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Keywords

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Abstract

Pallet factory has lots of residues like sawdust, chips which are recycled wood wastes. Making fuel pellets from pallet residues can not only solve wood waste problem but also bring great profits. Pellet production line contains crushing, drying, pelletizing, cooling and packing. The production line owns flexible and easy operation to complete high-efficiency work, which make it possible for pallet producers to make pellets by recycling pallet residues.

An extensive pallet industry has become established as a result of the rapidly expanding use of mechanical handling equipment. Unitized loads of industrial and agricultural products are handled by a variety of mechanical handling equipment such as lift trucks, racks, conveyors, slings, booms, and stackers. Pallets provide one of the

foundations upon which to assemble these loads. Pallet parts generally come from the lower grades of either hardwood or softwood lumber. Some sound below-grade material may be included. During the pallet production process, there is much fuel residue left which can be made into fuel pellets by **wood pellet mill**.



Feasibility of Making Fuel Pellets from Pallet Residues

1. Stable Supply of Raw Material

A wooden pallet is the structural foundation of a unit load which allows handling and storage efficiencies. Wooden pallet production can be integrated with that of box, dimension, and other lumber products at the mill. In a pallet production plant, many procedures like chamfer, notcher, multiple cutoff saw, block cutoff, resaw will result in wood residues such as sawdust, wood chips. It is estimated that approximately 45 to 55 percent of the log input to a pallet plant is to become waste. These wood waste provide free and abundant raw materials for pellet production.



2. Demands of Bio-energy Markets

The development of bio-energy markets provide opportunity for making fuel pellets from pallet residues. Wood pellets are the most popular renewable energy sources available across the world. They are much denser than natural wood and have a low moisture content of less than 10%, which means that very little of the energy produced is needed to evaporate water. Compared with wood waste direct combustion, wood pellets can be burnt at high temperatures with high combustion efficiencies.

3. Benefits from Using Pallet Residues

Economical benefits

- Using wood waste to make pellets can reduce landfill disposal and save more space.
- Wood pellets from wastes maybe a secondary product that adds value to pallet residues.
- Energy prices rise, which is a push for energy to be produced from pallet residues.

Environmental benefits

- Wood pellet fuel is a renewable resource and, therefore, a sustainable form of energy
- The use of fuel pellets as energy reduces potential waste and pollution

Fuel Pellet Production

1. Pallet Residues Collection

In small-scale pallet factory, wood wastes can be gathered by manual work. For large

scale pallet production, a tractor or bulldozer can be used to collect the residue.

2. Size Reduction

Collected pallet residues are in non-uniform. Only raw material of consistent quality can produce consistent quality pellets. Part of this consistency is the size of raw material particles used in the pellet mill. So use a hammer mill to reduce material size. The hammer mill will take wood residues and break them down into a consistent smaller size, making drying and pressing through the pellet die quick and consistent. There are two kinds of hammer mills for choice: **diesel driven hammer mill** and **electricity driven hammer mill.**

3. Material Drying

Pellet production is a high temperature process. The right moisture content of wood particles will produce the best quality pellets, reduce energy consumption and reduce pellet mill downtime. So the materials must be dried. Content moisture should be 10 to 18 percent for making biomass pellets. For small scale production, you can leave the waste particles in the sun to dry naturally. In large scale, you can place the waste in **wood dryer** until it is dried to the desired moisture level.

4. Pelletizing

Wood pellet production doesn't need to add binder as lignin, an element of wood, plays a role of binder and helps to pelletize when it is melted by heat. Produce the pellets using a wood pellet mill or, for smaller batches, a pellet press that includes a die and roller. The die is a metal piece with holes drilled through it. The roller goes across the die and presses the wood through the holes into pieces the size of finished pellets. Pellet presses are **flat die pellet mill** or **ring die pellet mill.** Either types can be used to make wood pellets that are consistent in density and moisture level.

5. Cooling

Cool pellets thoroughly. When the pellets come out of the pellet press, they will be hot and moist. Spread them out and allow them to cool and dry naturally. Or you can also choose a **wood pellet cooler.**

6. Package and Storage

Bag and store the pellets. Put the pellets in bags and seal the bags. The pellets will need to be stored in a dry place where they will not become moist.

Introduction of Fuel Pellets

Wood pellets are a type of biomass fuel. Produced from compacted sawdust and other wood waste products, they are cylindrical in shape and general measure between 6-10mm in diameter and 10-30mm in length. Wood pellets produce very little CO₂

when burnt and are therefore widely recognised as one of the most eco-friendly fuels.

1. Spotlights of Wood Pellets

- high quality (shape and hydrous rate are stable)
- dry, easy to store
- burning under environmental compliance is possible
- suitable for automatic combustion operation
- made of regional renewable resources
- energy density is higher than wood chips, suitable for transportation and storage
- possibility to be an alternative for energy system from smaller to larger scale

2. Application of Fuel Pellets

- Wood pellet is mainly used as fuel for heating in home pellet stove and medium or small-scale electric power plant. The benefits of wood pellets for heating are affordability, sustainability and convenience.
- Wood pellet can also be used for animal bedding. They are manufactured at high temperature to provide a sterile and low dust environment. Biodegradable nature of wood pellets means that it is easy to dispose of and can be used as a fertilizer or on the compost heap.

3. Source of Raw Materials

Wood pellets are usually made from dry, untreated, industrial wood wastes like sawdust, shavings, or chip fines. Wood wastes are mainly organized in three major categories: forest biomass, wood processing residual by-products and urban wood waste. And these wood residues can be divided into two types: logging residues and industrial wastes. Industrial wastes are mainly from sawmill, plywood production, particleboard production, pallet factory and so on.

Prospect of Wood Pellets in the World

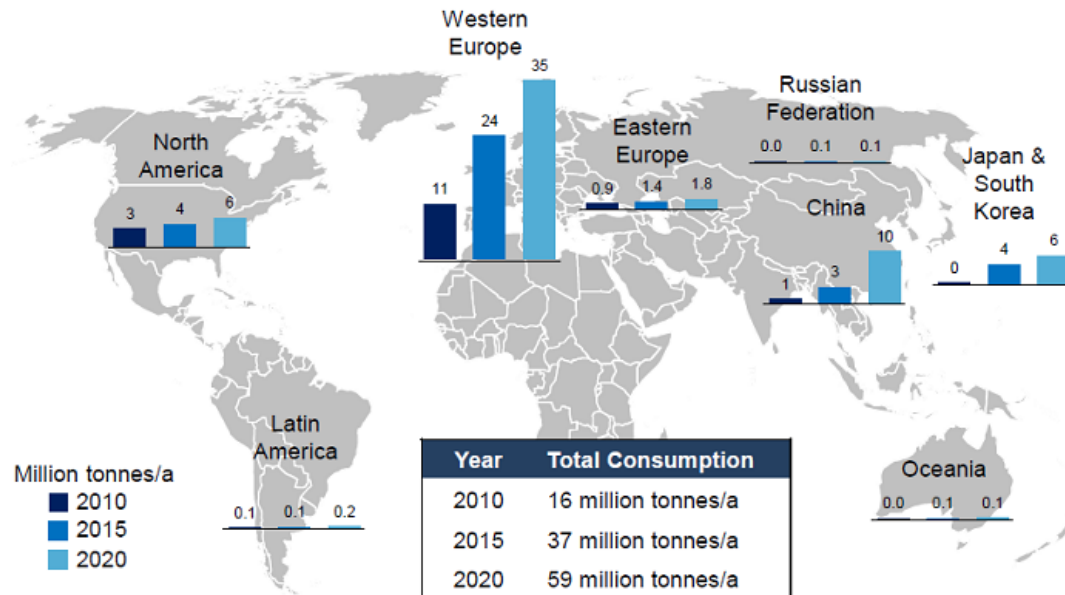
1. International Market Demand for Wood Pellets

Global wood pellet demand is rapidly expanding as consumers, businesses and regulators look for alternatives to fossil fuels. The fuel pellet is mainly used for residential heating and commercial & industrial use. Globally, wood pellet demand is projected to grow from an estimated 23 million tons in 2014 to around 50 million tons in 2024.

The European Union is the engine of the wood pellet market. There is strong demand in the European heating sector as high energy prices drive consumers to look for fuel alternatives. Biomass Associations in Europe expect that the consumption of high-

quality wood pellets for heating purposes will increase from over 7 million tons in 2011 to 13 million tons in 2015 and 22 million tons in 2020. Also, policies that promote the generation of renewable energy are spurring the use of pellets as a substitution for coal in power plants.

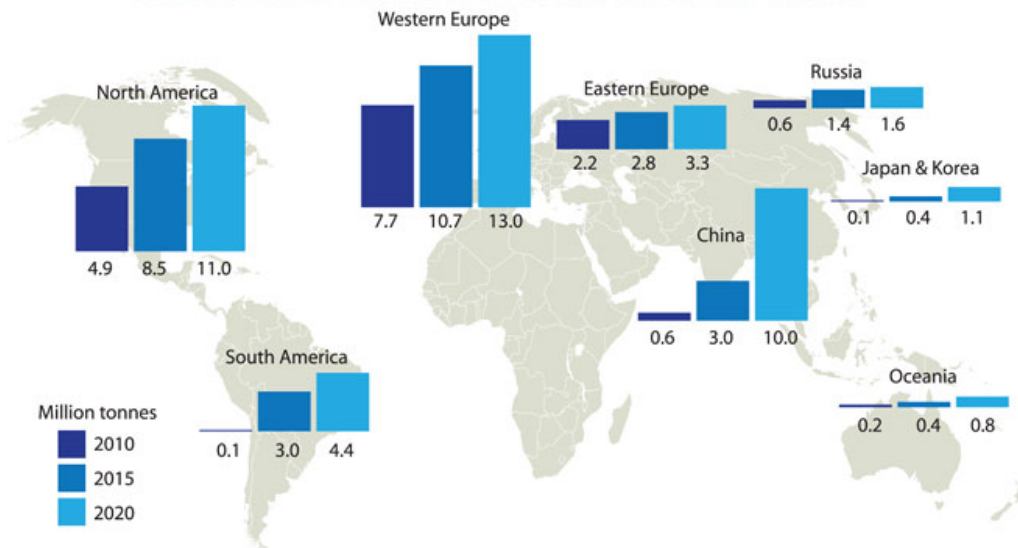
The following figure about global wood pellet consumption can clearly show you that: regions where pellet consumption is expected to increase, pellet demand drivers by region and forecasts for global pellet demand.



2. International Market Supply of Wood Pellets

The global growing demand for wood pellets has made many investments in wood pellet production. The production capacity was unequally distributed among the largest producers: US, Canada and Europe, and emerging producing countries such as Australia and South America. The global production of wood pellets has shown an exponential growth: from 2 million tons wood pellets in 2001 to 4 million ton in 2006, to 9 million in 2008 and 16 million in 2010. In the next 10 years, a doubling of pellet production in North America, and major growth in Europe and China.

GLOBAL PELLET PRODUCTION: 2010, 2015 and 2020 Outlook



From the above global market analysis of wood pellets, it is obvious that pellet fuel, a renewable, clean-burning and cost stable heating fuels, is currently needed throughout the world. Moreover, with the increasing of pelletizing technology and the improvement of pellet machines, there are various kinds of wood pellet mills provided for different pellet production demands. Therefore it is great time to invest in pellet fuel business to get profit. The pellet mill with high operability and a small size can make pellets for home heating. The large and advanced pellet mill is more suitable for large scale pellet production.

Development of Pellet Machine

Wood pellet machine is the core device in pellet production. With fast development of science and technology, pellet mill is developed in two types: small flat die pellet mill and ring die pellet mill, which are driven by two engines: diesel engine for areas shortage of electricity and electricity engines.

With the fast development of biomass energy project, small scale wood pellet mill become very popular. The small flat die pellet mill has a history for more than 10 years in China. At the beginning, it mainly used to process the pellet as feedstuff. Now the small scale wood pellet mill enables you to make pellets or feed granules with your own materials.

Ring die wood pellet mill also actually comes from feed pellet mill. It is favored by large scale pellet production. It adopts intimidating mechanical feeding style. Feedstock entered into the pelletizing room with high speed in the rotating centrifugal way. Feedstock is being distributed by the slicker to realize evenly feeding.

The mature and complete pellet making is pellet production line which contains crushing, drying, pelletizing, cooling and packing. The key element for a pellet plant is having the criteria to choose the right equipment and capacities, so that the production line has flexible and easy operation to complete high-efficiency work under the energy-saving condition, which make it possible for pallet producers to make pellets by recycling the scrap wood.

Fuel pellets can be stored and traded on the regional, national and international level: these features combined with the other advantages such as environmental benefits, relatively high energy density, and easiness to use and economic interest make pellets attractive in many countries from both the demand and supply side of the market. Therefore in the pallet factory with lots of residues like sawdust, chips which are recycled wood wastes, it is wise to make wood pellets from these pallet residues!