

Sustainable energy future – How can standards help meet the challenge?



Name: Miss Ester Williams

Date of Birth: 26 December 1984

Position: Standards Development & Certification Officer

Organization: Bureau of Standards Jamaica (BSJ)

Address: 6 Winchester Road, Kingston10

Country: Jamaica

Email: ewilliams@bsj.org.jm

1.0 Introduction

The International Organization for Standardization's (ISO) focus on a *Sustainable Energy Future* reflects a universal cry from countries, industries and citizens. Sustainable energy provides for the energy needs of today without jeopardizing the energy needs of future generations. In reality, energy affects every area of human existence, and the lack of access to clean, affordable and renewable energy hampers sustainable development at the national, regional and international levels.

More than 85% of the world's current energy needs are met through fossil fuels such as coal, oil and natural gas; and the global demand is likely to increase by 45% by the year 2030. To offset this prediction and decrease carbon dioxide (CO₂) emissions, the ISO has been adamant in publishing applicable and practical international standards to heightened awareness of practices government, businesses and consumers can use to increase energy efficiency, reduce cost and improve performance with renewable energy sources. Proper management and implementation of these standards can provide a positive impact on 60% of the world's energy in the long-term by the year 2050.

As a developing country, it can be confidently reported that Jamaica is ready to move towards a sustainable energy future, especially since the launch of *ISO 50001:2011, Energy management systems – Requirements with guidance for use*. The Jamaican National Energy Policy (JNEP) 2009 – 2030, has laid the foundation to ensure that Jamaica achieves by 2030: *“a modern, efficient, diversified and environmentally sustainable energy sector providing affordable and accessible energy supplies with long-term energy security and supported by informed public behaviour on energy issues and an appropriate policy, regulatory and institutional framework.”*

The policy aims to facilitate the establishment of a comprehensive programme of efficiency improvement and energy diversification to provide high-quality, affordable, environmentally-friendly energy and to reduce the country's dependence on high-cost imported oil. Jamaica has embarked on this quest because of the increasingly important role of energy in the socio-economic development of our country. The implementation plan will span the private and public sectors, however; it is important to understand that commitment to standards and adequate funding are the main drivers for its success.

This paper seeks to demonstrate how standards and Jamaica's energy future are inextricably linked to finding cost-effective and environmental-friendly solutions to reduce energy-related CO₂ emissions, to achieve the country's stated energy conservation and sustainability goals.

2.0 Energy Challenges - The Real World and Jamaica's Dilemma

Global warming and its effect of climate change remains the most terrifying challenge of achieving a sustainable world. The human-induced activities that release large amounts of greenhouse gases (GHG) such as CO₂ into the atmosphere contribute significantly to this evil, which is causing our Earth to get hotter and hotter. Globally, the energy sector accounts for 65% of all GHG emissions, especially amongst developed countries such as the United States of America (USA), Russia, Japan, the European Union (EU) and China. However, developing countries CO₂ emissions are on the rise and the same is true in Jamaica.

In Jamaica, there has been no discovery of any petroleum or coal resources for sustaining the energy sector. Hence the country is heavily dependent on imported petroleum as its primary source of energy; especially for its electricity, industrial, transportation industries as well as to satisfy commercial and residential demand. Several researches conducted during 2000 - 2008 by the United Nations, World Bank and other private groups/consultants revealed that, over 70% of Jamaica's total energy mix is supplied by imported fossil fuels and 86% of Jamaica's electricity production is supplied by imported petroleum-based fuel.

The electricity generation process is energy intensive, inefficient and very expensive (compared to Trinidad & Tobago - another Caribbean country that has its own oil source). It is envisioned to increase as oil prices peak and the Jamaican dollar loses value relative to its US counterpart. It could be analyzed that Jamaica is investing in a process that is negatively impacting the atmosphere, because the extraction, processing, transportation and distribution of fossil fuels is by far the largest industry to release GHG.

The industrial sector which comprises bauxite and alumina mining, cement production and food processing is another large energy consumer, accounting for 37.4% of total energy use. Increased demand for the goods and raw materials consumers use daily are supplied by the industrial sector, which creates a

ripple effect for increased CO₂ emissions. Due to the high level of production, carbon dioxide and hydrocarbons are released because of leaks, spillage and the burning of fuel for power, heat and electricity for the operation of factories, processing plants and equipment.

The use of fuel for road transportation has seen increases and accounts for about 23% of Jamaica's energy consumption. The fleet of new vehicles in the island has grown especially SUVs, minivans, pick-up trucks and public buses; thereby resulting in increased use of petroleum-based products such as gasoline, diesel and lubricants. Often, major cities are polluted and congested with black smoke (vehicular emissions), especially from public buses, taxis and minivans. Although new fuel-efficient vehicles are being imported; population growth, cost and the demand for travel are urging some passengers to invest in older makes, models and fuel type of vehicles.

Another peaking issue is the commercial and residential demand for electronics, appliances and a better quality of life; which causes businesses and families to use energy for lighting, cooling, cooking and entertainment. Although this sector contributes less CO₂ to the atmosphere, it still remains a challenge because energy usage and electricity is likely to increase as the climate changes, population grows and Jamaica moves towards developed status by 2030. Jamaica has begun much energy efficiency practices in the homes, offices and buildings, but this was mainly done to reduce the monthly cost of electricity instead of reducing CO₂ emissions.

Amidst these challenges - *'where there are Standards, there are Solutions'*. Mass communication, understanding and public awareness of standards and good practices are compulsory if Jamaica should be successful with the implementation of new technologies and renewable sources of energy to lessen the emissions crises.

3.0 Standards in Action – “Helping Jamaica to ease energy: using our wits to save watts”

ISO international standards have significantly helped Jamaica in unearthing energy efficiency measures, technologies and good practices that can be useful to implement the national energy policy. Standard is the soil that fuels the growth for organizations to meet the energy challenge, by using the right balance of energy efficiency tools, such as renewable and lower carbon energy sources. The Bureau of

Standards Jamaica (BSJ) facilitates this process through standards development and conformity assessment, to help consumers, government and businesses operate sustainably to meet quality, safety, environmental and energy needs.

Over the last 2 financial years (April 2012 – March 2014), the BSJ has reported a significant increase in the publication of standards, especially the adoption of ISO standards. This was a deliberate strategy to promote general consensus based requirements; encourage consumers to demand quality, save time and money; and to shape the Jamaican culture into a standards-driven society. Out of this venture, the Industrial Chemical and Allied Products Technical Committee (ICAP) used ISO and ASTM standards to amend the National Petroleum Quality Control Act to include technical specifications for Ethanol, Bio-diesel and Ultra Low Sulphur Diesel (ULSD) for implementation in the transportation industry. This vision was to support the use of cleaner fuel in vehicles, thereby lowering emissions. The Jamaica Urban Transit Company (JUTC) - the major provider of public transportation in the urban metropolis; has begun using ULSD and plans to support its operation by using air quality standards to improve fuel quality, vehicle inspections and realize maximum benefits.

The high usage and cost of energy clearly impedes economic growth and sustainable development. However, the implementation of ISO 50001, ISO 9001 and ISO 14001 has allowed many Jamaican firms to become more efficient, cut wastage to reduce their cost structure and compete at better prices in the marketplace. Although no company has been certified to ISO 50001 in Jamaica, the sale of the standard has proven that companies are striving to dovetail their work to the requirements therein. Red Stripe Jamaica, producers of beer, is one such company that has begun implementation of the system to minimize energy emissions in service of preserving the environment, while also achieving optimized energy economics. Similarly, the Carib Cement Jamaica Limited which had achieved the BSJ Certification Mark and ISO 9001 and 14001 certification in 2007, has recently embarked on expansion and modernization of its plant by upgrading dust control systems and retiring inefficient technologies to reduce carbon footprint and improve environmental performance to meet all applicable local and international emission standards.

The BSJ standard awareness promotions of the National Building Code, Volume 2: Energy efficiency building code, requirements and guidelines (JS 217), has provided guidance to several government agencies and Ministries to introduce energy efficiency / conservation projects in public spaces such as schools, hospitals and utility offices. It is also noted that, ISO standards for solar cell efficiency have been useful for preventing the importation and use of substandard solar units with high dependence on fossil fuel.

As a result of this public campaign, the Ministry of Science, Technology, Energy and Mining (MSTEM) had strategically installed energy efficient pump motors and power factor correction equipment, as well as solar and wind driven pumps to reduce energy costs at the National Water Commission (NWC) which accounts for over 40% of public sector energy consumption. Additionally, efforts have been made to install energy efficient air conditioning system at the Spanish Town Hospital; replace incandescent light bulbs with compact fluorescent lamps (CFLS); apply cool roof coatings on buildings and install solar photovoltaic systems to supply electricity for schools across the island.

Mr. Phillip Paulwell – Minister of MSTEM, in a public address boasted that Jamaica will soon be the leading Caribbean country in the gross production of renewable energy. Jamaica will not settle with the status quo, but rather focus on the coalition of success strategies to boost performance across high energy sectors; lower carbon emissions; double renewable energy by 2020 and achieve the Jamaica National Energy Policy (JNEP) 2030. For a detailed analysis of standards contribution to Jamaica's energy sectors, see table 3.1 *Jamaica Roadmap to a Sustainable Energy Future*.

Table 3.1 Jamaica Roadmap to a Sustainable Energy Future



Energy Sectors	ISO Standards	Benefits – Reducing Emissions	Jamaica Renewable Energy Examples
<p>Electricity</p> 	<ul style="list-style-type: none"> • JS ISO 50001 – Energy Management System • ISO 13065 – Sustainability criteria for biofuels • ISO Solar energy standards 	<p>Standards used in electricity generation and distribution</p> <ul style="list-style-type: none"> • provide consistent, flexible and reliable power supply, with safety and accurate billing • promote renewable energy to tackle issues concerned with climate change and energy security • provide guidelines for installation of energy generation systems • support government plans to improve lighting energy efficiency in public spaces • reduce energy costs and carbon emissions 	<ul style="list-style-type: none"> • JPSCo. upgraded power plants with new technologies to increase efficiency and operability • Introduction of net billing and net metering • Renewable energy sources <ol style="list-style-type: none"> 1. Wind farms 2. Solar panel system 3. Hydropower 4. Geothermal 5. Ethanol 6. Bio-diesel
<p>Industrial</p> 	<ul style="list-style-type: none"> • JS ISO 50001 – Energy Management System • JS ISO 14001 – Environmental Management System 	<p>An integrated management system helps</p> <ul style="list-style-type: none"> • measure and manage energy use • reduce energy costs and carbon emissions • provide secure supply of energy for operation • improve reputation in terms of quality, energy, safety 	<ul style="list-style-type: none"> • Natural gas used instead of coal to run machinery and equipment in many processing facilities • Recycled materials to produce new products • Energy efficient / green technologies

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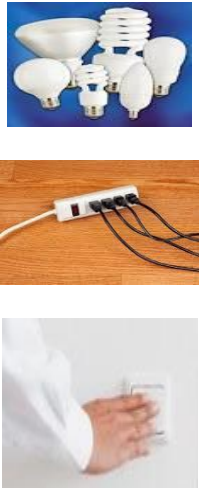
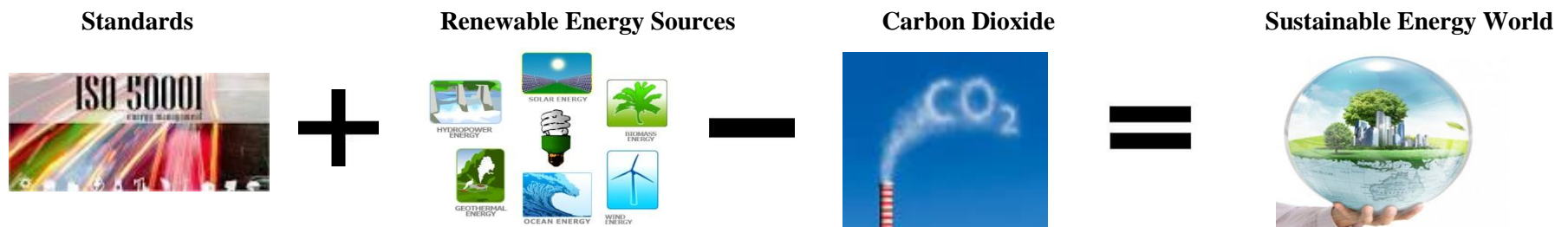
Energy Sectors	ISO Standards	Benefits – Reducing Emissions	Jamaica Renewable Energy Examples
	<ul style="list-style-type: none"> • JS ISO 9001 – Quality Management System • ISO 13579 – Method of measuring energy balance and calculating efficiency 	<p>and waste management</p> <ul style="list-style-type: none"> • provide best practices for market access and transparency 	
<p>Transportation</p> 	<ul style="list-style-type: none"> • ISO 26262 series – Road vehicles. Functional safety guide • ISO 18541 series – Road vehicles. Standardized access to automotive repair and maintenance information (RMI). • ISO 6469 series – Electric vehicle (EV) safety 	<p>Standardization in this industry should</p> <ul style="list-style-type: none"> • reduce the cost of producing vehicles and parts • improve safety, electronic systems and processes • improve performance and operability • enhance traffic management systems • offer protection for the environment, with applicable emissions testing methods • offer travel efficiency measures to lower travel demand and the need for driving • reduce air and noise pollution 	<ul style="list-style-type: none"> • Public buses are fueled by compressed natural gas and ULSD • Use ethanol and bio-diesel • Avoid engine-idling, rapid driving and braking • Draft framework to import and sell EVs that stores energy from braking

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Energy Sectors	ISO Standards	Benefits – Reducing Emissions	Jamaica Renewable Energy Examples
<p>Commercial and Residential</p> 	<ul style="list-style-type: none"> • JS ISO 50001 – Energy Management System • JS ISO 13153 – Framework of the design process for energy-saving single-family residential and small commercial buildings • JS ISO 23045 – Energy efficiency assessment of buildings 	<p>Increasing energy efficiency in building construction</p> <ul style="list-style-type: none"> • reduces energy demand and CO₂ emissions • provides automated control systems to adjust temperature, lighting and energy usage • stimulates potential cost savings, especially in electricity bills • boosts energy conservation 	<ul style="list-style-type: none"> • Fluorescent and LED lighting • Digicel JA. installed solar & wind energy • Purchase and use energy efficient (energy star certified) appliances and electronics • Use of motion detectors • Shutter control on windows

ENERGY EFFICIENCY EQUATION



4.0 Success Stories - Renewable Energy Bottom Line

4.1 Electricity Sector

The Jamaica Public Service Company (JPSCo.) is by far the largest electricity provider in the country with a generation capacity of 623 MW. Since 2010, the company has explored and implemented renewable energy as fuel diversification efforts to reduce their dependence on oil for electricity generation. In 2013, a new hydroelectric power plant was completed, which added add up to 7.2 MW of renewable energy to the electricity grid. Additionally, the company formed partnership with Blue Mountain Renewables (BMR) Jamaica Wind to build a 34 MW wind farm; and planned to convert their 120 MW Bogue plant to use liquified natural gas (LNG).

4.2 Industrial Sector

The Jamaican brewing giant - Red Stripe, has committed US\$7,700,000 to energy efficiency through the installation of a Combined Heat and Power (CHP) plant. As part of their ISO 50001 implementation plan, this was done to reduce carbon footprint and environmental impact through a 50% decline of CO₂ emissions levels by 2016. This CHP system requires less fuel to provide electrical power, steam and chilled water to the brewery. In an article Mr. Cedric Blair - Managing Director reported that, “the CHP technology is a highly efficient way to produce energy and has proven to be very reliable in achieving significant costs saving, environment benefits, enhanced energy security and overall efficiency in excess of 80%”.

4.3 Transportation Sector

In 2011, the Government mandated a 10% Ethanol Fuel Blend for automotive petrol and in 2013, introduced Ultra Low Sulphur Diesel (USLD) and the blending of bio-diesel. The authorities are discouraging inefficient motor vehicles from being imported in the island and has therefore aligned a tax regime to the mileage per gallon, engine size and years of vehicles. Further, policies are being developed to lower duties on hybrid and electric vehicles (EVs) to open the market for this technology, to improve fuel efficiency. This opportunity seems promising because of the assurance that EVs are internationally designed with uniformed safety features as set out in the ISO 6469 series of standard. Investing in EVs are

likely to zero CO₂ emissions because they are powered by rechargeable batteries or solar powered stations. Another recent initiative by the Government was the importation of 100 new buses with corrections and changes to the emission systems, to ensure efficiency and satisfy the demand for travel or encourage commuters switch to public transportation.

4.4 Commercial and Residential Sector

The tropical climate of Jamaica makes it susceptible to the prevalence of solar panels in offices and homes. ATL Automotive reported significant changes to its electricity bill, by about JA \$400,000.00 after the installation of solar photovoltaic system. This initiative provides 58.8 kW of energy, and accounted for 30% of the company's needs. New Era Homes 2000 Ltd. has been in the business of developing energy smart communities since 1997. In 2002, the company was awarded by a local environment agency for the promotion of energy conservation in its home design, layout and finish. The company understands that energy efficiency begins at home; and commits construction to JS ISO 13153 – Framework of the design process for energy-saving single-family residential and small commercial buildings to provide better designs in housing schemes situated in Greater Portmore - St. Catherine parish, with features that help conserve energy and money for both the home owner and the environment.

5.0 Conclusion

Standards can contribute significantly to shaping Jamaica and the world to sustainable development, with practices to lower CO₂ emissions and increase the use of renewable energy. Standards can help, but public education, renewables and financing are additional pillars that will promise success. International standards, such as those published by the ISO, ensure the environmental sustainability of industrial products and processes; help businesses minimize the use of non-renewable resources and also encourage economic energy savings. They promote green technology markets and more energy-efficient homes and businesses. Jamaica is on par with this global agenda and has started implementing several strategies, but there is more to be done at every level of society. Jamaica must therefore, continue with standards today, use more renewables tomorrow to reduce emissions forever – because the *future is priceless* and a *sustainable energy world is possible!*

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