Introduction to basic biomass town concepts in Japan

February 2011
Tokyo

MAFF
Ministry of Agriculture, Forestry and Fisheries
1) Biomass
What is Biomass?

- “Biomass” is defined as renewable, organism-derived organic resources, excluding fossil resources.
- Biomass resources are produced by organisms through photosynthesis using solar energy. This means that it will remain a renewable resources in a sustainable manner throughout our life cycle, as long as both life and solar energy continue to exist.
- Biomass is “carbon neutral in that it does not increase the amount of CO2 in the atmosphere during the human life cycle.

Origin of a word “Biomass”

**BIOMASS** = **BIO** (biological resources) + **MASS** (a large amount of a substance)
Character of Biomass

Burning fossil fuels increases the amount of carbon dioxide in the atmosphere and this contributes global warming. Biomass are produced by organisms through photosynthesis using solar energy; thus, Biomass is carbon neutral in that it is renewable resources dependent on working of plant, and that carbon removed from the air by the plants offsets the carbon emitted by the plant when it is burned. off-set

Present Society depends on Fossil Fuel

Future Society utilizing Biomass

Global Warming

Addressing Global Warming

Lowering emissions of carbon dioxide by using biomass instead of fossil fuel
Storage and Use Ratio of Biomass in Japan

- **Animal feces**: Approximately 88 million t
  - Used as compost etc. Approximately 90%
  - Unused Approximately 10%

- **Sewage sludge**: Approximately 78 million t
  - Used as building materials, compost etc. Approximately 77%
  - Unused Approximately 23%

- **Black liquor**: Approximately 14 million t (dry base)
  - Used as energy Approximately 100%

- **Waste paper**: Approximately 27 million t
  - Used as raw materials, energy etc. Approximately 80%
  - Unused Approximately 20%

- **Food waste**: 19 million t
  - Unused Approximately 73%

- **Lumber residues**: Approximately 3.4 million t (dry base)
  - Used as fertilizers and animal feed etc. Approximately 27%

- **Wood waste**: Approximately 4.1 million t
  - Used as materials for paper, energy etc. Approximately 95%
  - Unused approximately 5%

- **Non-edible parts of farm crops**: Approximately 14 million t
  - Used as materials for paper, bedding of animals etc. Approximately 90%
  - Unused Approximately 10%

- **Forestry residues**: Approximately 8 million t
  - Poured into fields Approximately 55%
  - Used as compost, feed, bedding of animals etc. Approximately 30%
  - Unused Approximately 15%
  - Used as materials for paper etc. Approximately 1%
  - Hardly used Approximately 99%

(Source: Basic promotion plan for biomass utilization)
Examples of utilization of biomass

There are two ways of utilization of biomass as follows:
① used as products such as compost, feed, charcoal deodorizer, plastic, biofuel etc.
② used as energy such as generating electricity, utilization of heat etc.
Biomass is expected for utilization as material. There are following ways.

① Produce bio plastics such as a tray or garbage bag from thinning wood, non edible rice and rice husks, substitute resin from fossil fuel

② Produce liquid feed from food manufacturing residue and provide animals for measure high prices of feed and utilize for circulation of food resource

③ Substitute nano carbon from fossil fuel to woody biomass

<table>
<thead>
<tr>
<th>Biomass plastics</th>
<th>Animal feed (eco feed)</th>
<th>Nano-carbon</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAgrifuture Joetsu Co.Ltd</td>
<td>OBright Pig Chiba Co.Ltd</td>
<td>OToshiba Co.Ltd —Maff’s project— <del>Hita city ,Ooita prefecture</del></td>
</tr>
<tr>
<td><del>Joetsu city ,Niigata prefecture</del></td>
<td><del>Asahi city ,Chiba prefecture</del></td>
<td></td>
</tr>
<tr>
<td>*produce new resin compound from</td>
<td>*produce pig feed from food manufacturing residue and waste food after deadline at</td>
<td>*technical demonstration project which handles gasification of woody</td>
</tr>
<tr>
<td>thinned wood, non edible rice</td>
<td>super markets</td>
<td>biomass through thermal cracking and make nano carbon from hydrocarbon</td>
</tr>
<tr>
<td>and plastic resin (poly lactic</td>
<td>*amount of product: 300t/day (enables to handle solid raw material 120t and liquid</td>
<td>with catalyst</td>
</tr>
<tr>
<td>acid,poly olefin)</td>
<td>raw material 180t)</td>
<td>*expectation for resin usage with high function after mixture resin into</td>
</tr>
<tr>
<td>under cooperation among industries,academies and officials</td>
<td></td>
<td>nano carbon.</td>
</tr>
<tr>
<td>*usage as garbage bag or tray or fan after molding</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Collecting waste hood and Providing liquid feed

pig farmer

【nano carbon】
(source: Toshiba Co.Ltd)
2) Biomass Policy
-Biomass Town etc-
Why domestic biofuels need enlarging? ① background

- Japanese population has begun to decrease while the aged population are increasing. Abandoned arable land is increasing because farmers decreases.
- Thus, farmland needs to be utilized for not only food/feed production but also energy-crop production.

### Current Status

**Farmland**

- Food
- Feed

**[abandoned arable land, etc.]**

Need to cultivate new demands beside food production

**Future**

- Food
- Feed

**[Farmland]**

- Energy crops etc.

---

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abandoned arable land (1,000ha)</td>
<td>343</td>
<td>386</td>
</tr>
<tr>
<td>Abandoned arable land ratio (%)</td>
<td>8.1</td>
<td>9.7</td>
</tr>
</tbody>
</table>

---

Japanese population has begun to decrease while the aged population are increasing. Food consumption is expected to decrease. Increasing abandoned arable land and desolation of satoyama (mountain villages) are one of the biggest issues with regard to national land and environment conservation.

![Graph showing forecast of Japanese population and proportion of the aged 65 or over from 2000 to 2050.](chart)

---


- Total population
- Proportion of population of the aged 65 or over
Production of biofuels has 3 major benefits as follows.

**Food and agriculture**
- Nurture agricultural industries
- Boost and preserve potential of food supply by being fully utilized abandoned arable land (food security)
- Increase the opportunity for employment and revitalization of agricultural community by creating new industries

**Energy**
- Cope with rising crude oil price by making alternative energy
- Diversify energy supply sources (energy security)

**Environment**
- Contribute achieving the Kyoto protocol commitment by carbon neutrality of biofuels
- Realize recyclable society by utilizing unused and/or waste biomass

Why domestic biofuels need enlarging? ② effect
Biomass Nippon Strategy

December 2002

- **Prevent global warming**
  - Biomass is carbon-neutral, is alternative to fossil fuels, and contributes prevention of global warming.

- **Formulate recyclable society**
  - Reduces waste, and makes the transition of recyclable society

- **Nurture industries strategically**
  - Create new industries and jobs by utilizing biomass for new energy and materials. Expects such industries to be strategic leading industries of Japan.

- **Vitalize agricultural community**
  - Biomass resources is affluent in Japan. Promotion of utilization of biomass will bring new opportunity to agricultural community.

March 2006

- **New Biomass Nippon Strategy**
  - **Revised points**

  - **Accelerate Biomass Towns**
    - **Goal:** 300 towns by 2010
    - Promotion of utilization of unused biomass such as rice straws and forestry residues is a key for achievement.

  - **Promotion of biofuels**
    - **Further promotion of utilization of domestic biofuels**
      - Based on Roadmap for significant boost of the production of domestic biofuels, reported to the Prime Minister in Feb. 2007, biomass policy is to be moved ahead.

* 7 relevant ministries: Cabinet Office, Ministry of Internal Affairs and Communications, Ministry of Education, Ministry of Agriculture, Forestry and Fisheries, Ministry of Economy and Industry, Ministry of Land, Infrastructure, Transportation and Tourism, Ministry of Environment*
Outline of The fundamental law of promoting usage of the biomass (promulgated in 2009/09/11)

Objective
We establish this law for the purpose of driving forward the policy on promotion of getting most of the biomass comprehensively and deliberately by establishing fundamental principles, revealing responsibility of the concerned persons and setting fundamental matters of the policy.

Fundamental principles
- Promote policies collectively and effectively
- Promote policies for preventing the global warming
- Promote policies for organizing circulation style community
- Contribute to industrial development and improvement of international competitiveness
- Contribute to activating agriculture, forestry, fishing and village
- Make the most of the biomass with its property
- Diversify the source of energy
- Promote voluntary action of community
- Develop social tendency for the biomass
- Secure stable supply of food
- Give attention to environmental protection

Policies of the nation
The nation will take steps to make measures necessary for...
- Promote necessary bases
- Create business supplying the biomass
- Promote and spread technological developments
- Cultivate and maintain human resource
- Promote usage of product of the biomass
- Promote voluntary action of private enterprise
- Promote action of local public body
- Promote cooperation between the nations
- Collect information about the biomass
- Promote understanding of the people

Policy of local public body
The local public bodies will enforce the policies second to the nation’s policies with considering local conditions (nature, finance, social environment) comprehensively and deliberately.

The conference for promoting usage of the biomass
1. The nation should set the conference for promoting usage of the biomass to advance collectively and effectively and adjust relationship between concerned administrative organs.
2. Concerned administrative organs should set the expert conference for promoting usage of the biomass and learn what experts say for adjusting relationship written in 1.
   * The conferences should be set and adjust in secretariats of the Ministry of Agriculture, Forestry and Fisheries.

Promoting synthetic policies will organize circulation style community and activate agriculture, forestry, fishing and village
Overview of basic promotion plan for biomass utilization

**Purpose**
- Plan for biomass utilization as for fundamental principals, national aims to be realized and technical affairs on research and development according to the fundamental law of promoting usage of the biomass (平成21年法律第52号)
- On previous biomass nippon strategy, the biomass town concepts are proceeded in each region, but actual practices are not preceded effectively. The plan is expected to solve these problems.

**Promotion of biomass usage**

- Development of industries and enforcement of international competence
- Prevention of global warming and formulation of recyclable society

**Abstract of plan**

1. **basic direction on the policy**
   - Promotion of the most of effective biomass utilization under the strong cooperation among farmer as biomass producers, biomass product producers, municipal governments and concerning ministries

2. **The national aims to be realized**
   - Vitalization of agricultural village
   - Creation of new industry
   - Prevention of global warming

   - 600 municipalities establish biomass usage promotion plan (new biomass town concept)
   - Creation of new industries utilizing biomass about 500 billion yen size market
   - Utilize approximately 26 million carbon ton of biomass

   - Municipalities established biomass utilization promotion plan are supported by effect verifications of practices, technical information providing for problem solution etc toward real effect.
   - Promote biomass utilization through forest residues which is not almost utilized now

3. **Policies conducted comprehensively and effectively by government**
   - For realizing national aims mentioned 2, promote platform installation for biomass utilization, creation of new biomass industries 6th industrialization of agricultural village, research and development and human resource development
   - Making Roadmap for biomass utilization which shows what stakeholders must do under relevant ministries cooperation, technical problems to solve and goal of output to realize

4. **Affairs for technical research and development**
   - Promote for establishment of technological system which handles comprehensively from biomass collecting, transportation to manufacturing, usage as well as new technological development for biomass usage
   - From a long term of viewpoint, promote new biomass resources such as algae with high biomass productivity or with expectation for future usage
What is Biomass Town?

- Biomass Town is....
  a community which utilizes biomass comprehensively with strong ties between a community and local stakeholders. Government promotes Biomass Town for the achievement of one of the Biomass Nippon Strategy’s goals: 300 biomass towns by 2010.

Current Situation of each region

- What kind of biomass to use depends on regions.
  for example, domestic animal wastes, leftover food, sewage sludge, thinned wood, seafood processing residues
- How to use biomass also depends on regions.
  product: composts, plastic energy: gas, electricity

  [Bioethanol, BDF]

- Goals of policy in each region vary.
  for example, prevention of global warming, local production of energy for its local consumption, revitalization of local businesses and etc.

Issues to consider

- framework for corporation among concerned parties
- a variety of ways to use biomass corresponding to local needs.
- efficient ways to collect, transport, convert biomass resources and use biomass energy etc.

Enlargement of Biomass Town

Past Achievement

- 2004: 13 towns
- 2005: 44 towns
- 2006: 90 towns
- 2007: 136 towns
- 2008: 197 towns
- 2009: 268 towns
- 2010: 286 towns

GOAL: 300 biomass towns by 2010
Major Biomass Towns

Sado City, Niigata Pref.
For creating an environment which Sado islanders and Japanese crested ibis live together by utilizing local resources

Kosaka Town, Akita Pref.
For utilizing biomass in Kosaka Town, a hub of 3 R (reduce, reuse and recycle) campaign

Maniwa City, Okayama Pref.
For promoting biomass-related industries by study tours to facilities of making woody biomass

Hita City, Oita Pref.
For becoming a nationally preeminent "department store" of biomass resources

Motegi Town, Tochigi Pref.
For producing "Midori" compost, made from local biomass resources and local production for local consumption

Ie Village, Okinawa Pref.
For revitalizing Ie Village as a bioethanol island by focusing on agriculture

Shimokawa Town, Hokkaido
For a leading low carbon society where local community and forests coexist

Shirakawa Town, Gifu Pref.
For local environmental circulation of forests and energy

Source: Sado Toki Protection Center
### 286 Biomass Towns (as of November 2010)

<table>
<thead>
<tr>
<th>Prefecture</th>
<th>Towns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hokkaido</td>
<td>Sapporo City, Chitose City,</td>
</tr>
<tr>
<td></td>
<td>Abashiri City, Otaru City,</td>
</tr>
<tr>
<td></td>
<td>Obihiro City, ...</td>
</tr>
<tr>
<td>Fukuoka Pref.</td>
<td>Fukuoka City, Fukuoka City,</td>
</tr>
<tr>
<td></td>
<td>Fukuoka City, ...</td>
</tr>
<tr>
<td>Aichi Pref.</td>
<td>Aichi City, Aichi City,</td>
</tr>
<tr>
<td></td>
<td>Aichi City, Aichi City,</td>
</tr>
<tr>
<td>Niigata Pref.</td>
<td>Niigata City, Niigata City,</td>
</tr>
<tr>
<td></td>
<td>Niigata City, ...</td>
</tr>
<tr>
<td>Toyama Pref.</td>
<td>Toyama City, Toyama City,</td>
</tr>
<tr>
<td></td>
<td>Toyama City, ...</td>
</tr>
<tr>
<td>Ishikawa Pref.</td>
<td>Ishikawa City, Ishikawa City,</td>
</tr>
<tr>
<td></td>
<td>Ishikawa City, ...</td>
</tr>
<tr>
<td>Toyama Pref.</td>
<td>Toyama City, Toyama City,</td>
</tr>
<tr>
<td></td>
<td>Toyama City, ...</td>
</tr>
<tr>
<td>Niigata Pref.</td>
<td>Niigata City, Niigata City,</td>
</tr>
<tr>
<td></td>
<td>Niigata City, ...</td>
</tr>
<tr>
<td>Nagano Pref.</td>
<td>Nagano City, Nagano City,</td>
</tr>
<tr>
<td></td>
<td>Nagano City, ...</td>
</tr>
<tr>
<td>Gunma Pref.</td>
<td>Gunma City, Gunma City,</td>
</tr>
<tr>
<td></td>
<td>Gunma City, ...</td>
</tr>
<tr>
<td>Shizuoka Pref.</td>
<td>Shizuoka City, Shizuoka City,</td>
</tr>
<tr>
<td></td>
<td>Shizuoka City, ...</td>
</tr>
<tr>
<td>Ibaraki Pref.</td>
<td>Ibaraki City, Ibaraki City,</td>
</tr>
<tr>
<td></td>
<td>Ibaraki City, ...</td>
</tr>
<tr>
<td>Akita Pref.</td>
<td>Akita City, Akita City,</td>
</tr>
<tr>
<td></td>
<td>Akita City, ...</td>
</tr>
<tr>
<td>Aomori Pref.</td>
<td>Aomori City, Aomori City,</td>
</tr>
<tr>
<td></td>
<td>Aomori City, ...</td>
</tr>
<tr>
<td>Tochigi Pref.</td>
<td>Tochigi City, Tochigi City,</td>
</tr>
<tr>
<td></td>
<td>Tochigi City, ...</td>
</tr>
<tr>
<td>Iwate Pref.</td>
<td>Iwate City, Iwate City,</td>
</tr>
<tr>
<td></td>
<td>Iwate City, ...</td>
</tr>
<tr>
<td>Chiba Pref.</td>
<td>Chiba City, Chiba City,</td>
</tr>
<tr>
<td></td>
<td>Chiba City, ...</td>
</tr>
<tr>
<td>Gunma Pref.</td>
<td>Gunma City, Gunma City,</td>
</tr>
<tr>
<td></td>
<td>Gunma City, ...</td>
</tr>
<tr>
<td>Shizuoka Pref.</td>
<td>Shizuoka City, Shizuoka City,</td>
</tr>
<tr>
<td></td>
<td>Shizuoka City, ...</td>
</tr>
<tr>
<td>Chiba Pref.</td>
<td>Chiba City, Chiba City,</td>
</tr>
<tr>
<td></td>
<td>Chiba City, ...</td>
</tr>
<tr>
<td>Gunma Pref.</td>
<td>Gunma City, Gunma City,</td>
</tr>
<tr>
<td></td>
<td>Gunma City, ...</td>
</tr>
<tr>
<td>Shizuoka Pref.</td>
<td>Shizuoka City, Shizuoka City,</td>
</tr>
<tr>
<td></td>
<td>Shizuoka City, ...</td>
</tr>
<tr>
<td>Chiba Pref.</td>
<td>Chiba City, Chiba City,</td>
</tr>
<tr>
<td></td>
<td>Chiba City, ...</td>
</tr>
<tr>
<td>Gunma Pref.</td>
<td>Gunma City, Gunma City,</td>
</tr>
<tr>
<td></td>
<td>Gunma City, ...</td>
</tr>
<tr>
<td>Shizuoka Pref.</td>
<td>Shizuoka City, Shizuoka City,</td>
</tr>
<tr>
<td></td>
<td>Shizuoka City, ...</td>
</tr>
<tr>
<td>Chiba Pref.</td>
<td>Chiba City, Chiba City,</td>
</tr>
<tr>
<td></td>
<td>Chiba City, ...</td>
</tr>
<tr>
<td>Gunma Pref.</td>
<td>Gunma City, Gunma City,</td>
</tr>
<tr>
<td></td>
<td>Gunma City, ...</td>
</tr>
<tr>
<td>Shizuoka Pref.</td>
<td>Shizuoka City, Shizuoka City,</td>
</tr>
<tr>
<td></td>
<td>Shizuoka City, ...</td>
</tr>
<tr>
<td>Chiba Pref.</td>
<td>Chiba City, Chiba City,</td>
</tr>
<tr>
<td></td>
<td>Chiba City, ...</td>
</tr>
<tr>
<td>Gunma Pref.</td>
<td>Gunma City, Gunma City,</td>
</tr>
<tr>
<td></td>
<td>Gunma City, ...</td>
</tr>
<tr>
<td>Shizuoka Pref.</td>
<td>Shizuoka City, Shizuoka City,</td>
</tr>
<tr>
<td></td>
<td>Shizuoka City, ...</td>
</tr>
<tr>
<td>Chiba Pref.</td>
<td>Chiba City, Chiba City,</td>
</tr>
<tr>
<td></td>
<td>Chiba City, ...</td>
</tr>
</tbody>
</table>
3) Flow and consideration points to make biomass town concepts
Flow of making biomass town concept in Japan

1) Making draft concept paper at municipal government level.

2) Submitting draft paper at Regional Agricultural Administration Office

3) Checking among MAFF, MOE, METI, MLIT, MIC, MEXT and CAO
   Above 90% of waste biomass or above 40% of unused biomass

4) Public announcement of becoming a biomass town on MAFF’s website
MAFF’s support system for domestic biomass town in Japan

• Grant for initial cost of hardware(within 1/2 or within 1/3)
• Grant for soft project(within 1/2)
• Condition: municipal government which has biomass town concept or similar plan.
• Submit from municipal government via Regional Agricultural Administration Office toward MAFF.
How to design Biomass Town

- Considerate the range or width of the biomass town (whole city or partial district)
- Considerate from biomass potential quantity (entry)
- Considerate biomass utilization (local needs and demands) for biomass (exit)
- Discuss among biomass producer, converter, user, municipal governments and residents
- Examine a profit of whole project with gathering cost, personal expense etc on running phase.
Cause of Unsuccessful Biomass Town

- Unsecure of biomass potential quantity
- Mistake of gathering cost for biomass raw materials
- Mistake of biomass utilization needs and demands
- Lack of Communication among biomass producer, converter, user, municipal governments and residents
  i.e. failure of securing raw materials and lack of selling biomass products or fuels in the market.
- Imbalance whole income and running costs on running phase.
Contents of Biomass Town Concept

- Subject area
- Implementation body of Biomass Town Concept
- Basic information and social situation of the subject area
- Potential unused biomass and current usage of biomass Current situation and efforts for biomass utilization in the area
- Basic principles for biomass town concept formulation
- Target of biomass utilization and expected benefit from each project
- Development of project and discussions with stakeholders so far
- Theme images

These are index of biomass town concept. So please refer for biomass town concept paper in Thai and Vietnam.
# Conversion Technologies of Biomass Town Concept

The conversion technologies of biomass towns are as follows:

<table>
<thead>
<tr>
<th>Percentage of Biomass Town</th>
<th>Number of Biomass Town</th>
<th>Feed</th>
<th>Compost</th>
<th>Pellet</th>
<th>Tip</th>
<th>Methane Fermentation</th>
<th>Bio Diesel</th>
<th>Bio Ethanol</th>
<th>Gasification (Wood)</th>
<th>Biomass Plastic</th>
<th>New Material</th>
<th>Others</th>
<th>Combustion</th>
<th>Power Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>73.5</td>
<td>197</td>
<td>160</td>
<td>268</td>
<td>199</td>
<td>162</td>
<td>214</td>
<td>74</td>
<td>41</td>
<td>31</td>
<td>5</td>
<td>202</td>
<td>200</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>69.7</td>
<td>74.3</td>
<td>60.4</td>
<td>79.9</td>
<td>27.6</td>
<td>15.3</td>
<td>11.6</td>
<td>1.9</td>
<td>75.4</td>
<td>74.6</td>
<td>61.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Almost all the biomass town

Energy use with biomass

Total number of biomass town is 268
As of March, 2010
Biomass utilization technology on Energy use

- Woody tips, Methane fermentation, Biodiesel are major conversion technologies.
- Bio ethanol and Gasification from woody biomass are fewer (more difficult technology to realize).
- In total, 74.6% of biomass town is considering of combustion, 61.6% of biomass town is considering of power generation.
- Some portion of biomass town have realized content of biomass town concept paper.
Biomass utilization technology on other use

- Compost is major technology in biomass utilization.
- In biomass town, Motegi town and Ooki town are famous for making and utilizing compost.
- Coping with waste, biomass utilization leads to a reduction of governmental cost on waste management (incineration cost etc).
4) Example of Biomass Town in Japan
Biomass utilization flow at Shimokawa-cho biomass town concept

Utilize forest resources as local basic fortune and promote rural development paying consideration for environment. Utilize woody biomass for fuel toward heating or hot-water supply at public facilities. Aiming for reduction of GHG and establishment for recyclable society. And promote waste oil at household to BDF production

Shimokawa-cho, Hokkaido prefecture
Disclosure: 2008, March 3 (24th disclosure period)

Overview of Shimokawa-cho
Population: 3,776 (as of 2009 July)  
No. of Households: 1,847 households (as of 2009 July)  
Area: 644.20km²

Geography: situated in north of Hokkaido

Outline of the Concept
- Utilize forest resources as local basic fortune and promote rural development paying consideration for environment.
- Utilize woody biomass for fuel toward heating or hot-water supply at public facilities. Aiming for reduction of GHG and establishment for recyclable society.
- Promote waste oil at household to BDF production.

Target Utilization rate
- Waste-kind biomass: 99%
- Unused biomass: 40%

Main Facilities
- Gomi-onsen (woody biomass boiler)
  - Introduction of woody biomass boiler in public hot spring
  - Demonstration project for introduction of pellet boiler toward greenhouse
  - Introduction of woody steam boiler for lumbering factory
Shimokawa Biomass town in Hokkaido

- Utilize woody chips and pellets for thermal utilization at public spring (Gomi Onsen)
- Reduction of running cost: 5 million yen/year
- Reduction of CO2: about 300t-CO2/Year
- Creation of jobs: 65 men under sustainable forest management
Establish a recycle-oriented society by promoting conservation oriented agriculture setting “Organic matter utilization centre Midori-kan” as the core facility, promote utilization of advantaged forestry resource and conversion of waste oil into energy.

**Target Utilization rate**
- Waste Kind Biomass : 99%
- Unused Biomass : 65%

**Main facilities**

**Motegi-machi Recycle centre “Midori-kan”**

Utilized amount of Biomass 4,400t/y

- Production of quality compost utilizing 5 kinds of local biomass resources; raw garbage from households, cow dung, leaves, saw dust, rice husk
- Recognition system for agricultural products grown with the original Compost as “Farm products of Midori Compost” (60% of farmers in the town are engaged in the this system)
Motegi biomass town
-from collection to utilization-

Collecting Fallen leaves
Collecting Rice Hulls

Inside of compost plant
Midori compost
Vegetables brought up by Midori compost
Motegi biomass town
-Merit-

- Sales of Midori compost
- Providing food materials for school meal
- Reduction of kitchen garbage treatment cost
- Reduction of incineration cost of pruned branches
- Environment Preservation of livestock breeding farmer etc

Produces total values more than 50 million yen/year
Biomass promotion system in Maniwa City biomass town concept

**Overview of Maniwa city**
- Population: 51,583 (as of 2009 July)
- No. of Households: 17,614 households (as of 2009 July)
- Area: 828.4 km²
- Geography: situated in north of Okayama

**Outline of the Concept**
Target waste kind biomass such as woody residues, animal manure and food waste and unused woody biomass. Prepare collecting, conversion and usage system and enhance utilization ratio. Conduct Biomass Maniwa tour.

**Target Utilization rate**
- Waste-kind biomass: 90%
- Unused biomass: 40%

**Main Facilities**

**Biomass processes**
- Compost
- BDF vehicle
- Biomass power generation
- E3 station
- Woody block
- Greenhouse with pellet boiler
- Ethanol production pilot plant
- BDF facility

**Platform**
- Cooperation among Industry and university and government
- Rural conference on biomass town Maniwa promotion (policy decision)
  - Mayor
  - Administrative
  - Industrial
  - Citizens
  - Person in charge of city office

**Support**
- Adviser
- Specialist

**Adviser**
- Rural conference on biomass town Maniwa promotion (policy decision)
  - Mayor
  - Administrative
  - Industrial
  - Citizens
  - Person in charge of city office

**Specialist**
- Biomass policy office (promotion, adjustment)
  - Local Government
  - Citizen
  - Industry
  - Liaison conference

**Source**: Maniwa City HP
Circulation of Biomass in Oki-machi town

Electricity generation with biogas from raw garbage, human waste and sewage sludge. Liquid fertilizer generated as by-product is utilized for local farming, expecting reduction of burden for waste treatment. Waste oil collected from the town will be utilized for public vehicles and farm machines. Future utilization of woody residues and waterweed is to be considered.

Population: 14,559 (as of 2010, Oct)  
No. of Households: 4,443 households (as of 2010 Oct)  
Area: 18.43km²  
Geography: situated at the centre of Chikugo plain

Waste-kind biomass: 95%  
Unused biomass: 40%

Circulation center “Oki Kuru-run”

- Separation of raw garbage, households, school lunch
- Septic tank
- Provision of local farm products that are grown with liquid fertilizer from biogas plant & compost, to households & school lunch
- Fermentation to produce liquid fertilizer
- Biogas recovery and liquid fertilizer at biogas plant
- Return to farm lands as organic liquid fertilizer
- Sewage Sludge (30.6t/d)
- Night Soil (7t/d)
- Raw garbage from households (3.8 t/d)
- Methane fermentation reactor
- Mesophilic

Water treatment

Storage tank for liquid fertilizer 6,000 t/y

Reuse

Heat, power generation

Main Facilities

Overview of Oki-machi

Disclosure: 2005, Jan, 19 (1st disclosure period)
Ooki biomass town
-cooperation from household-

- Collection of house garbage by use of bucket containers.
- Twice a week
- Collecting cost is free.
- Bucket containers are distributed before collecting day.
Energy use in Ooki

- Methane fermentation from household garbage.
- 166,209 kWh for self utilization
- Production liquid fertilizer: 6000 t/year → 100 ha of paddy field
Ooki biomass town
-merit-

• Reduction of household garbage 44%
• Reduction of incineration cost 20 million yen per year.
• Famous among municipal governments and 4000 men visit Ooki–machi for investigation.
• Being conscious for environment through collecting garbage by types.
Hita City Biomass Town Concept

Overview of Hita City
Population: 72,814 (as of 2009 April)
No of households: 26,424 household (as of 2009 April)
Area: 66.19 km²
Geography: situated in west of Oita

Outline of the concept
Aiming for recyclable society utilizing abundant biomass. Especially utilize pig manure, household garbage and sludge into methane fermentation facility and utilize heat and power generation.

Target Utilization rate
- Waste Kind Biomass: 95%
- Unused Biomass: 40%

Main facilities
Hita biomass resource center
Estimated Biomass utilization 15,000t/year (2006)
supported from government 459 million yen

- Receive garbage (24t/day), animal manure (50t/day) and sludge (6t/day) for compost and liquid fertilizer
- Methane gas for power generation

Biomass utilization flow in Hita City biomass town concept
Hita Biomass town

• Methane fermentation and Woody biomass power generation
• Abandon biomass; animal manure, wood biomass, house garbage, sludge of sewage
• Electricity is used for self utilization (mainly)
Hita biomass town
methane fermentation

Biomass Center

Pig framer(7)
- Pig manure 50t/day
- Garbage 24t/day

Community sewage(2)
- Sludge 6t/day

Waste water

Water treatment Center

Electricity 2 million kwh/year

Paddy field/farm

Utilization of liquid fertilizer and compost

Utilization of Heat and electricity
- Self sufficient for electricity and heat in need
- Surplus electricity is sold

Liquid fertilizer 2,500t/year
- Compost 300t/year

170kW × 2

River

Pig manure 50t/day

Garbage 24t/day
Hita biomass town
woody biomass generation

- Woody Biomass: About 100,000t/year
- Running: 24hour/day, About 8,000hours/year
- Generation: about 80,000MWh/year
- Effect reduction of CO2: About 44,000t-CO2/year
5) Biomass Town Concept
Promotion projects in East Asian
Attention turns to biomass due to global warming and rising crude oil prices.

East Asia is endowed with massive biomass reserves that are not effectively utilized. Wide-ranging support for its effective use is needed.

In light of 8th and 10th AMAF+3 meeting, ASEAN countries need aid to handle rising food prices as well as environmental and climate problems.

Japan’s Biomass Town Initiative

Based on the Basic Promotion Plan for Biomass Utilization,
- Promotion of 「Biomass Town Concept」 to utilize regional biomass comprehensively toward 「biomass utilization promotion plan by municipal bodies」
- Survey biomass usage in Asia, share information and formulate manual

Global Needs for Sustainable Biomass Usage
- Attention turns to biomass due to global warming and rising crude oil prices
- East Asia is endowed with massive biomass reserves that are not effectively utilized. Wide-ranging support for its effective use is needed.
- In light of 8th and 10th AMAF+3 meeting, ASEAN countries need aid to handle rising food prices as well as environmental and climate problems.

By disseminating Japan’s “Biomass Town” project, we can develop sustainable biomass systems compatible with food production throughout East Asia.

This project was endorsed to be continued till 2012 at the 10th AMAF+3 meeting held in Cambodia.

Details

- FY2008: Basic Research, Area selection, Coordinator selection, Training program in Japan
- FY2009: Field survey, Local training, Share among local people, Draft of Biomass Town Concept
- FY2010: Field survey, Share among local people, Completion of Biomass Town Concept, International symposium
- FY2011: Providing Technical Knowledge, Dispatch technical specialists, Support for another area
- FY2012: Field survey, Share among local people, Completion of Biomass Town Concept, Considering for promotion measures

Effect

- Build East Asian Biomass Town models
- Industry-gvt.-academia collaboration on Biomass Town projects
- Advertising of Japanese Biomass technology
- Mutual cooperation among Japanese and foreign Biomass Towns

With Japanese Biomass Town know-how, we can contribute to rural redevelopment and recyclable society in East Asia and help counter global warming.

(Technology development, joint research, CDM etc.)
East Asia Biomass Town Concept Promotion Project

Thai
Loei prefecture NaDuang village
(FY2008〜FY2010)
※After FY2011, support for biomass town concept promotion for other area.

VietNam
HoChiMimh City CuChi District
(FY2008〜FY2010)
※After FY2011, support for biomass town concept promotion for other area.

Malaysia
Subang Jaya City
Seri Serdang District
(FY2010〜FY2012)

Indonesia
South Sumatera Province
Palembang City
(FY2010〜FY2012)