



Country Update

Biomass Gasification –Topics Now in Japan

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IEA Bioenergy Agreement: 2010-2012
Task 33: Thermal Gasification of Biomass
2nd Semi-annual Task Meeting, 2011
Sweden, October 18-20 , 2011

3.11 Cataclysm: East Japan Great Earthquake



Photos just after the earthquake, the end of March, (by courtesy of LPG-GAS INDUSTRIAL NEWS JAPAN)

An earthquake of unprecedented force
A tsunami of unspeakable destructiveness
....then
A radioactive awakening



*Even now, a bus on a ruin,,,
from my friend*

Japan convulses, grieves, moves on

*Thank you for your helpfulness, thoughtfulness, encouragement
from all over the world!! We are fine.*

Chance to rethink energy options

Before 3.11/ After 3.11....discontinuity

Before 3.11

Review of Basic Resource/Energy Policy (June 2010)

Review of Basic Energy Plan (June 2010) ---

--Enforcement of introduction of Nuclear and renewable energy

Nuclear (& hydraulic, “zero emission” energy) ⇒ ~50%

After 3.11

Again, Review of Basic Energy Plan ---

--Enforcement of introduction of renewable energy, especially solar and wind ?

⇒ now under discussion...

Renewable energy research center in Fukushima?



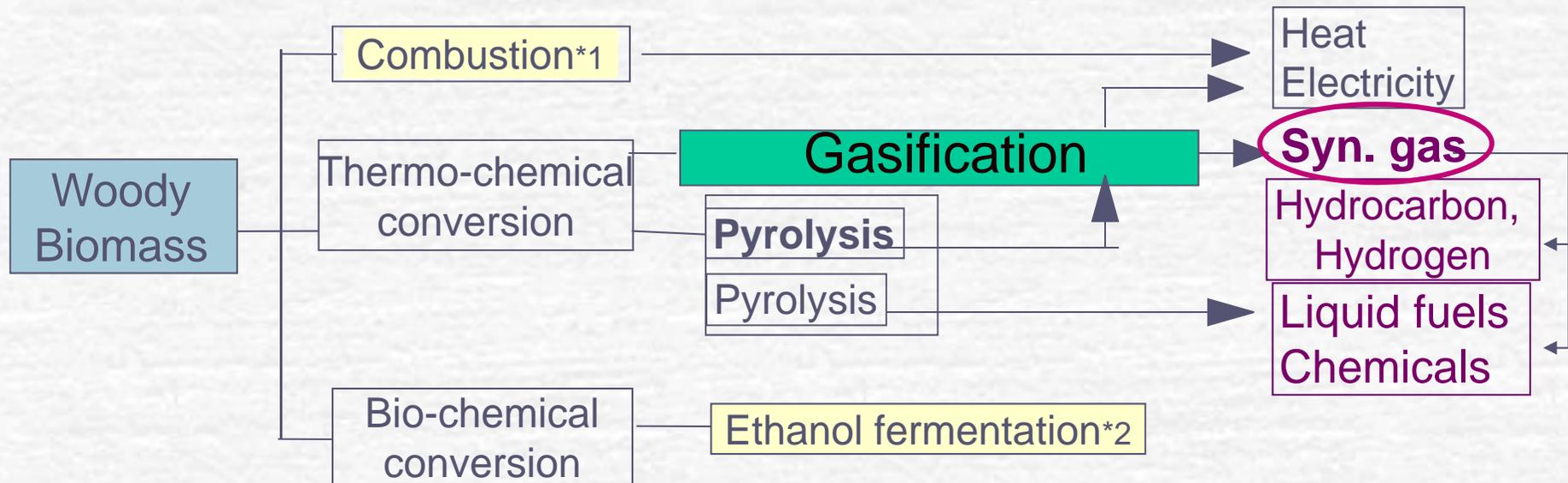
After earthquake

A vast amount of debris— 27 million t

70-80%: woody biomass wastes

How to treat ? Combustion? Others?

Woody biomass-to-energy conversion technologies



*1 Combustion:

Co-combustion with coal for electricity, in a large scale, practical use, commercialized

Combustion, biomass alone, pellet and/or chips, for heat in a small scale, trial to introduce, (cost?, facilities?)

Combustion, biomass alone for electricity and heat, in a relatively large scale, partially commercialized, (a few)

*2 Ethanol fermentation:

R&D stage: many research projects (started several years ago) have been performed, but a new project has not started since 2010.

Woody biomass-to-energy conversion technologies

Gasification

Gasification now in Japan:

*Gasification-for heat, electricity (power generation)

:developed at demonstration stage in a relatively small scale

R & D projects had been performed in 2002-2010

in METI-NEDO (Ministry of Economy, Trade and Industry)

MAFF (Ministry of Agriculture, Forestry and Fisheries)

ME (Ministry of the Environment)

But now, A few plants run,

After 3.11 Earthquake,

introduction of small scale gasification-electricity (and/or CHP) system is proposed (under discussion)

*Gasification- for Liquid fuel synthesis

: developed at bench /test plant scale

R & D projects had been performed in 2002-2010

in METI-NEDO, MAFF, ME

Gasification-Liquid fuel/Chemicals synthesis

(relatively in a large scale, having a complete system: including biomass supply-gasification-purification-catalytic synthesis, using an entrained-flow gasifier or fluidized bed type gasifier)

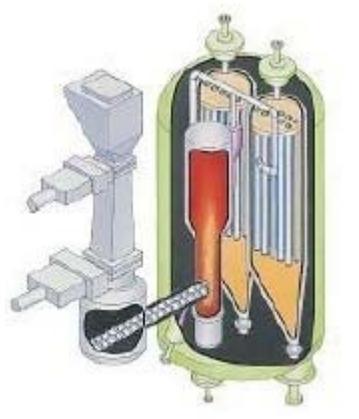
- Mitsubishi Heavy Industries Ltd.,---
 - Entrained-flow gasifier,
 - Methanol (-DME) synthesis,
 - 250kg/day-scale gasifier & 2t/day-scale gasifier
- TAKUMA Co. Ltd
 - Fluidized bed gasifier
 - Electricity & Methanol

Fiscal supports to these two projects have been terminated in 2010.



Gasification-Power generation & MeOH Syns. Examples Fluidized bed type gasifier...Takuma Co. Ltd.

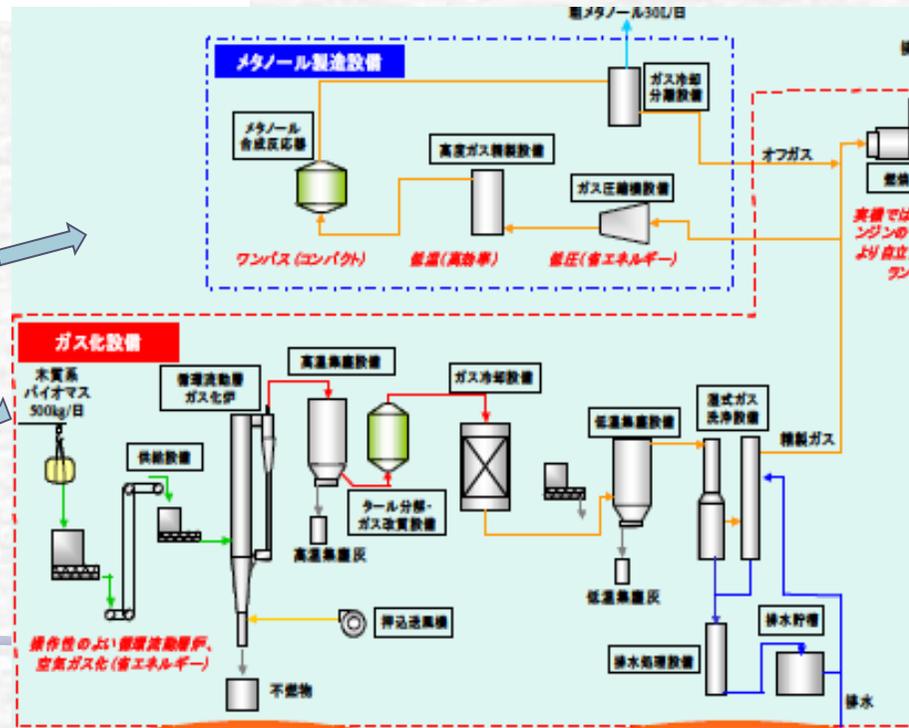
Fluidized-bed, Small scale, 150kW



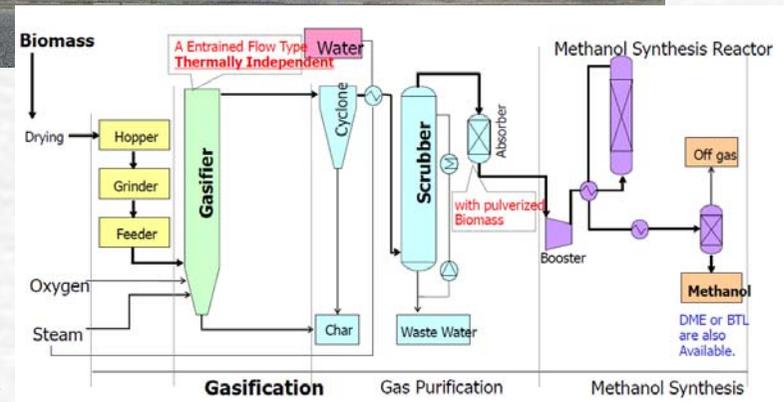
Fluidized-bed, Small scale,
100-200kW, Kyoto

Methanol synthesis process →

Gasification process →



Gasification-Power generation & MeOH Syns. Examples entrained-flow gasifier ...Mitsubishi Heavy Industries Ltd.



Gasifier : Entrained-flow type:
Capacity: 240 kg-biomass/day (left),
2t biomass/day (right),

gasification agents: oxygen and steam
normal pressure at 750-1000 °C,
240 kg-biomass/day: heated by electric furnace
2t biomass/day: self-heating (partial combustion)

Methanol synthesis devise: Capacity: equiv. 20kg-biomass/day
Cu-Zn catalyst, 30kg/cm² at 180 - 250 °C



NEDO's Biomass R&D Projects: Strategic Development of Next Generation Bioenergy Utilization Technologies: FY2010-, 2011- (New project) ---

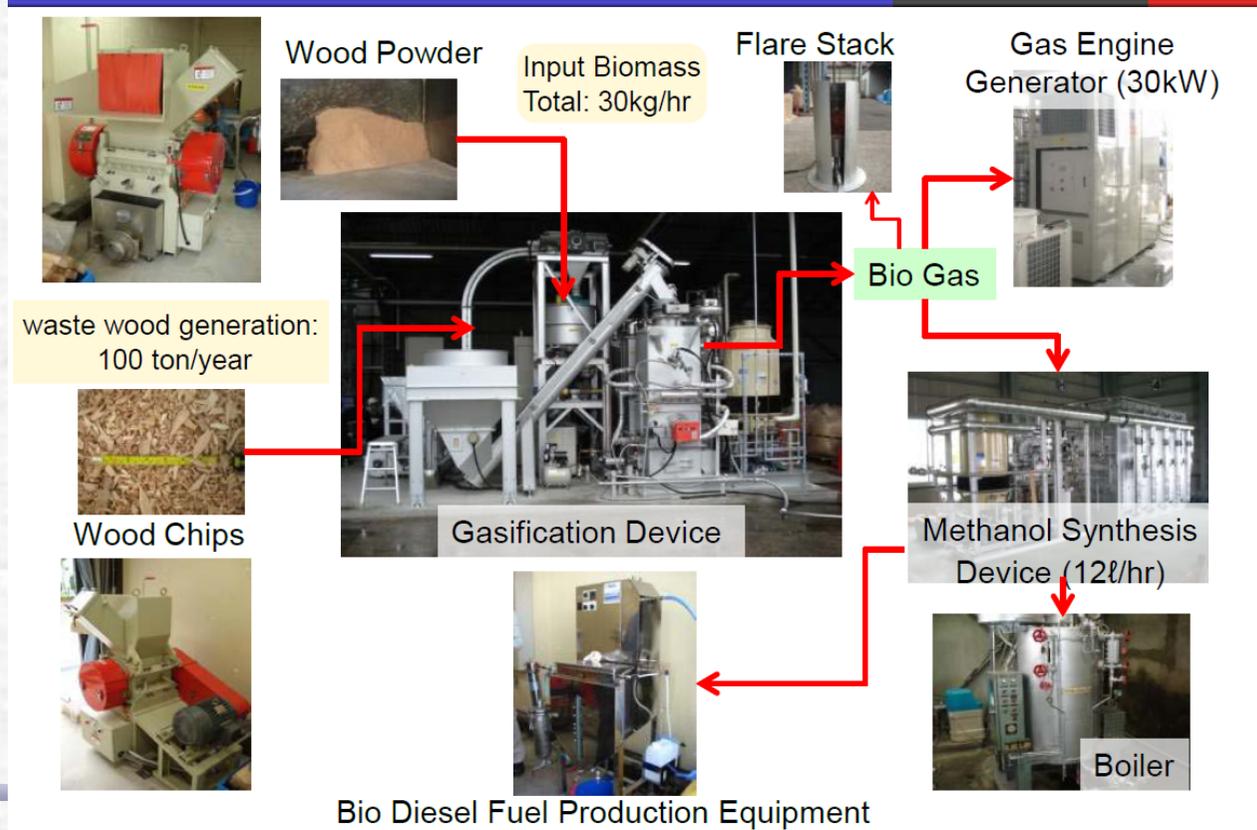
- ☞ Basic research : for next generation technologies
 - BTL Synthesis---
 - BTL(FT) synthesis (fixed bed gasifier)
 - Bio-LPG synthesis (entrained-flow gasifier in labo. scale)
 - New catalyst for bio-premium-gasoline
 - Bio-fuel from micro-algae
 - others --- Bio-butanol production, pyrolysis

In new bio-fuel projects, focus:
rather "Micro algae", "Catalyst for bio-fuel synthesis" than
"gasification".
- ☞ Applied research : for practical applications
 - Gasification for CHP for small district/region

Gasification-CHP in a small scale, urban area, small-scale entrained-flow gasifier ...Shimizu Corporation

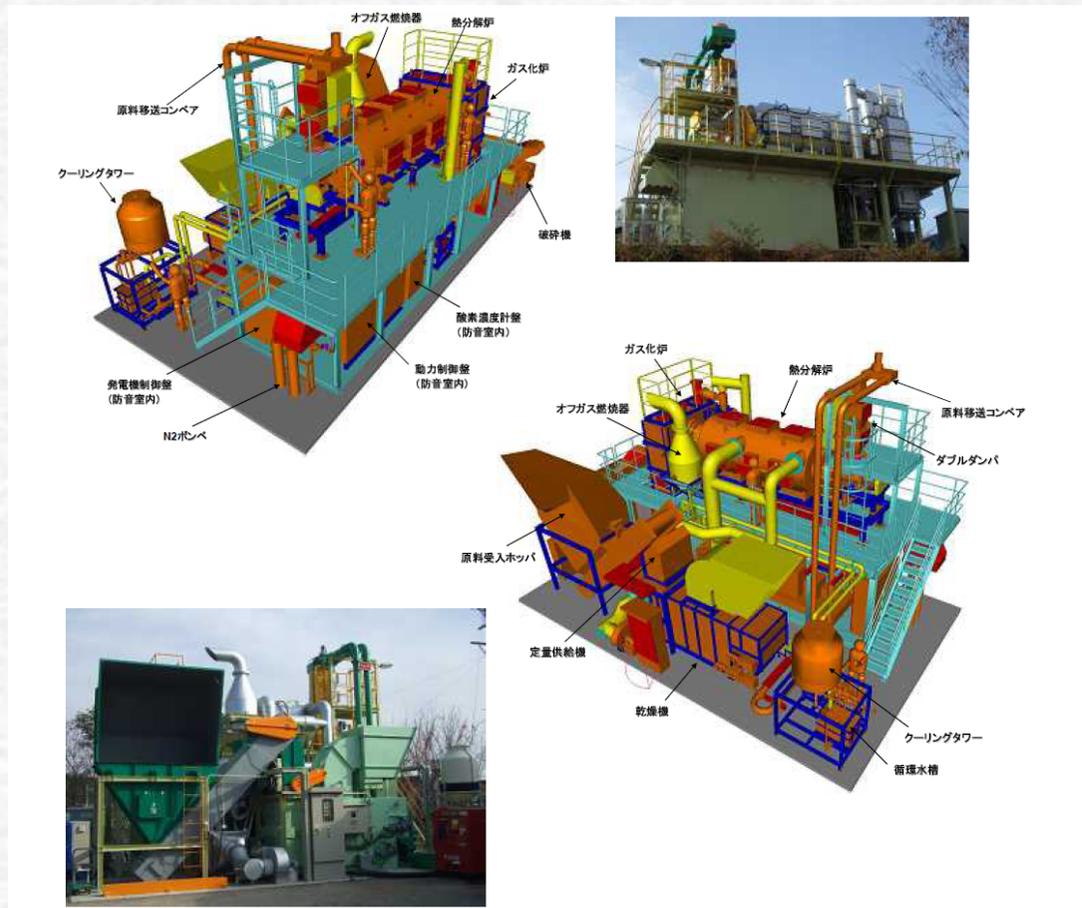
Shimizu Corporation: one of the largest construction company
Woody and municipal wastes (waste papers) generated
in urban (office) area --- gasification of these wastes on site

Flow Chart of “Buil. Bio-Master”



Gasification-CHP in a small scale, local area, rotary kiln type gasifier ...Chugai Ro Co. Ltd.

Woody wastes (including bark) generated
in mountain district--- gasification of these wastes on site



MAFF project

Present Status of Biomass Gasification in Japan

- Gasification for heat and/or power generation (electricity) has been partially in practical application or demonstrated, but in a small scale (10-300 kW) in most cases.
- Gasification for liquid fuels(bio-fuel)/chemicals synthesis had been developed at bench/test plant scale. (R &D stage)
A few test plants having a complete system (including biomass feeding-gasification-purification-bio fuel synthesis processes) had run, but now none.....
Bio-fuel-for-next generation is advocated, in new bio-fuel projects, focus are on microalgae, catalyst....

Some kinds of Tariff, incentives, subsidies are under consideration.

After 3.11 earthquake, basic energy plan has been reviewed, (including renewable energy, biomass energy).





Thank you for your
kind attention!!

