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Sponsored by PURC/OOCUR – MIAMI May 11-15.

Session 4b. EMERGING ENERGY ISSUES

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Introduction

Man is an exploitative and inventive factor in the development of systems to sustain and maintain his existence, and natural renewable sources of energy have long been exploited by him – wind, water, the sun, animal waste and wood are all energy resources that were added to energise society for thousands of years. It was, for example, only when steam came into its own in the 19th century as an energy resource it ignited the Industrial Revolution which changed society in Britain and the world for the better forever.

Cheap oil and gas provided much of the energy that drove the prosperity of the 20th Century, but as we enter the 21st century there is the perception that the resources are restricted in quantum because of the possibility that known deposits of these reserves are drying up, especially oil.

There are multiple sources of energy, albeit in varying levels of inventory around the world. The availability of these commodities, except the sun, is frequently proscribed by not only the distance of the end user from the source, but also the competing geopolitical interests of the producing States, fluctuating currency rates, financial, tax and fiscal policies of the buying and selling parties, the manipulation of the price on the commodity markets by way of "long" and "short" positions in the future options exchanges, wars and rumours of wars, and of course the means of delivery of the product.

The International Energy Agency (IEA) published its findings in November 1998 that growth in oil output could not be expected to continue beyond year 2010. But little or nothing has been done to deal with this problem. On the contrary, however, during the past ten (10) years oil consumption increased by about nine (9) million barrels per day. The United States of America, which possesses only about four (4) per cent of the world's population, consumes nearly twenty five (25) percent of the world's oil, and imports more than half of its needs.

The Saudi Petroleum and Mineral Resources Minister, ALI NAIMI, speaking at the World Petroleum Congress in Johannesburg on September 27, 2005, expressed the view that Africa's dynamic oil industry will play a critical role in enabling the continent to realize its economic potential while at the same time helping to meet the world's growing energy needs. He felt that prices are under pressure because the petroleum industry's infrastructure is stretched thin.

Minister Naimi has debunked the theory that "the end of the age of oil is at hand". He explained that there is no shortage of petroleum resources left to be developed and produced. The resource base is more than sufficient to meet projected demand, he posited. There is the **availability**, but the problem is the **deliverability**. He describes "deliverability" as a measure of their capacity as an industry to develop, produce, transport, refine and deliver to end consumers the energy they require in their lives. The petroleum industry, he emphasizes, faces infrastructure constraints and bottlenecks that are causing market volatility and restricting its ability to bring oil from the ground to the consumer. Among the contributing factors to the deliverability difficulties are increasing regulatory complexity and inadequate return on investment caused by a prolonged period of low oil prices and low product refining margins from the mid-1980s to the late 1990's.

HIGH COST OF FUEL

The impact of the spiraling cost of fossil fuels on the world's economies continues to be a major source of concern. Third world countries are even more vulnerable to the effects of

high fuel prices and in the Caribbean where power generation from fossil fuel is widespread, price increases are viewed with justified trepidation. The dependence on foreign sources poses strategic risks for any country's economy.

With developed countries now accelerating their use of renewable energy resources to reduce their dependency on imported fossil fuels, the Caribbean, which has found economic integration so elusive to date, needs to deal with this challenge collectively. Our efforts to date through CARIBBEAN RENEWABLE ENERGY DEVELOPMENT PROJECT (CREDP) have not moved us much closer to a regional approach to renewable energy resource development, something that the Caribbean Community (Caricom) seems not to have recognized thus far.

CREDP is an initiative of the Caricom Secretariat geared at "promoting the transformation of renewable energy markets in the Caribbean area". There seems, however, to be a divide between "policy" and "implementation". Caricom is brilliant at the formation of policy but apparently there is a schism when it comes to the formulation itself, and getting things done as outlined therein.

We in the Caribbean are highly dependent on imported petroleum as our main source of energy, and are exploring alternatives to fossil fuel as the cost of oil skyrocket, with concomitant harsh social implications on our several economies.

In early September 2006, in oil-rich Trinidad, a conference was held to focus on ways to mitigate high energy costs. Four years ago the Caribbean region consumed approximately 2.4 quadrillion BTU of total energy of which petroleum accounted for 93%. The natural consequence of this is that our Caribbean countries are highly vulnerable to current fluctuating market prices. In Aruba, for instance, the high fuel price is affecting the country's tourism industry. DOMINICA is complaining bitterly of the effects on the poor and the unemployed as a result of the escalation of the price of oil. There, the Minister of Energy is apprehensive that there will be riots and demonstration in the streets.

A regrettable consequence of the stranglehold on the economy by the high price of fuel is migration and brain drain since employment cannot be guaranteed and industries do not flourish. And one of the inevitable results is that those who cannot do better, because citizens have to live as best as they can, they would resort to drug trafficking. And this, of course, has consequences not only for individual countries but major cities where a ready market could be found for the produce.

The TRINIDAD Energy Minister said that the Caribbean countries were exploring twenty-six (26) renewable energy projects comprising 9 (nine) wind energy, 4 (four) solar energy, 3 (three) hydropower, 5 (five) geothermal energy and 5 (five) solid biomass.

In the Caribbean we are subject to exogenous economic shocks, and there are already tensions in the economies. Answers must be found.

With the tremendous expansion of the economies of China and India which depend on and consume great amounts of fossil fuel, there will almost certainly come a time, if it is not yet on us, when we may not be able to buy because of the prohibitive cost. Caribbean countries are pursuing several renewable energy projects including wind-power, solar energy, hydropower, geo-thermal energy and solid biomass. But, then again, there are challenges by the almost prohibitive financing costs.

Further, Trinidad's proposal to run natural gas pipelines on the floor of the Atlantic Ocean to major users of natural gas for the generation of electricity represents a paradigm shift in the way energy is produced, distributed and consumed.[1] Guyana proposes a refinement of this policy. Electricity can be generated from fossil fuels, hydro, wind, solar, biomass, tidal energy, waste and any other form of available energy. Energy may be transported in the form of electricity on an electric submarine transport cable, instead of a pipeline.[2]

[1] Guyana's Renewable Energy Policy, Guyana Energy Agency, March, 2007. p.10
[2] Ibid.

The IDB has been working with the Brazilian Government on a strategic plan to develop a world-class bio-fuels innovation and production hub in Brazil, and to promote the marketing of new technologies in the Global Market. Brazil is a world leader in the production of ETHANOL and hopes to expand this in other forms of bio-energy.

Interestingly also, we find that the 750-student Green Mountain College in Poultney, Vermont, USA plans to cut its greenhouse gas emissions by joining Central Vermont Public Service's Cow Power Programme, which harvests waste from local farms. In a statement issued by the college it said that the initiative helps the college to do its part to address global warming by reducing its carbon emissions by approximately 3500 metric tons per year. This is equivalent to removing 758 passenger vehicles from use for one year. The programme capitalizes on a common by-product from one of the state's top industries – with a typical Vermont dairy cow producing around 13 gallons of manure daily. Those who are interested in statistics, Vermont boasts the highest cow-to-people ratio in the USA, with 300,000 cattle and just over 600,000 people.

We shall not lose sight of the fact that nuclear energy is generated by the USA and many other countries. The cost, we have been advised, is substantially lower than fossil fuel and is a clean system which may cause less pollution.

GLOBAL WARMING

Climate change is a growing threat to international security and the world economy. It poses a huge challenge and the developed rich nations need to lead the way to solve it since they bear a large responsibility for the present level of greenhouse gas emissions. When the United States of America withdrew from the 163 nations KYOTO PROTOCOL for curtailing global warming the excuse was that it would hurt the US economy at the expanse of China and India

KYOTO obliges 35 rich nations to cut emissions of green-house gases – which come mainly from burning fossil fuels by some five percent from the l990 levels by 2012.

One of the great American Presidents, President William (Bill) Clinton, has set up a CLIMATE GLOBAL INITIATIVE, and at a summit run by him in September, 2006, he introduced British Billionaire, Richard Bronson, who has committed himself to spending all the profits from his airline and rail businesses – estimated at US$3 Billion over the next ten years in combating Global warming. Bronson is the Chairman of a Company – the Virgin Group – and said the money will be spent on renewable energy initiatives within his company and in investments in Bio-Fuel research, development, production and distribution, as well as projects to tackle emissions contributing to Global warming. He said, "We have to wean ourselves off our dependence on coal and fossil fuels. Our generation has the knowledge, it has the financial resources and as importantly, it has the will power to do so". President Clinton has commended Bronson and offered that "Richard's commitment is ground-breaking not only because of the price-tag – which is phenomenal – but also because of the statement that he is making – clean energy is good for the world, and it is good for business".

There is much talk about greenhouse gases and I am sure you all know that emission of greenhouse gases comes mainly from the burning of fossil fuels in power plants, factories and motor vehicles. Guyana, incidentally is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) whose overall objective is targeted at reducing the production of greenhouse gases.

The Chief British Government economist, NICHOLAS STERN, on the cost of climate change has written that ignoring climate change could lead to economic upheaval on the scale of the l930s Depression. Underlying the need for urgent action to combat global warming, he said the world does not have to choose between tackling climate change and economic growth, contradicting US President George Bush who pulled out of the Kyoto Protocol against global warming in part because he said it would cost jobs. "The evidence gathered by the review leads to a simple conclusion: the benefits of strong, early action considerably outweighs the costs", "our activities over the coming few decades could create risks of major disruption to economic and social activities later in this century and

in the next, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century" Stern has written.

What are the likely consequences of the current trend of global warming? The average global temperatures will rise by 2-3 degrees centigrade within the next 50 years or so, compared with temperatures in 1750-1850; the earth could warm by several more degrees, with severe consequences that would hit poor countries most; melting glaciers would initially increase flood risks and then reduce water supplies, eventually threatening one-sixth of the world's population, mainly in the Indian sub-continent, parts of China and the South American Andes; declining crop yields, especially in Africa, could leaving hundreds of millions unable to produce or buy enough food; rising sea levels could result in tens of hundreds of millions more people flooded each year. In the Caribbean, even now, we experience unusual sea level movements in Barbados and other island states, and in Guyana.

As an aside, the question of global warming also seems to have some effect on the question of the right to information and free speech. The British journal "NATURE" reported on 27th September 2006 that US officials blocked the release of a statement by government climate scientists that explored possible links between global warming and stronger hurricanes: But a spokesman for the US National Oceanic and Atmospheric Administration (NOAA) dismissed the "Nature" report as an "interesting piece of fiction" and said the statement was not sent out because it was not ready by the start of hurricane season on June 1.

At the heart of the dispute is an exhaustively vetted two- page fact sheet meant to explain how climate changes are related to hurricanes. It has not been officially released but a copy made available includes the words "Draft – not for distribution". NOAA spokesman Jordan St John said some 50 scientists worked to craft a document acceptable to all, ranging from those who maintain human-caused global warming can intensify hurricanes to those who contend any changes in hurricane intensity are due to natural cycles.

While noting a "role for global warming" in the increased sea surface temperatures in the tropical Atlantic and the Gulf of Mexico – prime hurricane-spawning territory where growing storms feed on warm water – the statement also stressed previous periods when the tropical Atlantic was significantly warmer than the global average.

The journal, "Nature", said work on the fact sheet started in February 2006, after NOAA researchers accused political appointees at NOAA of "ignoring…the possibility that global warming could cause hurricanes to be more intense or frequent". The Journal also claimed that scientists at NOAA were concerned that climate scientists who published articles on the connection between climate change and increased hurricane intensity were kept away from the media, while those whose research supported the idea of natural cycles were put forward.

But we have protagonists duel on the inaccessible planes that pit science against non-science, the voracious oil companies and industry against environmentalists and the developed and industrializing economies against the less prosperous and third world Republics. The warning that danger is at the gates is growing shriller while the insouciance and studied neglect of those opposed to this view deepens. The crux of the matter is not the highbrow argumentation or political opportunism. IT IS A QUESTION OF SURVIVAL.

We are all suffering from the consequences of Global warming, and those who can contribute to the lessening of the suffering of mankind are concerned only with material things and the wealth friends can garner. We seem to have lost sight of the very elementary truth that death comes to us all and makes us all equal when it comes: It is God who created the magnificence of the Universe as most of us believe, yet it is through the minds of man and woman that God speaks and develops the world only if only we open our hearts.

GUYANA

Guyana is the only English speaking country on the South American mainland bordered by Suriname, Brazil and Venezuela. It has a population of about 750,000 and its main exports are mainly raw materials including sugar, bauxite and gold.

GPL

Our electricity is supplied mainly by the Guyana Power and Light (GPL) that is a Government owned company. GPL has a customer base of 126,000 and produces about 530 GWh (Giga watt hour) per annum. 60% of this energy is generated by internal combustion engines running on heavy fuel oil (HFO), the remainder is generated by machines running on No.2 diesel.

The Company provides service along a narrow strip of our coastland, where 90% of our population resides. Since its creation in 1999 the GPL franchise area has been extended to include all of Guyana but it continues to operate only in its traditional service area. This state owned electric utility and its predecessor (the Guyana Electricity Corporation) have suffered from a lack of capital investments in generation, transmission and distribution. Historically power generation has been from heavy fuel-fired boilers and diesel-fired internal combustion engines with heavy fuel-fired internal combustion engines replacing the boilers more recently.

OIL

With a total dependence on imported fossil fuel Guyana's economy is very vulnerable to fuel price increases forcing it to look aggressively for solutions on multiple fronts. It is imperative to note, that the fluctuating fuel prices have had a profound effect on Guyana's economic, financial and social development. It is further important to note that in 2005, Guyana spent approximately 38% of its gross domestic product (GDP) on fuel and lubricants.[3] By comparison the fuel bill in 1999 was 16% of the GDP.[4] We are

[3] Guyana's Renewable Energy Policy , Guyana Energy Agency, March 2007.p.2.
[4] Ibid.

positive that Guyana has oil reserves in commercial quantities though finding it has been elusive to date.

Hydropower

While we continue to vigorously pursue prospecting for oil we have finally found a partner to commence the development of our vast hydropower resources. It has been our aspiration since the 1960's to develop one of our numerous hydropower sites but for a number of reasons our aspirations were never realized. This is a project that is seen as commercially viable and one that promotes sustainable development taking into consideration the social, economic and environmental components.[5] It is evident that should this materialize, it will represent a major economic development and economic opportunity for Guyana, both as a primary source of power for domestic consumption and as the hub around which the development of the country's economic potential may be directed.[6] The most advanced project in this regard, is expected to generate 103 MW. The feasibility study for this project shows that energy may be delivered to a particular area (Sophia) at US 7.2 cents per kWh. It 15 years it is projected to be lowered to US3-4 cents per kWh.[7]

In the seventies and early eighties we expended significant resources into the development of a 750MW hydropower project but this was not completed and the heavy industries we contemplated to attract from this development therefore never materialized. We have signed a Memorandum of understanding (MOU) for the construction of a 100 MW hydro plant.

The development of this hydro power plant, the expected commissioning of a 30MW co-generation facility by our State owned Sugar Company (fueled by bagasse) and an IPP-developed 12MW wind farm are expected to adequately meet our country's electricity needs in the medium term. Regrettably, they are yet to come on stream

[5] Guyana's Renewable Energy Policy. Supra, p.3.
[6] Ibid. p.4.
[7] Ibid.

Skeldon Sugar Modernization Project.

The Skeldon cogeneration plant which is part of the modernization project using bagasse as fuel alternative, is expected to sell about 70 GWh per year to the national grid and will account for 14 % of generation. The cogeneration plant is expected to supply some 10 MW to consumers in the area.

There are three generating sets which have the capacity to produce 20 megawatts of electricity. The generating sets are to be used when bagasse is not available to power the turbines. At the end of last year (2008), thirty seven thousand seven hundred and fifty eight (37,758) megawatts were exported to the National grid from the turbines and generators.

Wind Power

It has been found by studies conducted on Guyana's wind resources along the northern coast is favorable for the development of wind farms. As known, isolated wind mills are used as stand-alone systems or as hybrid systems. [8]

Ethanol

With the rise of fuel prices, alternative transport fuels become more competitive and ethanol is gaining momentum as a viable alternative to gasoline. It is understood that the Government of Guyana has signed a MOU with a private developer with the objective of establishing an ethanol production facility in Guyana using sweet potato as the feedstock. This facility is expected to produce about 150 million liters of ethanol annually and use 400,000 tons of sweet potatoes.

Its important to note that Brazil has been able to produce ethanol at a cost of US$39.74 per bbl, while an estimate based in Guyana's current cost of sugar cane production is US$57.24 per bbl. Obviously this cost can be reduced if the ethanol facility is annexed to

[8] Guyana's renewable Energy Agency. Supra, p.5.

an existing sugar factory. [9] As the price for gasoline increases, ethanol becomes more competitive as a gasoline extender and octane improver – and this seems to be a viable option for Guyana.

Biodiesel

The Guyana Institute of Sciences and Technology (IAST), in collaboration with the National Edible Oil Company, the National Agricultural Research Institute and the National Industrial and Commercial Investments Ltd have been working on biodiesel alternatives. For instance it has set up a laboratory specifically to research the production of biodiesel and has successfully produced biodiesel from coconuts.

There is a planned expansion of this project in the North West District of the country where there is easy access to oil palm, and there is an active plan to develop some 2000 hectacres per year for the next 5 years to increase production. This pilot project was initiated to meet the existing demand for diesel in the region and its general thrust was to replace about 3 to 5 percentum of the local demand for the fuel. The factory has a capacity to produce between 150 to 200 barrels of fuel per month and it is the first to produce fuel from palm oil here. It has provided jobs for about 90 persons and has benefitted close to 150 families.

Reducing Power Demand

While we have concrete plans to meet our short to medium term power requirements from renewable energy sources we recognize the importance of demand side management. A major project to replace incandescent bulbs with compact fluorescent lamps has already had a positive impact on reducing power demand. We have a peak reduction of 2MW from 76MW.

[9] Guyana Renewable Energy Policy. Supra, p.9.

We expect to expand our demand side initiatives to include energy efficient appliances and the management of our daily routines to reduce energy consumption.

We also have ingesters fuelled by cow-manure which produce methane gas. This gas is used for cooking and lighting purposes. The gas when generated by the ingesters is channeled by hoses into stoves and lamps used for domestic purposes.

Brazil Energy

While Guyana is fortunate to have more than 6,000MW of hydro potential and significant wind energy potential we are cognizant of the limited options available to our Caribbean neighbors. Another prospective hydropower development in Guyana is premised on the export of power to Brazil.

Guyana's Hinterland Regions.

As I mentioned before 90% of Guyana's population resides on a narrow coastal belt that is less than 1000 Km^2. The remaining 213,000 Km^2 of Guyana's territory is home to dozens of small communities where our indigenous citizens reside. Most of these communities live in poverty and a supply of electricity would allow them to develop cottage industries and process a range of raw materials, fruits and vegetables, market their craft internationally via the internet, i.e. be given an opportunity to lift themselves out of poverty.

These communities are hundreds of kilometers away from the coastal networks and dozens of kilometers from each other. With demand being generally in the tens of kilowatt, localized generation for each community is unavoidable. The cost to run cables from the main generating stations to the interior locations will be astronomical and prohibitive. A survey has been completed and the unique renewable energy capability of each community has been established. Pico hydro, i.e. Mini Hydros, PV systems, i.e.

Photo Voltaic or Solar, and wind turbines have been identified to serve most of the communities with back-up diesel generators in some cases.

The Government of Guyana, ever conscious of the needs of our indigenous population has recently installed solar panels and residents are now enjoying living conditions akin to those of their compatriots in other areas along the coast.

Indeed, our **Public Utilities Commission** has encouraged and approved the Guyana Telephone and Telegraph Company (GT&T) establishing and extending its telephone service to the interior and remote areas of the country, powering it by means of the PV system. Solar panels have been set up in several areas, the care and protection of which have been entrusted to the heads of the various communities. The Government of India has, in terms of an agreement with the Government of Guyana, installed traffic lights using the photo voltaic technology.

Financing & Incentives

Financing is a major constraint in developing energy supply systems mainly because such systems usually require large capital investments. The general strategy should be – through fiscal incentives to encourage investment in the energy sector.[10] One way of doing this may be through the introduction of a tax regime which works as incentive for these alternatives. For instance legislation may provide for import duty concessions for all renewable energy equipment, systems and construction materials for renewable energy projects.

Electricity stealing and prepaid metering.

One of the principal inhibiting factors for a Company to show profit or to break even are instances of stealing of electricity by certain categories of consumers. This category is classified as **NON-TECHNICAL LOSSES.** Some employees/technicians of the utility companies are themselves corrupt, and for gifts of filthy lucre from those who can afford,

[10] Guyana Renewable Energy Policy. Supra, p.8.

are compromised. They have knowledge of the system and tamper with and manipulate the meters to under-record the consumption. The white collar employees sit in the offices and manipulate the consumer data base and erase names from the system. On the other hand there are consumers themselves who do their own thing. They access the electrical wires from the poles and connect to their system. These wires are invariably run in mini ditches and then across trenches and drains to their residences. Many have been electrocuted but that is no deterrent to others since they believe in the "freeness".

In certain areas where there are widespread co-operatives which have made stealing an art, the utility companies have removed the meters from the premises and mount them at heights of about 15 – 20 feet on poles along the parapets adjacent to the homes.

But then, all losses ought not to be blamed on the consumers. There are quite a few cases where meters themselves have been found to be defective, recording slowly and understating the true consumption. These meters need to be replaced but many utility companies plead lack of adequate funds for such an exercise. They should gird their loins and bite the bullet. When these meters are replaced the inevitable increased revenue will compensate for the investment in the meters.

Prepaid Metering

Generally Prepaid metering is the payment by consumers for electricity (or gas/water) prior to consumption and this credit lasts until it is fully utilized or expires.

A number of countries have adopted the prepaid meter system. South Africa has a large number of installed meters and the United Kingdom for instance currently has in excess of 3.5 million prepaid metered subscribers. Other countries such as Canada, Sudan, Madagascar, New Zealand and Argentina have similarly followed suit.

Prepaid meters operate via the use of a '**smart card system'**, which allows consumers to purchase a reusable energy debit card for the amount of KWH required. Each card, unique to the consumer, is keyed to the consumer's individual meter and account number,

which in turn prevents the use of the card by any other meter/consumer. The card may subsequently be reset with further credit. It is virtually tamper-proof.

The advantage of this meter –if it is to be used for avoiding meter theft, is that the meter is completely sealed and the card is used to capture all transactions and consumption information. This information is relayed to the utility, which can have access to the consumer's usage information and may be a good gauge with respect to load forecasting. It is important to note that the software can be written to detect and to act as a prompt in detecting non-purchase of credit for prolonged periods.

Of interest, the utility may opt to allow some form of emergency energy, should the credit be utilized completely before recharging the cards. This allows for the deduction to be taken on the next usage and it allows the consumer to better manage and monitor his consumption.

There are a number of advantages of the system. For instance it invariably eliminates the cost of meter readings as well as charges pertaining to wrongful disconnections/reconnections, and an inefficient billing system. At the same time it gives the utility advance cash flow.

Pre-paid metering should not be viewed as an inconvenience or an unjust system imposed by the utility company. Indeed, it is, and should be viewed as a means of putting control of the use of electricity in the hands of the respective consumers. This control allows the consumers the privilege to make informed decisions and choice as it relates to electricity consumption.

The prepaid system is also geared to take into consideration the default of consumers who may neglect to update the card in time. The meters are equipped with an emergency energy facility to allow consumers whose units are depleted a fixed credit limit deductible when they factor in their next credit.

In sum, therefore, prepaid metering eliminates the costs relating to meter reading since none are required:

(b) administrative charges associated with disconnection and reconnection cease:

(c) payments are in advance so cash flow is improved.

(d) no need for billing system, and the discrepancies associated with it are eliminated.

(e) eliminates bad debts.

(f) billing delays are eliminated.

(g) allow consumers to save money through better energy management.

The consumer and the utility will be both winners.

Energy Deliverability

As our plans for adequate power generating capacity, based on renewable resources progress, we are acutely aware of the limitations in our networks to deliver this power efficiently to our load centers. In the absence of capital to build a national grid, Guyana had reverted to establishing small generating facilities around its franchise area from 0.325MW to 22MW. Most of these small generating facilities operate inefficiently on expensive No.2 diesel.

With the development of the renewable power sources, particularly the hydro, it is imperative that the national grid be completed. In fact half of the actual construction cost for the hydropower development is for a 230KV-300Km- transmission line to deliver the power to a central distribution point. From this point we need to have the capability to allow for the efficient movement of bulk power across all our load centers. It is projected not only the transmissions lines will be built but also a number of new substations to deliver power to existing load centers and over 50,000 new consumers stand to benefit from an Unserved Areas Electrification Programme (UAEP).

The UAEP is one of the pillars of Guyana's poverty reduction strategy as the expectation is that with access to electricity, communities would be able to engage in economic activity to increase their income. Funding for the UAEP provides for only the distribution networks and the State electric utility is required to provide the financing for generation and transmission.

The lack of capital to upgrade the distribution networks and the growth in demand over decades have combined to result in a high level of technical losses in these networks. Technical and commercial losses at the moment are about 36.5% of production. This further burdens our limited generating capacity and creates distribution bottlenecks. Millions of dollars are paid annually to consumers for damaged appliances due to voltage related problems.

GPL estimates that an investment of about US$80M over five years is required to develop an efficient network to deliver power reliably to all its consumers. With an annual turnover of US$90M, a tariff already beyond the means of thousands of ordinary citizens, total dependence on imported fossil fuels, a high level of losses (both technical and non-technical) and a mandate to extend its service to another 50,000 households, GPL faces an enormous challenge to deliver power, reliably, efficiently and at a sustainable, affordable price.

Our country, Guyana, does not produce fossil fuels, and as such the attraction of a renewable energy supply is very attractive since it would reduce the cost by millions of dollars per year of foreign currency, which we spend to purchase oil.

Without any attempt to be overly ambitious, I believe that Guyana's path to self-sufficiency in its production of energy sources has already been charted by Nature – by the Sun. The uncapped energy available for at least 270 days per year can be collected and stored as photovoltaic energy. The desirable geographical location of Guyana, sub-equatorial and away from the uncertainties of change in weather patterns which may

cause vast change in energy demands, offers an excellent opportunity of sustainable development and predictability.

Guyana is a prime candidate for the introduction of sun-generated energy, both in an economic and technical basis. A population of approximately 750,000 residents with about 200,000 homes with a present demand of about 76MW energy can be adequately serviced by the Sun. It can also be used in areas where the cost of extending the electricity grid outweighs the benefit. These systems are particularly useful in Guyana interior/remote areas. With the introduction of photo-voltaic/solar technology to residential areas, we would be offered the opportunity to re-deploy some assets, at present used to purchase fuel, into the development of, say, social services. The State benefits from the savings of foreign currency and the citizens enjoy a better standard of life. The use of solar energy shall allow for the decentralization of energy generation. Such a protocol will reduce seepage and loss in transmission of the product thereby lowering the unit cost of distribution since the distribution area will be limited.

The initial outlay to set up a solar system may be out of reach for the ordinary citizens. The cost of the panels, batteries and other paraphernalia would be extravagant, and that is a factor which must be taken into account in the determination of the use of any photovoltaic system. However, when the hydro project comes on stream the country stands to benefit generally, and more particularly, consumers will be afforded a more reliable service at a much more reasonable cost. We are looking, with anticipation, to that day.

Finally, while currently the world is experiencing an apparently stable and more affordable oil price, it is important that we do not be mislead by a false sense of security. In the recent past oil prices have been fluctuating to the detriment of economies world-wide; and we shall not allow ourselves to be victims of exogenous influences when we consider the conflicts in the Middle and Far East that can lead eventually to conflagration. This, in turn, can disrupt the social order and world-wide economies which can inevitably lead to spiraling oil prices.

The small economies of the Caribbean Region will not escape the consequences of the downturn of the economy and it is therefore imperative that the region set about to consolidate its substantial renewable resources to deal with the emerging energy issues.

Respectfully submitted.

Prem Persaud