

Climate Change – Promoting The Use of Renewable Energy Worldwide.

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Abstract

The paper attempts to look at the United States role in Global Renewable Energy as a measure for Nigeria to emulate and adopt in solving its Energy challenge and as a way of mitigating the effect of climate change. The United States is taking a leading role in addressing climate change by advancing an ever-expanding suite of measures. They have initiated a number of policies and partnerships that span a wide range of initiatives from reducing emissions at home to developing transformational low-carbon technologies to improving observations systems that will help better understand and address the possible impacts of climate change. The efforts emphasize the importance of results-driven action both internationally and domestically. The international community recognizes the importance of moving forward collaboratively in addressing climate change. The Kyoto Protocol and Bali Action Plan represents an important step in this global effort by recognizing that all countries that contribute to atmospheric emissions must undertake measurable, reportable, and verifiable mitigation actions in order to cut greenhouse gas emission. Hence the need for Global collaboration to adopt a means of less dependent on fossil power, paving way for Alternative Energy Sources that is both environmentally effective and economically sustainable.

Keywords – Climate change, Renewable energy, Energy challenge, Alternative energy.

Introduction.

The United States is taking a leading role in addressing climate change by advancing an ever-expanding suite of measures. They have initiated a number of policies and partnerships that span a wide range of initiatives from reducing emissions at home to developing transformational low-carbon technologies to improving observations systems that will help better understand and address the possible impacts of climate change.

The 2008 Washington International Renewable Energy Conference (WIREC), a major landmark was held in Washington, D.C., from March 4-6, 2008, and involved nearly 9,000 people from 125 countries. The event brought together worldwide leaders in renewable energy (RE) from governments, international organizations, nongovernmental organizations, and the private sector to discuss the role that renewables can play in alleviating poverty, growing economies, and passing on a healthy planet to future generations. The conference concluded with more than 140 pledges from governments, international organizations, and private-sector representatives to advance the uptake of renewable energy.

United Nation Framework Convention on Climate Change (UNFCCC) serving as the meeting of the Parties to the Kyoto Protocol will take place from 11th to 22nd November, 2013 at the National Stadium Warsaw in Poland this year, we expect Nigeria to lead Africa, as the United States will continue to engage

constructively to contribute to an agreed outcome on a post-2012 arrangement that is both environmentally effective and economically sustainable.

The U.S. government authorized the National Renewable Energy Laboratory (NREL) to estimate the carbon dioxide (CO₂) savings that would result from the pledges made at the 2008 conference [3]. Unless specifically noted in the pledge text, the baseline year for energy and emissions growth was 2005. This start date allowed for consistency across pledges and facilitated the use of a common International Energy Agency (IEA) database for 2005 energy use.

While energy is essential to modern society, most primary sources used today are unsustainable. About 82% of the nation's energy comes from fossil fuels, 8% is derived from nuclear, and 9% comes from renewable sources [1]. Given the environmental impacts associated with the current fuel mix – global climate change, acid rain, copious freshwater usage, hazardous air pollution, and radioactive waste – renewable energy has great potential to meet the demand for power with a much smaller environmental footprint. Renewables could also play a significant role in alleviating other pressing problems such as energy security by providing a distributed, diversified energy infrastructure.

This paper aimed at highlighting the WIREC 2008 Conference and United States of America initiatives on climate change and the use of Renewable Energy to enable Nigeria emulate in addressing its problem on climate change. The figures below demonstrate the potential and progress of renewable energy in the U.S.

U.S. Role in Global Renewable Energy.

•Several US Government agencies work to support investment and implementation of RE projects overseas:

- State Department, US Agency for International Development
- US Trade and Development Agency
- Export-Import Bank, Overseas Private Investment Corporation
- Department of Energy

•Emphasis on Public-Private cooperation

•OPIC: Six Renewable-Energy Investment Funds established \$505 million committed, to mobilize \$1.6 billion worldwide Part of WIREC 2008 pledge

•Additional programs for Finance and Political Risk Insurance

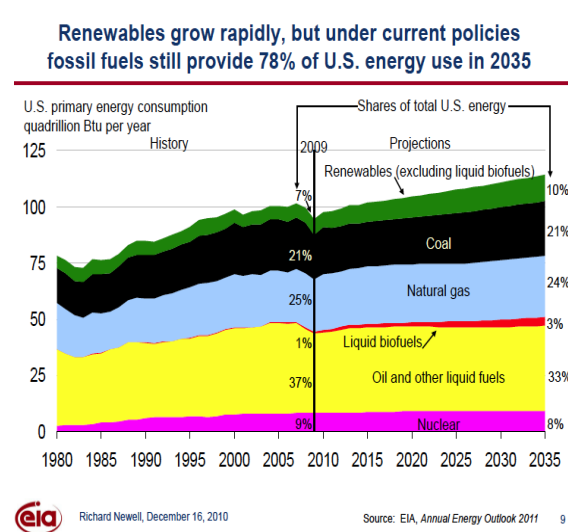
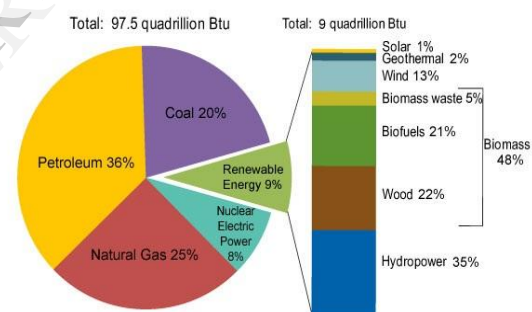


Fig. 1: U.S. Actual and projected renewable energy consumption 1980 – 2034[1, 5].

U.S. Energy Consumption by Energy Source, 2011



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 10.1 (March 2012), preliminary 2011 data.

Fig. 2: 2011 U.S. Energy consumption by energy source[1].

WIREC Pledges

As a first step in this process, analysts reviewed and placed each WIREC pledge in one of two categories (Tier 1 or Tier 2). Tier 1 pledges were characterized as pledges that included specific metrics (e.g., “x” number of megawatts (MW) of renewable energy technology installed; or “y” percentage of renewable energy in total energy mix) where a specific greenhouse gas (GHG)

impact could be derived from the pledge. Tier 2 pledges were defined as pledges that will enable broader RE deployment, but did not include specific quantifiable elements that would allow for a specific GHG impact to be derived. Examples include research and development (R&D), resource assessments, grants, loans, and project financing. Because this distinction was not entirely clear in all cases, NREL asked contributors to review their pledges and provide any additional information or detail if they viewed a Tier 2 pledge as more appropriate for Tier 1 classification [4].

In his speech the then President Bush noted, "I think we ought to be result oriented people, not process people. It's one thing to have a nice conference, but out of those conferences we should expect results." More than 140 pledges received and published as part of Washington International Action Program with 31 Pledges from U.S. Government.

The Asia-Pacific Partnership (APP).

The APP, driven by results engages the governments and private sectors of Australia, Canada, China, Japan, the Republic of Korea, and United States to:

- Promote investment in clean technologies, goods, and services
- Accelerate the sharing of energy-efficient best practices and identify policy barriers to the diffusion of clean technology
- Advance clean development and climate objectives, recognizing that development and poverty eradication are urgent and overriding international goals.

From implementation the APP have taken the following action as outlined below:

- Partners have convened regularly both to implement action plan projects and to monitor progress on a multi-sector program designed to promote the development and deployment of clean energy technologies among member nations
- To date, the APP has endorsed a total of 156 projects that are already achieving concrete results

Some of the examples of the APP success are highlighted below:

Assessment Support Dramatic Efficiency Improvements in Indian Power Plants

APP Power Generation and Transmission Task Force-provided technical support, including assessment, training, and diagnostic equipment, to two large Indian power plants, Kolaghat in West Bengal and Ropar in Punjab, will result in 4 percent boiler efficiency improvement at both 210 MW plants and ultimately achieve 10-15 percent reduction in total CO₂ emissions if implemented in full.

U.S. APP Participant Converts Coke Oven Gas to Clean Heat and Power in China

U.S. APP participant Solar Turbines, Inc., a wholly owned subsidiary of Caterpillar Inc., has placed 15MWe of clean energy technology for the coking industry in China. By using Solar Industrial gas turbines, one customer, Shandong Jinneng Coal Gasification Company, is reducing their CO₂ emissions by 40,000 tons per year.

U.S. Funding

- \$65 million to the implementation of the Partnership, part of overall announced APP commitments of approximately \$200 million from various Partner countries.
- U.S. APP funding is essentially set capital that has already resulted in committed cost-share funds of \$44 million for selected projects, and is expected to leverage more than \$480 million in additional downstream funding through ancillary funding and financing from concessional and commercial banks.

U.S. Brazil Biofuel Collaboration.

In November 2008 - U.S. and Brazil announced expansion of cooperation on biofuels to advance security and promote sustainable development. The U.S. and Brazil unveiled plans to expand scientific collaboration in biofuels and to work with five new countries interested in developing their domestic biofuels industries: Guatemala, Honduras, Jamaica, Guinea-Bissau, and Senegal. These new partners, along with the Dominican Republic, El Salvador, Haiti, and St. Kitts and Nevis, comprise a total of nine partner nations to benefit from U.S.-Brazil biofuels collaboration. The U.S., Brazil, and MOU partners have obligated over \$4.3 million across twelve projects

that are underway. All partners are working to develop local biofuels industries to reduce dependence on imported fuels and promote sustainable development.

Fifth Summit of the Americas.

At the recent Fifth Summit of the Americas the President announced plans for a regional initiative in the Western Hemisphere:

"Through this partnership, we will harness the progress being made by nations across the hemisphere - from Brazil's work on biofuels, to Chile's investments in solar power, to Mexico's efforts to curb greenhouse gas emissions, to El Salvador's work on geothermal energy..."

"Each country will bring its own unique resources and needs, so we will ensure that each country can maximize its strengths as we promote efficiency and improve our infrastructure, share technologies, support investments in renewable sources of energy. And in doing so, we can create the jobs of the future, lower greenhouse gas emissions, and make this hemisphere a model for cooperation."

OPIC Projects in India.

Some of the ongoing Overseas Private Investment Corporation from the U.S Government agency in India is highlighted below:

- **Solar Energy:** 2 MW, Grid-connected photovoltaic project \$6.2 million in financing for construction and operation.
- **Hydropower:** 12 MW \$10 million in financing and \$6 million in political risk insurance to a U.S. small business for the rehabilitation, construction and operation of a hydropower station.
- **Green Jobs and Manufacturing:** Compact-fluorescent lights \$10 million credit facility for light bulb plant construction and operation

- **Green Buildings:** LEED Platinum commercial office building \$130 million financing for construction and operation in Delhi; A Flagship Project under the Asia-Pacific Partnership by OPIC + State Dept. + DOE.
- **Wind Energy:** \$450,000 provided in political risk insurance (+ \$750,000 forthcoming) to a U.S. small business for installation and operation of turbines in Tamil Nadu and Maharashtra.
- **Waste-to-Energy:** Series of 20 rice-husk plants \$1 million in financing for plants in rural villages.

Entrepreneurship in Emerging Markets.

Solar Energy Uganda electric systems take solar as a long term solution for sub Saharan Africans. They believe that without electricity, without ability for the village household to extend the day, social and economic development will not be attainable. There is Entrepreneurial vision, Innovation: *Solar Homeowners Associations*, Village cooperatives – direct responsibility, Use of microfinancing and local maintenance, Funding support from E & Co. (private) and USADF (public). Emerging markets are now active in 8 sub-Saharan countries with target of 300,000 homes by 2015 [2].

Challenges: Solar panels & electric units must be imported/Costs of these manufactured goods.

New Initiative: SAPFAV (Solar Assembling Plant For African Villages)

The African population is about 850,000,000. Out of that, only 7% has access to electricity. We estimate that 90% of the Africans, live in rural areas with no electricity at all. A solar plant will therefore:

1. Enable millions of Africans transform their lives with the affordable & dependable solar electricity.
2. Assure stable supply of good quality solar panels & accessories like: controllers, inverters, etc.

3. Avail solar products at a more affordable cost (SAPFA will bring down prices to 35%. & more people will be able to afford solar electric systems).
4. Provide best suited technology designs to the African architecture, & cultural values.
5. Bring employment to Africans.

Local Impact – Solar PV in Africa

Solar is to be taken as a long term solution in the electrification of sub Saharan Africa. As of present, there is a World Wide renewable energy demand for solar panels. Most solar manufacturers are making big panels for big bucks to meet the Western market. Small framed solar panels which are needed for village electrification are very hard to get. However, solar power can be use independently at village home, school, hospital, water development, purification, pumping and distribution. See figs.3 – 5. Meanwhile, there is still need for continued public and private support.



Fig. 3: Home



Fig. 4: School



Fig. 5: Hospital

NREL International Program Advances Global Sustainable Energy Use.

National Renewable Energy Laboratory (NREL) plays a leading role in supporting several multilateral initiatives designed to advance the use of renewable energy and energy efficiency in ways that both increase economic development and address global challenges such as climate change and energy security. The program is carried out through Market Development from China, India & South Asia, and Brazil; Technology Collaboration primarily with EU Countries; Global and Regional Assessments – Energy and Environmental Analyses and Proliferation Prevention from Russia, Ukraine, Kazakhstan, and Armenia. NREL International Team are China – Biofuels, RE Law Implementation, Wind Development, Rural Electrification; India – Solar Analysis & Biofuels; Brazil – Biofuels. For its Resource Assessment & Decision Tools: AID – South Asia, UNEP – SWERA/Global, HOMER – Geo-Spatial Tool

Kit, and Other Tools, while on Policy and Climate Programs has Asia Pacific Partnership, Climate & Air Quality Analysis and RE Policy Analysis and Planning.

International Technology Collaboration

The Bodies or Agencies are into Joint research and development projects, Codes and Standards, Technology education and outreach, Technical exchanges, Supported primarily by DOE programs and Growing interest in technology collaboration around the world. The Agencies are 1. International Energy Agency (IEA) Agreements on Biomass, Buildings, Hydrogen, Solar and Wind 2. International Partnership for Hydrogen and fuel cells in the Economy (IPHE) on Solar Thermo-Chemical H₂ Production, European H₂ Roadmap, Fuel Cell Testing & Safety and IPHE Demonstration Task Force 3. EU Partnerships with Denmark, Spain, Sweden and Other Countries.

Geothermal Energy Development in East Africa.

Geothermal reserves in East Africa's Rift Valley have the potential to provide up to 15,000 megawatts of power, significantly reversing Africa's chronic energy shortages. Up to now the high up-front costs associated with geothermal exploration coupled with perceived political, economic and regulatory risks have been the primary barriers to geothermal energy development in East Africa. But this is changing. As the United States is a leader in geothermal energy technology, USAID, in collaboration with the Geothermal Energy Association, established the EAGP to tap into the U.S. industry's long standing technical expertise and manufacturing capabilities to help strengthen the capacity of East Africa countries to develop their geothermal resources for power generation and direct use applications, thereby contributing to East Africa's long-term economic growth and development. Number of people possibly served by Geothermal Energy from the existing grid is up to 61 million who are within 20 Km of powerlines which are within 200Km of the center of the East African Rift.

Kenya's Use of Geothermal Energy

- 45 MW Olkaria I Plant Operating in Hells Gate National Park Since Early '80's at > 98% Availability
- 12 MW Added by Private Sector (ORMAT International) in 2000
- 70 MW added in late 2003 with Global Village Energy Partnership (GVEP)
- Plans for Additional 450 MW by 2019
- Potential Exists for 2000 – 3000 MW in Kenya, Uganda and Tanzania.
- Exploration Ongoing at Lake Magadi, Longenot, Menengai and Suswa Sites
- Government Encouraging Public Vs Private Competition with financial institutions aid.

Innovative International Technology Partnerships

- **Carbon Sequestration Leadership Forum:** 22 members; focused on CO₂ capture & storage.
- **International Partnership for the Hydrogen Economy:** 17 members; organizes, coordinates, and leverages hydrogen RD&D programs.
- **Generation IV International Forum:** 10 members; devoted to R&D on next generation of nuclear systems.
- **ITER:** 7 members; project to develop fusion as a commercial energy source.
- **Methane to Markets:** 20 members; recovery and use of methane from landfills, mines, oil & gas systems, and agriculture.

- **Asia-Pacific Partnership on Clean Development & Climate:** 7 members; focuses on accelerating deployment of technologies to address energy security, air pollution, and climate change.
- **Global Nuclear Energy Partnership:** 19 members; seeks consensus on enabling expanded use of nuclear energy using a nuclear fuel cycle that enhances energy security, while promoting non-proliferation.

Climate Change and Nigeria.

Nigeria must close a "communication gap" to ensure that vital information on [climate change](#)-related events reaches all those who could use it to help minimize their impact [6]. A 'national climate service policy' would ensure greater management and use of data on events such as [flooding, prolonged droughts and heat waves](#). We need to think of establishing a national framework for climate service and international collaboration. The framework would ensure better public communication of climate issues such as rainfall, flooding, drought and rising temperatures. According to Nigeria's National Emergency Management Agency, 363 people died and a further 2.1 million were displaced between July to October last year because of flooding [8][9]. Hence Nigeria as a great nation faces issues both of **Adaptation** – Controlling desertification, Conserving portable water, Preventing sea level rise, as well as issues of **Mitigation** – Eliminating gas flaring and Preserving our forests. And to achieve this we need international collaboration as outlined above to reduce the effect of climate change by promoting the use of renewable energy [7][9][13].

Conclusion.

In view of the above, all these would be a very good issue for Nigeria to present at this years' **United Nation Framework Convention on Climate Change (UNFCCC)** serving as the Meeting of the Parties to the Kyoto Protocol which will take place from 11th to 22nd November, 2013 at National Stadium in **Warsaw**,

Poland for discussion by leading other African countries. Nigeria can explain adaptation issues and point to a future gas capture rather than flaring, and the value of planning for a future where our energy supplies are diversified, and drawn from abundant **Renewable sources**. Opportunities to achieve these aims and propel our dear country along the low-carbon high-growth path will be obtained at Warsaw, through means such as technology transfer and adaptation financing. Nigeria can be at the heart of these negotiations by being a proactive participant.

The challenge as ever is leadership. Right across Governments, from the Head of Government to the Federal Minister of Finance as well as the Federal Minister of Environment, all need to believe that climate change considerations need to be integrated into national policy. And right across the world: collective international leadership. Let's all agree on trying for a low carbon future by embracing the use of Renewable Energy.

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