HIROSHIMA UNIVERSITY

Important aspects for biomass utilization in Japan

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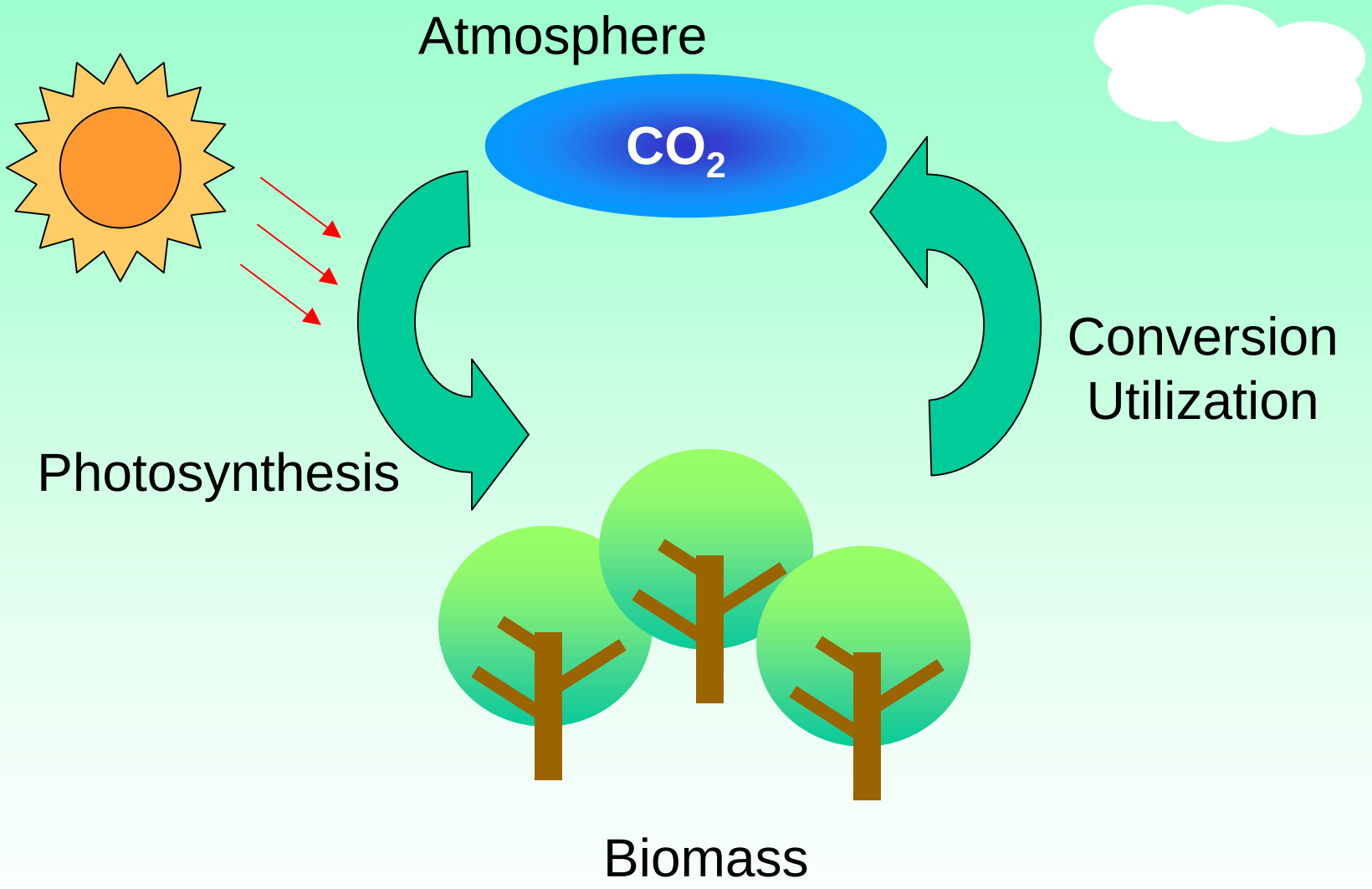
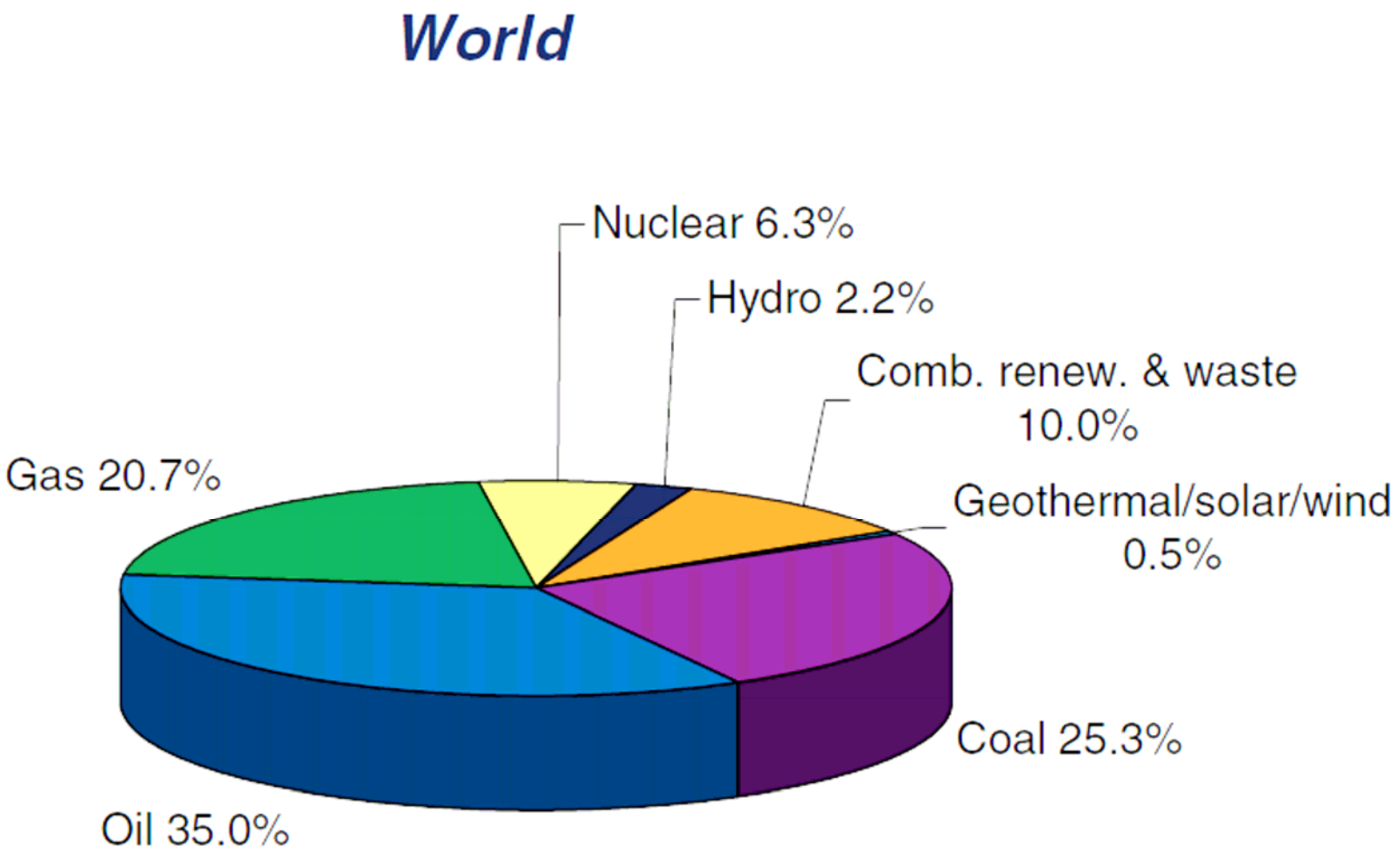
Biomass species

Characteristics of biomass



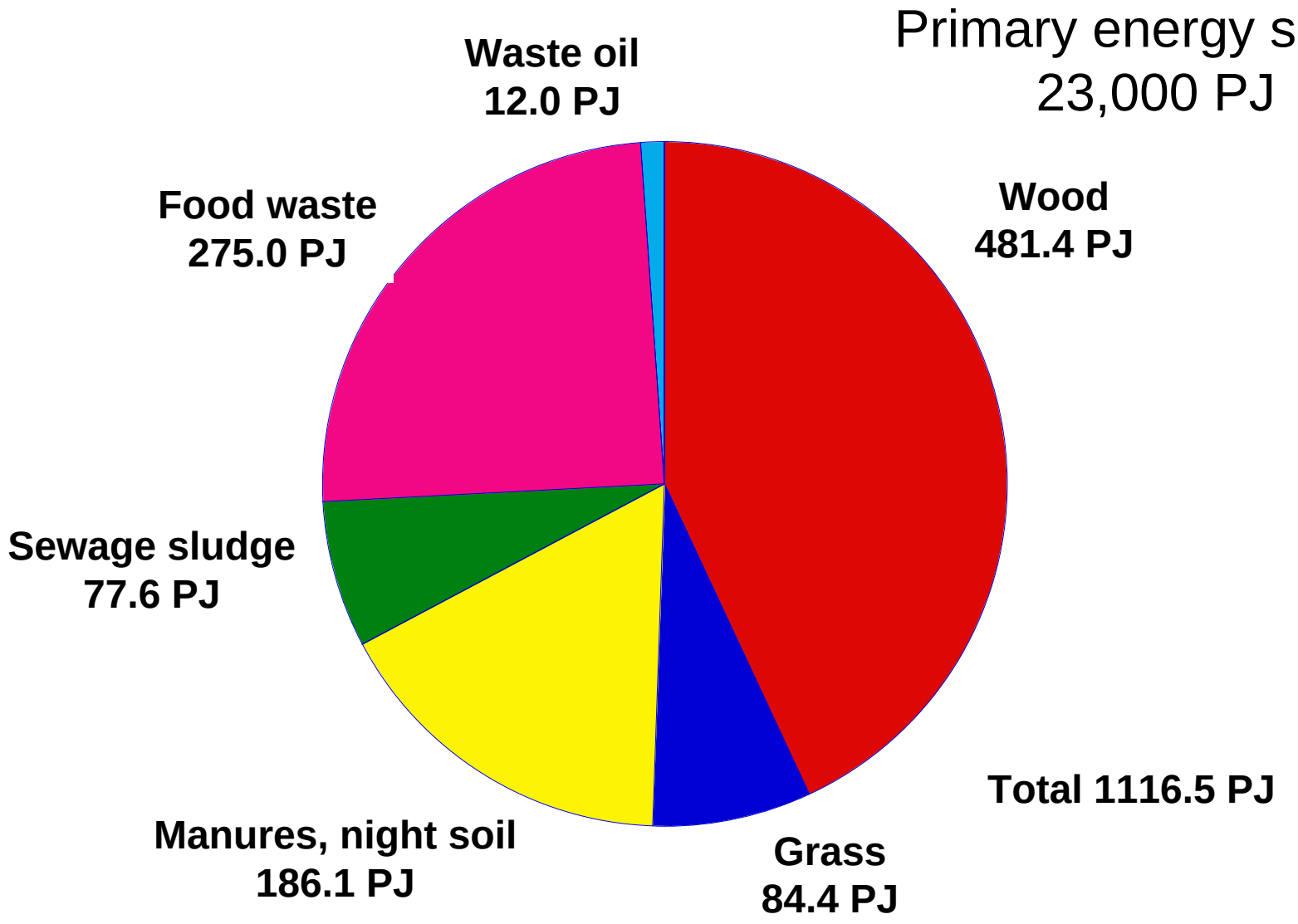
Renewable, carbon neutral

Share of total primary energy supply in 2005

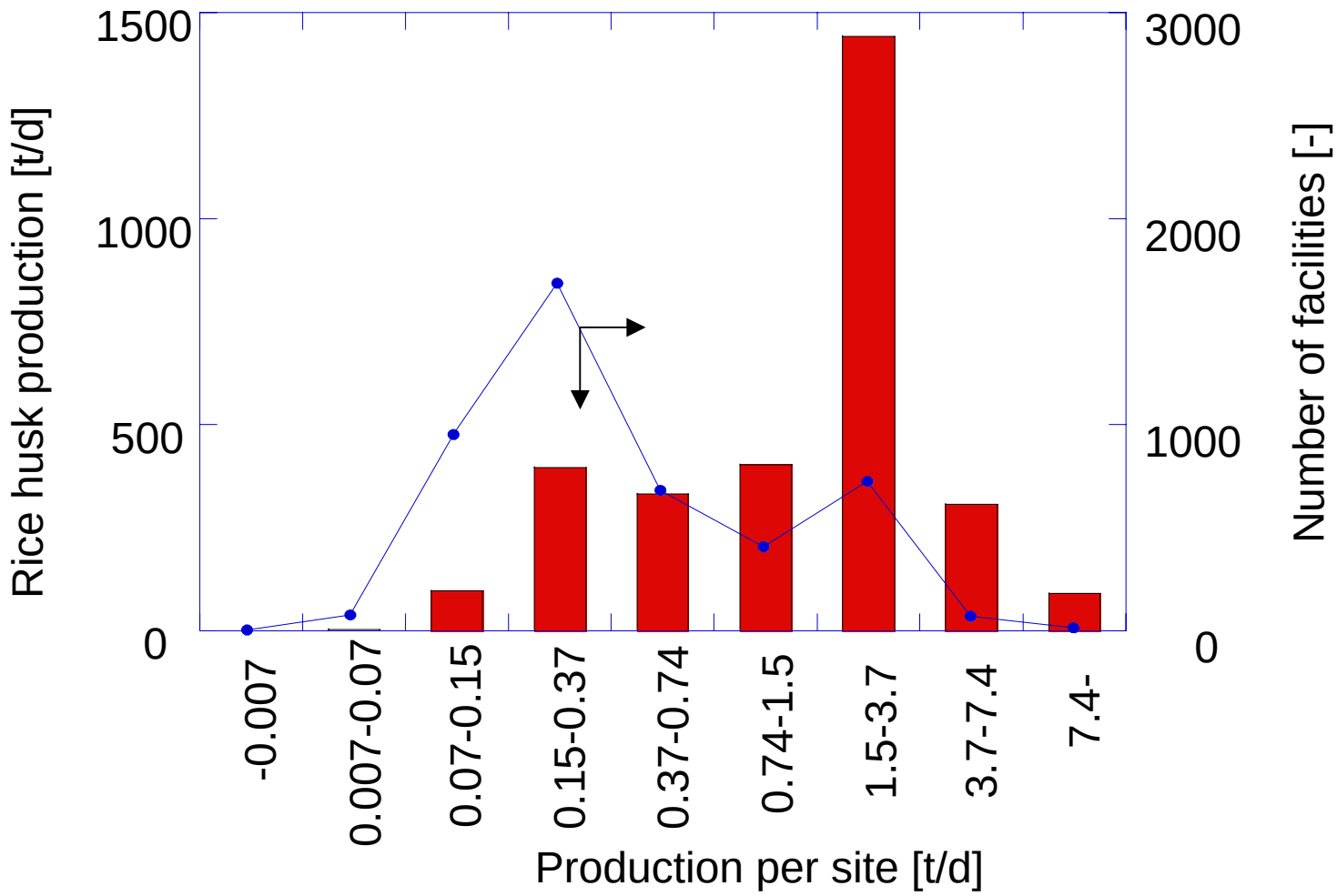


http://www.iea.org/Textbase/stats/pdf_graphs/29TPESPI.pdf

Availability of Japanese biomass

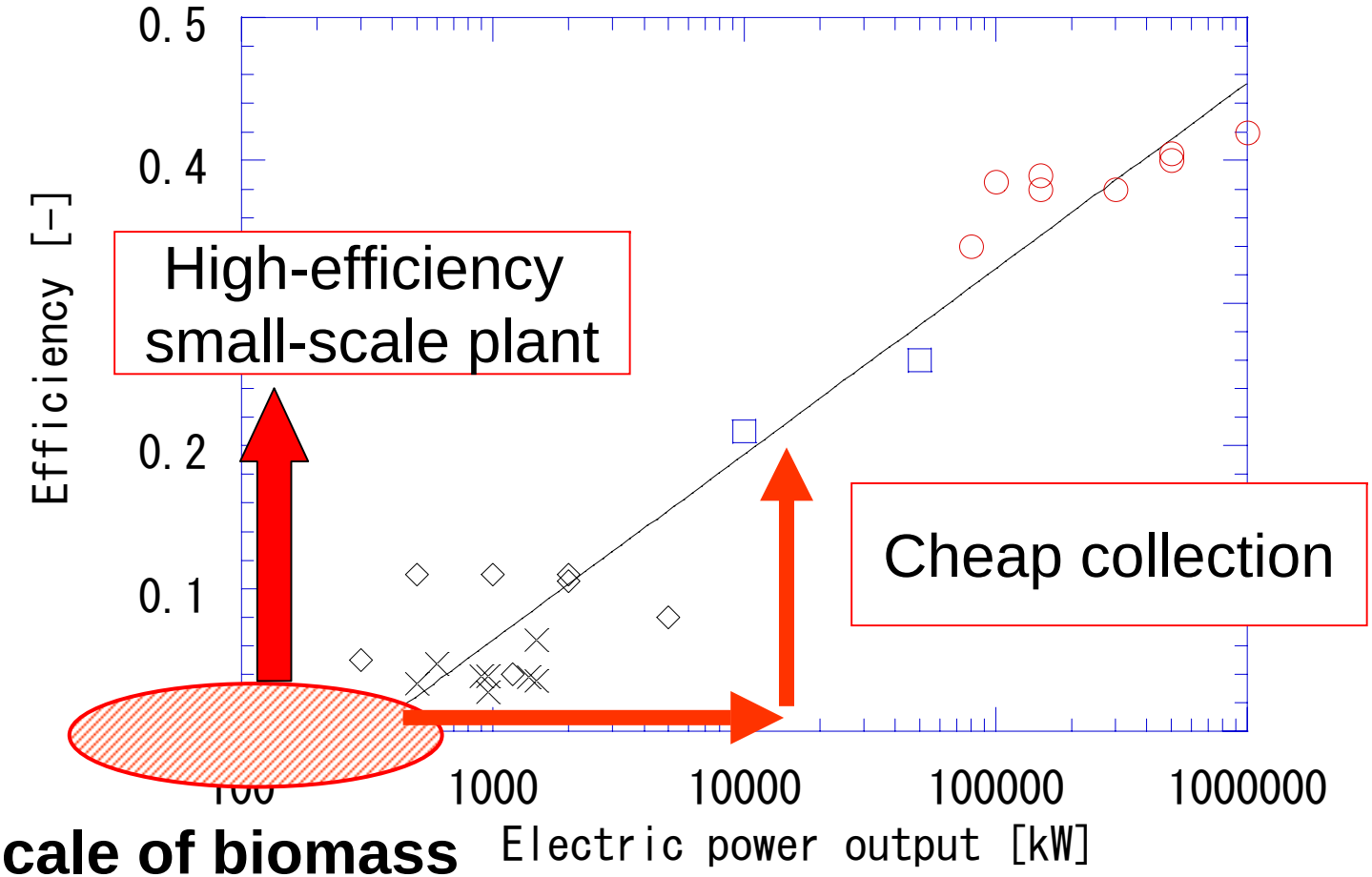


Plant scale



Multiply by 4 for possible rice straw production

Efficiency as a function of scale



Scale of biomass production

Direction of biomass utilization

Domestic biomass is 5% of primary energy supply

Production scale of domestic biomass is dozens t-dry/d

Macroscopic

-2010 Domestic biomass for Kyoto Protocol
(6% GHG reduction vs. 5% of primary energy)
2010- Biomass from overseas
(CDM/JI/ET, ODA)

Microscopic

Activation of rural region…Small scale, high efficiency
Making best of what they have
Solving the problems in the region
Biomass technology as the local industry

Technology development

compact plant

– High-efficiency, small-scale plant like Japanese compact car

Compact plants are needed for Japanese biomass utilization, but they have not been developed!!

Movable pelletizer

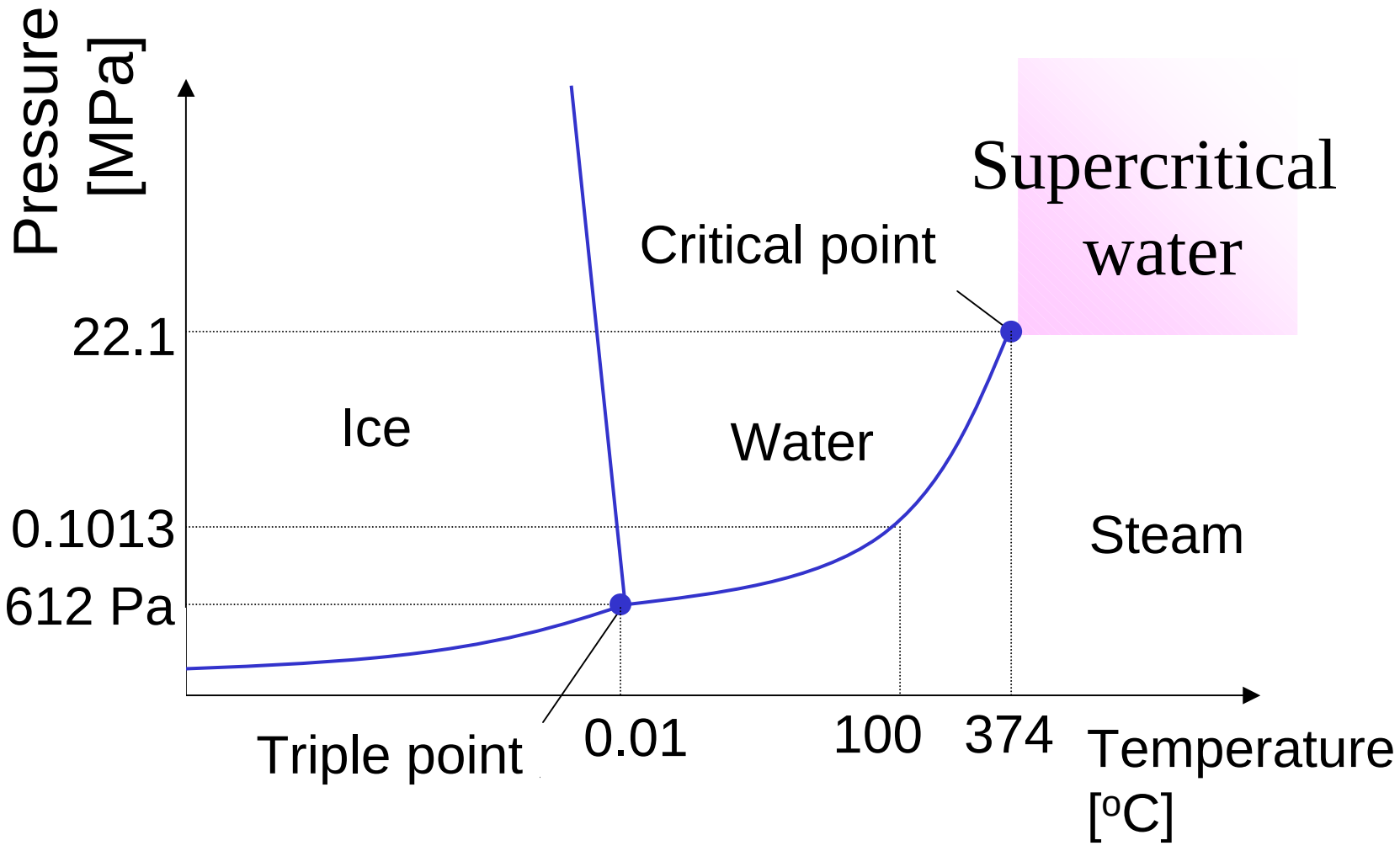
Movable pelletizer

Boiling under various pressure

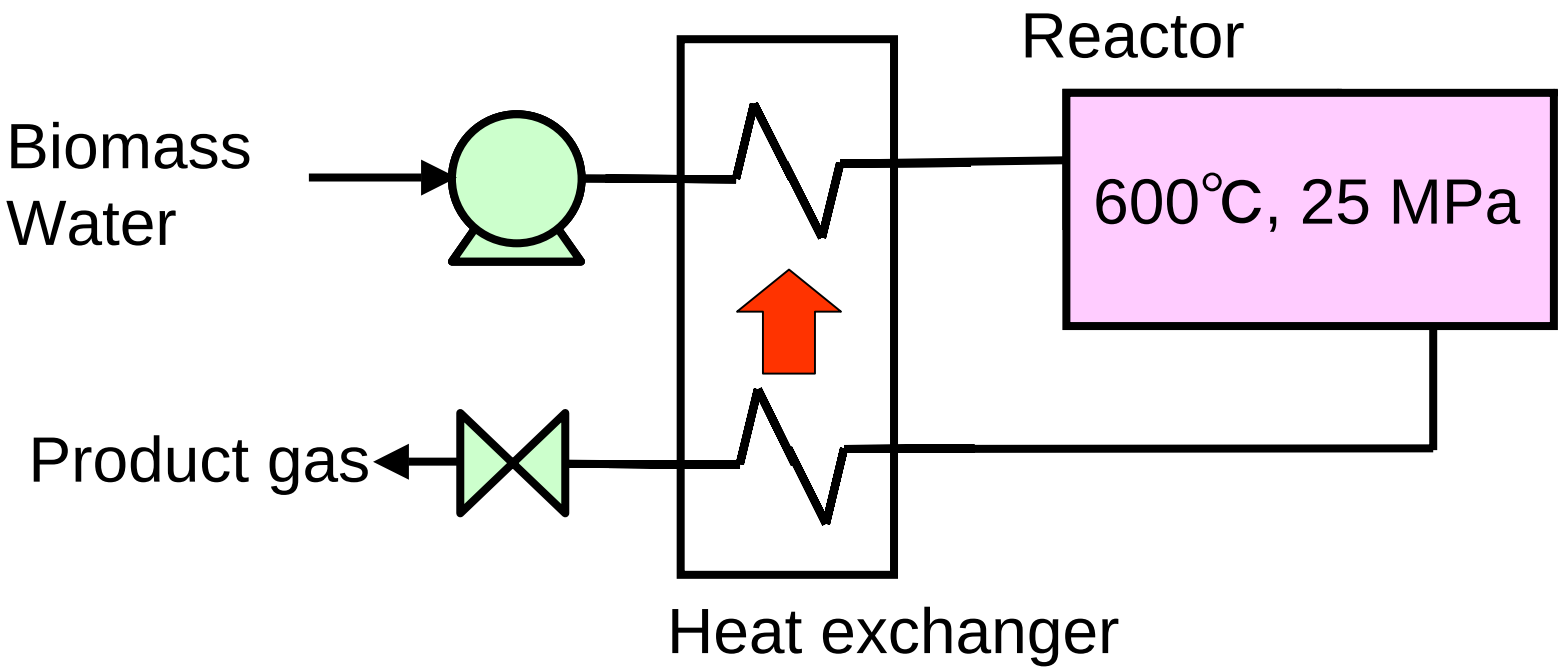
Pressure [atm]	Boiling point [℃]		Density [kg/m^3]		Expansion [-]
			Water	Steam	
0.8	94	Mt. Fuji	962	0.49	1963
1.0	100	0 m	959	0.60	1598
1.2	105		955	0.70	1364
10	181	-100 m sealevel	886	5.27	168
100	312		686	56.4	12
218	373	C.P.	315	315	1

Supercritical

Phase diagram of water



Supercritical water gasification process



1 t/d supercritical water gasification pilot plant

Benefits of biomass utilization

Sustainable society
Retarding global warming
Recycle society
Reactivation of rural area (more jobs)
Controlling sugar price
Energy security
Saving foreign currency
Obtaining foreign currency
Saving energy expense
Improving standard of living
Increase in income

Biomass Nippon Strategy

Brazilian ethanol
American ethanol
Thai ethanol

CDM

Lack in experience

What is biomass?

Where do we get it?

It’s expensive!!

We don’t have budget!

Hey, we cannot collect sufficient amount!

How can we solve all these problems!?

System design

- More and more trial and successful examples
- Which leads to the extraction of the knowledge to success
- Understanding of the rural community is needed
- Then the experience can be applied to foreign countries

System design

Storage in the cold field in winter

Storage in the form of sugar juice, not cane

Co-treatment to increase the scale

Small and cheap manual oil feeder

Do not sell electricity, but use by yourself

Use the subsidies with collaborating the municipalities

Solve the problems of the district by the use of biomass

Do not collect waste by yourself, but work with waste collectors

Asking donation is effective in the rural community

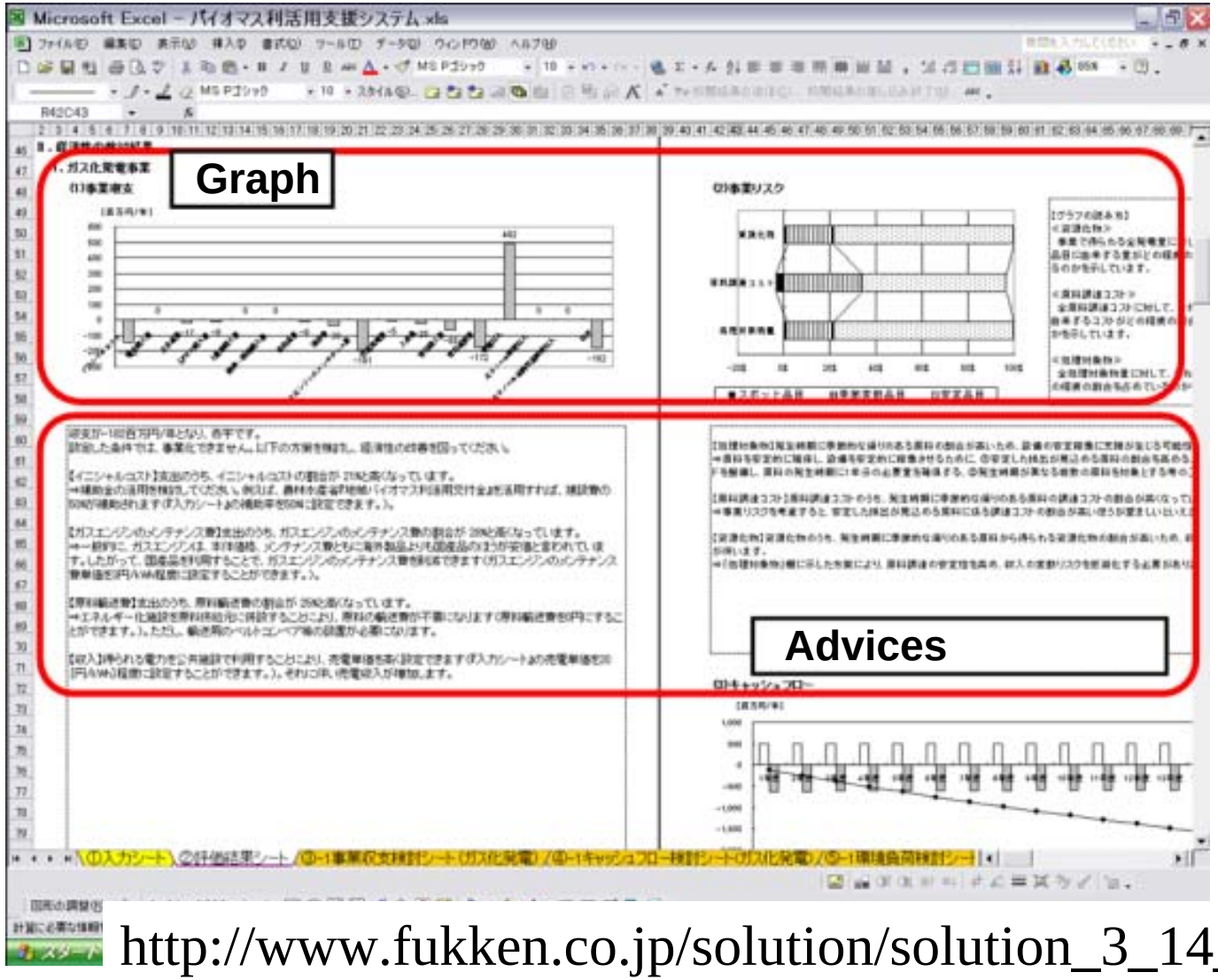
Mix waste biomass to improve economy

Try to use byproduct for increasing income

Ideas!!

niv.

System design



http://www.fukken.co.jp/solution/solution_3_14_03.htm

Price of technology

Of course the technologies to be used should be cheap ones. The farmers are not always rich.

Small-scale biomethanation and jatropha production are desirable for this point.

Accessibility

What is important for prevailing these technologies are farmers' accessibility to the biomass utilization or collection site and education.

Network development for biomass utilization is also important.

Conflict with food/feed production

The conflict in land use with food/feed production is a large problem. Even in China, ethanol production from crops is to be limited. Thus, technology development for ethanol production from lignocellulosic materials is important.

Biodiversity

For large scale plantation, biodiversity is to be considered.

- For ethanol production in China and jatropha production in Indonesia, the possible land to be used is semi-arid land or the cultivation is by intercropping.

- In Thailand, land area that can be used for agricultural purpose is limited.

In this way, the biodiversity problem can be avoided.

Conclusions (1/2)

Domestic biomass is 5% of primary energy supply

Production scale of domestic biomass is dozens t-dry/d

Various kinds of benefits exist for using biomass.

One direction is use of rural biomass

- Reactivation of rural area

Another direction is use of foreign biomass

- Improving standard of living
- Saving energy expense
- Increase in income

Conclusions (2/2)

Technology development and system development are needed.

compact plant

– High-efficiency, small-scale plant like Japanese compact car

economical and beneficial system

– System design to achieve benefit to the society

- Price of technology
- Accessibility
- Conflict with food/feed production
- Biodiversity

Thank you!!