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ECLAC SUBREGIONAL HEADQUARTERS FOR THE CARIBBEAN

FOCUS

Newsletter of the Caribbean Development and Cooperation Committee (CDCC)

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**FACING THE STORM: A BRIEF ON POLICY
RESPONSES TO THE GLOBAL CRISIS IN THE CARIBBEAN**

**BIOTECHNOLOGY DEVELOPMENT
AND CLIMATE CHANGE IN THE CARIBBEAN**

**PLAYING THE GLOBAL MUSIC INDUSTRY WITH
TECHNOLOGICALLY ADVANCED CULTURAL PRODUCTS**

ENERGY EFFICIENCY IN THE CARIBBEAN

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The Economic Commission for Latin America and the Caribbean (ECLAC) is one of five regional commissions of the United Nations Economic and Social Council (ECOSOC). It was created in 1948 to support Latin American governments in the economic and social development of that region. Subsequently, in 1966, the Commission (ECLA, at that time) established the Subregional Headquarters for the Caribbean in Port of Spain to serve all countries of the insular Caribbean, as well as Belize, Guyana and Suriname, making it the largest United Nations body in the subregion.

At its sixteenth session in 1975, the Commission agreed to create the Caribbean Development and Cooperation Committee (CDCC) as a permanent subsidiary body, which would function within the ECLA structure to promote development cooperation among Caribbean countries. Secretariat services to the CDCC would be provided by the Subregional Headquarters for the Caribbean. Nine years later, the Commission's widened role was officially acknowledged when the Economic Commission for Latin America (ECLA) modified its title to the Economic Commission for Latin America and the Caribbean (ECLAC).

Key Areas of Activity

The ECLAC Subregional Headquarters for the Caribbean (ECLAC/CDCC secretariat) functions as a subregional think-tank and facilitates increased contact and cooperation among its membership. Complementing the ECLAC/CDCC work programme framework, are the broader directives issued by the United Nations General Assembly when in session, which constitute the Organization's mandate. At present, the overarching articulation of this mandate is the Millennium Declaration, which outlines the Millennium Development Goals.

Towards meeting these objectives, the secretariat conducts research; provides technical advice to governments, upon request; organizes intergovernmental and expert group meetings; helps to formulate and articulate a regional perspective within global forums; and introduces global concerns at the regional and subregional levels.

Areas of specialisation include trade, statistics, social development, science and technology, and sustainable development; while actual operational activities extend to economic and development planning, demography, economic surveys, assessment of the socio-economic impacts of natural disasters, data collection and analysis, training, and assistance with the management of national economies.

The ECLAC Subregional Headquarters for the Caribbean also functions as secretariat for the Programme of Action for the Sustainable Development of Small Island Developing States (SIDS POA). The scope of ECLAC/CDCC activities is documented in the wide range of publications produced by the Subregional Headquarters in Port of Spain.

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- The Bahamas
- Barbados
- Belize
- Cuba
- Dominica
- Dominican Republic
- Grenada
- Guyana
- Haiti
- Jamaica
- St. Kitts and Nevis
- Saint Lucia
- Saint Vincent and the Grenadines
- Suriname
- Trinidad and Tobago

ASSOCIATE MEMBER COUNTRIES:

- Anguilla
- Aruba
- British Virgin Islands
- Montserrat
- Netherlands Antilles
- Puerto Rico
- Turks and Caicos Islands
- United States Virgin Islands

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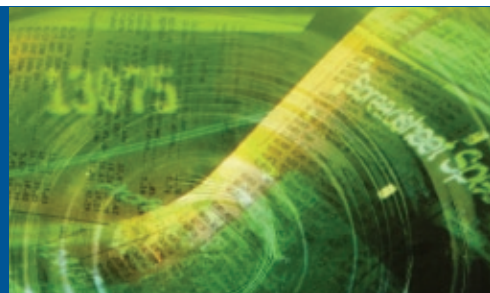
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FACING THE STORM: A BRIEF ON POLICY RESPONSES TO THE GLOBAL CRISIS IN THE CARIBBEAN



INTRODUCTION

The financial and economic crisis affecting the world economy since mid-2008 has already impacted the Caribbean countries' growth and stability through diverse channels of transmission: slowdown in remittances from workers abroad, tighter access to external financing, loss of export markets, negative evolution of the terms of trade, etc.

This phenomenon has not gone unnoticed by the Caribbean governments, and thus, a wide process of discussion and implementation of policy responses to alleviate the impact from the global slowdown is under development across the region.

Learning to live with the Global Crisis

During the last few months policymakers in practically all the Caribbean countries have been actively discussing and adopting an array of measures addressing issues such as the economic downfall, rising unemployment, accelerating inflation or weakening consumers' confidence. Thus, measures adopted have ranged from tax and tariff adjustments to expansion of social programs, from establishment of price controls to wage increases. Figure I presents information on those measures adopted by governments across the region in response to the global economic slowdown between the third quarter of 2008 and the first quarter of 2009.

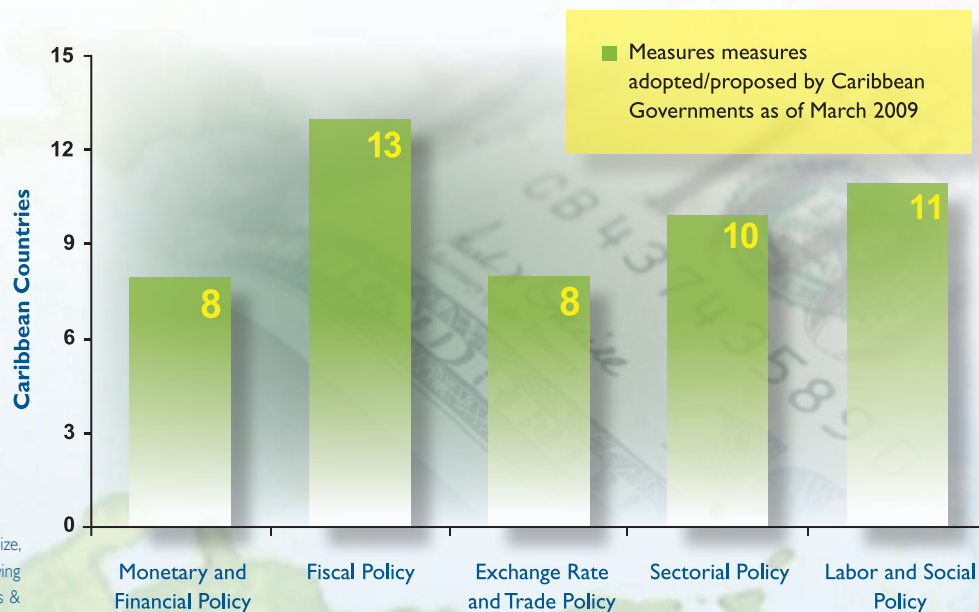
The data collected by ECLAC shows that out of 15 Caribbean countries surveyed, in 14 of those countries the Government has already implemented or is in the process of implementing specific measures in reaction to the negative effects derived from the global crisis. The issues of major concern for policymakers seem to be the contraction in key economic sectors like tourism, the fall in fiscal revenue and consequent budgetary imbalances, the rise in unemployment, and the jeopardizing of advances made during the last decade in poverty reduction and social welfare.

The survey also found that at least in 13 Caribbean countries significant adjustments have been made to the fiscal policy to better cope with the consequences of the global crisis. Specific fiscal measures adopted have been generally related to secure funds to finance the 2009 budget, mainly from external sources like multilateral

agencies; but also through the issuing of domestic debt in some cases. Other measures frequently adopted have been the introduction of budgetary cuts in non-essential expenditures in order to spare and concentrate resources for essential expenditures, like social programs, or investments in infrastructure projects aiming to give a boost to the economy.

Similarly, labour and social policies have also been targeted in 11 countries where those policies have been substantially modified during the last months with measures such as implementation of unemployment benefits, expansion of welfare programs, or adjustments in wages and salaries. Sectorial policy is another area where governments have been quite active in implementing promotional measures targeting those productive sectors with a significant social and economic weight: agriculture, tourism, construction, among others. ►

Figure I Governmental Response to the Global Crisis in the Caribbean, 2008-2009



Note: Includes information collected from Bahamas, Barbados, Belize, Guyana, Jamaica, Suriname, Trinidad & Tobago, and the following ECCU countries: Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia, and St. Vincent & the Grenadines. In the case of the ECCU countries, the monetary policy is managed by a single common institution: the Eastern Caribbean Central Bank.

Source: ECLAC on the basis of official data

On the other side, it is worth noting that the exchange rate and trade policy is the category where fewer Caribbean Governments seem to have introduced changes in response to the global crisis. This could be explained partially by the existence in most countries of the region, of fixed or quasi-fixed exchange rates regimes vis-à-vis to the dollar, which effectively prevents most governments from pursuing proactive exchange rate policies. In addition, regarding monetary and financial measures it must be indicated that countries belonging to the Eastern Caribbean Currency Union in fact do not have any policies of their own, since it is a common institution, the Eastern Caribbean Central Bank, that is the sole entity in charge of managing the monetary and financial policies for the whole sub region.

Rallying the Caribbean: the regional initiatives

The information presented in Figure I refers to individual policy responses, carried out at the national level. However, it is necessary to mention the existence of some initiatives and proposals at the regional level aimed at coordinating efforts and resources, and establishing common responses to the crisis. In that sense, during the latest CARICOM Meeting of Heads of Government, several common initiatives were approved in relation to the global economic and financial turmoil¹. For example, it was agreed that the Committee of Central Banks Governors is to provide to the CARICOM members common proposals on how to better tackle the global crisis.

Undoubtedly, a key event that has

spurred interregional coordination between the monetary and fiscal authorities has been the collapse of Colonial Life Insurance Company (CLICO) financial group at the beginning of the year, the repercussions of which are still being felt across the region².

After the announcement by the Trinidad and Tobago Government of a multi-billion bailout for the troubled Financial Group, a chain reaction started, with monetary and financial authorities in one country after another taking actions on CLICO’s operations in their respective jurisdictions.

Thus, according to official reports and releases, as of late March, at least 6 Caribbean countries had adopted some kind of measures to cope with

Chart I Governments’ response to the collapse of CLICO and Stanford Financial Groups



Country	Actions Adopted
Bahamas	In February the Government took judicial control of CLICO Bahamas operations
Barbados	The Central Bank took actions in support of CLICO subsidiaries in Barbados during February, providing liquidity funds and opening a facility for further liquidity support. In March the Government announced that it was considering the acquisition of CLICO Life (a CLICO subsidiary in Barbados), injecting the acquisition funds back into the entity
Belize	During March the Government took judicial control of CLICO Belize, through the Supervisor of Insurance
Guyana	In February the Government took judicial control of CLICO Guyana. During March the Government reiterated support and guarantees for CLICO Guyana’s shareholders
Suriname	As of late March, the Central Bank had announced that it was monitoring closely the status of CLICO’s operations in Suriname to protect policyholder’s interests, and in consultation with CLICO’s officers to find a solution to the growing liquidity and solvency problems faced by the Financial Group’s operations in Suriname
Trinidad and Tobago	At the end of January, the Government announced the bailout of CLICO Financial Group, taking control of Colonial Life Insurance Company, CLICO Investment Bank and Caribbean Money Market Brokers, in order to protect the public interest and prevent contagion to other financial institutions
Antigua and Barbuda	In February the Eastern Caribbean Central Bank ECCB assumed control of the Bank of Antigua Ltd., (part of the Stanford Financial Group) to protect the interest of depositors and preserve the stability of the financial system of Antigua and Barbuda

Source: ECLAC on the basis of official media releases.

¹ The 20th Inter-Seasonal Meeting of the Conference of Heads of Government of CARICOM in Belize City, Belize, on March 2009.

² Also must be mentioned the collapse, during the month of February, of the Stanford Financial Group, an organization with considerable presence in the banking and financial sector of Antigua and Barbuda; under charges of financial fraud.

the CLICO debacle, ranging from the financial bailout implemented by Trinidad and Tobago, to increased monitoring on CLICO's operations and eventual intervention in other countries (See Chart 1). The adoption of those measures was accompanied by intense consultations between the monetary and financial authorities of the different countries involved.

Thus, during the March Meeting of the Head of Governments of CARICOM, it was agreed that the CLICO crisis was an issue that demanded concerted actions, and in such vein, the creation of a "College of Regulators" was approved, integrated by representatives from the central banks, to assess the challenges created by the global financial crisis and subsequent CLICO debacle; monitor and counteract the problems generated; and provide proposals to integrate and improve financial regulation in the region.

Furthermore, in April the central banks of Trinidad and Tobago, Barbados and the Eastern Caribbean Currency Union agreed on the establishment of a "Liquidity Support Fund", with a total of US\$ 80 million to provide financial support to the Eastern Caribbean countries that are at financial risk as a consequence of CLICO's collapse.

What Comes Next?

The efforts at the regional and national level to fight the repercussions of the global crisis, necessarily ask for the establishment and development of a comprehensive and continuous set of public policies.

However, that raises issues of viability and sustainability, since it is pretty clear by now that the slowdown of the world economy is going to last until 2010 or beyond. This means that the requirements of financial resources for those policies will be high indeed, and, in the case of some countries, probably very difficult to secure. In order to better cope with this situation, the improvement

and strengthening of public income and expenditure will have to be a top priority for policymakers.

Certainly, external financing is a key issue that many Caribbean governments will have to address, since the deterioration and tightening of international financial markets as a consequence of the global crisis will probably translate into costlier access to credit for the region. However, it has to be taken into consideration that, precisely in response to the global crisis, multilateral agencies are substantially increasing their resources and expanding their contingent lines of credit to countries in risk of financial and economic collapse.

In that sense, it is worth remembering the rescue package, with a value of US\$ 10 billion, implemented by the IMF for Iceland at the end of 2008 to stabilize this country's currency and banking systems, devastated by the global credit crunch. Following the bailout of Iceland's economy, other countries, like Latvia, Romania and Belorussia have followed suit, being granted generous multi-billion rescue packages by the IMF, World Bank and other multilateral agencies.

Furthermore, during the latest G-20 meeting of developed countries it was decided to strengthen the IMF's lending capacity with an influx of resources estimated at US\$ 1.1 trillion, with which to support and boost troubled countries³.

It is worth mentioning that some countries in the region have already been very actively securing liquidity and contingent credits from multilateral agencies. Such is the case of Jamaica, which has already secured or is currently negotiating credits with the World Bank, the European Union, the International Development Bank, the Caribbean Development Bank and other financial institutions for nothing less than US\$ 700 million to finance the budget for 2009 and support its fiscal and debt sustainability programme.

Considering these precedents, most Caribbean countries should not discard the option of applying in the future for comprehensive support packages from the multilateral agencies, in case their financial and economic standings keep deteriorating.

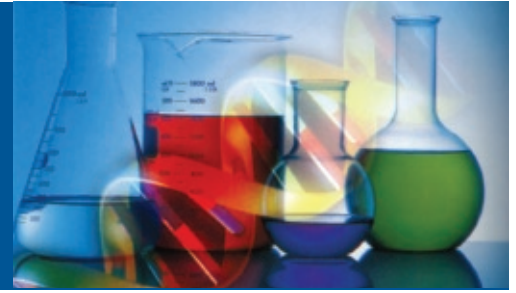
Regarding public expenditures, it is clear that major efforts must be undertaken to give due priority to essential expenditure, such as social programmes, and cut or postpone non-essential spending. Additionally, the improvement of safety networks and programmes demands the development of better targeting mechanisms and improved management to prevent the dilution and waste of resources and efforts, and optimize the positive impact among vulnerable groups. Similarly, the strengthening of monitoring and evaluation activities is indispensable in order to achieve higher efficiency levels, maximize resource use and reduce corruption.

Another key issue to address is the increase of fiscal income with a long term perspective. It is understood that under the current circumstances, for many Caribbean countries the degree of freedom to apply measures towards an expansion of fiscal income, such as tax reform, is very limited. However, regardless of the short term constraint, medium and long term efforts to increase and strengthen public revenues, expanding the fiscal universe, reducing tax evasion and tax elusion, fighting smuggling activities, etc., must be neither abandoned nor forgotten.

Overall, available information shows, without a doubt, that the global crisis is at the top of the agenda for the Caribbean, and, correspondingly, the governments' reaction to this phenomenon has been significant; reflecting widespread concerns among policymakers about the economic and social costs from the fall in activity levels, market shrinking, rising unemployment, and deterioration of social standards. In that sense, the regional response through measures like duty and tax reductions has been in line with measures adopted worldwide. As the slowdown of the global economy continues challenging the social and economic stability of the region, the Caribbean governments will have to bring into play new and extended measures, at the national and regional level, in order to face such challenges. ■

³ The G20 meeting of industrial nations took place in April 2009, in London.

BIOTECHNOLOGY DEVELOPMENT AND CLIMATE CHANGE IN THE CARIBBEAN



BACKGROUND

In April 2009, the Economic Commission for Latin America and the Caribbean (ECLAC) Subregional Headquarters for the Caribbean in collaboration with the University of the West Indies (UWI) convened a meeting of technical experts working in the field of biotechnology. The technical meeting, held at the ECLAC Subregional Headquarters for the Caribbean, Port of Spain, Trinidad and Tobago, provided a forum where scholars in the field of biotechnology could share information on both their accomplished and current research agendas.

The meeting was also intended to establish the link between biotechnology and climate change and to examine the modalities of utilizing biotechnologies to address the anticipated impacts of climate change. At the end of the meeting a coordinated, regional approach to the development of biotechnology in the Caribbean was developed that would benefit the agriculture sector through improved food security; and the social sector through improvements in security and health care, among other purposes.

AT THE OPENING OF THE MEETING ECLAC

Ms. Charmaine Gomes, Sustainable Development Officer, lauded UWI's commitment to continued work in this area and noted the importance of a scientific approach in alleviating or minimizing the impacts of climate change. She also noted the ways that technology and in particular, biotechnology, could serve this objective from both a regulatory and a policy standpoint.

Mr. Neil Pierre, Director, ECLAC Subregional Headquarters for the Caribbean, referred to the work that ECLAC and its other partners are doing in the area of biotechnology and identified the impacts of climate change as one of the major challenges of this century, noting that biotechnology was increasingly perceived as providing solutions to addressing these impacts and citing the 4th Assessment Report of the Inter-governmental Panel on Climate Change which noted that the impacts were unequivocal, and the Stern Review with its well-documented economic and social impacts of climate change and the costs of adapting to and mitigating these impacts. The issue to be explored was how biotechnological applications could provide solutions to the challenges posed by these impacts in ways that could make the region more competitive at the global level, as well as more resilient to external threats, either economic or natural. It was also important to note that biotechnology was not a solution to the challenges faced by climate change but rather an effective tool to combat this global phenomenon with the development of new, high-yielding, disease-resistant and climate-adaptive crop species to compensate for the decline in food production being one example. The importance of investment in research and development by both government and the private sector within agreed-upon policy frameworks in this regard was also noted.

The University of the West Indies

Professor Pathmanathan Umaharan of UWI noted that the decision to partner with ECLAC was most important and that the significance of the meeting should not be overlooked, coming on the heels of the hemispheric and regional meeting on biotechnology and bio-safety technology which was held in Port-of-Spain, Trinidad and Tobago on April 27th 2009. The application

of biotechnology and its role in human development is one of the research pillars at the UWI, and reference was made to the Biotechnology Centre at the University's Mona campus as well as the strong desire to add research capabilities to other campuses. The professor also cited specific examples in the field of agriculture and medicine where biotechnology could play a role in providing solutions to the challenges faced.

Ministry of Science, Technology and Tertiary Education, Government of Trinidad and Tobago

Mrs. Karen Rosemin of the Ministry of Science, Technology and Tertiary Education of Trinidad and Tobago, represented the Minister and provided information on the work being done by the Government of Trinidad and Tobago (GOTT) in the area of climate change, making specific reference to the ECLAC project on the Economics of Climate Change. She also informed that the GOTT was in the process of developing a national policy to mitigate the impact of climate change that was part of the national policy on the environment and sustainable development. The main objective of the policy is the creation of an environment that would enhance the quality of life in Trinidad and Tobago, based on the principles of sustainable development.

One of the main concerns of the government is the fact that Trinidad and Tobago is one of the highest emitters of green house gases on a per capita basis, mainly because of its industrial make-up. Revenues generated from industries, however, add significantly to the Gross Domestic Product (GDP) of the country and therefore there is a pressing need to reduce the carbon footprint to protect the environment for generations to come. For this reason, the importance of a national policy for the energy sector could not be overlooked.

Three significant areas of the policy were noted: natural gas, preservation of the environment and encouraging the use of renewable energy, notwithstanding the fact that the economy of Trinidad and Tobago was energy-based. She stated that Trinidad and Tobago was signatory to the United Nations protocol on climate change and more recently to the convention on Biological Diversity (CBD). She reiterated the government's commitment to promoting research and development as evidenced by a TT\$7 million fund established for the creation of a biotechnology centre at the University of Trinidad and Tobago (UTT).

HISTORY AND APPLICATIONS OF BIOTECHNOLOGY

Molecular Markers

Recombinant DNA (rDNA)

DNA, deoxyribonucleic acid, the genetic material of the cell, is present in both the nucleus and the cytoplasm. In recombinant DNA (rDNA) technology, genes are switched on in the cell circuitry and recombination or swapping genes takes place. This technology introduces DNA into cells by a random process in which any genes could be targeted and may be achieved through the use of vectors or DNA guns. Some of the more important features of rDNA technology are:

- modification of nuclear and cytoplasmic genomes;
- modification of genes through a parasexual process;
- creation of novel pathways e.g., as in formation of a blue rose;
- changing the expression of a gene as in gene silencing;
- faster process than plant breeding.

However, rDNA is limited to a small number of genes; it manipulates single traits only; many stages in transformation are still unpredictable; and the results are dubious and subject to public opinion. There are, however, ways by which next-generation technologies might compensate for the shortcomings of present-day rDNA technology. For example, omics technologies, including genomics (faster method of sequencing DNA) or transcriptionics. Also, because the

complexity of rDNA is increasing, it is fast approaching that of plant breeding in that it can do many things that plant breeding can do. Other ways whereby rDNA is showing improvement are by the use of gene targeting by microinjection and using homologous recombination which is appropriate for animals but not for plants; development of markerless transgenic plants; Genetic Use Restriction Technology (GURT) or biological containment of transgenes to prevent contamination through plastid transformation and which removes viable pollen from transgenic plants; minimization of somoclonal variation; full copy integration; proper gene expression; control of the unpredictable expression of transgenes in the environment; more stable transgenics.

Addressing the ring spot virus in papaya in Jamaica

In this process, a gene that is resistant to the virus is transferred into the papaya, with an 80% success rate in conferring resistance to the virus. The subject of terminator technology being the same as hybrid technology was discussed and it was noted that farmers who bought genetically modified seeds could replant seeds produced by those plants but the new offspring would not have the modified factor.

Transgenics

The World Trade Organization's (WTO) statements on trade in transgenics was brought into the discussion, but it was also noted that trade in modified organisms fell within the ambit of the Cartagena Protocol which made allowances for the ill effects of genetic engineering, whereby transformed foods had to be shown to be substantially different from conventional foods.

Chloroplast technology

This technology is useful in products that could be engineered into chloroplasts to produce chiral molecules such as bioplastics. It might also be used to produce chemicals that are part of the cell chemistry with the ability to change phenotypes so that the resulting proteins might be incorporated into the cytoplasm.

Stress tolerance using rDNA

It was thought that this technology had not been effective since it can only move

a few genes at a time. However, it was noted that emerging technologies could allow screening for stress tolerance. It was also noted that UWI did not have a gene rDNA library but used available international sources.

STUDENT RESEARCH ON BIOTECHNOLOGY

Critique of methodologies employed

- Design of a tele-health network & cardiopulmonary ambulatory patient monitoring system in Trinidad & Tobago
- Modifying spathe colour in anthuriums
- Somatic embryogenesis of Guinea hen weed and Ackee: experiences, challenges and lessons learnt.

Design of a tele-health network & cardiopulmonary ambulatory patient monitoring system in Trinidad & Tobago

This is one of the key elements of a health initiative that is being spearheaded by the University of Trinidad and Tobago and involves the provision of emergency health support utilizing internet-based techniques. Its main feature is the acquisition of appropriate ambulances that are properly equipped so as to allow for communication of emergency patient health data via the internet so that timely health care could be provided from the onset of a health episode and continued en route to a health facility.

Several concerns were raised about this initiative, especially based on the current health support structure that exists. Among the concerns was the challenge of obtaining the necessary support from the laboratories and the ambulance service providers in agreeing to have their facilities outfitted with the relevant equipment to allow for this health net service. Moreover, in order to transmit data, the system will more than likely require dedicated lines and requisite approvals from the Telecommunications Service of Trinidad and Tobago (TSTT). It was noted, however, that en route to hospital, only the patient's vital signs would be transmitted from the ambulance to the lab, and no preliminary tests would be undertaken. ►

Colour variation in anthuriums

Colour variation in anthuriums was thought to be attributable to the non-production of anthocyanins by both white and green anthurium spathes as well as to the presence of chlorophyll in green spathes and the absence from the whites. Other possible reasons were differences in sulphide content and shift in the hydrogen ion concentration (pH). In the case of the latter, even though the mechanism for colour change with shift in pH was unknown, it was suggested that the use of acid-base titration may provide some answers. This, however, opened up other variables that might present more difficulties than does genetic manipulation.

Somatic clonal variations in Guinea hen weed and Ackee

Solutions to the variations observed were conducted either by direct use of plant material or from intervening callus phase

to maturity through an examination of the route of the somatic embryos to maturity. It was thought that this pathway may influence the chance of variations. In the case of ackee, there was need to verify whether fidelity was maintained.

Other – toxicity of cassava and other root tubers

Cyanogenic compounds in cassava are responsible for its bitter taste. Processing for human consumption usually removes much of the toxic compounds, but animals die from eating raw cassava. In Jamaica, a project was underway to engineer plants with low cyanogenic compounds and increase protein and vitamin levels. It was noted also that the toxic compound Linamarin was an important nitrogen source for root tuber development. Other bitter compounds in roots offered protection and their removal could increase vulnerability to infections.

BIOTECHNOLOGY, CLIMATE CHANGE AND POLICY

It is noted that the threat of climate change lies in the rapidity in which the changes occurred and the unpredictability of weather patterns. In the region there is ample evidence of these threats in sea level rise, the increased frequency and intensity of hurricanes, the increased frequency and severity of droughts and increased temperature.

Biotechnology could play a vital role by the transformation of species that could better adapt to climate change impacts. However, such transformation could result in other less desirable features.

Key considerations for developing a Regional Biotechnology Policy/Strategy

The formulation of a Regional Biotechnology Policy/Strategy is a being undertaken by the Caribbean ►

FREQUENTLY ASKED QUESTIONS ON BIOTECHNOLOGY

What is biotechnology?

Contrary to its name, biotechnology is not a single technology. It is, however, a group of technologies that share two (common) characteristics, working with living cells and their molecules and having a wide range of practical uses that can improve our lives. In its purest form, the term “biotechnology” refers to the use of living organisms or their products to modify human health and the human environment for commercial purposes. The term brings to mind many different things. Some think of developing new types of animals while others anticipate almost unlimited sources of human therapeutic drugs. Still others envision the possibility of growing crops that are more nutritious and naturally pest-resistant to feed a rapidly growing world population.

Classification of Biotechnology

Red biotechnology is applied to medical processes. Some examples are the designing of organisms to produce antibiotics, and the engineering of genetic cures through genomic manipulation. For example, since the early 1980s Cuba has invested in red biotechnology and has become an important producer of biotechnology derived medicines, vaccines and diagnostic kits (CTA 2005). The foreign exchange generated through sales of these

products is an important contribution to the country's Gross Domestic Product;

Green biotechnology is biotechnology applied to agricultural processes. An example is the selection and domestication of plants via micropropagation. Another example is the designing of transgenic plants to grow under specific environmental conditions or in the presence (or absence), of certain agricultural chemicals. An example of this is the engineering of a plant to express a pesticide, thereby eliminating the need for external application of pesticides. An example of this is Bt corn. Whether or not green biotechnology products such as this are ultimately more environmentally friendly is a topic of considerable debate.

White biotechnology, also known as industrial biotechnology, is biotechnology applied to industrial processes. An example is the designing of an organism to produce a useful chemical. Another example is the using of enzymes as industrial catalysts to either produce valuable chemicals or destroy hazardous/polluting chemicals. White biotechnology tends to consume less in resources than traditional processes used to produce industrial goods.

Blue biotechnology is a term that has been used to describe the marine and

aquatic applications of biotechnology, but its use is relatively rare.

What is Fermentation Technology?

Fermentation technology is the oldest of all biotechnological processes. It is based on fermentation which is a process of chemical change caused by organisms or their products, usually producing effervescence and heat. Microbiologists consider fermentation as “any process for the production of a process by means of mass culture of micro-organisms” and this is the definition that is widely accepted by biotechnologists.

What is Enzyme Technology?

Enzyme technology is best described as the technology associated with the application of enzymes as the tools of industry, agriculture and medicine. Although the earliest reports concerning exploitation of enzymes were documented in the late 1800s, true industrial application of enzymes only began in earnest in the 1960s. The majority of enzymes used in industrial/biotechnological applications are derived from particular fungi (*Aspergillus*) and bacteria (*Bacillus*). Safe organisms must be used for consumer-related applications.

What is tissue culture?

Tissue culture is a method of biological research in which fragments of tissue

Community (CARICOM) Secretariat. Based on national consultations in some member states, the project will concentrate on the following areas: innovation and technology, regional priorities, institutional framework, information sharing and public awareness. New economic models for biotechnological research would also be considered within the context of the existing economic climate.

Because any proposed solution to climate change was not proportional to the scale of the changes, specifically the extent and rate, it would be very challenging to identify any one or combination of solutions. The best means of identifying solutions is by taking a systematic approach, focusing on individual components. This would serve to create a platform for component by component solutions.

The importance of data in support of

the contribution of biotechnological research to meeting environmental challenges such as climate change should not be minimized. It was in this regard that tertiary level institutions should be encouraged to engage in data mining and management of such data that would be available to support the development and implementation of appropriate policies in biotechnology at both the national and regional levels.

PROPOSALS FOR ACTION IN THE REGION

A blue-print for action in the region is as follows:

- Development of an integrated approach to research and development in biotechnology at the tertiary level.
- Creation and/or strengthening of linkages between scientists and policy makers through the convening of meetings where

research results are shared and policies arising out of the research discussed

- Allocation of financial resources towards research and development in support of policy
- Allocation of resources including financial, to provide solutions in the case of negative feedback
- Provision of the necessary physical and other infrastructure that would facilitate research in the areas of climate change and policy development
- Development of mechanisms for the implementation of policies
- Use of science and technology to inform policy
- Development of mechanisms to keep policy makers abreast of advances in research and development and technology.

from an animal or plant are transferred to an artificial environment in which they can continue to survive and function. The cultured tissue may consist of a single cell, a population of cells, or a whole or part of an organ. This is typically facilitated *via* use of a liquid, semi-solid, or solid growth media, such as broth or agar. Tissue culture commonly refers to the culture of animal cells and tissues, while the more specific term plant tissue culture is used for plants.

What is recombinant DNA?

Combining DNA, referred to as recombinant DNA, from different existing organisms such as plants,

animals, insects and bacteria results in modified organisms with a combination of traits from the parents. The sharing of DNA information takes place naturally through sexual reproduction and has been exploited in plant and animal breeding programs for many years.

What are Molecular Markers?

A molecular marker is any kind of molecule indicating the existence of a chemical or physical process. Molecular markers are used in molecular biology and biotechnology experiments to identify a particular sequence of DNA. As the DNA sequences are very highly specific, they can be identified with the help of the known molecular markers which can find out a particular sequence

BIOTECHNOLOGY FAQ

of DNA from a group of unknown sequences.

How could Biotechnology be useful to us?

- In the development of new crop varieties thereby helping in adapting to climate change, disease and pest resistance and promoting food security;
- In the development of new drugs;
- Diagnosis of diseases in humans;
- In forensic applications through DNA fingerprinting;
- Bioremediation as in the treatment of waste;
- Gene therapy to correct hereditary conditions;

GLOSSARY OF TERMS

AFLP - Amplified Fragment Length Polymorphism; a molecular marker generated by a combination of restriction digestion and PCR amplification.

Chromosome - a cellular structure comprised of a long, folded DNA molecule and protein.

DNA - deoxyribonucleic acid, the substance within cells that carries the "recipe" for the organism and is inherited by offspring from parents.

DNA Fingerprinting - cutting a DNA chromosome with restriction enzymes and separating the pieces by electrophoresis to generate a unique pattern, the "fingerprint" for each species, breed, hybrid, or individual, depending on which enzymes and probes are used.

Electrophoresis - a lab technique for determining DNA fragment sizes

by separating them in a gel placed in an electric field.

Eukaryotic Cell - A cell that contains membrane-bound compartments in which specific metabolic activities take place

Gene - a functional unit of DNA, one "word" in the DNA recipe.

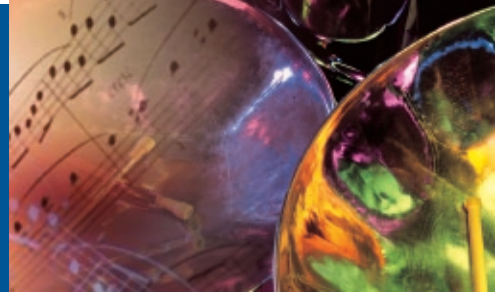
Genetic Code - the information contained in DNA molecules that scientists describe on the basis of a 4-letter alphabet (A, C, G, and T).

Genetic Engineering - the process of transferring DNA from one organism into another that results in a genetic modification; the production of a transgenic organism.

Genetic Map - the locations of specific genes along a chromosome marked with probes.

▶ (continued on page 14)

PLAYING THE GLOBAL MUSIC INDUSTRY WITH TECHNOLOGICALLY ADVANCED CULTURAL PRODUCTS



Culture is an intrinsic component of the soul of any society and related artefacts must be used as critical elements of trade between countries.

BACKGROUND

The need for Trinidad and Tobago to diversify its economy by reducing dependency on energy has been well enunciated. Unique niches must be created that would ensure competitiveness and sustainability in the international arena. This need is even more imperative with the impending catastrophic downturn resulting from the recent global financial crisis.

There must be an urgent paradigm shift from manufacturing to services, with emphasis placed on innovation, entrepreneurship and maximum use of Information and Communications Technology (ICT). This initiative has to be supported by appropriate legislation to protect and monitor intellectual property rights. Additionally, there should be easy access to venture capital.

The financial future of Trinidad and Tobago, and by extension the entire Caribbean, depends on harnessing, promoting and marketing culture.

It follows, therefore, that we should be aggressively seeking ways of forming strategic business alliances in an effort to establish sustainable markets for our cultural heritage, especially music.

Calypso, chutney, mambo, meringue, parang, reggae, rumba, salsa, shango, soca, son and zouk are indigenous, intoxicating Caribbean rhythms. Yet only one of these, *reggae*, has managed to carve its own category in the prestigious Grammy Awards. All others have been lumped into the ubiquitous group known as *world music*, simply because of inadequate mainstream market penetration and the requisite volume of

sales. This anomaly needs to be quickly addressed and rectified.

As we chart the way forward, there is need to place emphasis on initiatives that would build awareness for, and ensure universal acceptance of our diverse culture. Our mission, therefore, should be to unearth, develop, nurture and harness entrepreneurial talent, which would eventually become the infrastructure for creation of a sustainable music industry.

Situation Analysis

The global music industry has been substantially subsumed into the diverse portfolios of entertainment conglomerates EMI, Sony, Universal, and Warner. These are collectively and appropriately named *The Big Four*. Simultaneously, fledgling independent labels are struggling for survival in a hostile and fiercely competitive environment rampant with piracy. However, entertainment continues to be the fastest growing, most lucrative worldwide economic sector.

Developing countries should therefore seize the opportunity to enhance and market new cultural products for financial benefit. There is also an obvious need to simultaneously form strategic alliances with one or more of the above groups of companies. Culture has enormous commercial potential since raw material is always available in abundance. Therefore, finished products and services have unlimited potential for earning foreign exchange.

A Strategic Plan for Sustainability

In order to realise this goal, a five-point strategic plan has been conceptualised. Its main elements are summarized, as follows:

Collection. The Copyright Music Organization of Trinidad and Tobago needs to be strengthened. This would

ensure that royalties due to composers, publishers, arrangers, producers and performers are collected and disseminated on a timely basis. It is especially important, since an increasing number of World Carnivals rely heavily on our music for their own recognition and success. Furthermore, much of our foreign revenue is uncollected because it is not economically feasible for sister organisations to collect on behalf of COTT.

Production. Our local music industry needs to pay more attention to the quality of its repertoire. Emphasis must be placed on the manufacture of innovative products that would create a *visceral* impact on the international marketplace. Unfortunately, piracy has become almost a *necessary evil* in our society, resulting in producers and artistes being afraid to invest time or money in recordings of any substance. There is no *quick fix* to this problem. One solution is to develop a clientele that would insist on purchasing the genuine article. This takes time.

Marketing. Unity is strength. The entire repertoire of the music industry of Trinidad and Tobago should, therefore, be marketed under one Umbrella Company (jointly owned by the private and public sectors). An integral part of this exercise would be the exhuming, resurrection and dissemination of our *back catalogue*, which is inarguably, more palatable and palpable than our current fare.

Services. The industry needs to identify a number of ancillary services to become foreign exchange earners. Archive Restoration, Mastering, Publishing, Song Writing, Steelpan Crafting, Animation and Graphic Design are some of the areas in which entrepreneurial skills need to be developed. These will support the main activity, which is recording and production of material for commercial exploitation.

Competitiveness. Trinidad and Tobago's music industry needs to become and remain globally competitive. Continuing music-literacy education, training and apprenticeship programmes; strengthening the enabling environment; provision of fiscal incentives and easy access to working capital are some examples of strategies, which ought to be identified and implemented so as to achieve this objective.

National technical and financial support should be given to innovative ICT-derived cultural products developed by local entrepreneurs. These will be integral to viable implementation and long-term success of this plan.

New ICT-derived Cultural Products

PETE the Panstick® is a sophisticated entry-level curriculum in the form of an interactive teaching/learning DVD. It is the first phase of an integrated approach to developing and nurturing a structured music industry. *PETE* will be initially marketed directly to recognized legal entities such as Ministries of Education and International Schools at the primary level. The animated character, *PETE* is bilingual (English and Spanish) and delivers his content through an interface that introduces students to the Steelpan via a series of chapters, namely *instrument, arrangers, quiz, history music and games*. The product is very easy to navigate and designed to be left in the hands of unsupervised children. Besides imparting a rudimentary knowledge of music, *PETE* will ensure that young children hone their motor skills and learn to use ICT from an early age.

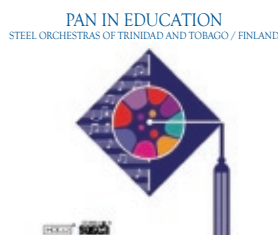
The Pan in Education Business

Model is the first of a series of unique, innovative, feature-packed, cost-effective, timeless cultural products, conceptualised by citizens of Trinidad and Tobago. The prime objective is to create a cadre of Caribbean innovators and entrepreneurs capable of playing successfully in the global marketplace.

Over the past five years, a curriculum has been conceptualised that would achieve the above objective. It has been divided into two main components, namely *Music Literacy* and *Entrepreneurial Development*. This curriculum is now supported by a National Occupational Standard (NOS), entitled *Music Producer*,

developed in conjunction with The National Training Agency and a lead body of industry professionals.

The NOS contains forty four units covering the areas of Audio Engineering, Music, Business, Technical Writing, Marketing & Public Relations and two generic units on safety and entrepreneurship. The standard has been endorsed by all CARICOM countries and will therefore form an integral part of the syllabus of the Caribbean Examinations Council.



Both curriculum and NOS are contained on disc 2 of the upgraded CD entitled *Pan in Education*, produced by Sanch Electronix, originally released in 2005.

The Percussive Harmonic Instrument (P.H.I.) is a MIDI-based electronic instrument that merges the powerful facility of MIDI with an intuitive form inspired by the world's most significant new acoustic instrument, the Steelpan. The most striking feature of the popular tenor Steelpan is the note arrangement of almost three octaves on one single playing surface.

This physical note arrangement, called the circles of 4th and 5th, exists only in traditional acoustic Steelpans and is strongly rooted in music theory, which makes for a natural form for anyone teaching, learning, composing and performing music. The circles of 4th and 5th are also available on the P.H.I. - the MIDI-based extension of the traditional Steelpan instrument. Thus, the P.H.I. will now allow musicians to explore their creativity in an even more fluid medium.

The scope of the P.H.I. is immense as it allows users to interface with the powerful capabilities of MIDI. Some key facilities include:

- ◆ Easy access to a theoretically infinite range of voices (sounds) during performances, well beyond those capable with the traditional acoustic instrument

- ◆ Greater flexibility in creating, editing and arranging musical orchestrations through use of readily accessible technology; recording and archiving, allowing quick and easy notation of music as it is performed; easy manipulation, recording and archiving of complex compositions for large bands and smaller ensembles
- ◆ Easy reconfiguration of the P.H.I. to accommodate performances that use multiple ranges or custom note arrangements on the playing surface
- ◆ Access to multiple instrument ranges on the same surface

“Simply connect a P.H.I. to an existing MIDI network and the musician is ready to perform”.

Patents for P.H.I. are pending and have been filed by Government on behalf of the people of Trinidad and Tobago. The technology to manufacture the instrument has been leased to Panadigm Ltd, a company formed by the Steelpan Development Centre of The University of the West Indies.

By way of a memorandum of understanding, an initiative known as **The PETE, PIE, P.H.I. Panadigm®** has been signed between Sanch Electronix and Panadigm Ltd. It will ensure optimisation of the opportunities that will accrue from collective global marketing and distribution of these exciting new cultural products. ■



For further information, please check www.youtube.com/user/phiteamvids

Simeon L. Sandiford

Guest contributor

Simeon Sandiford is the Managing Director of Sanch Electronix

Visit Online: <http://sanch.com/index.shtml>

ENERGY EFFICIENCY IN THE CARIBBEAN



This is a summary taken from the Report of the Meeting on Energy Efficiency in the Caribbean, held in Port of Spain, Trinidad and Tobago on 29 April 2009.

The meeting was convened by the Economic Commission for Latin America and the Caribbean (ECLAC) Subregional Headquarters for the Caribbean to discuss information provided by countries (Barbados, Guyana, Suriname and Trinidad and Tobago), in response to a questionnaire, "Preparatory Survey for the Energy Efficiency Workshop" as part of a project "A study to determine the extent of energy efficiency in Latin America and the Caribbean," conducted in collaboration with the Latin American Energy Organization (OLADE).

BARBADOS

The energy situation in Barbados is characterised by dominance of crude oil (95%) in the energy mix; drastic decline in oil production; high oil imports; the potential for natural gas reserves to meet present but not increased future demands; delays in the implementation of wind energy development; and a lack of policy on energy sources. Barbados is among the world's top five countries for penetration of solar water heaters. Homeowners benefit from lower electricity bills and the electric utility benefits from less demand problems.

Recent advances in the political, normative and institutional frameworks

The legal instruments that promote efficient energy use are a 150% tax break on expenditure related to energy efficiency and conservation for companies and a tax-free claim for expenditure on energy audits and retrofits for individuals. The attempts to reduce demand for foreign oil and the tax breaks on energy saving expenditure are regarded as implicit and explicit energy policies, respectively.

The political/socio-economic context governing energy efficiency

Politically, it is prudent to reduce dependence on foreign oil, given the global movement towards alternative energy; economically, depletion of foreign reserves by oil imports needs to be addressed; and socially, energy efficiency can reduce environmental impacts.

Key actors of energy efficiency and their effective role

The Ministry of Investment, Finance and Energy which reports to the Prime Minister's Office is responsible for energy matters. It is supported by the Energy Efficiency Committee and the Division of Energy, with the former hastening the identification and implementation of energy projects by removing undue bureaucracy. Through small ongoing projects, ministries promote energy efficiency to the public. The Fair Trade Commission is a regulatory entity working with the electric utility to implement tariffs that promote energy generation at the individual level. Effectiveness will depend on the rates and the public's ability to install the necessary capacity.

Other stakeholders promoting energy efficiency include **retailers** who source and sell energy efficient products; the non-governmental organization (NGO) **Barbados Association of Energy Professionals** which focuses on energy efficiency, research and education; **energy saving companies**; and **consulting firms** offering energy services to government, the utility and private/residential sector.

Resources and mechanisms for funding energy-efficiency programmes

The funding needed for energy efficiency programmes varies with scope. Government provides small funds for projects on their properties, and the Inter-American Development Bank (IDB), contributes significant sums towards the hotel sector and the development of policy and sustainable energy frameworks. The Caribbean Tourism Organization, and Caribbean Alliance for Sustainable Tourism monitor energy efficiency programmes, and the IDB monitors disbursements.

Results of energy efficiency programmes

Although some years ago the Division of Energy managed a major auditing exercise that increased awareness of energy issues among businesses, no energy efficiency programmes exist. Instead, a few projects target energy efficiency. The projects include government-commissioned energy audits on their properties and ongoing consultancies to retrofit new buildings and improve energy efficiency. In the private sector, successes include a government-initiated audit, which led to retrofits in lighting, AC and room management at Barbados Port Inc.; a major lighting overhaul in a government ministry; and cogeneration and gas compressors in a few hotels, leading to over 50% energy savings

Lessons learned

Positive experiences in the implementation of energy efficiency programmes:-

- The promise of cost savings is of interest to property owners;
- Where capital is available, good paybacks encourage instant implementation;
- Energy efficiency supports greening, thus ensuring easier acceptance at times.

The negative experiences in implementation of energy efficiency programmes:-

- Financing is often a challenge; Promising technologies are not readily available;
- Some clients do not seek professional advice before implementing solutions;
- Some solutions are evaluated only on financial criteria.

GUYANA

Recent advances in the political, normative and institutional frameworks

Guyana lacks the laws, regulations and

other regulatory instruments to support energy efficiency. Implicit energy policies include replacing incandescent bulbs with energy efficient lamps; unplugging appliances when not in use; and energy conservation tips. The Guyana Energy Policy, 1994 and Guyana Power Sector Policy and Investment Strategy are explicit policies. The launch of the energy efficiency programme is a first step towards realizing an energy efficiency policy. The Government supports energy saving initiatives and, as such, they are publicized by the Guyana Energy Agency (GEA), the electric utility Guyana Power and Light Inc., (GPL), Office of the Prime Minister, and the regulatory entity the Environmental Protection Agency (EPA), using newspaper, radio, television, press conferences and brochures.

Key actors of energy efficiency and their effective role

The energy portfolio is shared among the GEA, GPL and the EPA which all report to the Office of the Prime Minister. These institutions are involved in promoting energy efficiency in Guyana through information dissemination and public awareness. Several energy initiatives undertaken by NGOs in Guyana are supported by the IDB.

Resources and mechanisms for funding of energy efficiency programmes

Energy efficiency programmes are funded by the Government and IDB. Funds are disbursed through the Ministry of Finance and accessed by the Office of the Prime Minister, GPL and GEA. The Programmes are monitored by the Office of the Prime Minister and the Ministry of Finance.

Lessons learned

The positive experiences in implementing energy efficiency programmes:-

- Energy saving in switching from incandescent lamps to energy saving lamps;
- By sharing information, the public can engage in energy saving initiatives;
- Increased awareness leads to more conscious choices in purchasing appliances.

Negative experiences in implementing energy efficiency programmes:-

- Information dissemination is a costly

exercise;

- The societal class that may qualify for upgrade of old/inefficient appliances and vehicles may not have the financial capital to switch.

SURINAME

Suriname's population is 480,000, and the energy needs of its capital and outskirts are supplied by a large hydropower plant. Two thermal generators are not in full use and are used primarily as back up. Of Suriname's energy clients, 95% are households, with a few commercial and industrial clients. .

Recent advances in the political, normative and institutional frameworks

There is a lack of laws, regulations and other regulatory instruments promoting energy efficiency in Suriname. Nevertheless, an explicit energy policy is the importation of used cars under 5 years old to encourage fuel conservation and reduction in carbon emissions. Implicit energy efficiency policies include:-

- Purchase of hydro energy from Suralco, a private multinational alumina company;
- Using local heavy fuel oil (HFO) or heavy vacuum gas oil from the State Oil Company (Staatsolie Maatschappij Suriname) for power generation;
- Free installation of energy saving lamps in households, a "once-only" activity conducted in collaboration with the Government of Cuba;
- Promoting the use of renewable energy in rural villages by the government.

Due to high oil prices, Government is unable to subsidize the State Power Company-NV Energie Bedrijven Suriname (NV EBS) that services the transportation sector. The resulting market-driven prices means that rural inhabitants now must pay the full cost or use less electricity. The Department of Energy, State Oil Company and NV EBS, which report to the Ministry of Natural Resources, have responsibility for energy efficiency.

Key actors of energy efficiency and their effective role

The Ministry of Natural Resources is responsible for national energy policy and its Department of District Electrification supplies electricity to

rural villages in the interior. NV EBS is sole supplier of electricity and gas in Suriname's cities, and its policy is to promote energy efficiency by converting its generators from diesel to heavy fuel gas oil, thereby reducing transport and distribution losses. Other policies include buying more hydropower from Suralco and construction of two hydropower plants to satisfy future energy demands. The State Oil Company explores and exploits fossil fuels and produces diesel, HFO, crude oil and asphalt bitumen. It is expanding to include gasoline for the automotive sector, thereby reducing demand for imported diesel and gasoline. The company also produces electricity for sale to NV EBS.

NGOs promote renewable energy through operation of a small hydropower plant tailored for gold mining in the interior; and utilization of photovoltaic systems in rural villages to supply electricity for water pumps and lighting. The Anton de Kom University of Suriname is involved in rural renewable energy projects and in studies on reducing generation, transmission and distribution losses in collaboration with NGOs, NV EBS, the State Oil Company and other industries. There are several engineering consultancy firms, but none specializing solely in energy efficiency.

Resources and mechanisms for funding of energy efficiency programmes

Funding is available from the United Nations Development Programme, the Organisation of American States and the European Union for energy efficiency/renewable energy projects on reducing carbon dioxide and developing economic activities mainly in rural villages. In 2008, an IDB-funded project focused on 'Suriname power sector assessment and alternatives for modernization.' The State Oil Company and NV EBS are also accessing bank loans and state loans from Suriname and India.

Government programme funds are managed by the Ministry of Natural Resources and also by the Ministry of Planning, though some negotiations may take place through the Ministry of Planning and Developing Cooperation. Other funds are managed by NV EBS and the oil company. Energy efficiency programmes are monitored by the Department of Energy, NV EBS and the state oil company. The Ministry of Finance disburses funds for government ►

(continued on page 14)



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FREQUENTLY ASKED QUESTIONS ON BIOTECHNOLOGY

Glossary of Terms

Genome - the entire DNA "recipe" for an organism, found in every cell of that organism.

Isozyme - a molecular marker system based on the staining of proteins with identical function, but different electrophoretic mobilities.

Mutation - a change of one of the "letters" in the DNA "recipe" caused by chemicals, ultraviolet light, X-rays, or natural processes.

PCR - polymerase chain reaction, which rapidly duplicates specific DNA molecules in response to temperature changes in a computer-controlled heater.

Plasmid - a small, circular DNA that is used to transfer genes from one organism into another.

Probe - a very short piece of DNA used to find a specific sequence of "letters" in a very long piece of DNA from a chromosome or genome.

RAPD - Randomly Amplified Polymorphic DNA; a molecular marker based on the differential PCR amplification of a sample of DNAs from short oligonucleotide sequences

Recombinant DNA (rDNA) - DNA formed by joining pieces of DNA from two or more organisms.

RFLP - restriction fragment length polymorphism, which describes the patterns of different (polymorphism) sizes of DNA (fragment length) that result from cutting with restriction enzymes (restriction).

Sequence - the order of "letters" in the DNA "recipe." The DNA sequence is the chemical structure that contains information.

Transformation - a procedure to transfer DNA into the cells of an organism. Can be done with Agrobacterium (most dicots), calcium chloride (bacteria), electroporation (any organism), or the particle gun (any organism).

Transgenic - an organism that has been modified by genetic engineering to contain DNA from an external source.

Vector - any DNA structure that is used to transfer DNA into an organism; most commonly used are plasmid DNA vectors or viruses. ■



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ENERGY EFFICIENCY
IN THE CARIBBEAN

programmes. Disbursements for donor-funded projects are monitored by the respective donors and organizations.

Results of energy efficiency programmes

As a result of energy efficiency programmes, several benefits were achieved:

- The energy saving lamps reduced energy consumption by up to 10% ;
- Energy consumption (2008) in the capital and outskirts was 727 GWh and 130 MW peak demand, fully supplied by Suralco with its high lake levels. If lake levels fall, there is a plan to provide alternatives to satisfy demand.

Lessons learned

The positive lessons from implementing energy efficiency programmes are:

- Using HFO power generation was successful;
- Using energy saving lamps led to reduced energy consumption;
- Using hydro power saved Suriname's economy from the global oil crisis.

Lack of sustainability of the energy saving lamp project is a **negative lesson**.

TRINIDAD AND TOBAGO

The petroleum sector is important to the country's economy, accounting for 60% of Government revenue and 50% of GDP. Due to low energy costs, energy efficiency is not perceived as a priority and initiatives trail those in the region. The country is pursuing renewable energy options because of the finite nature of petroleum and environmental issues. A renewable energy committee was set up in February 2009 to produce a paper on renewable energy outlining a strategy to inform energy policy, to be supported in turn by legislation that will guide the development of renewable energy projects. Recent projects are the pilot solar energy project in Tobago and the ongoing conversion of public buses to utilize compressed natural gas. The 20-30% increase in energy consumption and recent rise in electricity rates have helped to raise public awareness of energy efficient appliances. Energy efficiency initiatives include energy efficiency tips; provision of electricity to squatters on State lands; and control of electricity piracy. Electricity tariff pricing is tiered and based on consumption level. ■

UPCOMING EVENTS

3rd QUARTER

2009

Expert Meeting on Geothermal Energy
29 June - 2 July Nevis

Forty- third meeting of the Presiding Officers of the Regional Conference on Women in Latin America and the Caribbean 7 - 8 July
Trinidad and Tobago

CARICOM Workshop on Social/Gender and Environmental Statistics
20 - 24 July Antigua and Barbuda

Training workshop on the use of the ECLAC Methodology in assessing Natural Disasters
21 - 23 July Barbados

Seminar setting Regional and National road traffic casualty reduction targets for Caribbean countries 4 - 8 August Guyana

Biannual meeting of the Statistics Commission of the Americas (SCA)
10 - 14 August Bogota, Columbia

Training in ECLAC DALA Methodology
12 - 14 August Trinidad and Tobago

ICPD+5 Meeting 19 - 22 August
Antigua and Barbuda

Workshop on Economics of Climate Change Modelling - Economics and other Disciplines
21 August 09 Trinidad and Tobago

Brainstorming meeting on the EPA Monitoring Framework August 09
Trinidad and Tobago

Dissemination workshop for the Household Surveys Project 26 - 27 August
Trinidad and Tobago

Meeting to Develop Sustainable Development Indicators 26 -27 August Barbados

LIST OF RECENT ECLAC PUBLICATIONS

Listed by Catalogue Number, Date and Title

- No.LC/CAR/L.193** April/2009
Cayman Islands - Macro socio-economic assessment of the damage and losses caused by Hurricane Paloma
- No.LC/CAR/L.194** April/2009
Report of the meeting of the High-Level Advisory Committee (HLAC) of the project: A review of the Economics of Climate Change (RECC)
- No.LC/CAR/L.195** May/2009
Report on the Meeting of Social Policies for Children's Rights - Knowledge Building through Partnerships in SIDS - End Year Forum 2008 (UNICEF in collaboration with UNRISD, Commonwealth Secretariat and ECLAC)
- No.LC/CAR/L.198** June/2009
Report of the meeting on biotechnology development and climate change in the Caribbean
- No.LC/CAR/L.197** May/2009
Training Course on Measuring ICT access and use in households and businesses
- No.LC/CAR/L.196/Rev.1** June/2009
Report of the expert group meeting on the CARIFORUM-EU Economic Partnership Agreement



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