecting their capacity to generate electricity.

Inquiries regarding the energy and transport sectors are essential when considering climate change mitigation strategies based on the reduction of fossil fuel combustion. Both the energy and transport sectors are highly susceptible to climate change impacts. For example, renewable energy relies on meteorological and climatic patterns such as hydrological cycles, wind configuration, and solar radiation levels. Renewable energy systems are intrinsically more sensitive to climate change than fossil fuel-based energy systems because they are part of a complex cause-effect interaction. In comparison, fossil fuel-based energy systems rely only on geological stores. For all these reasons, renewable energy is highly vulnerable to extreme weather events. At the same time, increasing renewable energy production is recommended as a primary means to reduce energy-related greenhouse gas emissions, thereby mitigating the effects of climate change.

The nexus between energy and climate change has prompted universal recognition of the fact that: (a) current production and consumption patterns are unsustainable, and that (b) careful assessment of other alternatives is imperative to achieve sustainable energy solutions. A change from a "business-as-usual" approach is critical to promote energy diversification and advance clean energy. Future energy policies should focus on: making effective use of sustainable energy sources such as wind, solar and geothermal; accelerating research and development of low-carbon technologies applied to more efficient, less energy-consuming vehicles; redesigning the way in which products are manufactured; and retrofitting homes and businesses to make them more efficient.

Policy Responses

The United Nations Framework Convention on Climate Change (UNFCCC) launched the global negotiations that led to the creation of the Kyoto Protocol in 1997. The Kyoto Protocol ends in 2012, and the nations of the world are already looking forward to a post-Kyoto agreement on climate change. It is therefore imperative for the Heads of State of the Americas to create the political conditions in the region for an equitable post-2012 agreement that is sufficiently ambitious to curb climate change. The Fifth Summit of the Americas offers a unique opportunity for the leaders of the Americas to initiate discussions on:

- Research and development of climate projection tools for renewable energy development;
- Best practices on water management for energy generation;
- Investment in conservation measures, including incentive programs for sustainable energy technology, manufacturing, and end-use efficiency;
- Identification and removal of constraints on transmission infrastructure through regional integration processes and mechanisms;
- Regional cooperation in financing the construction of new transmission lines that reduce inefficiency in power transmission;

- Policies and practices that strengthen the integrity of critical energy infrastructure;
- National energy portfolio diversification policies that take into account the protection of the environment and address greenhouse gas emissions; and
- Creation of political conditions for an equitable post-2012 agreement sufficiently ambitious to curb climate change

III. Reliability of Energy Supplies

The availability of power, liquid fuels, and other energy resources at any given moment, and over the long-term (described as energy reliability) may be disrupted due to a number of natural and human causes including:

- Natural disasters such as hurricanes, floods, earthquakes, drought;
- Human acts, including terrorism, sabotage, war, strikes;
- Mechanical and equipment failures, including power line disruptions, spills, breaks; and etc.
- Reductions in, or absence of, natural resources, including depletion of oil and gas reserves, water shortages, wind and other resource reductions.

In most cases, the lack of reliability is due to insufficient delivery of energy resources when events such as the above occur. This can be seen in cases where the electricity supply grid is not fully integrated. Power line integration is an important means of ensuring the delivery of reliable services in that it provides for multiple linkages that provide back up whenever there is a single point failure. This is critical, not only at the national level when local grids are not interconnected to form a robust national power network. Thus it is a key challenge to be addressed between countries and sub-regions of the hemisphere. The report, *Regional Electricity Cooperation and Integration in the Americas* produced by the General Secretariat of the OAS⁹ indicates that the overall reliability of the Hemisphere's electricity supplies can be dramatically enhanced by developing new interconnections between countries. The report cites the Central American Integrated Electricity System (SIEPAC) as an example of interconnectivity. Reliable access to energy sources supplied via oil and gas pipelines can be enhanced by increasing the number of interconnections between sources and points of demand, as is done in the power sector¹⁰.

Reliability can also be enhanced by making available multiple resources for the same service. For example, electricity may be generated by many different resources. This includes various fossil fuels (e.g. oil, gas, and coal), nuclear power, and renewable resources (solar, wind, geothermal, hydro, biomass, and ocean technologies). In Latin America, a region blessed with natural resources, 49% of power generation is from fossil resources and only 47% comes from hydropower. The remaining 4% is generated by all of the other alternatives. In the transport sector, the dependency on a limited number of resources is even more significant. Throughout the hemisphere, with the exception of Brazil, the transport sector is almost exclusively dependent on oil products (primarily gasoline, diesel, and jet fuel). Reliability in both the power and transport sectors is often compromised by shortages or other constraints on a primary resource. Such constraints may result from any of the abovementioned causes. A clear solution to this challenge involves the diversification of the energy matrix. By incorporating a diverse mix of fossil fuels, renewable energy sources and other alternatives, dependence on any single resource is reduced and a country's vulnerability to supply disruptions is minimized.

⁹<http://www.oas.org/osde/reia/Documents/Regional%20Electricity%20Cooperation%20and%20Integration%20in%20the%20Americas.pdf>

¹⁰http://www.worldenergy.org/publications/regional_energy_integration_in_latin_america_and_the_caribbean/default.asp

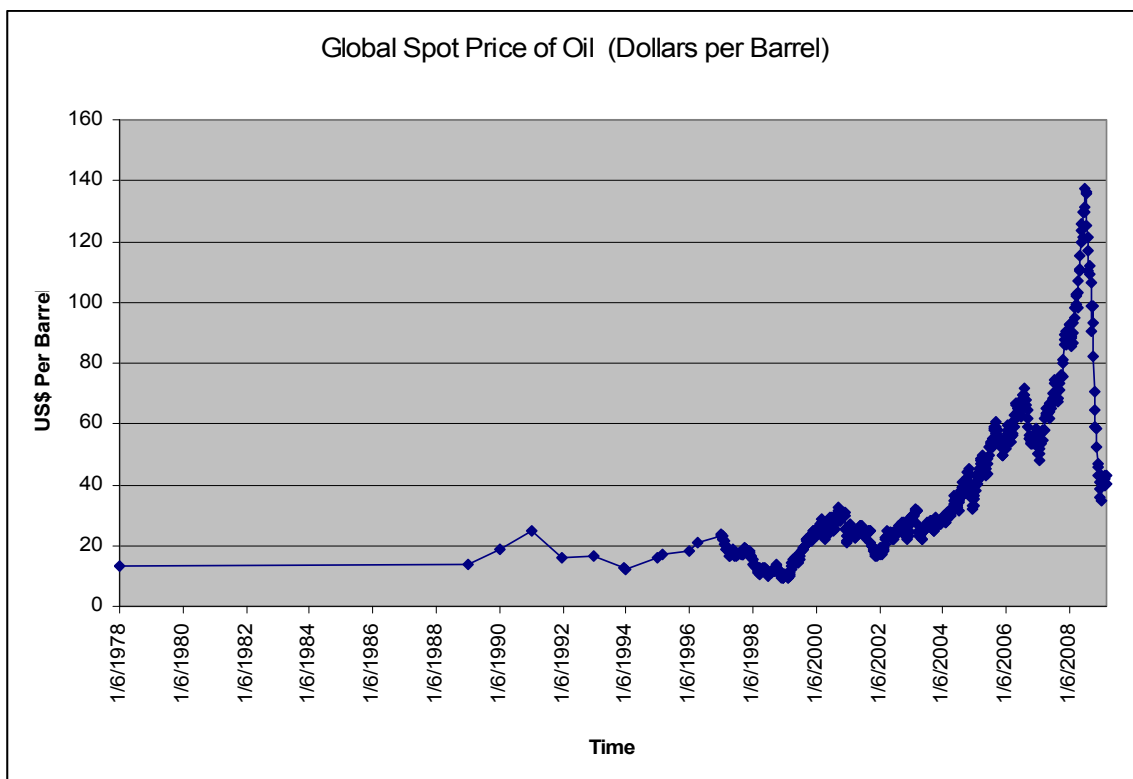
Policy Responses

- Promote cross-border and regional power and pipeline interconnections;
- Strengthen/establish the Sustainable Energy Partnership for the Americas (SEPA) including by using it to encourage the development and use of a wide variety of energy resources and to build collaborative programs between countries to strengthen energy supply networks;
- Encourage the deployment of renewable energy sources through targeted policy and fiscal incentive programs;
- Facilitate the transfer of clean, innovative and alternative energy technologies between the countries in the region;
- Facilitate the sharing of bi-national or multinational energy management and development capacity and promote knowledge exchange within the Western Hemisphere;
- Disseminate the necessary technological updates to foster energy conservation as well as to prevent energy losses in different sectors of the economy to make them more resilient to external shocks; and
- Identify bankable energy projects that trigger increased foreign direct investment for sustainable energy development, including: investments for increasing installed capacity to meet energy demand; improving vulnerable energy facilities comprising unreliable power generation plants and transmission lines; and investments in cross-border grids to facilitate the trading of electricity between countries.

IV. Energy Price Volatility

Energy price volatility refers to the degree of uncertainty and risk relating to the price of energy commodities over time. The dramatic fluctuation of oil prices experienced worldwide in 2008 is a clear example of high energy price volatility which represents a significant threat to the energy security of the Americas. Volatility—primarily in oil and gas—has raised concerns over its impact on economic and social development. The challenges are particularly serious for smaller and poorer nations.

Oil prices have increased significantly over the last ten years, going from US\$12 per barrel in January 1999 to a peak of US\$145 in July of 2008, the highest price in history for that commodity. The 2008 crude oil spike caused some Caribbean nations to spend more than 100% of their export earnings on crude oil purchases. As a result of the global financial crisis, in January 2009, crude oil prices plummeted to a low of US\$35. While there are certainly economic benefits resulting from lower oil prices, there is a real danger that different sectors of the economy may turn away from more energy efficient technologies. Likewise consumers may be less inclined to push for alternative power sources in favor of lower-priced oil and gas resources. Yet, history demonstrates that high-priced oil and considerable volatility returns over time and so it is essential that efforts to reduce oil and gas consumption be maintained throughout this economic crisis. The graphic below shows the global spot price of crude oil between 1978 and 2008. The six-year period from 2002 to 2008 shows crude oil prices increasing threefold. This trend may be characterized as volatile, especially between 2007 and 2008.



Weekly All Countries Spot Price FOB Weighted by Estimated Export Volume (Dollars per Barrel) (EIA, 2009)

The impacts of rising and volatile energy prices can be significantly reduced through diversified and dynamic energy portfolios. By developing a diverse mix of energy resources, a country is in a better position to stabilize its energy budget and curtail its exposure to extreme market variations. A dynamic energy portfolio may be sufficiently versatile to adapt to changing energy demand and market trends over time. On the energy retail side, power market deregulation policies can enable consumers to choose among energy suppliers and pay the true cost of energy. Deregulation leads to competition, and competition lowers the price paid by purchasers.

Drops in energy prices are normally perceived by consumers as positive as it relieves some pressure on highly stressed national energy budgets, particularly in the Caribbean region. However, low energy prices can also bring about declining investments in future conventional (oil, gas, coal) and renewable (solar, geothermal, wind) sources and other low-carbon technologies, and reduced income for net energy exporting countries. Moreover, the global financial crisis and the collapse of energy prices have depleted investment funds for new energy ventures. In other words, lower fossil fuel prices do not provide the incentives needed to promote diverse and dynamic energy portfolios and to reduce a country's exposure to future energy price volatility. Furthermore, low fossil fuel prices do not create favorable conditions for the advancement of the type of low carbon policies needed to curb climate change.

In Latin America and the Caribbean, investments in energy infrastructure are below 2% of the gross domestic product. Substantial financing is needed to support research and development in renewable energy and energy efficiency technologies, foster institutional capacity building, and facilitate the integration of technical standards and energy cooperation in the region. Energy price volatility has a direct impact on a number of issues that include, but are not limited to:

- Stressed national energy budgets, depletion of foreign exchange reserves, and disrupted access to energy by marginalized groups in cases where the price of energy is too high;
- Declining investments in conventional and renewable energy and other low-carbon technologies, accompanied by declining income of energy exporting countries in cases where the price of energy is too low; and
- Inadequate access to credit to defray the high upfront costs of renewable energy projects.

Policy Responses

- Creation of diversified and dynamic energy portfolios based on renewable and non-renewable, including the promotion of low carbon technologies;
- Implement economic policies and frameworks that contribute to new investments in renewable energy;
- Promote power market deregulation policies that allow consumers to choose among energy suppliers and pay the true cost of energy;
- Establish legal and policy frameworks that enable significant investment shifts to low carbon technologies; and
- Foster institutional capacity building and integration of technical standards and energy cooperation

V. Conclusion

Fossil fuels will likely continue to be the dominant source of energy for years to come, with natural gas increasing its share. Fossil fuel exporting countries will not discontinue their exploitation, and the economically vibrant nations of Latin America and the Caribbean cannot radically shift away from their consumption to supply their ever growing energy needs. These facts notwithstanding, the limited availability of fossil fuels and the need to curb climate change compel action. A meaningful shift in energy generation, distribution and consumption patterns is therefore inevitable. The heads of State of the Americas should seek to address these issues by advancing the notion that the issue of energy can be effectively addressed through sustainability, integration, market transformation, and diversification.

The critical importance of implementing successful energy strategies that benefit current and future generations cannot be over-emphasized. For this reason, energy sustainability must always been at the front and center of the concerns of the countries of the Americas. The need to address issues such as access to modern energy services, climate change, energy supply reliability, and energy price volatility has been addressed by the governments of the region at almost every Summit of the Americas held since this process was launched in 1994. The governments of the Americas are also becoming increasingly aware of the links between energy, climate change, and poverty.

The issue of energy sustainability entails the type of actions that are deeply rooted in the policies, plans and strategies that a nation must implement in order to ensure its development and prosperity. Further, the concept of energy security is paramount to economic growth, development, poverty alleviation, and health. It is also linked to environmental issues such as contamination and global warming.

The region's potential for renewable energy generation is enormous. Renewable energy has been an important part of the energy mix in the Americas for many years. Hydropower accounts for large portions of the electricity supply in Argentina, Brazil, Paraguay and Uruguay. In Brazil alone hydropower provides for approximately 85% of the electricity needs, whereas Costa Rica gets about 99% of all its electricity from clean renewable sources. With regard to energy conservation, many governments are implementing plans to improve the performance of household appliances, buildings, industries, and vehicles so as to make them more efficient.

The Fifth Summit of the Americas to be held in Trinidad & Tobago provides the heads of State of the Hemisphere with a precious opportunity to address the energy and climate change challenges of the 21st century. It also gives them the opportunity to initiate discussions around the need for adequate political conditions in the region for the negotiation of an equitable post-2012 agreement sufficiently ambitious to curb climate change.

Urgent and concerted action must be taken to ensure that energy uncertainty does not reverse the region's prosperity. The current global financial crisis stresses the need for significant political motivation and coordination to facilitate the deployment of renewable energy technologies, advance energy efficiency, and promote energy integration and cooperation efforts. The people of the Americas and their leaders must quickly scale-up their renewable energy initiatives and lead the region into a new era of energy sustainability.