



# Recommendations for Building Competitive Industries

The previous sections of this Report have identified the economic challenges facing Puerto Rico and made a series of recommendations to address them. Once the building blocks of growth are in place, Puerto Rico must look forward to develop a competitive set of industries that will drive growth and job creation in the decades to come. While we expect Puerto Rico's own leadership and local stakeholders to be best positioned to articulate an economic development strategy, the Task Force has identified three industries that could potentially drive long-term growth and job creation on the Island. In particular, Puerto Rico has a solid foundation on which to grow its clean energy, its role as an economic and tourism hub and gateway to the Caribbean and Latin America, and its health care industries.

“A clear and permanent status must lead the way to sustained growth and progress. It will give Puerto Rico important tools such as permanence, credibility, security, dignity, political power and a broader comprehension around the world of its political concept. These elements are fundamental to building the new economy necessary to lead us into the new global economy of the 21st century through enhanced competitiveness and sustainable growth.”

—Community Leader, E-mail Submission to the Task Force

## 1. *Developing Puerto Rico as a Model for Clean Energy*

### Issue

Puerto Rico is facing many energy challenges. Puerto Rico's energy costs are two to three times higher than in the United States overall because the Island relies heavily on oil to generate electricity. When the price of oil spikes, as it did in the summer of 2008, the effect on businesses and other consumers is devastating. Those high and unpredictable energy costs have made the Island less desirable for businesses, which, in turn, has contributed to a declining manufacturing base and increased unemployment. Moreover, Puerto Ricans have less disposable income because their utility bills are among the highest in the nation. Governor Fortuño recently declared “an energy crisis” due to Puerto Rico's dependence on oil and “an obsolete infrastructure.”

After taking office in 2009, Governor Fortuño took the first in a series of steps to transform the energy landscape of Puerto Rico by signing Executive Order 2009-23. The Order creates an Energy Public Policy Committee that is responsible for preparing and advising the Governor on a new energy policy for Puerto Rico. This energy policy will include “the diversification of energy resources, ensuring that the electricity supply on the [I]sland is affordable, reliable, and sustainable, and reduces greenhouse gas emissions.”

The Committee is authorized to prepare recommendations to develop and install new, alternative, clean, and renewable energy; to improve energy efficiency and accessibility to energy generation; to improve distribution and transmission; to maximize the use of Federal incentives; and to expedite permits for energy projects that comply with the policy. The Committee also will submit recommendations for legislation and regulations that will facilitate the development of energy projects.

Puerto Rico's commitment to energy reform through energy efficiency improvements and renewable energy investment was bolstered by DOE's down payment toward the Island's energy and environmental future through \$125.6 million in Recovery Act funds. There are a number of examples of projects around the Island that highlight existing efforts to reduce emissions and promote clean energy. For instance, the State Energy Program (SEP) used Recovery Act funds to support a program where cities throughout the Island replaced 4,800 traffic lights with LEDs. The new lights are expected to save about \$1.2 million annually in energy costs. In Gurabo, in eastern Puerto Rico, SEP funding is supporting the installation of photovoltaic panels on the city hall. The clean, renewable energy system in Gurabo will save an estimated \$5,400 annually and generate more than 20,000 kilowatt hours (kWh) each year. A lighting retrofit in the city will save almost \$35,000 yearly.

Similarly, the City of Bayamón, one of Puerto Rico's largest recipients of funds through the Energy Efficiency and Conservation Block Grant Program, has completed installation of a 587 kilowatt solar array at the Onofre Carballeira Sports Complex (pictured below), which will provide over 30 percent of the Complex's power needs over an expected 25-year lifespan. The project was partially funded with over \$2 million from a DOE block grant; this represents approximately 65 percent of the total cost, with the remainder supplied by the Municipality of Bayamón. The project is expected to save the municipality approximately \$250,000 a year and is located in a high visibility area where the municipality's basketball and soccer teams play across from a new "Tren Urbano" (Urban Train) station.



DOE's Weatherization Assistance Program (WAP) obligated over \$65 million to Puerto Rico under the Recovery Act. A priority of WAP in Puerto Rico is the installation of solar water heater systems in homes of income-eligible residents as part of its weatherization assistance services.

DOE's funding support of Puerto Rico's efforts has been reinforced by aggressive measures recently taken by the Puerto Rico government. In July 2010, the government passed two laws that expressed its commitment to promoting and facilitating the development of renewable energy sources in Puerto

Rico. Laws 82 and 83 of 2010 are designed to diversify the electric power generation mix and provide new incentive programs for enabling investments in renewable energy.<sup>35</sup> These measures and Executive Order 2009-23 solidify Puerto Rico's public commitment to: diversify sources of energy and infrastructure; reduce its dependence on fossil fuels; reduce and stabilize energy costs; create a green economy; and improve the environment and quality of life of its population.

Governor Fortuño estimated that Laws 82 and 83 will create more than 10,000 green jobs over the next 5 years and achieve an estimated investment of \$4 billion over the next decade.

Critical to the success of Laws 82 and 83 are the additional duties and powers established for the Puerto Rico Energy Affairs Administration (EAA) to implement this legislation. This additional authority will allow EAA to fulfill the objectives and programs included within the Laws and to design, promote, and enforce energy conservation and efficiency measures. EAA is currently drafting regulations that will implement the provisions of Laws 82 and 83.

As the Puerto Rico government implemented these new and aggressive energy reforms, Task Force members convened meetings with many local corporate and community leaders and community advocates to hear their views about the economic, energy, and environmental challenges facing the Island. Informed by the participants' concerns, the Task Force makes the following recommendation.

### Recommendation

#### ***Renewable Energy and Energy Efficiency Strategy for Puerto Rico***

Having heard the stakeholders' views and recognizing the energy needs of the Island, the Task Force strongly supports the efforts of the Puerto Rico government to promote and enforce energy conservation and efficiency in the end use sector, to diversify Puerto Rico's sources for electricity generation, to strengthen energy security, and to enhance economic development, while protecting and improving the quality of the environment.

"Finally, we are not environmentalists nor are we activists; we are active citizens that believe in our government and our duty to participate in its processes. We are here to help this Island government lead us better. Lead us into the Green Economy, not away from it. What is the status of Puerto Rico? In peril, to say the least. "Such is Life," some might say. We don't think so. We say our environmental status is what we as citizens make it. We hope and expect that any actions or decisions that the Taskforce and the people of Puerto Rico make will achieve the sustainable development of this Island."

—Civic Advocate, Letter to the Task Force

Puerto Rico is well positioned to become a model for implementing efficient and sustainable green energy projects. The Task Force therefore recommends that the President and Congress work closely with, and support, Puerto Rico's efforts to fundamentally change the Island's approach to energy and the environment.

To achieve this goal, the Task Force recommends that the President and Congress support Puerto Rico in the specific ways set forth below. The Task Force's recommendation is divided into two sections, the second of which has two phases, which are roughly equivalent to short- and long-term goals:

1. Assess Puerto Rico/U.S. Virgin Islands Electrical Interconnectivity
2. Help Puerto Rico Transform its Energy Economy
  - **Phase I:** Work with the government of Puerto Rico to develop improved regulatory and oversight conditions
  - **Phase II:** Assist Puerto Rico in developing a comprehensive plan for a new energy economy

### ***Assess Puerto Rico/U.S. Virgin Islands Electrical Interconnectivity***

Puerto Rico is not alone among Caribbean islands in relying heavily on imported petroleum products and consequently facing high energy prices. At the same time, the Caribbean is blessed with abundant wind, solar, and geothermal resources that can allow islands in the region to generate clean energy using indigenous sources. Efforts to utilize these resources on a large scale are hindered by the fact that the islands are small, isolated energy markets, with insufficient individual energy demand to support the cost of investing in medium or large scale renewable energy projects. In addition, the intermittent nature of wind and solar energy means that islands wishing to deploy renewable energy technologies must also back up this generation with traditional thermal generation that can be quickly dispatched.

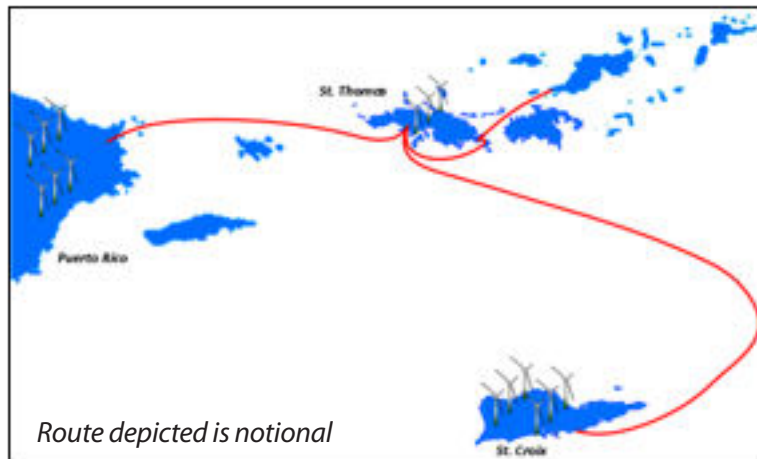
If it were found to be economically feasible, physically connecting the electricity systems of these islands through undersea electrical cables could help alleviate these concerns. Expanding the size of the electricity market that a utility can access could support the development of new renewable projects. In addition, physical interconnection means that an island could rely on the generating capacity of another island with which it is connected during periods of low resource availability. Lastly, interconnection could help improve grid stability and resilience in the event of a hurricane or other natural disaster.

Secretary of Energy Steven Chu and Secretary of State Hillary Clinton acknowledged the potential benefits of an eventual Caribbean-wide electricity grid in their remarks at the 2010 Energy and Climate Partnership of the Americas Ministerial. While a regional electricity grid that connects all Caribbean islands will remain a long-term goal for some time, the feasibility of pilot projects that could help develop a replicable model for inter-island electrical interconnection could be assessed. For example, a pilot interconnection between Puerto Rico and USVI could be cost beneficial for a number of reasons:

- With a gigawatt of excess generating capacity, Puerto Rico could serve as a hub for a regional energy grid.
- Both Puerto Rico and USVI could benefit. The Puerto Rico Electric Power Authority (PREPA) would have a productive use for its excess capacity, potentially leading to a reduction in costs

for the people of Puerto Rico. USVI could see a reduction in energy costs, an increase in system reliability, and the ability to develop new renewable projects without the need for additional backup generation.

- The interconnection could also include a data backbone cable that would allow Puerto Rico to sell data services while increasing broadband access in USVI.
- Interconnection between these islands would represent U.S. leadership in the Caribbean basin and support existing Federal efforts to address energy challenges in USVI under the Energy Development in Island Nations (EDIN) partnership.



The first step for considering such interconnection is a feasibility study. DOE, working through the USVI Water and Power Authority (WAPA), has begun examining the feasibility of a subsea electrical interconnection between PREPA, WAPA and the utility in the British Virgin Islands (BVI). DOE has signed a contract with Siemens PTI to conduct a feasibility study examining the technical and economic potential of such an interconnection.

The participants in assessing the electrical interconnectivity between Puerto Rico and USVI include DOE, WAPA, PREPA, Siemens, and the National Renewable Energy Laboratory (NREL), which is providing technical support.

The study will focus on options for a 50-mile interconnection between Puerto Rico and USVI, a 10-mile interconnection between USVI and BVI, and an 80-100 mile interconnection between the islands of St. Thomas and St. Croix of USVI. The objectives of the feasibility study include:

- Determine power capacities, types, and requirements of the three interconnections;
- Perform a power system study and identify necessary infrastructure reinforcements;
- Estimate project costs; and
- Demonstrate potential benefits in terms of generation cost and reliability compared with current systems or alternative distributed generation systems.

Furthermore, to advance discussions in the Caribbean region on the potential for subsea electrical interconnection under the Energy and Climate Partnership of the Americas, the Department of State,

through a grant to the Organization of American States (OAS), should fund a pre-feasibility study to examine an interconnection between Puerto Rico and St. Kitts and Nevis. This work results from a request from the government of St. Kitts and Nevis for the Department of State's assistance as it tries to develop Nevis' geothermal resources (estimated potential of up to 300 megawatts (MW)). St. Kitts and Nevis' power demand is approximately 40 MW, making Puerto Rico an important prospective market. Separate initiatives involving the World Bank, the government of France, and the European Union are underway to explore interconnection among other islands, including between the Dominican Republic and Puerto Rico, as well as among the French territories in the Eastern Caribbean region.

The Task Force looks forward to the results of these studies, and recommends that Puerto Rican officials and the relevant Federal agencies conduct any required environmental impact statements and environmental assessments.

Timeline	
Project kickoff for interconnection between Puerto Rico and USVI	October 2010
Interim report #1: HVAC/HVDC requirement and submarine cable study	January 2011
Interim report #2: Power system study	April 2011
Interim report #3: Cost-benefit analysis	July 2011
Final report	To be determined

Regarding the interconnection between Puerto Rico and St. Kitts and Nevis, OAS is currently negotiating the terms of agreement to work with NREL to execute this study. It is expected that the study would commence by the beginning of the second quarter of 2011 and would be completed in the first quarter of 2012.

### ***Help Puerto Rico Transform its Energy Economy***

**Phase I:** Work with the government of Puerto Rico to develop improved regulatory and oversight conditions

Utilities throughout the United States are governed at many levels. Typically, they are governed by their own boards (either private individuals for independently owned utilities, elected officials for municipal utilities, or elected boards for cooperative utilities owned by rate-payers), a State regulatory body, and the Federal Energy Regulatory Commission. These utilities interact by providing power to each other where needed, and are required to abide by both intrastate and Federal interstate regulations.

An established regulatory authority typically provides oversight and enforcement to improve the overall utility operation and to create a fair and equitable system. External regulatory authorities are generally required to define the relationship between utilities and self-generators who use or sell power, to encourage and develop generation of small quantities of power from diversified sources, and to encourage renewable power sources and energy efficiency.

In contrast to the utilities described above, Puerto Rico's sole utility, PREPA, is a public corporation, directed by a government board. Because PREPA does not interconnect with any other states or ter-



ritories, PREPA is not required to abide by Federal interstate regulations. There is no central, government-level regulatory body that oversees interactions between utilities.

Stakeholders have expressed significant frustration with the way the utility system is structured. There appears to be consensus among industry, academia, and other stakeholders that the current utility system could be substantially improved. In order for that to happen, however, Puerto Rico would have to commit to instituting oversight of the utility.

By establishing an independent, external regulatory authority, Puerto Rico could move toward a more diversified and energy efficient Puerto Rico. The Task Force therefore recommends that the Federal Government support efforts by Puerto Rico to change its energy regulatory structure. Such an overhaul would require collaboration among the Office of the Governor, EAA, Puerto Rico Industrial Development Company (PRIDCO), GDB, PREPA, and key members of the Puerto Rico Legislative Assembly.

At the outset, the Task Force recommends that DOE work with Puerto Rico's Executive Branch Reorganization and Modernization Committee, which was created in 2009 to reform Puerto Rico's executive branch.<sup>36</sup> This Committee was empowered to create new agencies, which could include a public utilities commission with regulatory and enforcement power.

In addition, the Task Force recommends that DOE offer its assistance to the newly created Renewable Energy Commission as it develops regulations to implement Laws 82 and 83. In conjunction with this effort, DOE should work with key stakeholders to assess the current regulatory situation, including identifying barriers to reform and making recommendations on legal and structural reforms needed to improve utility performance and to diversify Puerto Rico's sources for electricity generation.

Timeline	
Review existing legislative and regulatory authorities governing utilities	March 2011
Provide model regulatory framework and analysis of regulatory options for consideration	April 2011

**Phase II:** Assist Puerto Rico in developing a comprehensive plan for a new energy economy

Puerto Rico has the potential to successfully employ new, clean, renewable energy sources, increase energy efficiency, reduce greenhouse gases, and create green, well-paying jobs. Puerto Rico's economic situation and its geographic location make it well positioned to greatly advance the goal of developing a comprehensive, cost-effective energy policy for the Caribbean.

As noted above, Puerto Rico's production of energy is heavily dependent on fossil fuels. In 2009, 82 percent of the energy that was generated in Puerto Rico came from oil, 9 percent from natural gas, 8 percent from coal, and 1 percent from hydro and other sources.<sup>37</sup> In other words, 99 percent of Puerto Rico's energy comes from fossil fuels. Due to its dependence on oil, the Island's economy is subject to price fluctuations in global energy markets. Spikes in the price of oil, like the one seen in the summer of 2008, have a substantial negative effect on the Puerto Rican economy.

The current cost of electricity in Puerto Rico is approximately 21 cents/kWh, which is over twice as much as the average cost of 9.81 cents/kWh in the continental United States.<sup>38</sup> Due to these high energy

costs, economic development has been negatively affected. For example, in the past few years, several manufacturers have left Puerto Rico due, in part, to high energy costs. This has resulted in a 15 percent drop in the industrial energy use in Puerto Rico and the loss of approximately 150,000 jobs.

In an effort to reduce its electricity costs, Puerto Rico has plans to replace the bulk of its oil generation with natural gas generation. The current price of natural gas is lower than oil, and the availability and price of natural gas are currently considered more stable than the oil market. In addition to the natural gas conversion, Puerto Rico has numerous renewable energy projects underway that, when complete, could provide up to 600 MW of added renewable generation to the grid. This would also contribute toward the requirement in Law 82 to produce 12 percent renewable generation by 2015.<sup>39</sup>

The Task Force recommends that DOE support development of a Puerto Rico-led plan to address these issues. The goals of the program should be to:

- Reduce Puerto Rico's dependence on fossil fuels;
- Create "green job" opportunities;
- Reduce greenhouse gas emissions and criteria air pollutants; and
- Attract private capital to Puerto Rico.

In conjunction with the other Island energy projects described below, a program that explores cost-effective, indigenous, low-carbon energy alternatives in Puerto Rico may serve as a microcosm for implementing larger, overarching initiatives in the Americas. Puerto Rico's serious engagement with the goal of reforming its energy generation and consumption would send a signal to the rest of Latin America that the United States is committed to the future of the region.

DOE has developed a comprehensive energy deployment approach that addresses the entire energy system for any given location. The Integrated Deployment model has been developed through use in multiple locations, including cities, states, Federal agencies, and island nations. The mission of Integrated Deployment is to accelerate market adoption of renewable energy solutions to power homes, businesses, and vehicles through a comprehensive and aggressive approach.

DOE has modeled a process that supports each technology area separately but also looks at the integration points between the technologies. DOE also identified the cross-cutting components necessary for successful deployment of technology solutions. Those components can be critical to connect the technology solutions to the market. The last component is the partners necessary to implement change. The following illustrates the integration of the technology and deployment components with the partners to create the Integrated Deployment model.





Use of the Integrated Deployment model in two other island settings—the Hawaii Clean Energy Initiative (HCEI) and the EDIN pilot project in USVI—serves to illustrate what can be done in Puerto Rico.

The goal of HCEI is to transform an economy based predominantly on oil to an economy based on clean energy—specifically, to reach 70 percent clean energy by 2030. To realize the clean energy goal, Hawaii is undertaking a number of high priority activities, including an effort to double the rate of clean energy technology penetration. DOE is providing technical assistance for this effort, and Hawaii has entered into a Memorandum of Understanding with DOE defining short- and long-term actions needed to accelerate the State’s clean energy transformation.

The EDIN initiative was formally established by the United States, New Zealand, and Iceland in 2008. DOE is supporting the USVI in its effort to reduce fossil fuel consumption by 60 percent by 2025.

The Task Force recommends that, consistent with completion of Phase I discussed above, Puerto Rico, with assistance from DOE, assess the feasibility of applying the Integrated Deployment model to the Island. Assuming Puerto Rican stakeholders make a commitment to the project, the first step should be to establish an agreement with Puerto Rico to move toward an aggressive, cost-effective goal for energy efficiency and renewable energy implementation.

At the outset, Puerto Rico would use assistance from DOE to provide analysis and technical expertise to inform decision makers and stakeholders to help identify practical and prudent energy goals and cost-effective options. Initial activities could include: performing detailed analyses of energy conditions; engaging key stakeholders; reviewing current energy policies; and providing detailed resource assessments and cost-benefit analyses. Puerto Rico would use these analyses to develop an energy plan and strategies for the Island that should be supported by the Federal Government.

Participants would include the Office of the Governor, EAA, PRIDCO, GDB, the Legislative Assembly, PREPA, manufacturing and business industries, universities, municipal leaders, and other key stakeholders, with technical assistance from DOE.

Timeline	
Sign agreement regarding commitment, roles, and responsibilities of key parties	October 2011
Apply Integrated Deployment approach	October 2011 – September 2016

### ***Integrated Bio-Refinery Project***

#### **Issue**

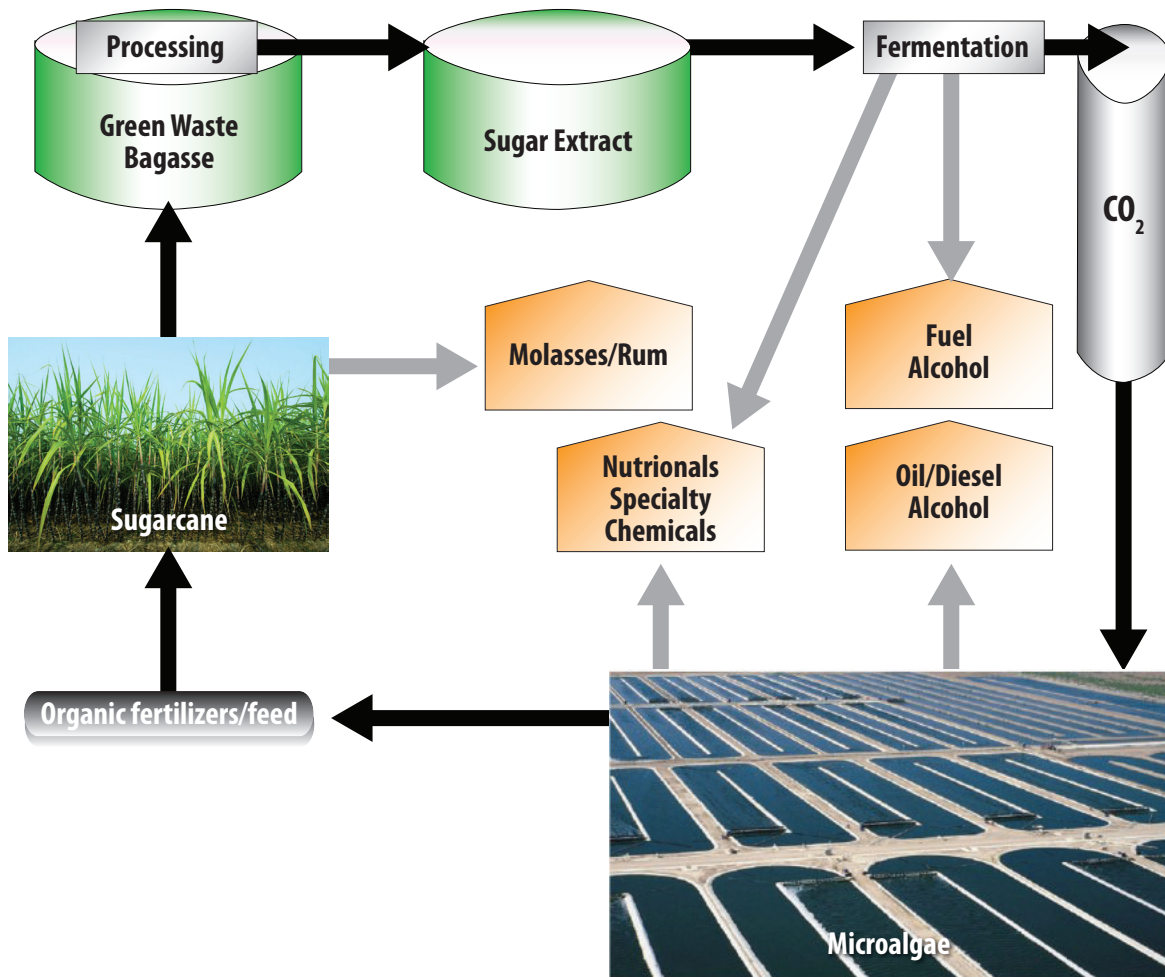
Puerto Rico's opportunity to be a clean energy leader in the Caribbean may only be partly addressed by improving Puerto Rico's interconnectivities with other islands, and enhancing current clean energy production as outlined above. To bolster Puerto Rico's clean energy leadership potential, DOC Minority Business Development Agency (MBDA) is helping to develop a public-private partnership, called the Integrated Bio-Refinery Project (IBP) of Puerto Rico. IBP involves the work of Sustainable AgroBiotech, LLC (SABI), an industry, academia, and government partnership that includes: Sustainable Cellulosics, Inc., a Minority Business Enterprise leading the effort; the University of Puerto Rico Mayagüez; Easy Energy Systems of Minnesota; and local agricultural farmers.

#### **Recommendation**

IBP will produce high value bioproducts, especially biofuels, using locally available biomass such as post-harvest agricultural "leftovers." Locally produced biofuel will reduce the Island's dependence on imported fossil fuel in the near term while non-fuel products (such as human nutritionals, specialty chemicals, and organic feeds and fertilizer) hold significant worldwide export potential. Combining technology and natural resource assets that are unique to Puerto Rico with technologies from its own laboratories, SABI will build integrated biorefineries, or "*Biomes*," at strategic locations in Puerto Rico where sufficient cellulosic waste biomass, primarily sugarcane bagasse, can be locally generated to produce at least 3-4 million gallons of fuel alcohol per year. *Biomes* will recycle the carbon dioxide (CO<sub>2</sub>) emission from fuel alcohol fermentation to produce microalgae biomass that will be used as the source for biodiesel, additional fuel alcohol, and high value organic products. Each operating *Biome* is expected to create hundreds of direct and supporting jobs.

The project has the potential to create value from underutilized agricultural lands, supply high quality molasses for rum manufacturers, and generate bagasse, a highly desirable cellulosic feedstock for renewable energy. A second long-term goal is to expand large scale recycling of CO<sub>2</sub> emission from other businesses into microalgae biomass as sources for biofuels and high value bioproducts. SABI aims to create an innovation economy for Puerto Rico and address the local, national, and global needs for renewable energy.

The graphic below represents for the process flow map.



The Task Force recommends that MBDA continue to assist Puerto Rico in creating an innovation economy that addresses the local, national and global needs for clean, renewable energy while also creating jobs. DOC has already facilitated the creation of the public-private partnership that will become the catalyst for change in the Puerto Rican economy. In addition, using the private sector and other government agencies, MBDA would help find ways of financing the project.

#### Timeline

The partnership is currently doing a feasibility study as a preliminary step to moving forward. Once the feasibility study is completed, the partnership should begin to finalize the financial plan. At the same time, MBDA should make initial calls to potential private sector investors. The feasibility study should be completed in the first quarter of 2011, and financing should be obtained by the second quarter. The first phase of the project should begin before the end of the 2011 calendar year.

**Renewable Energy Tax Credits****Issue**

Two ARRA programs provide grants and tax credits for renewable energy. The section 1603 program provides grants to specified energy properties that are placed into service by a particular date, with the goals of creating and retaining jobs, as well as expanding the use of clean and renewable energy. The section 48C program provides tax credits for qualified investments in advanced energy projects to support the building and equipping of new, expanded, or retooled factories that manufacture the products needed to power the green economy. The combination of the section 1603 renewable generation payments and the section 48C manufacturing tax credits has put the United States on the path to greatly expanding both the high technology clean energy manufacturing base and renewable electricity production. Approximately 4,500 projects receiving the 1603 grants are bringing more than 9.1 gigawatts of new, renewable energy online. The jobs created by these projects are largely in engineering, construction, transportation, operations, and maintenance.

These programs have been specifically targeted at companies investing in renewable energy in the United States, with the goal of creating good jobs for American workers. The \$2.3 billion in tax credits available under section 48C have been fully allocated. While the section 1603 grants were just extended through 2011, this extension does not include specific language regarding the treatment of energy companies in Puerto Rico and their U.S. subsidiaries.

**Recommendation**

The Task Force supports the extension of the 1603 and 48C programs to further advance the goal of facilitating the development of clean and renewable energy. The Task Force recommends treating energy entities in Puerto Rico and their U.S. subsidiaries as U.S. companies to allow their participation in these programs.

**Timeline**

The Task Force hopes that Congress would move these changes in its upcoming session.

***2. Promoting Puerto Rico as an Economic and Tourism Hub and Gateway to the Caribbean and Latin America***

Puerto Rico is well positioned to enhance its role as an economic hub and gateway to the Caribbean and Latin America by virtue of its location and culture. Puerto Rico is also a tourist destination with beautiful beaches and resorts. It boasts significant infrastructure, like the Luis Muñoz Marín International Airport and the Port of the Americas, which can be strengthened to support an increased role for Puerto Rico in the region. The focus of the Task Force's recommendations is to take steps that can begin to unlock Puerto Rico's potential as an economic and tourism hub.

***Assessing Potential Enhanced Access for Luis Muñoz Marín International Airport*****Issue**

Prior to September 11, 2001, 16 international airline carriers from Asia, Europe and Latin America brought passengers to and through San Juan's Luis Muñoz Marín International Airport (LMM) as an in-transit