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Biomass should be considered as a potential energy

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Abstract
Vietnam has many different energy resources from coal to oil and gas, coal and hydropower. However, these natural resources are not endless and are in danger of being exhausted. Therefore, in recent years, the Government has encouraged the research and use of renewable energy sources, both diversifying energy sources and contributing to environmental protection, including solar and biomass energy. Biomass (or energy from organic material - biomass). Biomass comes in many forms: wood, forestry products such as sawdust, agricultural waste such as straw, manure, energy crops (sugar cane, willow). According to experts, using biomass will provide new opportunities for agriculture and forestry in Vietnam. Also according to studies, our country can produce 170 million tons of biomass, if put into use, it will contribute to reduce CO2 emissions into the environment very effectively. According to fast and strong the development of economy, social. The people increasingly needed big energy resources that serve for life. However, the main sources of energy present base on the fossil. This is energy that cannot regenerative. Therefore, there are many ideas, applications about using energy efficiently. Beside some renewable energy was created, Biomass energy is the type of energy that the people use it a long time in different kinds. In the current world, many types of biomass energy have used but the question "How to use biomass energy efficiently and reasonably" still hard question and this question need to be researched carefully.

Keywords: sustainable development, biomass, ennergy

Introduction
As one of the leading beer producers in Vietnam, VBL prioritizes the application of energy-saving and environment-friendly technologies towards sustainable development. In order to reduce the amount of CO2 released into the environment, over the years, VBL has implemented many solutions including reducing fuel loss, modernizing equipment and using renewable energy, including biomass and biogas. The comprehensive application of biomass technology in manufacturing to reduce CO2 emissions is part of a program we call" For a Better World, "said Paul Bleijs, VBL Supply Chain Director. . . VBL is contributing to creating a new trend of sustainable production and business". In 2014, VBL has reduced 0.58 kg of CO2 emissions per HL beer through a program of saving and using energy efficiently as well as the application of new technologies in production. Specifically, after only 2 months of using saturated steam from biomass boiler, VBL Da Nang factory has reduced about 18% of CO2 emissions into the environment in 2014, equivalent to 1,080 tons of CO2 emissions. Biomass technology is also starting to be applied at VBL Tien Giang Plant since March this year and is expected to be applied at VBL's factory in District 12 (Ho Chi Minh City) in 2016 and VBL Quang Nam Factory. After 2017. According to the plan, in 2015, biomass will reduce 35% of CO2 emissions in production and this figure is 95% in 2016 and is expected to be 100% after 2018 at 4 VBL factories. Biomass is a very broad term meaning used to describe substances of biological origin that can be used as an energy source or due to its chemical components [1]. With such a definition, biomass includes natural plants, industrial crops, algae, and other plant species, or agricultural and forestry residues [2][3]. Biomass also includes materials that are viewed as waste from human societies such as waste from the production process of food for drinking water, mud/sewage, fertilizer, and industrial (organic) additive products. industrial by-product and organic components of domestic waste [4]. Biomass can also be subdivided into more specific terms, depending on

the intended use: generating heat, producing electricity or making transportation fuel [5].Biomass sources are converted into other forms of energy such as electricity, heat, steam, and fuel through metabolic methods such as direct combustion and steam turbines, anaerobic digestion (digestion), co-firing, gasification (gasification) and pyrolysis [6]. Pure vegetable oil is the oil extracted from the extraction of vegetable oil from oilseeds [7]. This process is like the production of vegetable oil in the food industry that has good technology [8]. Pure vegetable oil can be used directly in improved engines without the use of additives or structural changes [9]. Oil-bearing plants for the production of pure vegetable oils used in diesel engines are rapeseed, sunflower, soybean, palm, coconut, peanut, jatropha [10][11] The largest potential fuel will be used as renewable fuel in diesel engines as biodiesel [12]. Production technology starts with oil plants, which are now widely used in Europe [13]. This is done mainly due to the favorable characteristics of biodiesel in terms of its ability to blend with traditional diesel fuel and only need to adjust the engine fuel system small [14].

Biomass is agricultural waste (straw, bagasse, husk, corn fiber ...), forestry waste (dry leaves, wood chips ...), scrap paper, methane from landfills, treatment stations Waste water, and manure from cattle and poultry farms. Biomass fuels can be in the form of solid, liquid, gas ... burned to release energy. Biomass, especially wood, wood charcoal - provides significant energy in the world. At least half of the world's population is based on biomass. People have used them for heating and cooking for thousands of years. Biomass can also be converted into liquid fuels such as methanol and ethanol used in internal combustion engines; or into biogas (biogas) application for energy needs at the family level. The potential of biomass energy in Vietnam is extremely abundant and large reserves. Specifically, agricultural production waste accounts for the largest proportion: about 45%, fuel wood: about 30%, livestock waste (about 16-18%), waste and other organic waste (5-7%).

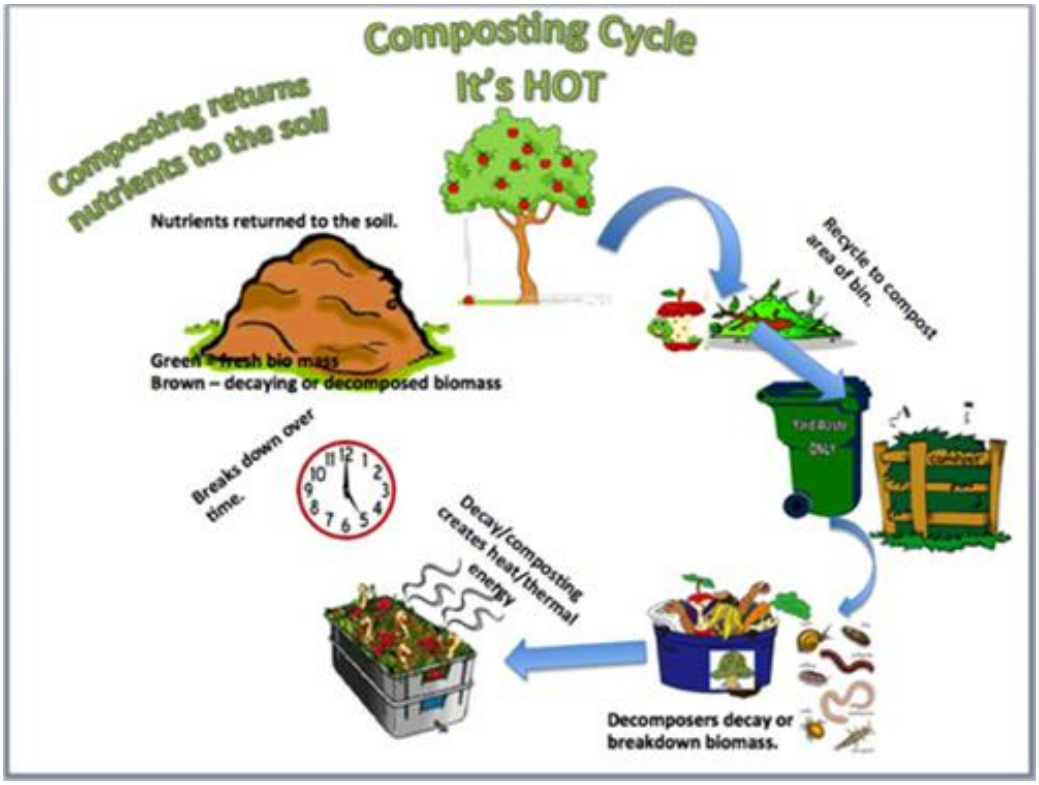


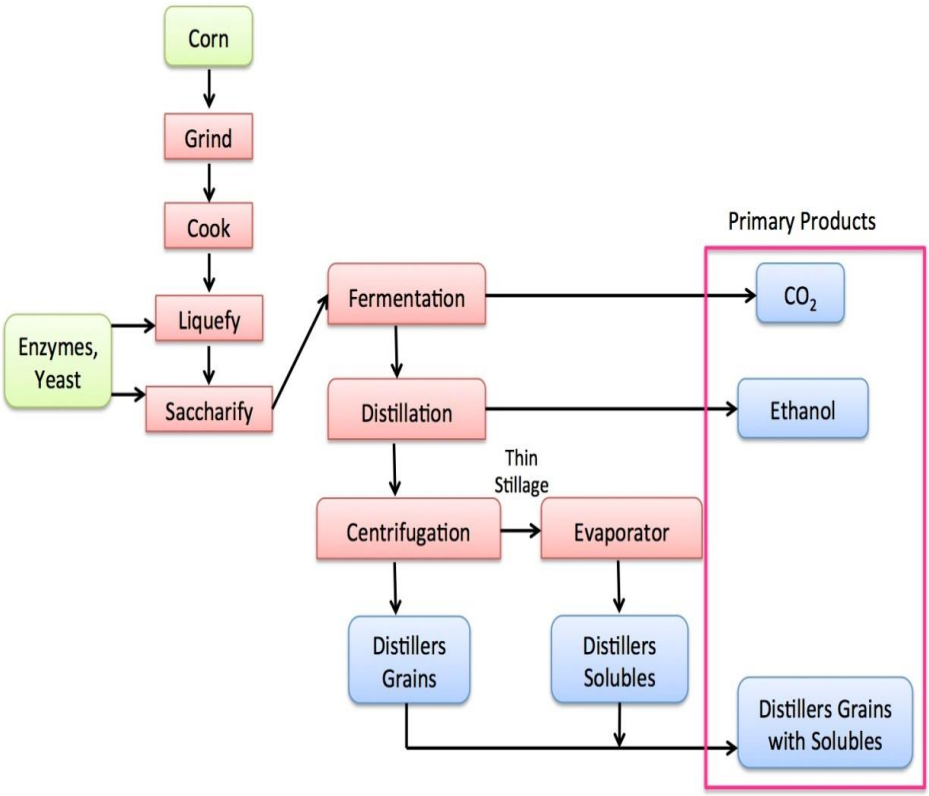
Fig.1: Biomass transformation cycle

Biomass energy is not only an energy issue but also a waste treatment problem affecting the environment now and in the future. Hanoi and Ho Chi Minh City emit more than 7,000 tons of rubbish every day, if biomass energy development in Vietnam develops, the environmental problem will have the opportunity to be completely solved, contributing to the energy development. Sustainable food quality of Vietnam. There is a lot of potential, a lot of strength, but after just two decades of research, we haven't got a real power plant to go into operation yet. Source of biomass energy, renewable energy is a top concern of Vietnam when the energy consumption in 2013 is about 57 million tons of oil equivalent (Mtoe) and forecast energy consumption continues to increase. High, about 7% per year from 2010 to 2020 and approximately 5% in the period 2020-2030. In particular, the growth of electricity demand has slowed down due to the general effects of the world economic crisis. We are only interested in using biomass energy for electricity generation, and other advantages and uses such as making biofuel, utilizing waste for biomass ... have not been studied and applied. "Not to mention, along with perfecting the technology of using fuel, developing auxiliary technology such as pretreatment, packaging, transportation ... is also one of the factors that need to be considered when developing biomass energy.

Biomass energy

The demand for energy use has been strongly increasing to serve production and business needs as well as other social security needs. When the demand for human energy is unlimited, the natural resources to produce energy are finite, their regeneration capacity requires very long time,

sometimes up to millions. Year. Countries around the world, including Vietnam, are forced to invest in efforts to find other sources of energy that can quickly and immediately regenerate such as solar, wind, water and solar energy. The amount of biomass ... Experience has shown that the industry of producing energy from biomass materials not only contributes to ensure energy safety in the country, but also creates new processing industries and new products. Biomass energy, is and will play a particularly important role in the process of economic development, ensuring social security in the world and in APEC economies. In Vietnam, biomass and renewable energy are still relatively new, undeveloped areas and occupy a very modest proportion in the total energy supply of the economy. The lack of infrastructure, the lack of professional knowledge, the poor experience in the process of managing and operating the operation apparatus, the limitations of resources, especially public resources. Technology and finance ... are the reasons that can cause the biomass energy development technology to be "delayed" than expected. Without "accelerating", it will be difficult for Vietnam to achieve the set target of renewable electricity generation rate of 4.5% by 2020 and 6% by 2030 in the VIIth Electricity Master Plan. In order to have a comprehensive view of current biomass energy, Vietnam Energy Development Support Center - the agency responsible for renewable energy of Vietnam Energy Association has compiled and published the Handbook. Vietnam green energy. Right from the first time it was launched under the theme of BIOMASS - Develop & Go green, the book has attracted more than 40 experts, scientists and businessmen from 30 collective units of management units and research units. Research, business units operating in the field of renewable energy and biomass energy are interested, contributing lessons. This is a reliable, up-to-date information book on basic knowledge, technology, partners ... in the field of renewable energy for investors, a complete and up-to-date source of valuable information. With the researchers. For policy makers, the book gathers typical research directions and feasible applications that are being supported. Bio-ethanol (Gasohol): Includes Bio-methanol, Bio-ethanol, Bio-butanol ... Among these bio-petrol types, Bio-ethanol is the most commonly used biofuel in the world because of its the ability to produce on an industrial scale from sugar-containing raw materials such as sugarcane, sugar beet and starch-containing raw materials such as cereals, potatoes, cassava ... Biogas containing ethanol with higher octane value than gasoline is usually dynamic. The muscle gets hotter quickly. However, the machine also wears more quickly, especially rubber gaskets. The disadvantage of Ethanol is dehumidification, so gasoline-ethanol contains a lot of water, making it difficult to "fix", rust metal, wear away plastic (plastic), so it is necessary to change materials for the engine, right Regular vehicle maintenance. Ethanol tanks must also be made of special metals, and transportation is more difficult than regular gasoline. Biodiesel (BioDiesel): Biodiesel can be used instead of diesel because it is similar in quality to diesel fuel but not produced from petroleum but produced from vegetable oil or fat. Animals with ester conversion (transesterification). Oils [also known as methyl (or ethyl) ester (FARME) fatty acids are mixed with sodium hydroxide and methanol (or ethanol) to produce biodiesel and glycerine with ester metabolism. Ethanol (or ethyl alcohol): Ethanol is a liquid, colorless, transparent, flammable fuel. Ethanol is used as an additive for gasoline, with the aim of increasing octane and greenhouse gas emissions. Water soluble and biodegradable ethanol. Ethanol is produced from biomass with a high cellulose content (like corn), through fermentation at a dry kiln or wet oven. In both of these kilns, yeast residue (wort) is produced and supplied to livestock on farms.



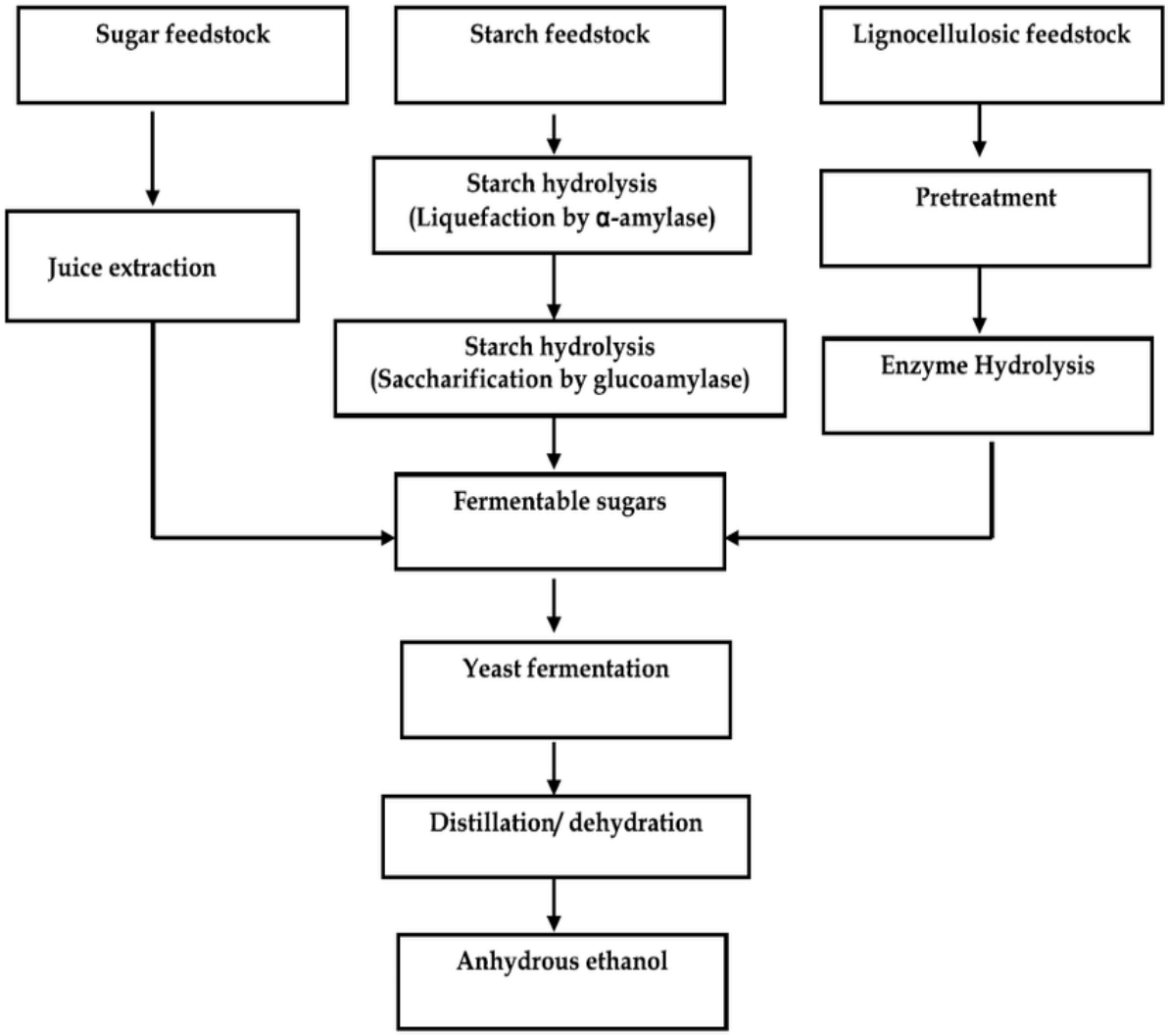


Fig.2: Ethanol production process from corn and starch

Biogas is a mixture of methane gas (CH4) and some other gases arising from the decomposition of organic matter in an anaerobic environment. The main components of Biogas are CH4 (50-60%) and CO2 (> 30%), the rest are other substances such as N2, O2, H2S, CO ... hydrolyzed in the anaerobic and catalytic environment by heat From 20-40ºC, the low calorific value of CH4 is 37.71.103 KJ / m3, so biogas can be used as fuel for an internal combustion engine. In order to use biogas as fuel, biogas must be treated before using to create an explosive mixture with air. H2S gas can corrode parts in the engine, its product SOx is also a very toxic gas. Steam has a small content but significantly affects flame temperature, fire limit, low calorific value and air/fuel ratio of Biogas.

There are many techniques to convert biomass energy into electricity. However, there are some popular methods such as direct-fired or conventional steam approach, pyrolysis, biomass gasification, anaerobic digestion, electricity production from waste landfill emissions. These are two common methods of generating electricity from biomass energy that applicated in most biomass power plants. Both types of systems directly burn bioenergy-feedstock to create steam for rotating generator turbines. These two methods are distinguished in the internal structure of the combustion chamber or furnace. At the direct combustion system, biomass is transferred from the combustion chamber bottom and the air is provided at the bottom of the furnace base. Meanwhile, in the conventional boiler method, the draft is transferred into the furnace from above but the biomass is still downloaded to the bottom of the furnace. Traditional direct burning systems are a pile system (two-chamber combustion chamber) or stoker boiler. The hot air was then transferred to a turbine and turned the turbine blades, operating the generator rotor. When used for direct burning, biomass must be dried, cut into pieces, and pressed into charcoal. When the preparation is completed, the biomass is fed into the kiln/boiler to generate heat/steam. The heat generated from the heating process, in addition to providing generator turbines, can also be used to heat plants and other construction works, it is exploited to maximize efficiency. This type of plant is also known as a combined heat-energy plant (Combined Heat Power - CHP), which is used to utilize heat and steam to maximize the energy potential created, avoiding wasting energy.

Pyrolysis is the process of burning biomass at very high temperatures and biomass decays in an oxygen-deficient environment. The problem here is that it is very difficult to create a completely oxygen-free environment. Normally, a small amount of oxidation still occurs and can produce some unwanted by-products. In addition, this technology requires a high heat source and very expensive. The process of burning biomass produces pyrolysis oil (pyrolysis oil), coal or synthetic gas (char & syngas). These products can

be used similarly to petroleum to generate electricity. Thus, the pyrolysis process does not produce ash or energy directly, but it transforms k into higher quality fuels. This process begins with drying biomass to maximize combustion efficiency, similar to direct burning. When cooled, pyrolysis oil is liquid, brown, and is used as a gasifier fuel. Solid biomass can be converted into gaseous form, called syngas. This gas can be supplied to cycle turbines associated with CCGT (Combined Cycle Gas Turbines) or other conversion techniques like coal-fired thermal plants.

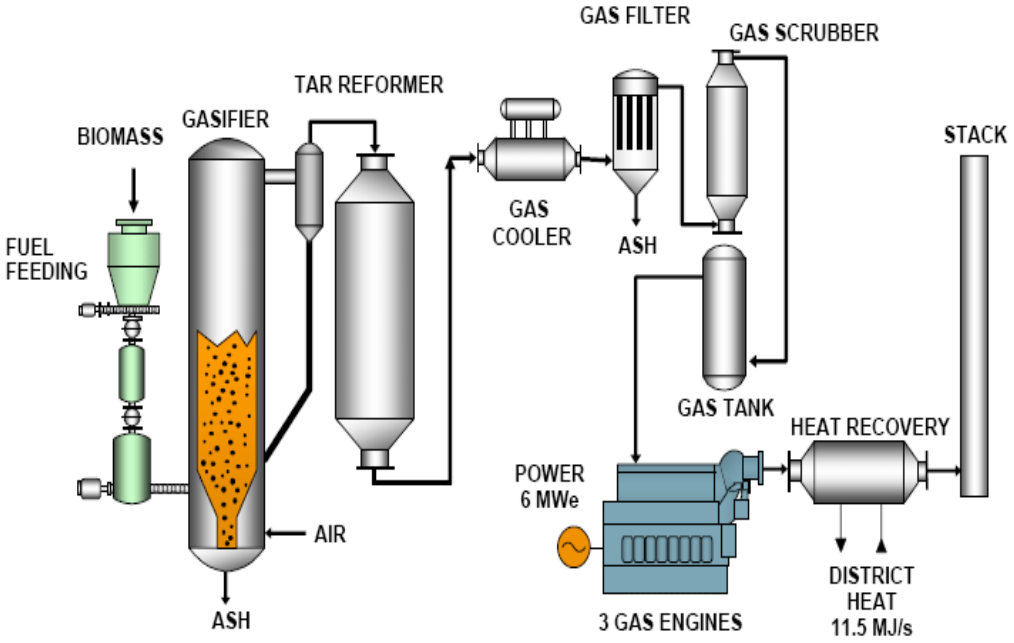


Fig.3: Gasification process

Many experts hope that biomass gasification will be more efficient than conventional biomass power plants. However, up to now, the process of gasification has not been widely applied in practice but is still at the technical testing stage. The furnaces convert solid biomass into gas that heated biomass in an environment in which solid biomass decomposes into flammable gas. This process is more advantageous than direct burning. Biogas can be cleaned and filtered to classify and separate harmful chemical compounds. Gas products can be used in high-performance generators (in the form of CCGT) - such as a combination of gas and steam turbines - to produce electricity. The performance of these systems can be up to 60%. This is a biological process in which methane gas is released from the decomposition of organic matter by microorganisms in an oxygen-free environment. This methane can be recovered and used to generate energy. The anaerobic digestion process uses biological wastes such as organic fertilizers and municipal solid wastes. Feces or waste are packed and decomposed by microorganisms and water. This process releases methane in the package, and this gas is fed into another gas container. Since then, methane has been used to power turbines and generate electricity. At the molecular level, hydrolysis converts organic substances into sugars and amino acids. Fermentation of these materials produces volatile fatty acids. These fatty acids then form hydrogen, CO2, and acetate during Acidogenesis. Finally, the methanogenesis process produces biogas, which consists of 55-70% methane gas, 25-35% CO2 and microelements such as nitrogen and hydrogen sulfide. In an anaerobic environment, methane gas can be recovered and used to power gas turbines or even fuel cells. Microbial growth and biogas production are very slow at normal temperatures. Anaerobic digestion usually occurs naturally when the concentration of moist organic matter in an oxygen-free environment, usually at the bottom of ponds, marshes, peat bogs, animal gut and other Anaerobic areas of landfills. The productivity of this process depends on the composition and ability of decomposition of waste materials. However, the speed of this process depends on the density of the microorganisms, their growth conditions and the temperature of the fermentation process. When used as a waste treatment process, the decomposition rate increases quite high in the temperature range of 20-40 degrees C. For urban solid waste, the decomposition rate can be increased in heat. Higher level like 50-60 ^{o}C. Anaerobic biodegradable microorganisms are marketed at relatively competitive prices, which are used on farms even on a small scale. Using methane in this way can help reduce bad odors and prevent them from spreading into the air, increasing greenhouse gases and causing fog.

Landfill gas uses the same technique as anaerobic digestion and has the same advantages. Landfill gas is a by-product of solid waste decomposition, with components comprising 50% methane, 45% CO2 and 4% Nitrogen. Moreover, this is also a positive measure to reduce the rate of wasteland use, landfill to convert into electricity [38]. Two ways to acquire landfill include traditional methods such as conventional drilling and push-in. normally, before the gas recovery, the three-dimensional structure of the landfill is mapped to determine the location of the capacitor and the optimal location for drilling. Traditional drilling methods use conventional drilling techniques with some technical improvements suitable for drilling areas. The pipes can be installed vertically, making gas recovery convenient. The push method uses 3-dimensional maps to find gas wells and can be used for separate drilling positions if necessary.

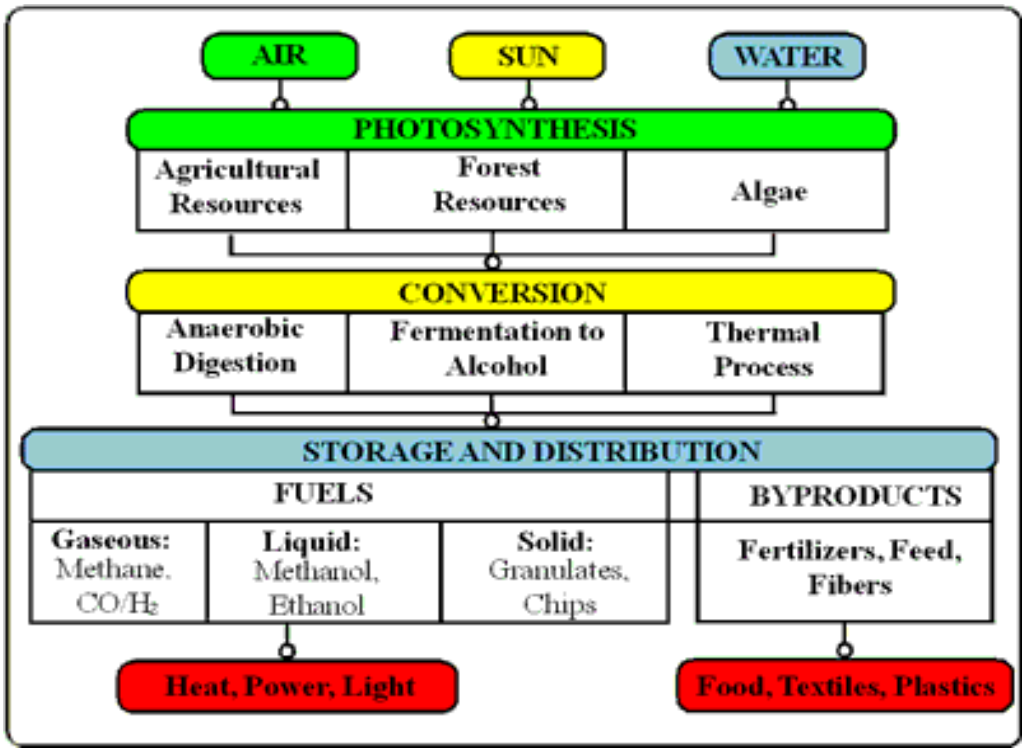


Fig.4: Fuel sources for biomass energy

In the context of the increasing exhaustion of fossil fuels, rising world oil prices and increasing reliance on world energy prices, the ability to meet energy requirements for domestic demand is increasingly difficult. The consideration of exploiting clean renewable energy has a very important meaning in terms of economy, society and sustainable development. Vietnam is a country with great potential for biomass energy from waste from agriculture, garbage, urban wastewater ... distributed across the country, in which some types of biomass can produce electricity. or apply energy cogeneration technology (producing both electricity and heat). This huge amount of biomass, if untreated, will be a major source of pollution and will continue to cause serious impacts on ecosystems (soil, water, and air) as well as human health. Every year, there are nearly 60 million tons of biomass from agricultural waste in Vietnam, of which 40% is used to meet household energy demand and electricity production. According to calculations, for every 5 kg of rice husk generated 1kWh of electricity, so with the amount of rice husk millions of tons, each year Vietnam can earn hundreds of MW of electricity. Agricultural residues are plentiful in the Mekong Delta, accounting for about 50% of the country's total agricultural waste and the Red River Delta with 15% of the total national production. Therefore, Vietnam has great potential to develop biomass power both now and in the future. However, the number of renewable energy projects in operation until now is still too small and only a few projects are grid-connected biomass, the investment is heavy and lack of a master plan. Can and is not commensurate with the existing potential of the country.

Conclusion

Using biomass energy is to reduce environmental pollution because the materials used to produce biomass energy are alcohol and animal and vegetable fats and oils, do not contain aromatic compounds, extremely low sulfur content, do not contain toxic. Using biomass energy compared to gasoline reduces about 70% of CO2 and 30% of toxic gas, because biomass energy contains an extremely small amount of sulfur, containing 11% oxygen, so it burns cleaner. Rapid biodegradable biomass energy, less polluting water and soil sources. Agricultural crops and other biomass materials are considered to be materials that contribute to carbon neutralization by its actual life cycle, plants collect carbon dioxide through photosynthesis. The input used in the production of biomass energy is considered renewable material and is likely to reduce greenhouse gas emissions. However, even if the input fuels themselves are able to neutralize carbon, the process of converting raw materials into biomass energy can cause carbon emissions into the atmosphere. Therefore, biomass energy must contribute to reducing carbon emissions, they must be demonstrated to reduce the true emissions of greenhouse gases in all production and use of biomass energy. In addition, biomass energy when discharged into biodegradable soil is four times higher than that of petroleum fuels and thus greatly reduces soil and groundwater pollution. Therefore, the use of biomass energy helps to reduce environmental pollution, reduce greenhouse gas emissions to help prevent global climate change.

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