

Reporting from the Field: Japan

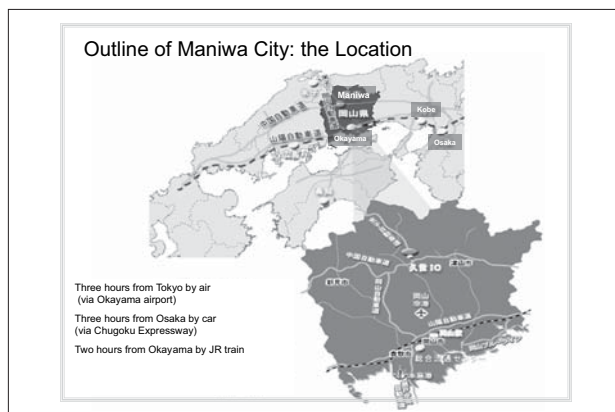
## Sustainable Regional Development through Optimized Wood Biomass Use - Development of Eco-Industrial Clusters in Maniwa City, Japan -

Koichiro Nakashima

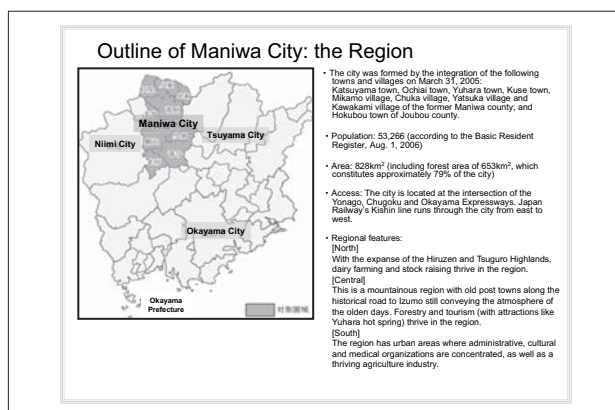
Director, Maniwa Bioenergy Corporation Ltd.  
President, Meiken Lamwood Corporation Ltd.  
Maniwa City, Okayama Prefecture, Japan



Good afternoon, ladies and gentlemen. Today I would like to explain how Maniwa City is working to develop eco-industrial clusters.



Slide ②



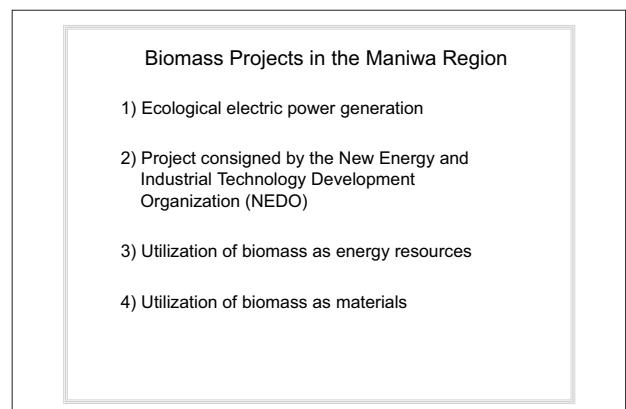
Slide ③

Maniwa City is located midway between Okayama City and Yonago City in the northern part of Okayama Prefecture. It is a typical "mountainous region"

as defined by the government.


Last year, mergers of small municipalities took place throughout Japan. In our region, too, as many as nine municipalities were merged to form one city that has a population of about 53,000 and covers a wide area of about 828km<sup>2</sup>. This is Maniwa City.

Today, I would like to discuss four projects undertaken in the Maniwa region. First, eco-power generation. Second, a project commissioned by the New Energy Development Organization (NEDO), which has just started this year. Through this project, we aim to develop our region in an environmental friendly way. Third, our continued efforts to use biomass as an energy resource, and fourth, utilization of biomass as materials. I would wrap up my presentation touching on some challenging issues that we are facing.



Slide ④

**1) Ecological electric power generation**  
(the first biomass resource utilization project in the Maniwa region)  
The boiler shown below generates electric power using waste wood discarded by saw mills.



Outline of the biomass electric power generation facility:  
Electrical output: 1,950kW  
Waste wood-fired boiler: Takuma N-600H  
Evaporation: 20t/h  
Steam pressure: 16kg/cm<sup>2</sup>G  
Steam temperature: 270°C  
Fuels: planer shavings, bark, etc.

In fiscal 1998, Meiken Lamwood Corporation expanded the scale of its wood biomass (waste wood-fired) electric power generation.  
(Wood biomass electric power generation started in 1984 with the output of 175kWh.)

Slide ⑤

Let me begin with eco-power generation project. At Meiken Lamwood Corporation of which I am the president, we use waste wood shavings to feed the boiler and generate steam, which is used to dry wood materials. The power generated from the boiler not only meets our in house demands but also sold to other companies since three or four years ago.

The feed stock tank, which was completed in 1997, can store about 2,000m<sup>3</sup> of wood shavings and has been used for generating electric power since 1998. Small independent electric companies were not allowed to sell electricity six or seven years ago, but with deregulation and the enactment of the Renewables Portfolio Standard (RPS) law, sale of electricity is now permitted under certain conditions. So today, we both consume and sell internally generated electric power.

To be more specific, we now sell electricity to a private company, Matsushita Electric Industries. As for environmental credits, we sold them to Chugoku Electric Power till last year, but now we are negotiating with Kansai Electric Power, which won our tender offer.

Nomura Holdings also purchases our eco-power under their green purchase program for a monthly fee of 600,000 to 700,000 yen, which we call "osaisen," a monetary offering to a shrine.

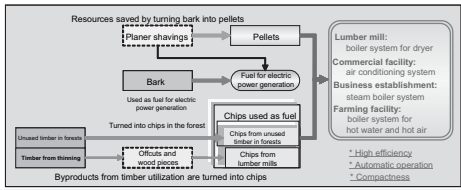
Further business development requires additional expenditure. We entered the electric power generation business on our own with a plant originally designed

to consume 60 to 70 tons of wood waste in a day. As the scale of business has expanded, however, about 150 tons of wood shavings will be required from the end of 2006, so we need community-wide cooperation to secure such a huge amount of feed.

**2) Project consigned by NEDO**  
An experimental project in Maniwa City toward establishing a regional energy cycling system using wood biomass

Outline of the project:  
This project, consigned by NEDO, aims to establish a regional-cycling type society with the local production and consumption of biomass. The objective is to enable the low-cost provision and transport of wood resources (unused timber from forests, waste wood from lumber mills, pellets, etc.) regionally available in Maniwa City and the use of these resources in the boilers at farming facilities, business establishments, lumber mills and so on as an alternative to fossil fuels such as heavy oil and kerosene. Data on the energy conversion efficiency, operability and economy of the system is being collected and analyzed, to demonstrate the feasibility of the business.

Project period: five years from fiscal 2005 to 2009



Resources saved by turning bark into pellets  
Planer shavings → Pellets  
Bark → Fuel for electric power generation  
Chips used as fuel  
Chips from unused timber in forests  
Chips from lumber mills  
Byproducts from timber utilization are turned into chips

Lumber mill:  
boiler system for dryer  
Commercial facility:  
air conditioning system  
Business establishment:  
steam boiler system  
Farming facility:  
boiler system for hot water and hot air

\* High efficiency  
\* Automatic operation  
\* Compactness

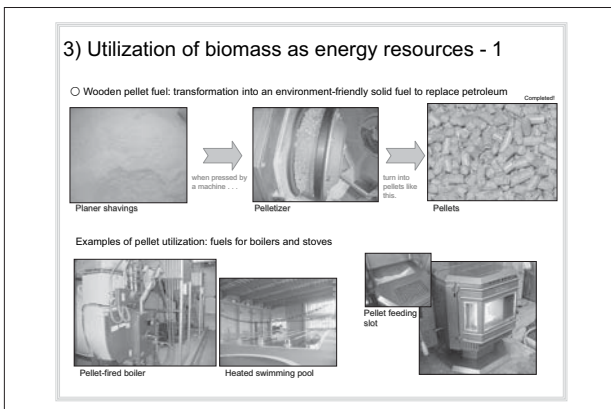
Slide ⑥

The second is the NEDO project which started this year. Before that, we incinerated our wood shavings to generate electric power and also used steam and heat generated from the process. Although there are many lumber mills in our region, it is very difficult for these mills to establish a mechanism to recycle bark wastes at their premises. Wood shavings were designated as "industrial waste" by the government, just four or five years ago. If these were to be incinerated on-site, a huge incinerator would need to be introduced, and then additional processing would be required before final disposal under regulations. Therefore, the lumber mills have to transport waste wood shavings to disposal sites in other regions, which, of course, requires additional cost and thus seems nonsense.

To cope with the situation, we incinerate a huge amount of bark waste in our boiler. Fully dried wood materials are in high demand in the wood industry, but drying of wood materials requires high-end facilities. To meet the demand, we have begun producing pellets from wood shavings and supply them to lumber mills as a fuel for drying wood materials, which is done in cooperation with NEDO.

More specifically, we produce pellets from the re-

remainder of wood shavings we consume internally as a thermal energy source, and supply them to commercial facilities and boilers for industrial use. Since last year, we have been conducting experiments to use waste wood materials as fuel for heating greenhouses for agricultural use. Such fuel has great economic significance in that it can be supplied at 70% of the unit price of oil, and also allows us to use local resources to the fullest extent.

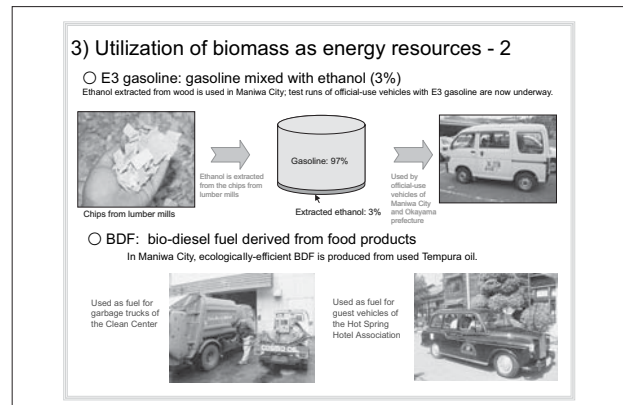


Slide ⑦

Next, let me speak about using biomass as an energy resource. In producing pellets, biomass - dried shavings are solidified. In Japan, commercial production of pellets began after the first oil shock, at the initiative of the then Ministry of International Trade and Industry. The subsequent decline of the oil price, however, reduced the commercial value of pellets, and eventually most manufacturers stopped producing pellets, excluding one or two companies. Yet, as greater importance began to be placed on biomass about five years ago, pellet production has been increasing gradually.

Today, pellet production in Japan barely exceeds 10,000 tons, while environmentally-advanced Europe produces about 6 million tons of pellets annually, which holds a small but important share in the energy resources market. In Japan we have a wealth of unused wood resources, which should be fully used as thermal resources locally. Our pellets are used for boilers at heated swimming pools and spas in the neighborhood, and also for stoves at schools, homes,

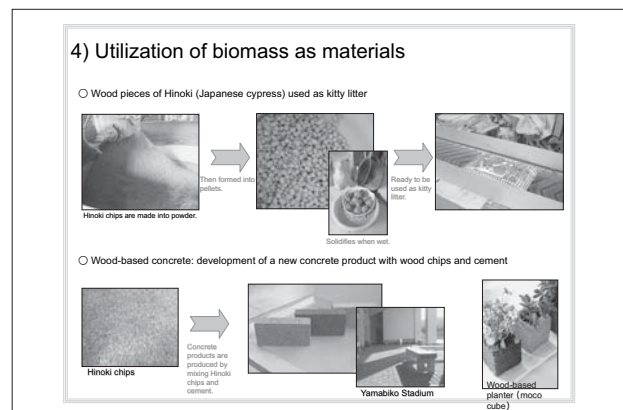
and public organizations.



Slide ⑧

The biomass potentials of Maniwa region, attracts increased attention nowadays. For example, Mitsui Engineering and Shipbuilding recently built a plant in our region where they conduct experiments for developing E3, gasoline mixed with ethanol, and will soon decide on whether or not to begin using the technology commercially from the next year.

On the other hand, inns in the Yubara Hot Spring resort in our region use bio-diesel fuel for their vehicles. So, local awareness about biomass use is changing positively.



Slide ⑨

Wood biomass is used for various purposes other than as an energy resource, such as for making kitty litter or cat sand. We can see that the use of discarded materials is increasing.

In our region, a manufacturer of secondary concrete products has just started producing wood-based concrete. Though commonsense would suggest that



true to the Maniwa region. We too have a wealth of resources, but most of these resources have remained unused. We aim to use such material resources and human resources as well, and effectively combine them for further industrial development.

Historically, Japanese people were very good at utilizing wood resources, cleverly using them first as materials and then as energy resources. It may sound somewhat exaggerated, but Japan seems to have become one of the least successful countries in the world in terms of using wood materials in the last thirty years. After World War II, the government launched afforestation programs and trees were planted in mountains throughout the country. But to-

day, such efforts are hardly rewarding. As you may know, Japan imports lumber from various parts of the world, and Japanese cedar and Hokkaido's larch are among the lowest priced timbers in the world. Such low valuation indicates that Japan no longer has a sound mechanism for using wood materials. Faced with such a situation, we hope to help create a new mechanism by sharing the experience of Maniwa, and to build a recycle-oriented society in our region by encouraging the use of local energy resources and materials.

With this remark, I will conclude my brief presentation on Maniwa's efforts. Thank you very much.



Oct. 26, 2006

(Translated version of original text in Japanese)

## Sustainable Regional Development through Optimized Wood Biomass Use

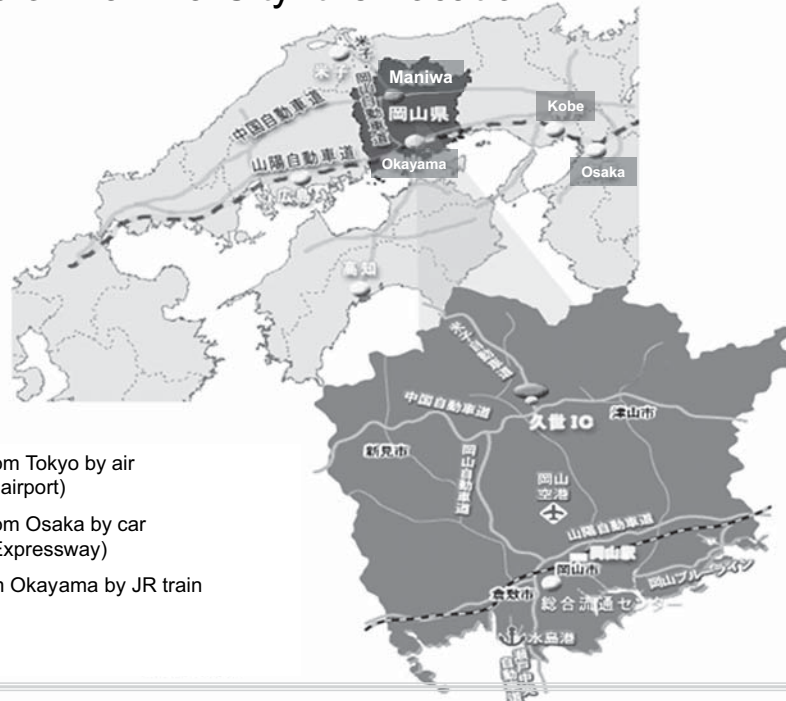
- Development of an Eco-industrial clusters in Maniwa City, Japan-

Maniwa Bioenergy, Co., Ltd.

Koichiro Nakashima

Slide ①

## Outline of Maniwa City: the Location



Three hours from Tokyo by air  
(via Okayama airport)

Three hours from Osaka by car  
(via Chugoku Expressway)

Two hours from Okayama by JR train

Slide ②

## 1) Ecological electric power generation

(the first biomass resource utilization project in the Maniwa region)

The boiler shown below generates electric power using waste wood discarded by saw mills.



Outline of the biomass electric power generation facility:

Electrical output: 1,950kW

Waste wood-fired boiler: Takuma N-600H

Evaporation: 20t/h

Steam pressure: 16kg/cm<sup>2</sup>G

Steam temperature: 270°C

Fuels: planer shavings, bark, etc.

In fiscal 1998, Meiken Lamwood Corporation expanded the scale of its wood biomass (waste wood-fired) electric power generation.

(Wood biomass electric power generation started in 1984 with the output of 175kW/h.)

Slide ⑤

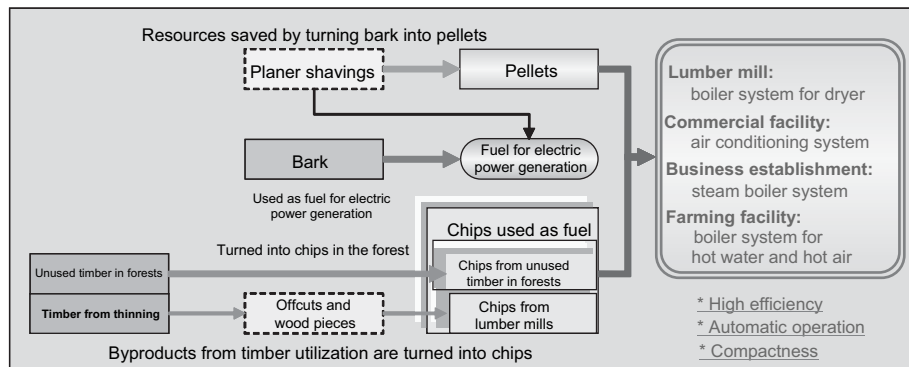
## 2) Project consigned by NEDO

An experimental project in Maniwa City toward establishing a regional energy cycling system using wood biomass

Outline of the project:

This project, consigned by NEDO, aims to establish a regional-cycling type society with the local production and consumption of biomass. The objective is to enable the low-cost provision and transport of wood resources (unused timber from forests, waste wood from lumber mills, pellets, etc.) regionally available in Maniwa City and the use of these resources in the boilers at farming facilities, business establishments, lumber mills and so on as an alternative to fossil fuels such as heavy oil and kerosene. Data on the energy conversion efficiency, operability and economy of the system is being collected and analyzed, to demonstrate the feasibility of the business.

Project period: five years from fiscal 2005 to 2009



Slide ⑥

### 3) Utilization of biomass as energy resources - 1

- Wooden pellet fuel: transformation into an environment-friendly solid fuel to replace petroleum



Examples of pellet utilization: fuels for boilers and stoves

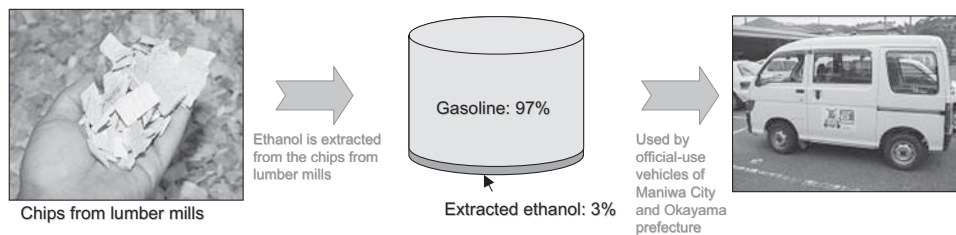


Slide ⑦

### 3) Utilization of biomass as energy resources - 2

- E3 gasoline: gasoline mixed with ethanol (3%)

Ethanol extracted from wood is used in Maniwa City; test runs of official-use vehicles with E3 gasoline are now underway.



- BDF: bio-diesel fuel derived from food products

In Maniwa City, ecologically-efficient BDF is produced from used Tempura oil.



Slide ⑧



## Outline of Maniwa City: the Region



- The city was formed by the integration of the following towns and villages on March 31, 2005: Katsuyama town, Ochiai town, Yuhara town, Kuse town, Mikamo village, Chuka village, Yatsuka village and Kawakami village of the former Maniwa county; and Hokubou town of Joubou county.
- Population: 53,266 (according to the Basic Resident Register, Aug. 1, 2006)
- Area: 828km<sup>2</sup> (including forest area of 653km<sup>2</sup>, which constitutes approximately 79% of the city)
- Access: The city is located at the intersection of the Yonago, Chugoku and Okayama Expressways. Japan Railway's Kishin line runs through the city from east to west.
- Regional features:
  - [North]  
With the expanse of the Hiruzen and Tsuguro Highlands, dairy farming and stock raising thrive in the region.
  - [Central]  
This is a mountainous region with old post towns along the historical road to Izumo still conveying the atmosphere of the olden days. Forestry and tourism (with attractions like Yuhara hot spring) thrive in the region.
  - [South]  
The region has urban areas where administrative, cultural and medical organizations are concentrated, as well as a thriving agriculture industry.

Slide ③

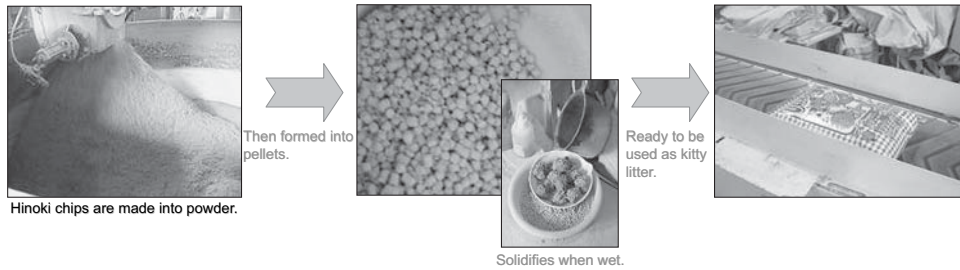
## Biomass Projects in the Maniwa Region

- 1) Ecological electric power generation
- 2) Project consigned by the New Energy and Industrial Technology Development Organization (NEDO)
- 3) Utilization of biomass as energy resources
- 4) Utilization of biomass as materials

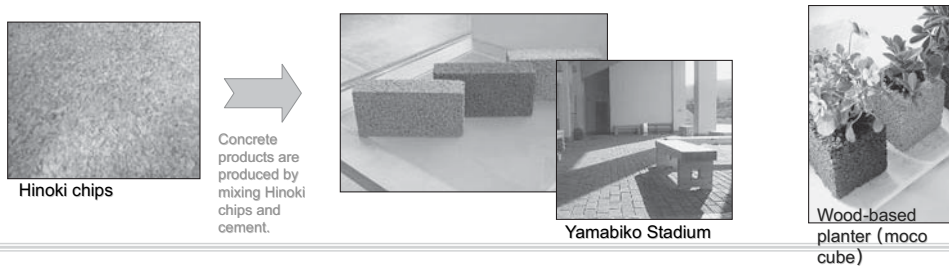
Slide ④

## 4) Utilization of biomass as materials

- Wood pieces of Hinoki (Japanese cypress) used as kitty litter



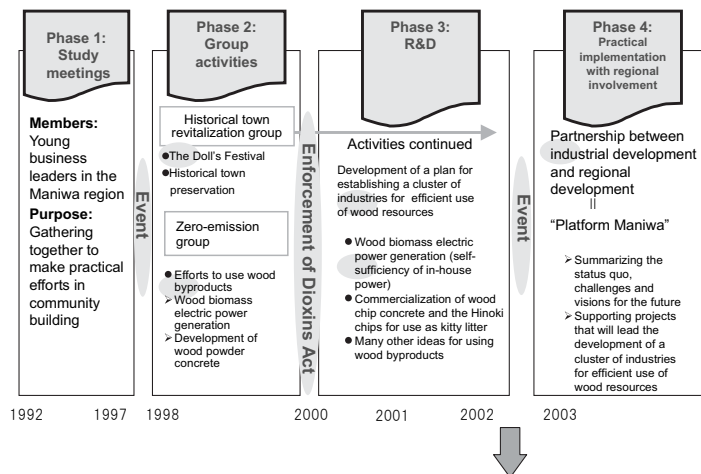
- Wood-based concrete: development of a new concrete product with wood chips and cement



Slide ⑨

## Establishment of the Maniwa School of the 21st Century (April, 1992)

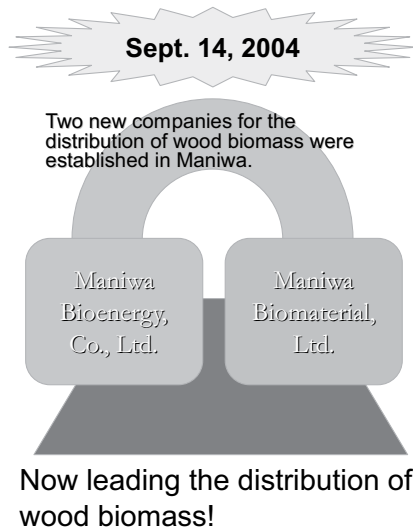
(the starting point of our efforts to establish a resource-cycling type society in the Maniwa region)



The Maniwa School of the 21st Century established as an NPO in FY2002  
- playing an important role in supporting the projects

Slide ⑩

FY2004: establishment of two new companies that will lead the initiatives for efficient use of biomass



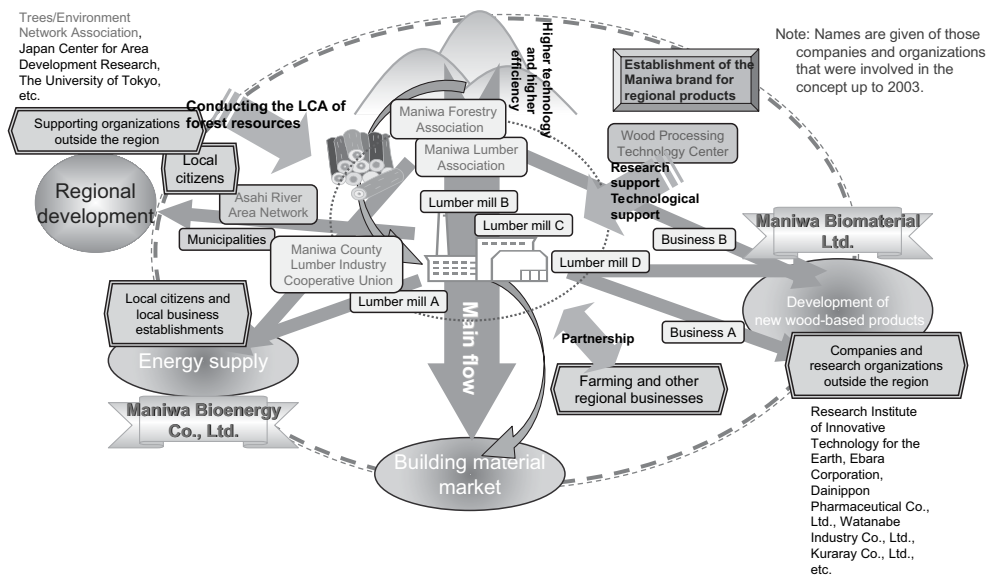
The new companies were established with funding from 18 companies (lumber operators, etc.) and organizations of the region.

Dual efforts from the energy and material aspects increase the efficiency of resource cycling.

- Maniwa Bioenergy, Co., Ltd.
  - Capital: 10 million yen
  - Sells wooden pellets as an alternative fuel to replace petroleum.
- Maniwa Biomaterial, Ltd.
  - Capital: 5 million yen
  - Sells materials produced from sawdust and shavings as reusable resources.
  - Conducts research, education and information provision activities to encourage widespread use of biomass resources.

Slide ⑩

### Concept of a Cluster of Industries for Efficient Use of Wood Resources



Slide ⑫