

MOCHIDZUKI LAB.

[Biomass Energy]

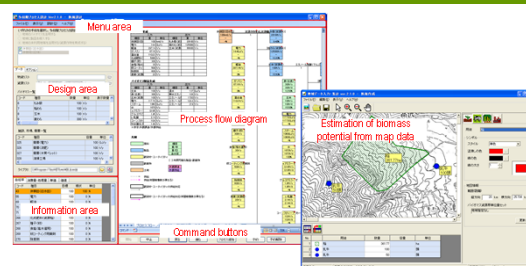
Collaborative Research Centre for Energy Engineering

<http://www.biomass.iis.u-tokyo.ac.jp>

Local Energy Chemical Engineering

Design and Evaluation of Biomass Town

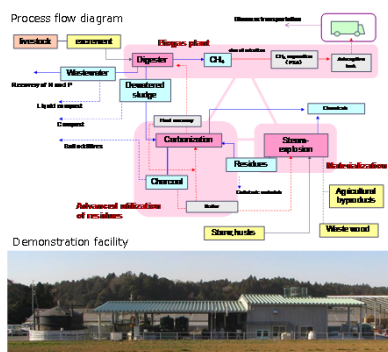
The final goal of this project is to promote the biomass-orientated regional material and energy circulations, to nurture the growth of the sustainable society. In order to create reasonable scenarios for the regional biomass utilization system, we have drawn up a plan of "Biomass Town" to meet the actual situation of local communities. We have examined methods to design and analysis of the biomass utilization systems based on the concept of Biomass Town. The methods involved analyses algorithms to deal with the following units: i.e., biomass availability, biomass collection/transportation, biomass utilization process design and environmental impact. Integrating the algorithms, we developed a Biomass Town Simulator.



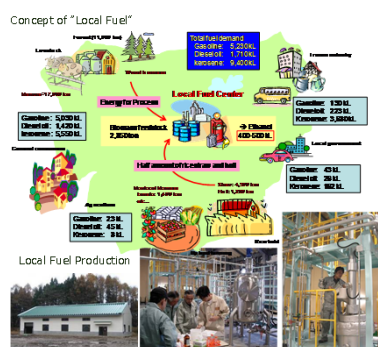
Biomass Town Simulator

Design of Local Biomass Utilization System and Its Demonstration

This work deals with the design and demonstration of the small-scale biorefinery that produces the local fuel from locally available biomass, such as unused biomass and energy crops. We participate in demonstration studies on biomass utilizations in some existing communities. In Karoti-shi, Chiba, as a model field of near-urban agricultural areas, we introduced an integrated biogas system which enabled cascade use of livestock wastes and other biomass. In Shinano-mach, Nagano, we have developed small-scale bioethanol system which can be applied to rice farming areas. The core of the process is a bioethanol production from rice straw powered by a biomass boiler using rice husk. Evaluating the material/energy flow, land use, environmental effects and local economy under the field research projects, we are trying to develop the community-scale sustainable biomass utilization. The system of local utilization of biomass resources is also important to the energy strategy of rural area in developing countries. We have prepared a pilot plant and research fields in Vietnam to investigate local biomass systems for South-East Asia.



Demonstration of Local Biogas Utilization
(Katori-shi, Chiba)



Development of Small-scale Bioethanol System Based
on "Local Fuel" Concept (Shinano-mach, Nagano)



Pilot Plant for the Research on Small-scale Biorefinery
(Hochiminh City, Vietnam)

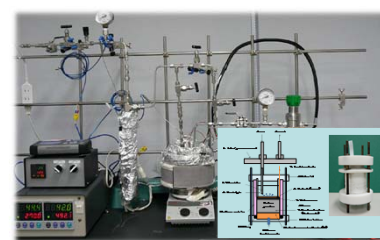
Development of Key Technologies for Biorefinery

As well as the total system design/demonstration, we are conducting researches on the development of key technologies and their fundamentals, based on chemical engineering, as follows.

- Combination of saccharification, fermentation and separation for bioethanol production
- Behavior of nitrogen and phosphorus in carbonization process
- Electrochemical oxidation of charcoals
- Biomass storage and its effects on the saccharification/fermentation



Development of Bioethanol Technology



Electrochemical oxidation of charcoal
(Direct carbon fuel cell)