New Opportunities for Biomass Utilization in Taiwan

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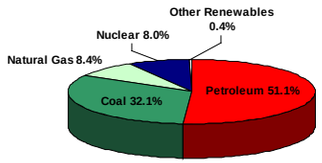
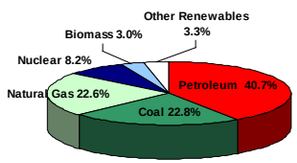
Introduction

Taiwan is heavily dependent on foreign resources to provide for its energy needs. Indeed, nearly 99% of the energy used in Taiwan is supplied through foreign imports, which makes the economic development of Taiwan strongly influenced by global supply and demand for these resources. Therefore, creating policy to increase the use of renewable natural resources in Taiwan becomes very important to continue to meet demand for the current energy consumption. In contrast, the United States has met about 6% of its energy needs through renewable energy, including wind, water and solar – and this as early as 2005. Of that, biomass provides about 3%. At present, biomass provides about 6% of Oregon's energy needs – twice the national average. Oregon therefore provides a good model for which to study the development of biomass utilization, with the goal of ultimately applying some of these experiences in Taiwan.

Taiwan Energy Consumption by Fuel Type
2007



U.S. Energy Consumption by Fuel Type
2005



What is biomass?

Biomass is one kind of renewable energy. Biomass refers to the sum total of all organic material in trees, agricultural crops and other living plant material. Woody biomass in particular is any biomass composed of wood and it can arise from three sources: wood products residue, urban wood waste and forest biomass.

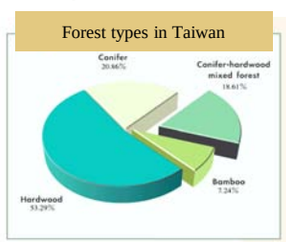
Biomass utilization is not a new concept and the process does not need to be complicated with high-tech. One example is the simple burning of wood to provide heat – this is biomass at work. In fact, over the past few decades, many sawmills and papermaking factories built their own cogeneration plants to burn their residual wood waste or convert their byproducts to create a consistent source of power. Biomass utilization, especially for energy, is considered an important alternative energy source to help reduce dependence on fossil fuels, which is one of the main sources of carbon dioxide emissions into the atmosphere.

Methodology

The main focus of this study was to explore the development of biomass utilization in Oregon. Information gained from this study was used for comparison with available resources and technologies in Taiwan. Ultimately, the goal is to find a way to use the native resources of Taiwan for the production of energy. Through this process, information will also be gathered about successful extension practices that could transfer to the development of supportive incentive policies by the government in Taiwan. To achieve these goals, three different methods were employed :

1. Information collection and analysis from internet, brochures, journals, and newspaper.
2. Interviews with relevant experts such as the members of the Oregon Forest Biomass Working Group, consultants, and professors of Oregon State University.
3. Visits the relevant facilities such as wood pellet mills, wood chip supply operations, and biomass gasification operations.

Forest types in Taiwan



Results

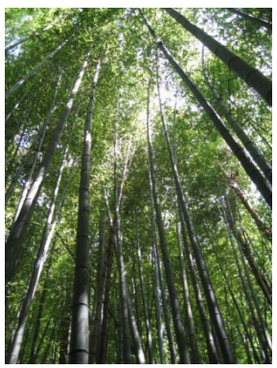
The utilization of biomass for energy production in Taiwan is a reasonable and feasible goal. The data gathered in this study suggests that the development and production of wood pellets using bamboo would be the best scenario for the initial push towards biomass utilization in Taiwan. The results of this study also emphasized the necessity of considering important factors such as investment cost, material supply, and labor capacity.

Why Use Bamboo?

Bamboo is a natural choice for use as biomass in Taiwan because it is an extremely abundant natural resource. Bamboo accounts for 7.2% of Taiwan's forests. Bamboo is very fast-growing grass species – coming to maturity within 4-5 years. In addition, it is easy to harvest with low harvest cost.

Bamboo is used in many aspects of everyday living. It is used in general construction, furniture making, paper and textile production, in craft product, for food (bamboo shoot), and also provides energy through combustion.

In the 1960s-80s, bamboo-related industries made a lot of money, which contributed to economic improvements for bamboo farmers, local community and government. But now, downturns in the economy have caused upsets in these industries. Indeed, much of the bamboo industry has moved from Taiwan into mainland China and Southeast Asia. Therefore, it becomes increasingly important to create new opportunities for the bamboo industry in Taiwan.



Why choose wood pellets?

The production of wood pellets for bioenergy use has many advantages, a few of which are listed below.

1. Requires less technical equipment than other systems
2. Has a low capital investment
3. Has low environmental impacts
4. Is feasible to develop locally
5. Has high market potential

The last point, that of high market potential, is well supported. Some studies show that global pellet consumption has grown from 2.7 million short tons in 2001 to 12.6 tons in 2008, which is an annual increase of about 25%. In 2008, European countries consumed over 75% of the pellets, driven by EU carbon and renewable energy policies.

Conclusions

The idea of using bamboo to produce wood pellets is new for Taiwan. Currently, no relevant technologies about bamboo pellet production exist, nor are there any facilities for this type of manufacturing yet in Taiwan. Hence, there are huge challenges ahead . Some of these are:

1. The properties of bamboo pellets are unknown,
2. The amount of bamboo resources needs updating
3. The wood pellet manufacturing process needs to be adapted to the bamboo pellet process,
4. There need s to be supportive policy incentives, etc.

Although there are many challenges, the implementation of this project could produce many potential benefits, including:

1. Enhance bamboo resource utilization
2. Increase bioenergy use
3. Reduce emission of carbon dioxide
4. Create job opportunities in communities
5. Revitalize the bamboo industries of Taiwan

Acknowledgements

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