May 27, 2008

Research Institute of Innovative Technology for the Earth
Taiyo Nippon Sanso Corporation

Verification of biogas concentration unit that uses "membrane / absorption hybrid method" at field test

Research Institute of Innovate Technology for the Earth (RITE - President: Yoshihisa Akiyama) and Taiyo Nippon Sanso Corporation (TNSC - President: Hirosuke Matsueda) had developed a biogas concentration unit that utilizes "membrane / absorption hybrid method*" jointly, and verified its performance to implement in practical use by conducting a field test by using actual gas at a biogas plant of Cornes & Company Limited (in Hokkaido) from this January.

Biogas is expected to be utilized more effectively as one of the clean carbon-neutral energy resources to prevent global warming.

Biogas is composed of methane by approx. 60vol% and carbon dioxide approx. 40vol%. Its combustion calorie is low. Currently, only part of its generated amount is used as fuel for boilers and expensive electric generators specially made for biogas. Its effective utilization is yet to be developed. To expedite the utilization of biogas that is an underdeveloped energy to reduce the use of fossil fuel effectively, we believe that it is important to increase the combustion calorie by concentrating methane gas and offer more options of available units that use natural gas. Also, high recovery ratio of methane gas will be the key to utilize biogas as the generated amount of the gas is limited.

"Membrane / absorption hybrid method" is a technology developed by RITE aiming to separate / collect carbon dioxide in exhaust combustion gas at low cost and in high purity. By comparing with a conventional chemical absorption method, it does not require a heat source to separate carbon dioxide in small scale, and this technology can reduce the energy necessary to separate carbon dioxide by less than half.

RITE and TNSC set a goal to make "membrane / absorption hybrid method" into a practical use first in the world. This method can concentrate methane to 98vol% or over at a low cost on site of a biogas generating location, and can achieve high methane gas recovery ratio. We had succeeded to improve the regeneration efficiency of carbon dioxide absorption liquid for circulated use while maintaining high methane gas recovery ratio, and improved the recovery ratio of carbon dioxide to more than twice of the conventional practice.

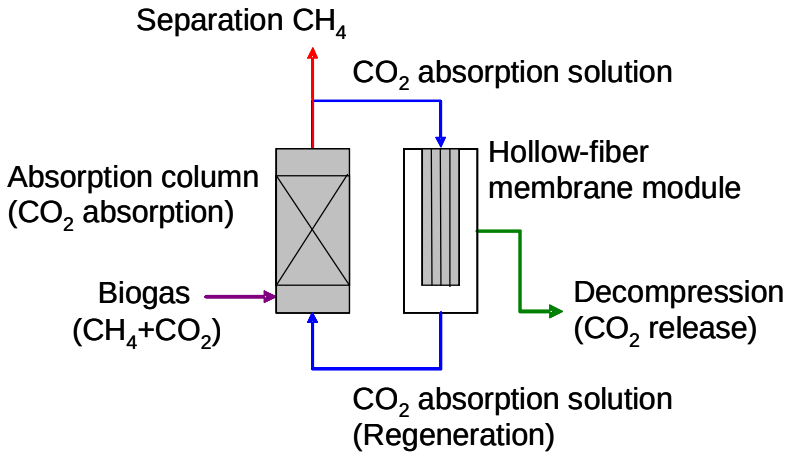
Furthermore, from 2006, we produced a substantiation unit in actual production scale (Photo 1) as Joint Program to Promote Technological Development with the Private Sectors*(RITE - Hokuto Laboratory), evaluated the performance of the unit by using simulated gas and improved its performance up to November of the last year. At the field test (Photo 2) started form January this year, we had rolled out a continuous operation test by using actual gas to evaluate and inspect its separation performance, durability and other aspects, and confirmed that there is no issue to use it practically in actual biogas field.

As the next steps, we will challenge to downsize the unit by evaluating an optimized operation condition and modifying the unit to makes it use for a commercial application in 2009.

Furthermore, we are reviewing the possibility to apply this technology to various carbon dioxide separation purposes by utilizing its feature that it can obtain high purity of both separated methane gas and carbon dioxide.

[Membrane / absorption hybrid method]

Membrane / absorption hybrid method is a technology RITE has been developing targeting to separate / collect carbon dioxide in combustion exhaust gas at low cost but in high purity by improving a conventional chemical absorption method. At this separation technology, carbon dioxide is absorbed by an absorption liquid and sent to one side of the porous membrane. The pressure on the other side of the porous membrane is reduced to flush the absorption liquid through fine holes of the membrane, so that carbon dioxide will be released and collected. The conventional chemical absorption method releases and collects carbon dioxide by heating the entire absorption liquid containing carbon dioxide to 120 °C or more. As the consequent, it has a disadvantage that the energy consumption will be large. At membrane / absorption hybrid method, it will be possible to reduce the energy necessary for separation to 1/2 or less compared to the conventional chemical absorption method.



Schematic diagram of biogas concentration in “membrane / absorption hybrid method”

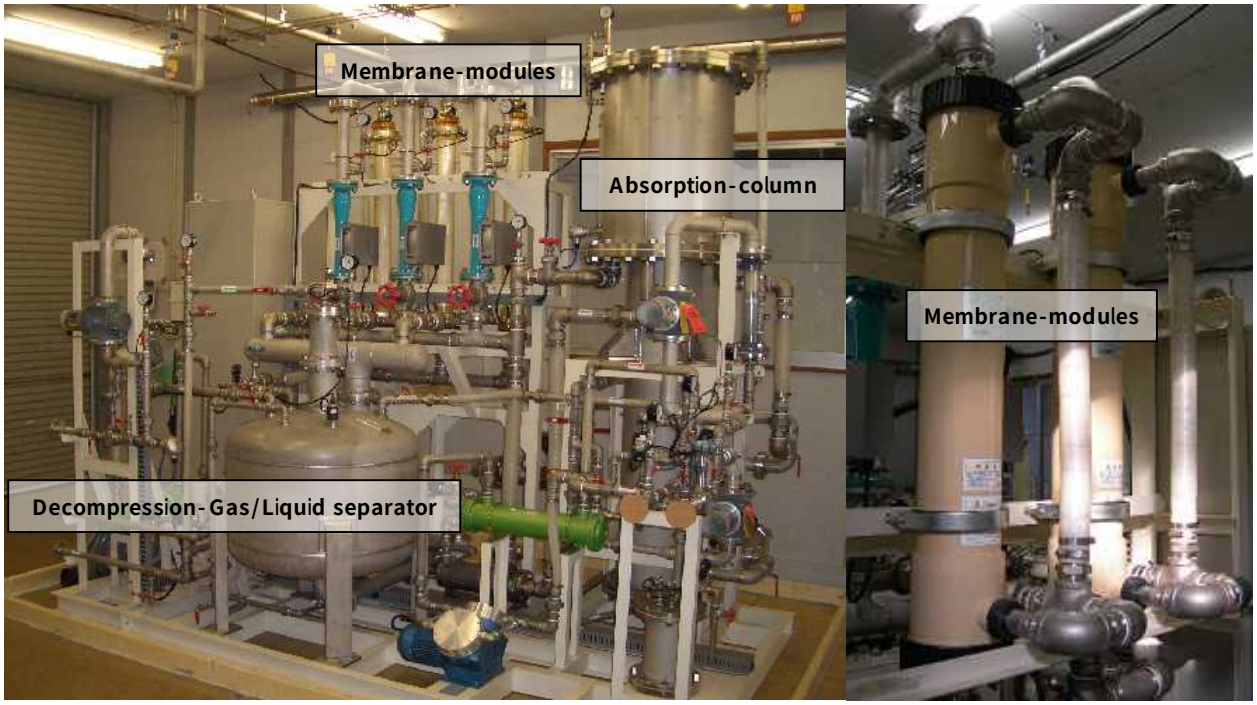
[Joint Program to Promote Technological Development with the Private Sectors]

In line with Japan entering Kyoto Protocol, this structure was established by Ministry of Economy, Trade and Industry in 2003 targeting to support and expedite technology development in the industry for innovative industrial technologies that can contribute to solve the global warming.

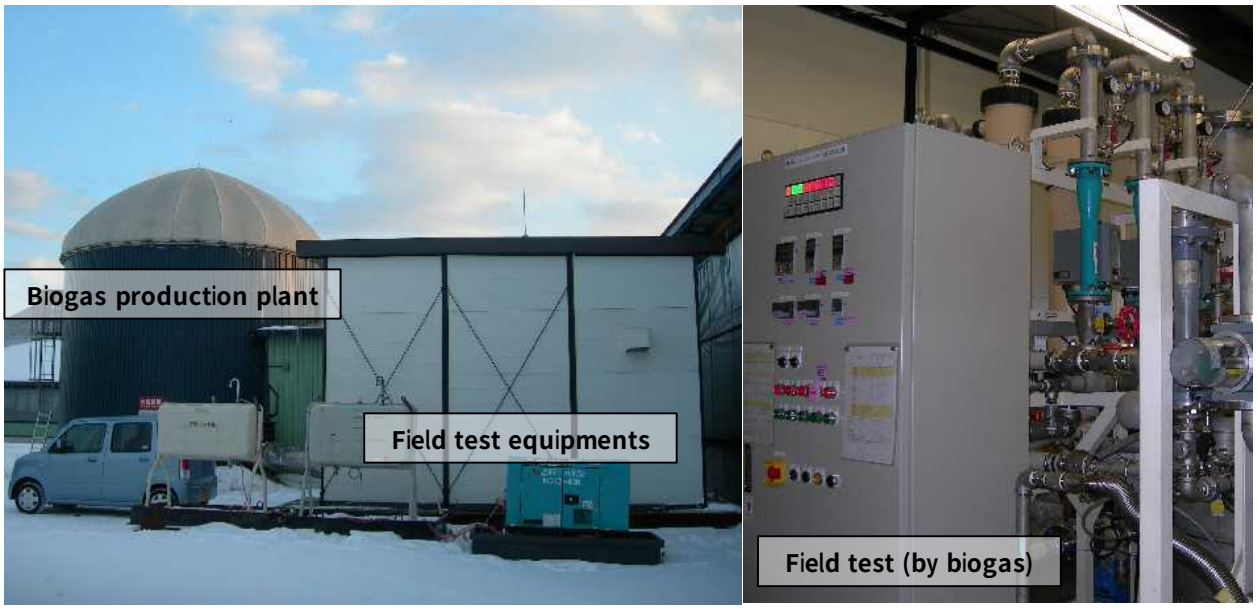
The technology devolvement will be driven jointly by sharing the project cost half by private sectors and half by RITE.

Technology developments in various fields were promoted proactively to stop the global warming.

[Photo 1 – Substantiation unit for a trial test]



[Photo 2　View of field test]



Research Institute of Innovative Technology for the Earth (RITE)

Establishment : July 27, 1990

Objective: Our objective is to contribute to the preservation of our global environment and the development of the international economy through the use of advanced technology. To attain this objective, we are collaborating with research institutions around the world in conducting research and development work, investigating various field relating to our mission, and gathering and providing information.

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TAIYO NIPPON SANSO CORPORATION

Establishment: October 30, 1910

Incorporation: July 20, 1918

Head office: 1-3-26, Koyama, Shinagawa-ku, Tokyo, Japan

Branch offices: Tohoku office, Kita-kanto office, Kanto office, Chubu office, Kansai office, Chu-shikoku office, Kyushu office, Hokkaido office

Facilities: Keihin, Tuskuba, Yamanashi, Kawasaki, Kawaski-mizue, Oyama

Major businesses: Industrial gas, Medical care, Electronics, Plants & engineering, LP gas, Hydrogen project

Representative: Hirosuke Matsueda, President

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