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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

LCET Low Carbon Low Emission Clean Energy Technology Programme
METI-UNIDO Collaborative Initiative

METI Ministry of Economy, Trade and Industry

LCET PROGRAMME

LOW CARBON LOW EMISSION CLEAN ENERGY TECHNOLOGY TRANSFER PROGRAMME

INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

LCET
LOW CARBON LOW EMISSION
CLEAN ENERGY TECHNOLOGY TRANSFER PROGRAMME

LCET PROGRAMME

LOW CARBON LOW EMISSION CLEAN ENERGY TECHNOLOGY TRANSFER PROGRAMME

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Pradeep Monga

Director | Energy Branch
United Nations Industrial Development Organization

Energy is a critical input for economic growth and sustainable development. No region or country has ever successfully developed its economy or built a robust industrial sector without access to reliable, secure and cost-effective energy supply and services. Africa, in particular, is endowed with substantial energy resources ranging from fossil fuels to renewables including hydro, wind, solar, geothermal and biomass. Yet, Africa suffers from severe energy poverty due to inadequate generation capacity, limited electrification, low power consumption, unreliable services and high energy costs.

In order to address these challenges, the United Nations Industrial Development Organization (UNIDO) and the Ministry of Economy, Trade and Industry of Japan (METI) joined hands in 2013 to design and implement a collaborative global initiative called Low Carbon Low Emission Clean Energy Technology Transfer (LCET) Programme. Under this programme, deployment and dissemination of new LCET systems, technologies and services are promoted to enhance access to clean, reliable and sustainable energy in Africa. Productive uses are equally fostered for new job creation and income-generating opportunities for local communities, aiming at promoting UNIDO's new mandate - Inclusive and Sustainable Industrial Development (ISID).

We believe that this brochure will continuously inform and benefit key players, thus fostering the success of the LCET Programme as well as relevant stakeholders in both Africa and Japan. We expect the brochure would serve as a means of providing resourceful information about the programme details, presenting factsheets for potential Japanese clean energy technologies and expertise for deployment and dissemination across Africa.

Michio Daito

Director | Technical Cooperation Division
Trade & Economic Cooperation Bureau
Ministry of Economy, Trade and Industry
Government of Japan

We have been coordinating and collaborating with the United Nations Industrial Development Organization (UNIDO) for more than 30 years. With this long-term relationship, we are pleased to have initiated, with UNIDO, a global programme called Low Carbon Low Emission Clean Energy Technology Transfer (LCET).

We believe that in order to achieve a low-carbon society, it is necessary for both developed and developing countries to continuously mitigate (and adapt to) global climate change. In Japan, there are outstanding technologies to achieve low-carbon growth through renewable energy, highly efficient power generation systems, home electronics, low-emission vehicles and energy-saving in factories. We would, through technical cooperation, continue to contribute to realizing a low-carbon society via widespread use of these advanced low-carbon low-emission technologies.

Moreover, the Ministry of Economy, Trade and Industry of Japan (METI) is now promoting, along with other relevant ministries, a bilateral carbon credit trading scheme called Joint Crediting Mechanism (JCM) to assist sustainable development in developing countries. Based on the Japan Revitalization Strategy approved by the cabinet, the JCM project aims at reducing greenhouse gas emissions through diffusion of leading low-carbon low-emission technologies, products, systems, services and infrastructure. We hope that our joint programme with UNIDO could be developed to accommodate future JCM projects in Africa.

TECHNOLOGY IS A DRIVER AND KEY CONTRIBUTOR TO CLEAN ENERGY, CLIMATE ACTION AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

Clean energy is critical for achieving sustainable development and is at the forefront of the global agenda; it is central to the issues of development, economic growth, and environmental protection. Technology plays a key role in promoting sustainability in many areas, including energy and sustainable industrial development. But developing countries, and especially the least developed countries, face an array of challenges in obtaining, adapting and effectively using technologies for sustainable development, not to mention in building productive capacity.

Despite a fairly adequate endowment of energy resources, with some regions blessed with all forms of energy potential, Africa suffers from severe energy poverty due to inadequate generation capacity, limited electrification, low power consumption, unreliable services and high energy costs. Recurrent power cuts, often unplanned, cause disruptions in economic activity, losses in production and damage to vital machinery and equipment; in most situations, factories are forced to resort to expensive diesel backup generation capacity.

The impact of this chronic energy challenge in the continent falls disproportionally on the productive sector which is dominated by Small and Medium-sized Enterprises (SMEs), a sector required to provide the economic environment necessary for growth and poverty reduction. Africa is also prone to the adverse impacts of climate change, and recent droughts, floods and seasonal changes are creating disruption for communities and industries.

Low carbon low emission clean energy technologies can significantly help not only in reducing GHG emissions but also in promoting access to energy and enhancing productive energy use.

The implementation of these technologies would enhance and benefit small businesses, job creation, and new entrepreneurial opportunities, especially in rural areas where electricity infrastructure, such as national grids, are not sufficiently developed enough. Therefore, the deployment and the dissemination of low carbon, low emission clean energy technologies are of fundamental importance for achieving inclusive and sustainable industrial development globally and, in particular, in developing countries.

Context

In 2013, in order to address the challenges listed above, the United Nations Industrial Development Organization (UNIDO) and the Ministry of Economy, Trade and Industry of Japan (METI) initiated a global collaborative programme called Low Carbon Low Emission Clean Energy Technology Transfer (LCET). LCETs have emerged as potential solutions to simultaneously address three key global challenges, namely energy poverty, job creation and climate change.

The programme concept promotes rapid deployment and dissemination of Japanese LCETs globally. In view of close consultations held between UNIDO, METI and recipient countries, the LCET programme, in its first phase is focusing on Africa in particular on small and medium- sized enterprises (SMEs) in Kenya and Ethiopia. These countries offer strong and consistent political ownership toward the energy and climate change agenda and a favourable policy environment. The LCET programme aims to create sustainable jobs, which generate income, and stimulate entrepreneurial opportunities and the development of small businesses, especially in rural areas which are not connected to national grids. Furthermore, it emphasizes the importance of linking sustainable energy with productive uses, while also benefiting local communities with new opportunities.

The LCET programme serves as a means of achieving inclusive and sustainable industrial development, while also providing linkages to the Joint Crediting Mechanism (JCM[1]), Japan's Bilateral Offset Credit Mechanism, which presents an option, among others, for alternative carbon market mechanisms. The JCM aims to promote the diffusion of LCETs globally through both the introduction of leading-edge clean energy technologies and products in developing countries, and proper evaluation of emissions reductions resulting from these technologies and products.

"LCET TECHNOLOGY TRANSFER IS OF FUNDAMENTAL IMPORTANCE FOR ACHIEVING INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT GLOBALLY"

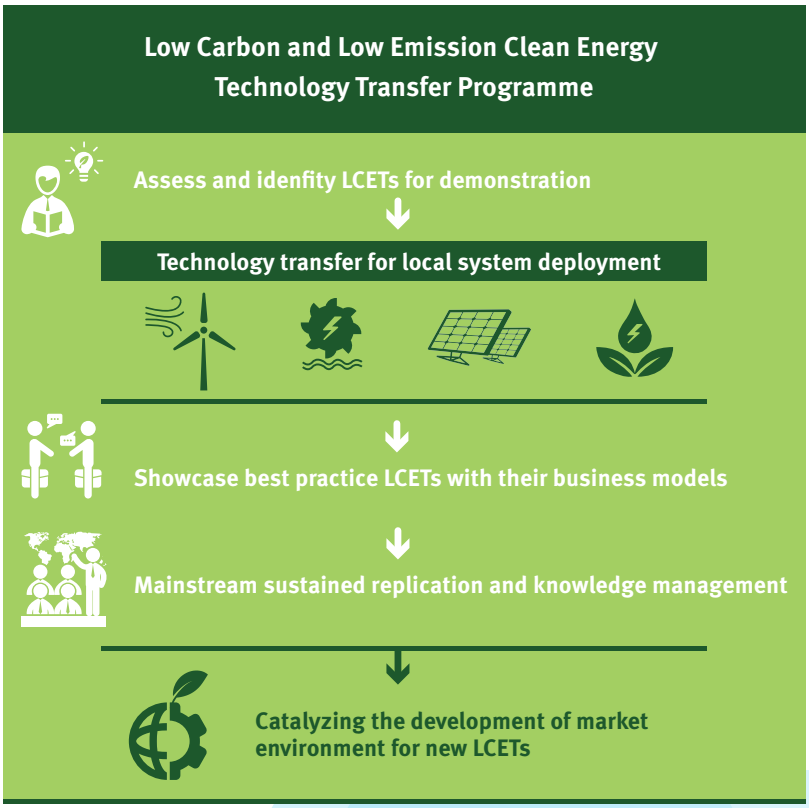
1 http://www.meti.go.jp/english/policy/energy_environment/ globallwarming/challenges.html

Technology Transfer Approach

The LCET programme is implemented in three phases to promote the technology transfer.

- Develop a selection criteria to initially identify and screen technologies that could be replicated and repeatedly demonstrated.
- Conduct a feasibility study of identified LCETs vis-á-vis the current techno-socioeconomic needs; and
- Implement pilot projects, including capacity building, for local counterparts.

Designed and implemented demonstration projects aim to showcase the technical and commercial viability of the technology, starting by working with government agencies and other stakeholders to identify potential pilot sites. At the same time, international training programmes with international and local institutions are developed to strengthen stakeholder awareness and technical capacities with extensive training on operation, maintenance, and management of the respective technology and mini grids.



- Identify best practices and showcase them with business models based on outcomes of demonstration projects; and
- Establish public and private sector partnerships to disseminate LCETs as demonstrated.

Active public private sector involvement is essential to positively influence local innovation, technology development and provision of capital for investment. It will also create new investment opportunities through for example the establishment of local product supply chains.

- Present proposals on holistic approaches and institutional mechanisms for diffusion of LCETs;
- Analyze and evaluate all outcomes achieved through the programme; and
- Recommend policies for LCET dissemination and market development.

Policy recommendations will then be formulated based on policy reviews, which will be conducted to capture regulatory policies, public financing, and business development models for the demonstrated system. Moreover, knowledge management and policy recommendation for replication and market environment development will be provided towards dissemination.

Impact & Results

In its first phase, the programme focuses on LCETs such as micro hydropower, solar energy, and waste-to-energy technologies in Africa. Two Ultra Low Head Micro Hydro Power (ULH- MHP) technology system projects have been implemented in Mwea (Kirinyaga County, Kenya) and Fentale (Oromia National Regional State, Ethiopia) to demonstrate to the local community how the technology operates, is maintained, and generates electricity for the local communities. The implementation of these projects involves the introduction of ultra-low-head micro hydropower (ULH-MHP) technology to increase access to renewable energy for required productive uses.

ULH-MHP systems can generate electricity when installed in agricultural irrigation, drinking and waste water canals when compared to conventional hydro-power systems; ULH-MHP systems are easy to install and maintain.

The Government of Japan, has provided additional funding for the further scaling-up of activities in the region.

The LCET programme achieves the following five key outcomes:

- Linking energy services with productive uses to stimulate economic growth;
- Adopting innovative business models that would facilitate the use of new technologies, services and products and make everyday activities more sustainable;
- Actively promoting a multi-stakeholder and multi-disciplinary approach to strengthen the links to government policy development and industry application;
- Strengthening institutional mechanisms for improved policy formulation to monitor and guide provision of rural energy services; and
- Promoting industrial value chains for LCETs and policies to scale up markets and foster rural-urban linkages.

1ST PHASE PILOT COUNTRIES: ETHIOPIA AND KENYA

UNIDO and METI have selected Ethiopia and Kenya as pilot countries for the first phase of the LCET programme. In these countries, two pilot projects focusing on ultra-low head micro hydropower (ULH-MHP) technology have been implemented under this programme. According to feasibility studies on ULH-MHP conducted, both countries have large hydropower potential for ultra-low head (under five meters) and their deployment. The implementation of these pilot projects will contribute to local industrial and social development, while also fulfilling local demand for energy access.

OUTLINE OF THE LCET PROGRAMME

PROJECT TITLE	Low Carbon Low Emission Clean Energy Technology Transfer Programme
DONOR	Government of Japan (Ministry of Economy, Trade and Industry, METI)
PARTNERS	**in Kenya** - Ministry of Industrialization and Enterprise Development (MOIED), Ministry of Energy and Petroleum (MOEP), National Irrigation Board (NIB), The National Treasury and Ministry of Agriculture, Livestock & Fisheries **in Ethiopia** - Ministry of Water, Irrigation, and Energy and Oromia Water, Minerals and Energy Bureau (OWMEB)
DURATION	Three years (started in 2013)
EXECUTING AGENCY	UNIDO in collaboration with METI

List of Low Carbon Technologies registered under the Environmental Technology Database of UNIDO's ITPO Tokyo website.[2]

List of Low Carbon Technologies[3]

2 *http://www.unido.or.jp/en/activities/technology_transfer/technology_db/*
3 **Disclaimer:** *These fact sheets are for information only. UNIDO is not responsible for the content and not legally bound by these technologies or technology providers by any means or form.*

Micro Hydro Power

Ultra Low-head Micro Hydro Power Generation System

Conventional small hydro power generation technology relied on relatively high head equivalent to waterfalls, and needed substantial civil work to secure enough head drop from rivers or waterways. Now, focusing on flow of water in existing waterways such as irrigation canals that had been previously overlooked, a new type of open channel power generating technology has been developed and introduced.

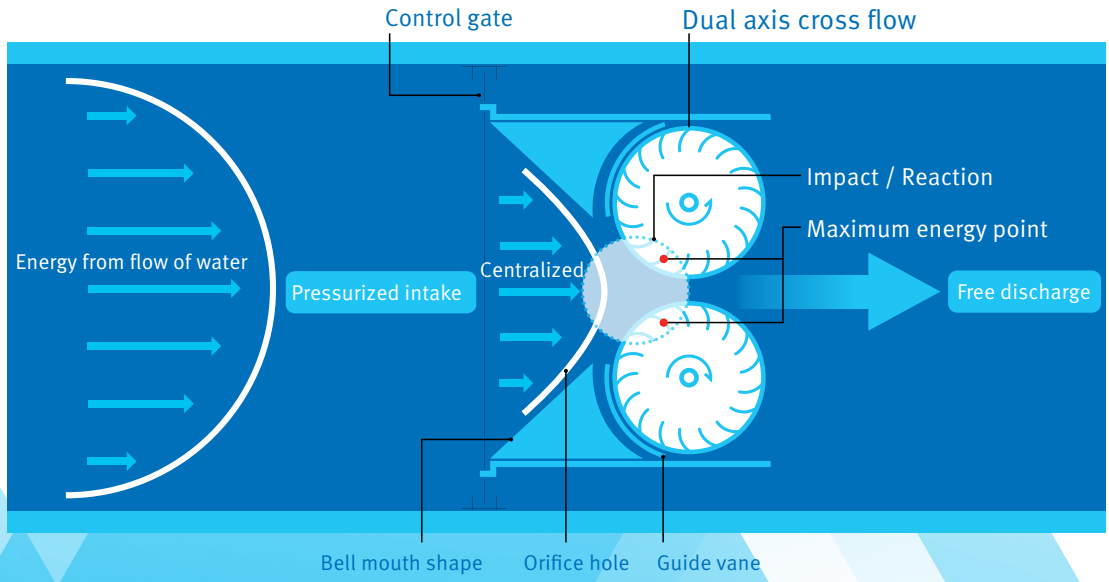
GENERATES POWER
WITH FROM 0.5 M HEAD UTILIZE CURRENT WATER FLOW EASY INSTALLATION AND MAINTENANCE

The technology is able to convert energy in ultra low-head environment into 24 hours of electricity. Technology that is easy to install and maintain can provide stable and high efficiency power output, compared to other natural energy resource-based technologies.

Conventionally, micro hydropower generation found difficulties in obtaining enough power output without securing sufficient head drop. The flow-based “Ultra low-head micro hydropower generation technology” is defying the common wisdom. With solar power systems, it is no possible to generate power during the night-time, while with wind power, power generation depends on the weather, lacking stability.

Any natural resource based energy system has its merits and demerits, but flow-based ultra low-head micro-hydro generator system can provide stable 24-hour electricity. This system needs only simple installation work and eliminates major cost of civil works. In particular, installation can be completed within a couple of days if channel is already developed. Its designing principle is quite simple. Easy maintenance — without special parts, its maintenance is quite simple. Cost savings — in case of trouble, on-site maintenance or trouble-shooting is possible. Having water flow adjusting gate, the system can accommodate in both irrigation and non-irrigation seasons that have variation of water flow volume even in rural areas. Seabell International Co., Ltd., with extensive experience in water management systems

ULTRA LOW-HEAD MICRO HYDRO POWER GENERATION SYSTEM



By concentrating on the maximum energy of dual cross-flow turbine, its power is optimized. Multiple cascading installations in one water channel are also feasible. Total cost is estimated at more than 10 million JPN in Japan (10kw output type). Cost reduction to half is foreseen if local procurement and manufacturing capacities are available.

"THE SYSTEM CAN ACCOMMODATE IN BOTH IRRIGATION AND NON-IRRIGATION SEASONS THAT HAVE VARIATION OF WATER FLOW VOLUME EVEN IN RURAL AREAS."

and sewerage industry consulting, has launched its product, "STREAM", Ultra Low-head Micro Hydro Power Generation System. With their patents covering more than 40 countries, Seabell International's original dual vertical axis cross-flow turbine generator has realized electricity generation in head drop of less than 3m, with minimum of 0.5m, which used to require at least 10 m.

Currently, besides the installation in various domestic sites, Seabell has joined overseas projects entrusted from international organizations and the Ministry of Economy, Trade and Industry in Japan. In India, even local manufacturing is considered. In Viet Nam, Laos, Cambodia, Myanmar of South-east Asia, and Ethiopia, Kenya in Africa, eco-friendly projects for cost saving and stable power supply are underway.

COMPANY DATA: **SEABELL INTERNATIONAL CO., LTD.**

HEAD OFFICE ADDRESS: 2-8-11 Higashi-Kanda, Chiyoda-ku, Tokyo, JAPAN 101-0031

ESTABLISHED: March, 2004

CAPITAL: 212.5 million yen

BUSINESS DESCRIPTION: Research and development of renewable energy. Manufacture and sale of micro hydropower. Design and consulting of micro hydropower.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: In 2008, some pilot projects commissioned by central and local government of Japan. In 2011, Joint research project with Waterworks of Tokyo metropolitan government. In 2012-2014, feasibility study in India commissioned by government of Japan. Now, some projects are in progress in South-east Asia and Africa in cooperation with government of Japan and international organizations.

CONTACT: **tel** +81-3-5822-2275 | **mail** indo@seabell-i.com | **url** http://www.seabell-i.com/en

Solar Home System

Small solar home system and mobile phone charging system

Small solar home system generates electricity from high efficiency solar panel. The lighting embedded with 18 fluorescence LEDs provides110 lux of light, 5-10 times brighter than similar products in the market. The small yet high capacity battery (84Wh), can illuminate two lights for 6 hours when fully charged.

The control box is designed to last for 6 years, whereas the solar panel and the battery can be used for 20 years and for 2 years, respectively.

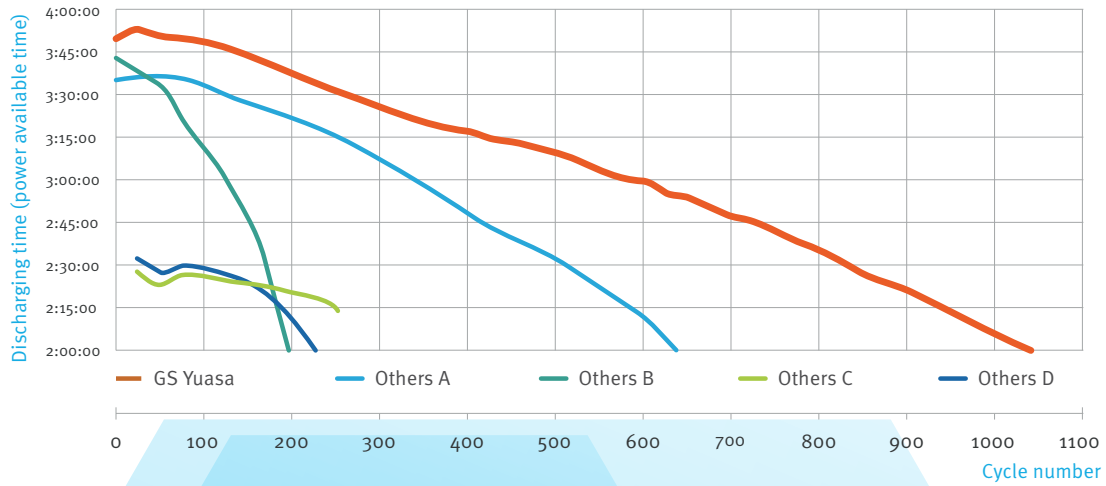
In rural Africa, the electrification rate is still below 20 percent. The life of the residents heavily depends on kerosene lanterns for lighting and firewood for cooking. They have long been suffering from health problems, such as fire accidents, burns, accidental ingestion among children, and pneumonia caused by the inhalation of smoke.

To solve these problems, different types of solar lanterns have been developed for developing countries, but the majority focuses on lower costs, rather than on the quality of products. The average performance of those products is 6Wp solar panel, 10-20 lux LED, 6Wh battery. In comparison, GS Yuasa, a world leading battery manufacturer, has developed a superior quality product called “AKARi Solar Light Kit” that is powered by a solar panel that generates 10Wp of electricity with higher conversion efficiency (energy

LIGHTING BRIGHTLY AND LONG WITH 5-10 TIMES HIGHER PERFORMANCE THAN SIMILAR PRODUCTS, CONTRIBUTING TO THE REDUCTION OF HEALTH PROBLEMS AS WELL.

SMALL SOLAR HOME SYSTEM AND MOBILE PHONE CHARGING SYSTEM

DISCHARGING TIME | FROM FULL CHARGE TO 10.5V (DISCHARGING RATE IS 20A)



Comparison of cycle test with competing products

This chart illustrates the comparison between competitor’s batteries and GS Yuasa’s battery used for solar streetlight and some large systems. Vertical axis shows discharging time (power available time). It stops discharging when the voltage drops to 10.5V (power gets unavailable at time voltage). Horizontal axis shows the number of charge and discharge cycle. For example, if we want to use “others D” for two hours, we can use it for 200 times only. On the other hand, GS Yuasa’s product is available for 1,050 times. It has 1.5 times higher performance than the 2nd position product, 5 time performance than the worst product.

"ONE LED LIGHT OF THIS SYSTEM WILL ENABLE THE ENTIRE FAMILY TO ENJOY MEALS AND THE CHILDREN TO STUDY."

conversion ratio is 17.4%) The lighting with 18 fluorescence LED is 110 lux, 5-10 times brighter than similar products. The small battery has high capacity (84Wh), and two LED lights illuminate for 6 hours when the battery is fully charged one LED light lasts for 12 hours). The brightness of lighting is adjustable, and when the system is used with 50% capacity, the run time doubles. The control box is designed to last for 6 years, whereas the solar panel and the battery can be used for 20 years and for 2 years, respectively, and the long endurance of each component is also strong features of this system.

One LED light of this system will enable the entire family to enjoy meals and the children to study. Moreover, it can contribute to reducing health problems, for example, by connecting the optional mosquito repellent to its USB port. The risk of malaria can be minimized.

The USB output is 2A, powerful enough for quick charging. Five mobile phones can be charged simultaneously, and a system owner can consider starting a mobile phone charging business. Services with electric hair clipper can also be considered as a new barber business. This system provides not only the solution to the shortage of energy infrastructure, but also contributes to income generation, job creation and improvement of living standard.

COMPANY DATA: **GS YUASA CORPORATION**

HEAD OFFICE ADDRESS: 1, Inobanba-cho, Nishinosho, Kisshoin, Minami-ku, Kyoto, 601-8520, Japan

ESTABLISHED: June 1, 2004

CAPITAL: 10 billion yen

BUSINESS DESCRIPTION: Manufacturing & sales of automotive batteries, industrial batteries, power supply systems, switchgear, lighting equipment, ultraviolet systems, specialty equipment and other electrical equipment

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: In April 2014, sales started in Africa. Basic model "AKARi Solar Light Kit" has seen sales of 2,000 units in Ethiopia, 1,000 units in Papua New Guinea, and 2,000 in other countries. As of October 2014, the products are available in 26 countries in Africa, in addition to Indonesia, Uzbekistan, Bangladesh, Myanmar, and Marshal Islands. The sales will start soon in South American countries as well. One distributor in each country is in charge of the direct sales.

CONTACT: **tel** +81-3-5402-5717 | **mail** kentaro.kubo@jp.gs-yuasa.com
url http://www.gs-yuasa.com/us/index.asp

Solar Lantern

Rechargeable solar LED lantern

In rural areas, people are forced to walk substantial distances to mobile phone charging station to fulfill battery. This is the typical case of inconvenience in un-electrified areas. In the insufficient brightness of kerosene lamp, people can spend neither happy hours for families nor enough study hours for children, and many issues are caused by fossil fuel.

In such un-electrified areas, this rechargeable solar lantern is very convenient and its advantages can be easily felt in daily life. The rechargeable solar LED lantern is one of the most viable means for rural electrification.

Lack of access to electricity is not just limited to inconvenient life style. The mal-effect can be exemplified by usage of kerosene lamp, which is commonly used as illumination in un-electrified areas, is not just insufficient in lighting daily life, it produces harmful smoke which causes health hazards, as well as injuries from burning, fire accidents, not to mention that fuel expense weighs heavily on household budget.

International Energy Agency (IEA) officially reported in 2012 that approx. 1.3 billion of people, which is equivalent to 20% of world population, are living their daily lives, facing these kinds of problem.

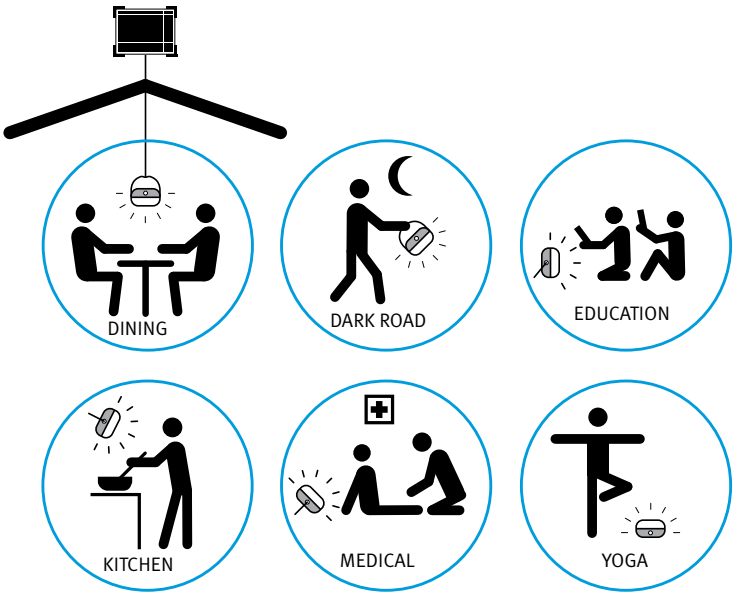
The rechargeable solar LED lanterns, based on advanced lighting and battery technologies, can solve not only the problems of such daily illumination, but also recharge cell phones that are widely spread even in un-electrified rural areas. Panasonic, who developed and manufactures its solar lanterns, is trying to introduce the products to households, outdoor works, shops, factories and public institutes such as schools and hospitals mainly in South East Asian and African countries, and the application has been steadily expanded. In the market where Panasonic can be fully confident of the big sales volume in the future, it is also possible to consider the possibility for local assembly, by supplying key components from Japan, so that total cost for products can be reduced.

THE RECHARGEABLE SOLAR LED LANTERNS' MAX. 90 HOURS OPERATION WITH BUILT-IN LONG LIFE BATTERIES, AND MOBILE PHONES RECHARGEABLE, LIKE "DOUBLE FUNCTIONS IN ONE UNIT"

SMALL SOLAR HOME SYSTEM AND MOBILE PHONE CHARGING SYSTEM

Large size of solar panel can reduce charging hours

3.5W solar panel enables full charge in approx. 6 hours (in the case of fine weather) and can be installed on the rooftop via 5m connection cable. The built-in rechargeable battery, one of the key components, can keep more than 90% of its capacity even if it is left for one year after being charged, and can be very useful during sudden blackouts. USB output has its capacity of DC 5V /500mA, and can charge the mobile phone, of which battery has 700mA capacity, in approx. 2 hours. Water proof IP34 can realize its usage in outdoor and rain fall conditions.



"IT CAN BE HUNG FROM THE CEILING LIKE CEILING LIGHT, CAN BE PUT ON THE TABLE LIKE DESK LIGHT AND CAN BE CARRIED LIKE TORCH LIGHT."

The rechargeable solar LED lanterns can offer 360 degree irradiation, and the brightness is very easy on eyes. It can be hung from the ceiling like ceiling light, can be put on the table like desk light and can be carried like torch light. The biggest advantage is its powerful built-in NiMH battery technology. It is over 1,500 times rechargeable, and it can be used at high mode (100lx) for 6 hours and at low mode (6lx) for 90 hours. The efficient 3.5W solar panel enables full charge in 6 hours. Not only LED and storage battery technology/ know how but the considerations for daily usage such as cell phone charging mode have been fully incorporated into its design. Since anybody can easily handle it and realize the convenience of electricity, it is also expected that solar lanterns can effectively contribute to the electrification in un-electrified rural areas.

COMPANY DATA: **PANASONIC CORPORATION**

HEAD OFFICE ADDRESS:1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8501, Japan

ESTABLISHED: March, 1918 (incorporated in December, 1935)

CAPITAL: 258.7 billion yen

BUSINESS DESCRIPTION: Panasonic is one of the largest electronics manufacturers in the world, who produces, sells and provides the service for its wide range of products such as electric components, AV equipment, home appliances, FA equipment, IT devices and housing equipment.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: Panasonic has started the sales of its rechargeable solar LED lanterns in un-electrified market of Asian and African countries since December of 2013. And also it is promoting its donation project of 100 thousand solar lanterns by the year 2018, when it will celebrate its century anniversary, and it donated more than 14,000 solar lanterns to 9 countries through NPO/NGOs and international organizations in 2013.

CONTACT: **tel** +81-50-3739-0785 | **mail** hotta.takayuki@jp.panasonic.com | **url** http://panasonic.net

Gasification System

Dry Distillation Gasification System

This Dry Distillation Gasification System significantly reduces the operation load, environmental load, supplemental fuel and incineration residue, etc., which were issues of conventional-type waste incinerators. Two units of dry distillation gasification chambers are installed, enabling one to operate alone and inject wastes into the other one for continuous operation. This system thermally decomposes and gasifies wastes with the stable combustion temperature control.

The waste heat from the incineration can be effectively utilized for boilers, water heaters, air conditioners, power generators, etc. Furthermore, the ignition loss after the dry distillation (ratio of non- combusted materials within the incineration residue) is as low as less than 3%. The system would be useful in medical facilities and factories, etc. where there are difficulties with waste disposal.

SAFE AND EFFICIENT WASTE INCINERATOR THAT WORKS REGARDLESS OF THE WASTE TYPE, REQUIRES NO PRETREATMENT, AND CONTROLS AIR POLLUTION. ITS WASTE HEAT CAN ALSO BE UTILIZED.

Ultra-rapid Cooling

In major African cities, people are facing the issue of waste collection/treatment due to increased popula- tion. They are also battling a situation in which human damage and environmental secondary damage are es- calating as a result of illegal disposal and burial of med- ical wastes. Nevertheless, having incinerators would not, per se, solve the issue. This is because incinerators may create pollution, including contaminants like di- oxins, etc., and new environmental issues. In addition, there is also the question of conventional-type waste incinerators requiring the waste separation process be- fore incineration, treatment of waste incineration res- idue, and supplemental fuel to maintain high temper- ature, etc. Dry Distillation Gasification System solves such difficulties.

The system realizes a stable combustion process and combustion temperature control and completely incin- erates wastes to less than 3% ignition loss regardless of the incinerated wastes. The system controls the emis- sions of harmful substances, such as dioxins, carbon monoxide, etc. to the absolute minimum and enables re-use of waste heat from the incineration. The system is less expensive than conventional products, and is in operation within and outside of Japan, including Korea, China, Thailand,

SAFE AND EFFICIENT WASTE INCINERATOR THAT WORKS REGARDLESS OF THE WASTE TYPE, AND CONTROLS AIR POLLUTION.

HARMFUL SUBSTANCE EMISSIONS | COMPARISON WITH THE STANDARD VALUE IN JAPAN

	Dry Distillation Gasification Combustion System by KINSEI SANGYO	**Standard value in Japan**
Dioxins	0.073ng-TEQ/Nm3	5ng-TEQ/Nm3
Dust concentration	0.005g/Nm3	0.15g/Nm3
Nitrogen oxide	102ppm	250ppm
Sulfur oxide	0.035Nm3/h	K value
Hydrogen chloride	22mg/Nm3	700mg/Nm3
Carbon monoxide	0.01ppm	100ppm

Various harmful substance emissions are significantly lower than the standard levels in Japan which have been stipulated by the Air Pollution Control Act. The originally-developed stable high temperature combustion in the dry distillation gasification system enables them to control harmful substances to the absolute minimum, producing almost no environmental load.

"THE SYSTEM CONTROLS THE EMISSIONS OF HARMFUL SUBSTANCES, SUCH AS DIOXINS, CARBON MONOXIDE, ETC. TO THE ABSOLUTE MINIMUM."

Indonesia, etc. It is found in a number of fields, such as production factories, medical facilities, waste treatment businesses, research centres, etc.

This Dry Distillation Gasification System comes in dif- ferent types - from small to large for each installation location, main waste to be combusted and combus- tion scale. This is due to the fact that KINSEI SANGYO, which promotes the development, responds to requests of utilization sites (customers) in a detailed manner. Therefore, even though over 270 units are currently in operation within and outside of Japan, there is not a sin- gle plant that is the same. In addition, KINSEI SANGYO offers total support from the design and installation/ test-run to maintenance according to each situation by utilizing the know-how that they have gained in their long experience with environmentally-friendly com- bustion chemistry systems.

Plants are safe due to their sealed structure that allows no harmful substance to leak, and the operation meth- od is simple one-man control. KINSEI SANGYO also fo- cuses on teaching local operators and managers. On the other hand, they are fully-equipped with actual training plants and training rooms in the company and actively host training/observations from various foreign countries.

COMPANY DATA: **KINSEI SANGYO CO., LTD.**

HEAD OFFICE ADDRESS: 788 Yanaka-machi, Takasaki City, Gunma Prefecture 370-1203

ESTABLISHED: March, 1967

CAPITAL: 50 million yen

BUSINESS DESCRIPTION: Planning, design, manufacturing, installation and maintenance/ management of industrial waste incineration plants, various types of incineration equipment, sludge drying equipment and waste heat boilers. Pollution Control Manager Certificate, In- dustrial Waste Collector/Transporter Certificate, First-Class Electrician business, certificate of operations, and chief of boiler installation work.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: They started selling the products in 1980. They have provided over 270 units to Japan, Korea, China, Taiwan, Thailand and Indonesia. They have acquired patents in 15 countries in Europe, the U.S., and Asia. They possess over 80 basic patents, pe- ripheral patents, and international patents within and outside of Japan.

CONTACT: **tel** +81-27-346-2161 | **mail** kinsei@kinsei-s.co.jp | **url** www.kinsei-s.co.jp

Wind-turbine System

High-spec mid-sized wind-turbine system

High performance mid-size wind-turbine system is not easily available in the global market. The system starts rotating when the wind speed is as low as 3m/s and output as much as 300kW of electricity with over 11.5m/s of wind speed. In an area with the annual average wind speed of 6.5m/s, one unit can generate electricity (600MWh/year), which is equivalent to the electricity use for 160 households. The unit can cover over 200 households in agricultural areas in developing countries, which have less electricity consumption.

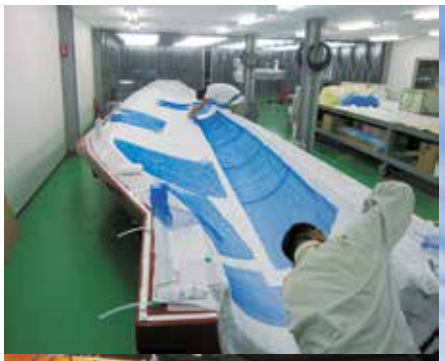
This compact design enables relatively easy transportation/installation. Furthermore, it is expected that new employment/business opportunities can be created from the maintenance, operation, etc. after the installation.

HIGH PERFORMANCE
MID-SIZE WIND-TURBINE SYSTEM WITH THE RATED OUTPUT OF 300KW.

ONE UNIT CAN GENERATE POWER EQUIVALENT TO THE ELECTRICITY USE OF 160 HOUSEHOLDS

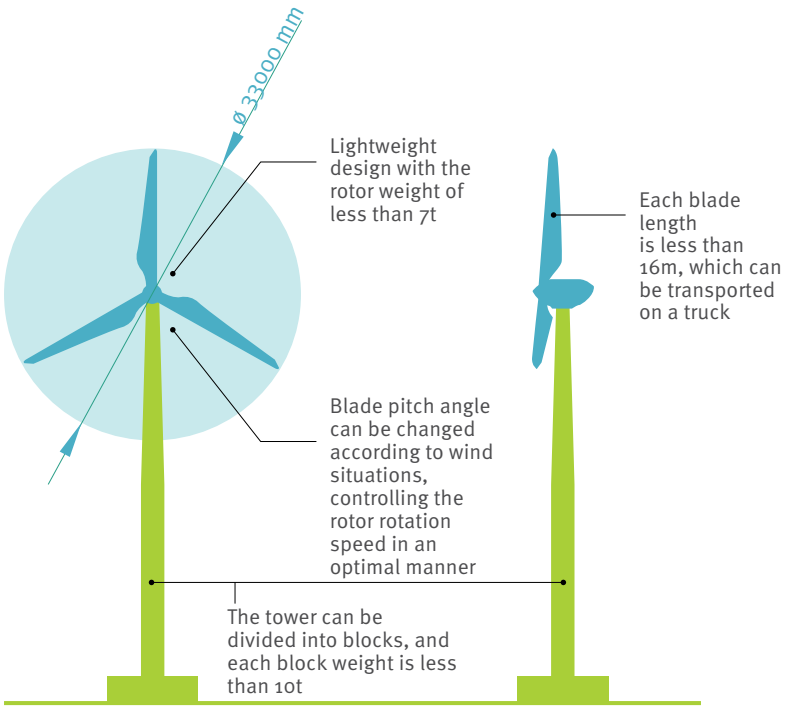
High Performance Turbine

Wind-power generation attracts attention as clean en- ergy. However, Japan has many mountains/ steep hills compared to Europe, U.S. and other areas. Japan is on the typhoon path, and faces many earthquakes. Due to such harsh geography and climate conditions, the dissemination of wind-power generation is not opti- mal. This “KWT300” is a mid-size wind-turbine system, which is suitable for such rather unique national geog- raphy and climate conditions as in Japan.



Since each blade is as light as approximately 700kg and easily receives wind, the turbine starts rotating when wind speed is as little as 3m/s and output as much as 300kW electricity at maximum with wind speed of 11.5m/s. In an area with annual average wind speed of 6.5m/s, for instance, one unit can generate electricity (600MWh/ year), which is equivalent to the electrici- ty use of 160 households. The unit can supply to over 200 households in agricultural areas in developing countries, which have less electricity consumption. What is notable is the technology that can change the blade pitch angle according to wind situations. Due to this, rotor rotation speed is controlled in an optimal manner, adjusting the power generation output. It can, thus, demonstrate significantly more stable and higher power generation efficiency compared to old European model mid-size wind turbines.

Regarding wind-power generation, a lot of electricity can be produced when there is strong wind. However, the generated power becomes zero if there is no wind. There are many communities in developing countries in which electricity depends on diesel power generators in mountains, remote islands, etc. If wind turbines, which have large fluctuations in power generation volume, are directly connected to diesel power generators, the fluc- tuations may considerably damage the system. There-



HIGH-SPEC MID-SIZE WIND-TURBINE SYSTEM

Specifications of the mid-size wind-turbine system **"KWT300"**

Rated power	**300**kW
Rotor diameter	**33**m
Rated rotation speed	**40.5**rpm
Cut-in wind speed	**3.0**m/s
Cut-out wind speed	**25**m/s
Survival wind speed	**70**m/s

Although this is mid-size, it offers great power generation efficiency. KOMAIHALTEC is the only company that can manufacture the high-spec mid-size wind-turbine system in Japan.

"THE TURBINE STARTS ROTATING WHEN THE WIND SPEED IS AS LITTLE AS 3M/S AND OUTPUT AS MUCH AS 300KW ELECTRICITY AT MAXIMUM WITH WIND SPEED OF 11.5M/S."

fore, in order to maintain the electricity quality, a con- verter is installed in this turbine. In addition, the blade pitch control prevents sudden output increase so that diesel power generators can keep up even in cases of a gust. This enables stability in electricity supply.

Furthermore, this is a compact design with the blade length less than 16m and tower that can be divided into 4-5 parts. It can be transported by a regular 10t truck and installed with a 60t crane. Maintenance and oper- ation, etc. will be promoted locally/will be locally taken care of after the installation, so it will lead to creation of new employment/business opportunities. Although this mid-size wind-turbine system was originally devel- oped for Japan, its true value may be demonstrated in developing countries.

COMPANY DATA: **KOMAIHALTEC Inc.**

HEAD OFFICE ADDRESS: 1-19-10, Ueno, Taito-ward, Tokyo 110-8547

ESTABLISHED: April, 1943

CAPITAL: 6,619.94 million yen

BUSINESS DESCRIPTION: Design/production/construction/inspection/repair of bridges, steel frames and other steel structures, design/contracting of civil engineering/building constructions and electricity sales business using wind-turbine system.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: One unit was introduced in Mexico in 2010 in a joint effort between the United Nations Development Programme (UNDP) and the Electric Research Institution of Mexico. They won a bid in Bhutan to introduce two units, which are scheduled to be installed in 2015. In addition, they have completed the feasibility study in the Maldives as part of a project by the Ministry of Economy, Trade and Industry. There are possibilities of introduction in North and Southeast Asia and other places.

CONTACT: **tel** +81-6-6475-2576 | **mail** renew@komaihaltec.co.jp | **url** www.komaihaltec.co.jp

Jatropha Bio-fuel

Bio-fuel utilizing Jatropha seeds

Nippon Biodiesel Fuel Co., Ltd. has established a sustainable local production system for local consumption business models by utilizing Jatropha-based bio-fuel. By promoting everything from the cultivation of Jatropha, which is the raw material, to usage of the bio-fuel within the local community, they can reduce the fuel cost in local/agricultural areas, which used to be higher than urban areas. Also expected is the creation of industry/employment opportunities.

ENERGY'S "LOCAL PRODUCTION FOR LOCAL CONSUMPTION." WIDELY SUPPORTING LIVES AND AGRICULTURE BY REDUCING THE FUEL COST IN AREAS WITHOUT ELECTRICITY

The fuel is currently utilized for power generators for mobile phone towers and for corn (maize) mills, etc. in Mozambique and in South-east Africa. Its scope of utilization is certainly spreading.

"Energy local production for local consumption". This refers to the establishment of a consistent system that starts with the cultivation of the plant, Jatropha. This is the source of the bio-fuel, the seeds of which are com- pressed to extract oil that is then refined. The finished fuel is used to drive local facilities, motors, diesel pow- er generators, etc. Jatropha requires almost no work, such as fertilizing and watering, and grows in poor en- vironments, even in areas with concerns about drought. Farmers can continue their existing agricultural activi- ties in the same way and plant Jatropha in unused land. The practice offers the farmers the advantage that they are more or less prepared for income reduction in case their main crops produced poorly. Farmers can grow Jatropha and use the energy produced from it without sacrificing food-production farmland. This style can easily be introduced to agricultural areas.

In 2012, Nippon Biodiesel Fuel Co., Ltd. launched the business in Mozambique with the support of the New Energy and Industrial Technology Development Organ- ization (NEDO). Effort was also made at the establish- ment of Union Organizations for farmers. There are, currently, some 6,000 farmers in approximately 100 unions participating in the business in Cabo Delgado Province, which is located in the northern area. The business also attracts considerable attention from the government of Mozambique as a new income source for low-income agricultural areas.

In addition, Nippon Biodiesel Fuel Co., Ltd. has since 2008 been working on breeding to overcome the issue of poor productivity of traditional Jatropha and utili- zation of oil extraction residue. The company collected Jatropha from across the world, promoted genetic re- search and multiplied its productivity by approximately 25 times (results recorded in 2010). Furthermore, the company has established the technology to turn the by-product (residue) after the oil extraction into feed/ fertilizer (joint patent). They have realized high value addition, which is expected to also lead to agricultural productivity improvement. Considerable momentum was accorded the establishment of the business in ag- ricultural areas of Mozambique, where fertilizer was hitherto not used.

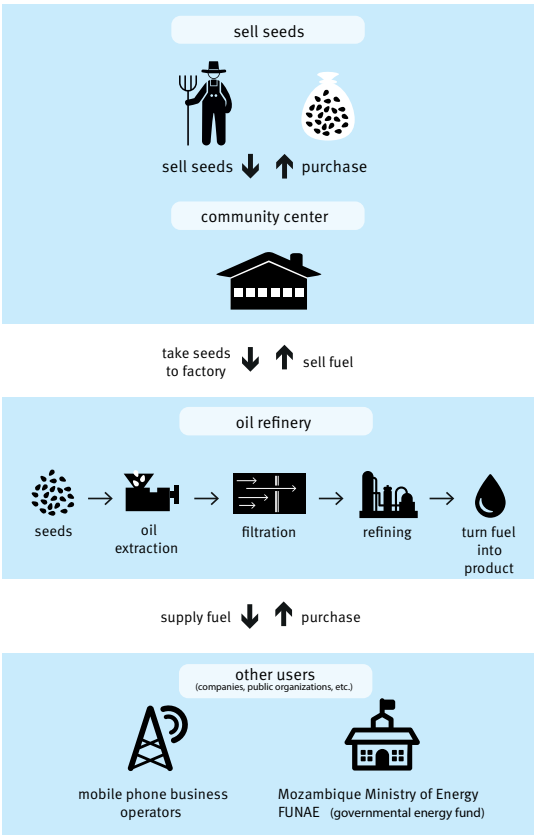
BIO-FUEL UTILIZING JATROPHA SEEDS

JATROPHA AND ENERGY SUPPLY IN AGRICULTURAL AREAS/CONCEPT

Since Jatropha, the raw material, is not suitable for human consumption, stable supply is possible at low cost.

Approximately 1L of high quality oil for biodiesel fuel can be extracted from 3-4kg of seeds (approximately three times canola and some five times soybeans) with the calorific power of 36.79GJ per ton (43.09GJ/t in case of diesel).

Even in the process, no special equipment or chemical, etc. is necessary. Since this is low-technology, operation is easy. The cost can also be kept low.



"JATROPHA REQUIRES ALMOST NO WORK, SUCH AS FERTILIZING AND WATERING, AND GROWS IN POOR ENVIRONMENTS, EVEN THOSE WITH CONCERNS OF DROUGHT."

Nippon Biodiesel Fuel Co locally promotes various ac- tivities, such as operating power generator stations (rather than gas stations), selling cold drinks and ice, renting charge-type lanterns, etc., to further conveni- ence. In agricultural areas, which are said to have less than a 2% electrification rate, the fuel price is increased by approximately 1.5 times compared to urban areas, mainly due to transportation cost. The local produc- tion of energy for local consumption also induced great expectations, not only to reduce fuel cost but also as a business to stabilize living infrastructure by creating employment opportunities, securing income sources, etc.

COMPANY DATA: **Nippon Biodiesel Fuel Co., Ltd.**

HEAD OFFICE ADDRESS: 655 Chiyo, Odawara City, Kanagawa Prefecture 250-0215

ESTABLISHED: January, 2000

CAPITAL: 226.802 million yen

BUSINESS DESCRIPTION: Import and sales business for vegetable oil, research and development business for vegetable oil, plantation management for energy crops, oil extraction and refining business for energy crops, sales of derivatives involving emission rights trading.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: They started the research and development in their farm in the Philippines in 2008. Since then, they have leased approximate- ly 100 types of seedlings and sold 10 sorts. They started the business in Mozambique in 2012, with the support of the NEDO. They were the first Japanese company to be selected for support by the AECF fund that has backed innovative business mod- els in Africa, since 2014.

CONTACT: **tel** +81-50-5532-4052 | **mail** info@nbf-web.com | **url** www.nbf-web.com/japanese

Thermal Decomposition

Recycling technology that thermally decomposes and gasifies organic wastes

The technology that can collectively treat organic waste (plastic and biomass) with thermal decomposition has been established. There is now a promise of commercialization for the equipment. Thermal decomposition, which heats waste from the outside, produces zero dioxins, unlike incineration. Furthermore, the high calorie gas produced in the decomposition of organic materials can be utilized as fuel for power generation, etc.

Commercial operation of this technology will start being promoted in Japan in September of 2015. The technology is scheduled to be deployed in developing countries concerned about increased waste, etc. due to population concentration.

U-turn Kiln

We produce a massive amount of waste in our daily lives and in industrial activities. Such waste is treated with incineration or by being buried under the ground. However, issues such as deadly poisonous gas, dioxin production and lack of landfill sites cannot be avoided. “C-POWER”, which is a technology to thermally decom- pose organic waste, not only solves such waste-related issues but also uses the combustible gas produced in the treatment for power generation. Any type of organ- ic material can be used as the raw material. This will in- clude materials, such as regular waste from households and businesses, plastic, plant waste (biomass), etc. Mix- tures can also be treated.

“DIOXIN-FREE”, WITH WHICH WASTE IS NOT INCINERATED BUT THERMALLY DECOMPOSED. IT CAN ALSO BE USED AS FUEL FOR POWER GENERATION, ETC.

The point here is that the technology does not inciner- ate (oxidize) these materials but heats the equipment containing the wastes from the outside to thermally decompose (reduce) the waste. Since the reaction does not involve oxygen, no dioxin is produced. The technol- ogy sends the high calorie combustible gas consisting of methane, hydrogen, etc., produced in the thermal de- composition, to the engine to generate power. Further- more, heat is collected from the exhaust gas to be used as energy. Power generation efficiency is approximate- ly 30%. The power generation efficiency of solar power generation is approximately 15%, so this technology’s great performance as power generation equipment should also receive attention.

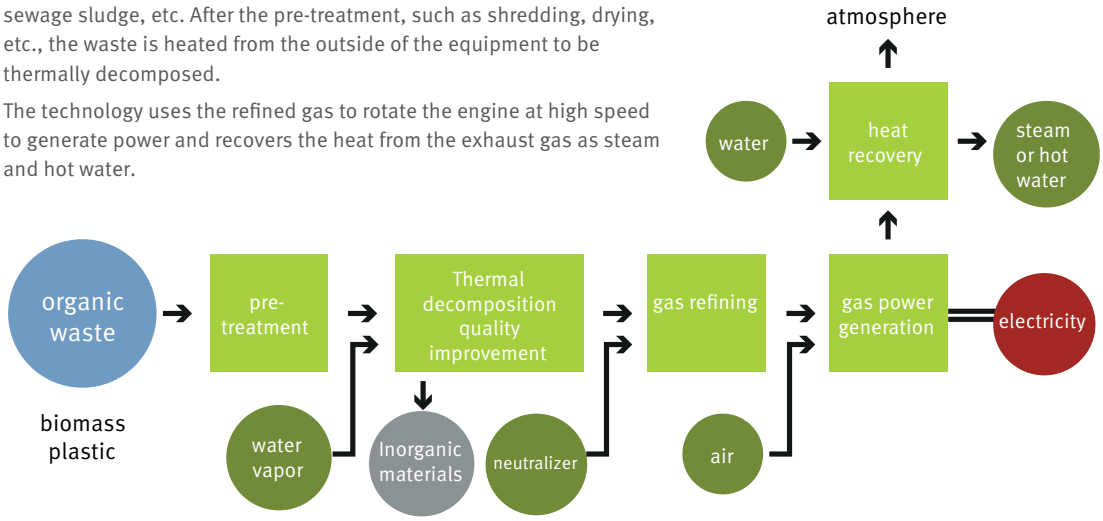
“U-turn kiln” was developed in 2000 based on this tech- nology. In this system, a horizontally-set up cylindrical incinerator rotates and decomposes waste as the waste moves left and right. The first commercial operation is scheduled to start in the spring of 2015 in Nasukogen Service Area (Tochigi Prefecture) of the Tohoku Ex- pressway. This will, per day be able to treat 5t of plant waste materials produced from tree pruning along roads, etc. A 100kW-scale power generator will also be installed. Furthermore, they have also been success- ful in developing “S (spiral)-turn kiln”, which can gasify the tar produced in thermal decomposition in the same equipment as the thermal decomposition. The demon- stration plant is in operation in Ishikari City, Hokkaido Prefecture.

RECYCLING TECHNOLOGY THAT THERMALLY DECOMPOSES AND GASIFIES ORGANIC WASTES

PROCESS OF "C-POWER" THAT THERMALLY DECOMPOSES ORGANIC WASTES

This technology can treat any organic material, such as plastic which is made of petroleum, wood, paper, food residue, human waste, sewage sludge, etc. After the pre-treatment, such as shredding, drying, etc., the waste is heated from the outside of the equipment to be thermally decomposed.

The technology uses the refined gas to rotate the engine at high speed to generate power and recovers the heat from the exhaust gas as steam and hot water.



"SINCE THE REACTION DOES NOT INVOLVE OXYGEN, NO DIOXIN IS PRODUCED."

On the other hand, a feasibility study of waste thermal decomposition power generation has been completed overseas in the Republic of Botswana, located in south- ern Africa. This is before anywhere else. The Republic of Botswana focused on this technology because the country was approaching the limit of waste treatment with its conventional landfill in the capital Gaborone. Botswana is not the only country in which the waste issue is escalating. In South-east Asian countries, etc., where the population of cities is significantly increas- ing, they are actually facing a situation in which waste is "pushed" close to residential areas. This technology may offer great contributions to solutions of such issues.

COMPANY DATA: **OSTRAND Corporation**

HEAD OFFICE ADDRESS: 1F Place Canada, 7-3-37 Akasaka, Minato-ward, Tokyo Prefecture 107- 0052

ESTABLISHED: September, 1976

CAPITAL: 25 million yen

BUSINESS DESCRIPTION: Engineering business for thermal decomposition plants that promote research and development for thermal decomposition gasification plants and beverage delacquering plants; consulting business for waste administration, companies/factories and waste treatment businesses.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: They successfully developed the "U-turn kiln" in 2000. They are scheduled to operate a commercial plant that will treat 5t of plant waste per day and generate 100kW-scale power (Sep of 2015). Furthermore, they made further revisions to the cham- ber and successfully developed the "S-turn kiln", in which the process has been simplified. The demonstration test for the pre-commercialization process started in 2014. The feasibility study has also been completed overseas in the Republic of Botswana in Africa, which is concerned about the rapid increase of waste.

CONTACT: **tel** +81-3-6894-7572 | **mail** hatta@ostrand .co.jp | **url** www.ostrand.co.jp

Eco Network

“local production for local consumption” electricity system

POWER GENERATION
SOURCE CAN BE ANYTHING, INCLUDING THE SUN, WIND AND WATER

Power generation source can be anything, including the sun, wind and water. A system that can procure the necessary amount of electricity on its own at the necessary time. This is a new electricity system, which is currently under development as an earth(global) environment-friendly and sustainable solution that can withstand electricity needs.

Electricity supply and demand are covered by clusters (groups) of several households – a few dozen households. This is a “local production for local consumption” electricity system, in which excess or lack of electricity can be compensated for among clusters. The necessary amount of electricity is procured on its own at the necessary time – the fund and time to install this system are less than the conventional electricity system, so it can be easily introduced anywhere.

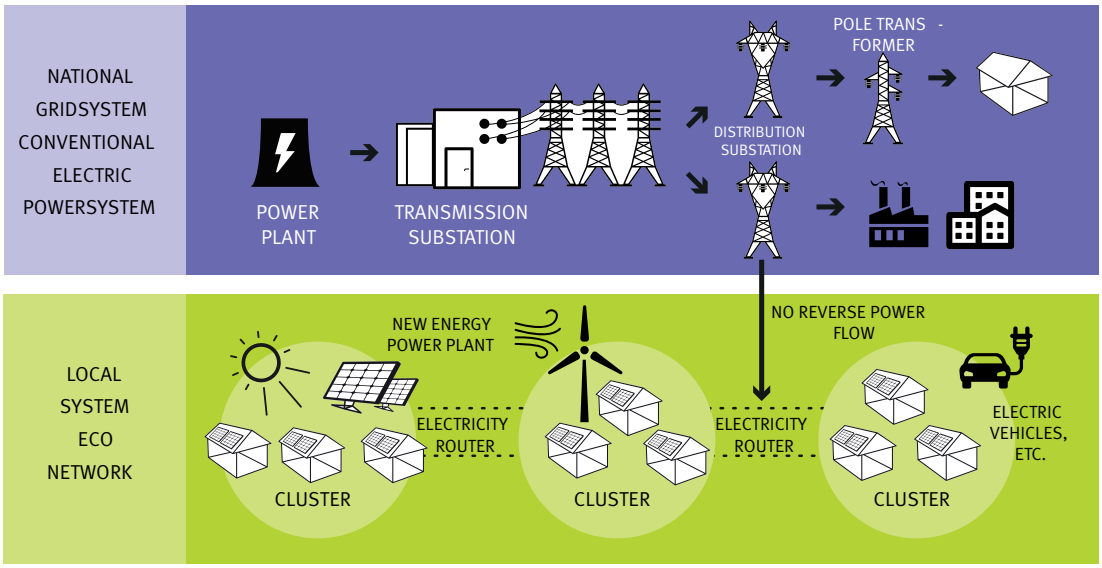
The current global electricity supply system takes the method of constructing a massive power plant, estab- lishing a long-distance transmission and distribution network and then supplying electricity to consumers. However, establishing this electricity infrastructure re- quires a huge amount of funds and time. The fact that most agricultural areas in developing countries are without electricity is due to this reason. In addition, us- ing a lot of fossil fuels for power generation increases CO_2 emissions, triggering health damage and global warming from air pollution.

The new electricity system “ECO Network” is being de- veloped as a solution that prevents such varied issues and withstands ubiquitous electricity needs. “ECO” comes from the initials of “Electricity Cluster Orient- ed”, and it can be described as “cluster expansion-type electricity network.” In this system, devices that gener- ate power from natural energy, such as sunlight, wind, water, etc., and batteries are installed very close to con- sumers in order to be connected to them. Frequency & voltage are controlled independently from GRID, and thus there is no problem in harmonizing ECONetwork with GRID. The group of the demand and supply for electricity is a “cluster”.

For example, in case of an area without electricity in a developing country where electricity consumption is small, a 10kWh ECO Network can make a cluster into a group of dozens of households. Furthermore, as many of these clusters as desired can be connected via elec- tricity routers to be expanded, so that electricity can be compensated and shared among clusters. The charac- teristics are the clusters’ autonomic controls and this unique control algorism, in which clusters with excess electricity, automatically send electricity to those clus- ters that are lacking electricity.

CLUSTER EXPANSION-TYPE ELECTRICITY NETWORK

ECO NETWORK STRUCTURE



This is a “local production for local consumption” electricity system, in which electricity is supplied and demanded within/among clusters to compensate for excess/lack of electricity. Frequency and voltageare autonomously controlled, and there is no reverse power flow to the electricity system control.

Therefore, it can introduce a massive amount of renewable energy within clusters. There is also no problem with coexistence of electricity systems. The system offers high energy security, which can continue electricity supply in an autonomous manner in case of disasters, even in case of blackout of the national power grid.

“CLUSTERS WITH EXCESS ELECTRICITY, AUTOMATICALLY SEND ELECTRICITY TO THOSE CLUSTERS THAT ARE LACKING ELECTRICITY.”

This is practically a reinvention of the electricity system and “just-in-time” electricity. The system can cover the necessary amount of electricity on its own at the neces- sary time and can easily respond to increased demands. In addition, massive investments and time are required to build a new, conventional electric power system. However, if this system is put into practical use, the sys- tem can be introduced inexpensively and within a short period of time in a relatively easy manner. Furthermore, not using IT technologies for the control part lowers cost and eases maintenance/operation. The fact that the system enables cluster units to supply electricity in a self-sufficient manner and is disaster/terrorism resist- ant is another positive point.

COMPANY DATA: **Wind Engineering Centre Co., Ltd.**

HEAD OFFICE ADDRESS: 4-8-7, Sumida, Sumida-ward, Tokyo Prefecture 131-0031

ESTABLISHED: November, 1981

CAPITAL: 45 million yen

BUSINESS DESCRIPTION: Design/manufacturing/sales of wind tunnel devices and peripheral equipment, design/manufacturing/sales of measurement equipment, improvement and maintenance of existing wind tunnel facilities, production/sales of models for wind tunnel experiments, energy business.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: They have been promoting a demonstration test in Yamagata Prefecture in preparation for the practical use of the system for three years since 2012. They have been promoting, since July of 2014, a demonstration test of an ECO Network by utilizing actual households. They aim to provide this solution on a global scale, mainly in developing countries in the future, based on this demonstration test’s success.

CONTACT: **tel** +81-3-3610-6100 | **mail** sales@windec.co.jp | **url** www.windec.co.jp

Clean Water Supply System

8,000L of “clean water” per day

This compact water purification system was industrialized for rural area adopting the “slow sand filtration system.” Clean Water Supply System purifies water from rivers or lakes with physical filtration, bio-filtration and, chlorine sterilization. Its water purification capability is 8,000L per day. In terms of numbers of people, it can supply as many as 800-1,600 people with purified water (5-10L per person).

It, low in environmental load without using coagulant or filter, realizes sustainability since it requires no maintenance by specialists but residents can maintain/manage/operate it by themselves easily at low cost for long-term.

When Yamaha Motor Co., Ltd. established a affiliate in Indonesia in 1974, families of Japanese expatriates raised voices that “tap water is dirty and smelly.” This triggered the development of water purification sys- tems for households/offices. With the aim of improving the health and hygiene of local employees, who live us- ing river water, etc., and reside in areas without water supply infrastructure, they started the development of the Clean Water Supply System in 2000.

WATER
PURIFICATION SYSTEM WITH LOW ENVIRONMENTAL LOAD THAT CAN BE OPERATED AT LOW COST

This is a water purification system adopting the “slow sand filtration system”, implemented throughout the world for centuries, has been industrialized for rural area. Clean Water Supply System purifies water from rivers or lakes clean and safe with physical filtration, bio-filtration and, finally, chlorine sterilization. Its water purification capability is 8,000L per day. It can supply as many as approximately 800 – 16,000 people with purified water. Furthermore, it does not use coagulant or filter, and it circulates the filtration tank with gravity once it takes water with an electric pump, from rivers, etc. Therefore, it conserves energy and has low envi- ronmental load. Even in areas without electricity it can be operated with the solar power generation system, which is an option. In addition, it requires almost no re- placement of parts or special maintenance by engineer, and can be maintained/managed/operated easily and at low cost for long-term.

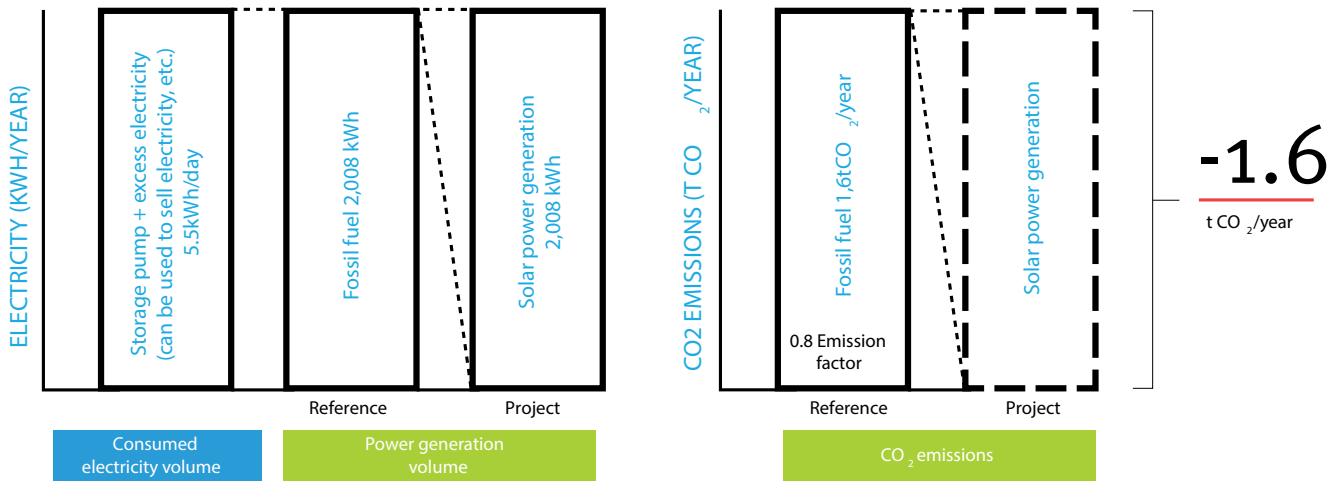
They have installed the system in eight locations in six countries mainly in the Asia region for studies/ monitor- ing and conducted data collection, issue extraction, im- provement and modification. Since its release in 2010, they have installed Clean Water Supply System in four locations in two Southeast Asian countries and two lo- cations in two African countries (as of Sept-2014). Sta- ble clean water supply has improved residents’ hygienic condition and significantly reduced diseases (such as diarrhoea, fever, etc., due to unsanitary water) in areas where they have installed the system. Since the resi- dents have been freed from water-fetching work, they can now spend more time on production/study activi- ties. This system is also contributing to improvement in quality of life.

“SINCE THE RESIDENTS HAVE BEEN FREED FROM WATER-DRAWING WORK, THEY CAN NOW SPEND MORE TIME ON PRODUCTION/STUDY ACTIVITIES.”

Furthermore, residents have established a committee to operate maintenance/operation/sales of water, etc. and paid wages to committee members involved such operations. It has created BOP business, such as new employment opportunities, businesses to deliver and sell purified water to out of the communities, paving new ways for cash income.

WATER PURIFICATION SYSTEMS FOR HOUSEHOLDS/OFFICES

CALCULATION OF CO2 EMISSION/REDUCTION EFFECT



Reference CO2 emissions

Consumed electricity (5.5kWh/day) x 365 days x CO2 emission factor 0.8 = approximately 1.6t CO2/year

Project CO2 emissions

Power generation volume (renewable energy: 2,008kWh) x CO2 emission factor (renewable energy: 0) = ot CO2/year

This shows how much CO2 can be reduced if the Clean Water Supply System is introduced. This system is also often installed as a set with a solar power generation system in areas without electricity. If the electricity of 2,008kWh (used to take water from rivers with a water pump) is converted into fossil fuels, the CO2 emissions would be approximately 1.6t per year. However, if solar power generation is used, this number becomes zero, which means that as much as 1.6t of CO2 is reduced per year.

COMPANY DATA: **Yamaha Motor Co., Ltd.**

HEAD OFFICE ADDRESS: 2500 Shingai, Iwata City, Shizuoka Prefecture 438-8501

ESTABLISHED: July, 1955

CAPITAL: 85,703 million yen

BUSINESS DESCRIPTION: Manufacturing/sales of motorcycles, scooters, boats and engines for racing carts, multi-purpose engines, power generators, water pumps, small snow plows, engines for cars, industrial robots, electric units for wheelchairs, etc. Import/sales of various products, tourism development business, management of leisure/recreation facilities and peripheral businesses.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: Clean Water Supply System has been installed in Indonesia (three locations), Vietnam (one location), Mauritania (one location - installed in a national park as part of the Grant assistance for Cultural Grassroots Projects of Japan by the Ministry of Foreign Affairs), Senegal (one location - in cooperation with JICA), etc. They are installing Clean Water Supply System in a number of other locations, such as Benin, Côte d'Ivoire, the Philippines, etc. in the future. Their initiative to secure "safe water" in emerg- ing countries was evaluated and received the Good Design Gold Award in 2013.

CONTACT: **tel** +81-538-37-1717 | **mail** kakehit@yamaha-motor.co.jp
url global.yamaha-motor.com/jp

Molasses Bio-ethanol

High quality bio-ethanol production from molasses

The technology to produce bio-ethanol using sugarcane juice (molasses) as the raw material has been established, and the company hopes it will contribute to the production of ethanol in Ethiopia, which is an exporter of sugar. While the production and use of bio-ethanol is already being considered as a measure to stop global warming, the use of “agricultural wastes” as raw materials is only beginning to attract consideration.

PRODUCING BIO-ETHANOL BY UTILIZING THE OPTIMAL YEAST FOR “EACH COUNTRY” AND “EACH FEEDSTOCK”

The advantage of this technology lies in the development of yeasts that suit the climate and various raw materials that are available in each country, and there are high expectations that the technology will help promote the use of agricultural wastes.

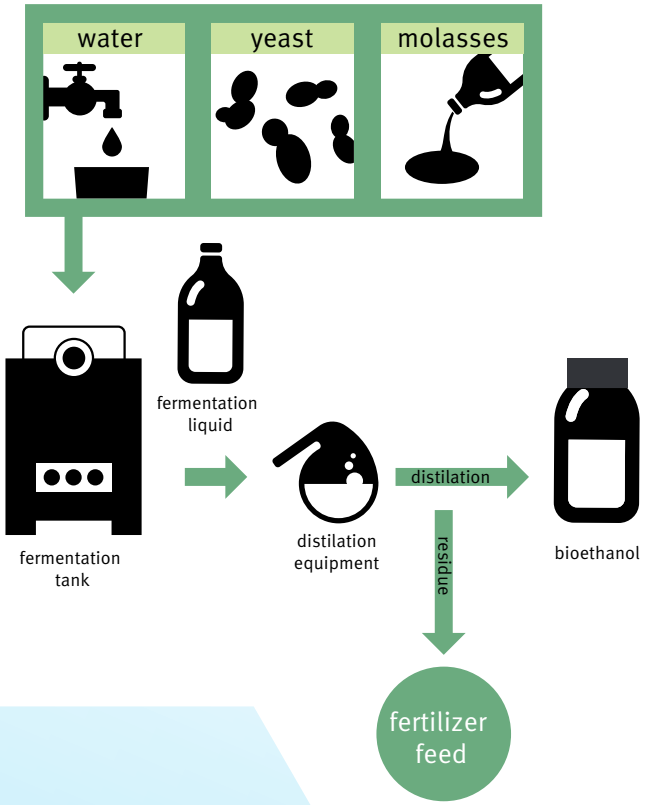
Bio-ethanol, which is produced by fermenting and dis- tilling the solution of sugar taken from plant materials, is attracting attention as a measure to combat global warming. Although it produces CO_2 when used as fuel, it does not increase the amount of CO_2 in the environ- ment since it was originally something that the plants had absorbed from the air; it is carbon neutral.

Biomaterial in Tokyo has developed the technology to produce high quality ethanol from molasses, and the company is aiming to put it to practical use in Ethio- pia. The production process using molasses, the res- idue left behind after sugar has been extracted from the sugarcane juice, is more or less the same as what is already being done with other feedstock such as corn and sugarcane. The difference lies in the performance of the yeasts that promotes fermentation. Biomaterial in Tokyo has developed several strains of yeast through cross-breeding and genetic modification that actively function even in areas with relatively high tempera- tures, an important feature for a country like Ethiopia. The modified yeasts also produce ethanol with less im- purities, meeting the standards outlined by Japan’s JIS (Japanese Industrial Standards). The company will also be bringing back to Japan the raw materials that are actually use“d in Ethiopia, and screen for optimal yeasts to further enhance ethanol productivity.

Sugar is an important export commodity in Ethiopia, and as such, large amounts of molasses are being produced on a daily basis. A portion

HIGH QUALITY BIO-ETHANOL PRODUCTION FROM MOLASSES

BIOETHANOL PRODUCTION PROCESS FROM MOLASSES



Bioethanol is produced by adding water and yeast to the raw biomass material (molasses in this case), fermenting them, and then distilling the final solution. The residue after ethanol has been removed can be reused by mixing with fertilizer and feed. The quality (such as impurities) and production volume of ethanol is determined largely by the yeast used. Biomaterial in Tokyo possesses its own know- how on its production.

"IT DOES NOT INCREASE THE AMOUNT OF CO_2 IN THE ENVIRONMENT."

of the molasses is already be- ing utilized to produce bio-ethanol, but the efficiency of fermentation is very poor with production volume being only about half of what is theoretically possible. Increasing the production volume of bioethanol by in- troducing the technology developed by Biomaterial in Tokyo would help Ethiopia meet its national policy of blending 10% bioethanol into its gasoline, which in turn may further stimulate the biofuel industry in Ethiopia.

On the other hand, the other residues that are pro- duced at the same time as molasses (such as bagasse) are also receiving attention. Biomaterial in Tokyo has also developed the know-how to produce ethanol from rice straws in Japan, and this can also be applied to fer- ment the cellulose in bagasse. In many Asian and African countries, there are concerns with the large amounts of waste materials produced from large agricultural indus- tries, such as seeds and husks from palm oil extraction, straws from rice fields, and bagasse from sugar refin- eries. Biomaterial in Tokyo hopes to approach issues faced by such countries after achieving results with the project in Ethiopia.

COMPANY DATA: **BIOMATERIAL IN TOKYO CO., LTD.**

HEAD OFFICE ADDRESS: 109 Venture Plaza Funabashi, 1-17-25, Kitahoncho, Funabashi City, Chiba Prefecture 273-0864

ESTABLISHED: June, 2006

CAPITAL: 75 million yen

BUSINESS DESCRIPTION: Development of biomass-related technology with a focus on "sugar", consulting work related to biomass use, development of food materials.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: The development of technology to produce ethanol from rice husks as a research project with the Ministry of Agriculture, Forestry and Fisheries. Overseas, they began a joint research with an Indonesian research agency on strains of yeast suitable for ethanol production in 2012. Since 2014, they have also been promoting the full-scale production of ethanol in Ethiopia using molasses as the raw material.

CONTACT: **tel** +81-47-409-8824 | **mail** bits@biomt.jp | **url** www.biomt.jp

Floating Solar Panels

Bubbling system for fish-farming utilizing floating type solar panels/independent power sources

This is a bubbling system (gasification method for liquid) for fish farming, utilizing completely waterproof solar panels/independent power sources. This accomplished utilization over the sea, where securing power source is difficult. The system sends micro bubbles to fish-cages; promotes the growth of fish and shellfish in deep water, which tend to lack oxygen; and contributes to sickness prevention and water quality improvement by using solar light as only power source.

In addition, security cameras, LED lighting and communication equipment on the rafts can be installed, enabling security enhancement and monitoring/support from remote locations. This system is currently utilized for milkfish farming in Laguna Lake in the Philippines. The system is demonstrating great results by increasing the survival rate, which used to be an estimated 10%, to over 50%.

Availability of food or, indeed, food production is a serious issue not only for countries in Africa but for developing nations across the globe. Fish, which constitutes valuable protein sources, are some of the important food items especially in these countries. However, due to increased water temperature (caused by abnormal weather resulting in part from global warming), lack of relevant infrastructure for fishing facilities and lack of skills, etc., the amount of fish usually caught is unstable. The bubbling system for fish farming utilizing floating type solar panels/independent power sources solves such issues.

ULTRALIGHT SOLAR PANELS THAT CAN BE INSTALLED OVER THE SEA WHERE SECURING POWER SOURCE IS DIFFICULT.

GREATLY PROMOTING THE FISH FARMING INDUSTRY

In this system, one installs completely waterproof solar panels (which were designed to be used over the sea), control devices, batteries, etc. on a raft, and produces fine micro bubbles from underwater pumps to solve the issue of lack of oxygen in water. The system enables fish in fish-cages to grow healthily, and it also contributes to the improvement of water quality. The technology was supplied by Power Bank System Co.,Ltd., which is a solar cell manufacturer. Since they developed solar panels that not only are completely waterproof but also can be made ultra-light, ultrathin and in curved form, the panels can be installed regardless of the location. In addition, since no cable is required to run on the sea floor, the system enables fish farmers to promote low- cost, well-planned and stable fish farming.

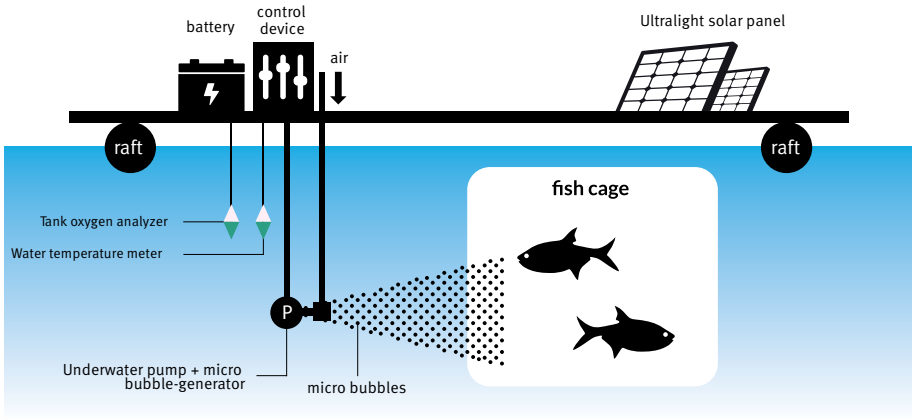
This system has been in use for milkfish (local national fish) farming in Laguna Lake in the Philippines since 2011. The practice has been part of extension services to the governments of developing countries based on Japan's Official Development Assistance for Overseas Economic Cooperation Projects. The system has demonstrated great results by increasing the survival rate, which used to be an estimated 10%, to significantly over 50%. The project is still in operation in the Philippines as a privately-owned extension service demonstration project.

BUBBLING SYSTEM FOR FISH FARMING UTILIZING FLOATING TYPE SOLAR PANELS/INDEPENDENT POWER SOURCES

SYSTEM CONCEPT IMAGE FOR "UKISHIMA", WHICH IS A BUBBLING SYSTEM FOR FISH FARMING

Ultralight solar panel
Size: 1795mm x 500mm x 20mm
Weight: Approximately 6kg
(1/20 of a common panel)
Power generation capacity: 158V/45W

Completely waterproof solar panels, control devices, batteries, etc. are installed on rafts to produce fine micro bubbles from underwater pumps by using independent power sources. This promotes the growth of farmed fish and realizes stable and well-planned fish farming.



"THE SYSTEM ENABLES FISH IN FISH-CAGES TO GROW HEALTHILY, AND IT ALSO CONTRIBUTES TO THE IMPROVEMENT OF WATER QUALITY."

Japan Electric Power Co., Ltd. promotes almost every activity related to negotiations and contracts with such domestic and foreign governmental agencies, local municipalities and fish-farming business operators. The company also offers additional support, such as certification application, studies, fund procurement, local environmental establishment/installation/ technical instructions, etc.: "Local production for local consumption with renewable energy".

Japan Electric Power Co., Ltd. promotes industrial improvement, creation of employment opportunities and rejuvenation of local economies based on the basic philosophy that "renewable energy that uses local resources should be utilized in the area". The company not only provides the technology to revitalize the primary industry, which is the foundation, but also trains local technicians. In the future, they will dispatch, as instructors, experienced, talented and retired Japanese technicians, who along with this bubbling system will definitively enhance development. The experts are scheduled to develop local residents as engineers and work to further enhance the education system so that the educated can contribute much more to their own countries as next generation technical instructors.

COMPANY DATA: **JAPAN ELECTRIC POWER CO., LTD.**

HEAD OFFICE ADDRESS: Hikawa-annex 2-502, 6-9-5 Akasaka, Minato-ward, Tokyo Prefecture 107-0052

ESTABLISHED: February, 2012

CAPITAL: 20 million yen

BUSINESS DESCRIPTION: Practical-use feasibility study business for introduction of renewable energy, such as solar power generation, power gener- ation construction business, maintenance operation business, local rejuvenation business and technician training business. Various types of coordination for commercialization for solar cell manufacturers in Japan. "Innovative environment technol- ogy project for green and water." - part of the collaboration of primary, secondary, and tertiary industrialization of rural areas, etc.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: This product was introduced to oyster farming in the Yatsushiro Sea in Kumamoto Prefecture between 2011 and 2012 (pro- ject obtained cooperation from the Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry). The product is utilized for milkfish farming in Laguna Lake in the Philippines (from 2011/project had cooperation by JICA).

CONTACT: **tel** +81-3-3610-6100 | **mail** sales@windec.co.jp | **url** www.windec.co.jp

Biomass Fuel

Technology that converts unnecessary agricultural biomass into energy

This new biomass fuel as an energy source of the next generation controls its CO2 emissions at approximately 1/3 of coal while having the same level of calories as coal. Since the raw material of this fuel is agricultural biomass (plant-based wastes created in the course of agricultural production), the procurement cost can be controlled. It also contributes to the solution of the waste treatment issue and can manufacture fuel of even quality from any raw material, such as rice husks, coconut husks, etc.

NEW SOLID FUEL
THAT REDUCES CO_2 EMISSIONS TO 1/3 OF THAT OF FOSSIL FUEL, REGARDLESS OF RAW MATERIAL OR PLACE

Alternative Solid Fuel

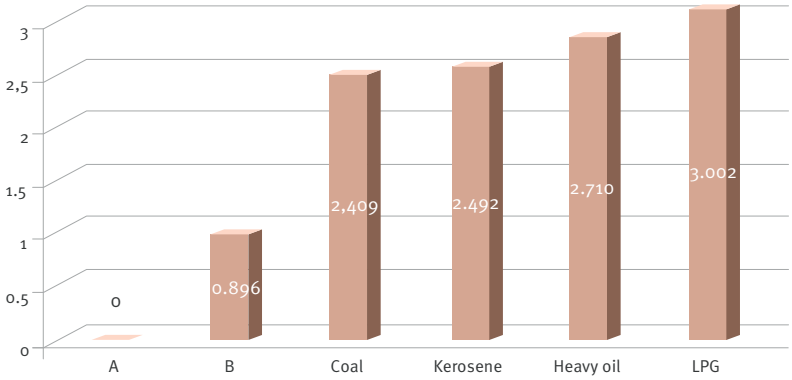
New biomass fuel is an alternative solid fuel for coal, and the main raw material is agricultural biomass, such as wood wastes, rice husks, coconut husks, etc. They finely shred raw materials, mix them with unnecessary plastic as a binder, and solidify them. Plastic composi- tion ratio in conventional solid fuel was close to 50%, but they have been successful in keeping the ratio un- der 15% in the new biomass fuel. The biggest character- istic is that they can control the CO2 emissions based on the carbon-neutral principle by increasing the ratio of biomass-based raw materials. This was certified as “fuel with great low carbon promotion effects” by the Minis- try of Economy, Trade and Industry and the Ministry of Environment in Japan.

The calorific value is approximately 25MJ/kg, and it was designed to be the same level as coal. Therefore, the fuel can also be mixed and used with coal in thermal power generation, etc. Materials are completely controlled by computers so that this quality is maintained regard- less of the location of the production. Approximately 20,000t of this new biomass fuel, which has been com- mercialized as “GREENCOAL”, has been produced by a Creative K.K. factory (Hiroshima Prefecture), which of- fered the license for the technology to BGCT JAPAN in 2004, by using wood as the raw material. They supply the fuel to power generation plants and paper factories. In Japan, the construction of the demonstration factory and research and development facility in Tamura City of Fukushima Prefecture, which was affected by the Great East Japan Earthquake, has also been decided as a sub- sidized project by the Ministry of Economy, Trade and Industry with the aim of creating employment opportunities, rejuvenating the local economy, etc.

With the background of the disposal issue of unneces- sary agricultural biomass and heightened interest to- ward greenhouse gas control measures, this technolo- gy is also attracting more attention from overseas. The launch of the “GREENCOAL” project has been decided in 12 countries worldwide, including India, Indonesia, Malaysia, Cambodia, Thailand, Kenya, Ethiopia, U.K., Germany, etc. Pilot plants are scheduled to be in oper- ation in several countries in a few years. Expected, for example, are

TECHNOLOGY THAT CONVERTS UNNECESSARY AGRICULTURAL BIOMASS INTO ENERGY

COMPARISON IN THE CARBON DIOXIDE PRODUCTION | VOLUME (T-CO2/T)



Source: Ministry of Economy, Trade and Industry

A Product that does not use plastic as the binder

B Product in which plastic has been added to the binder

"GREENCOAL" with 15% plastic composition ratio produces approximately 1/3 CO_2 emissions of coal, carbon- neutral (CO_2 produced when plants are incinerated is not counted as part of the emissions, due to the fact that it was taken in from air to begin with). In addition, they also have a policy to develop a 100% biomass product without plastic as the binder overseas, and this type will produce zero CO_2 emissions.

"CERTIFIED AS 'FUEL WITH GREAT LOW CARBON PROMOTION EFFECTS.'"

rice husks and rice straws for India and Thailand and coconut husks, etc. in Indonesia and Ma- laysia as raw materials, in accordance with each coun- try's situation. Since the said countries have already been disposing of a massive amount of these materials, the procurement cost of these is significantly lower than that of petroleum and coal.

In the practical use phase, they will aim to produce 150,000 – 200,000t-class production per factory per year. On the other hand, there is also a plan to estab- lish a small-scale facility by the unit of settlement to produce fuel and simultaneously generate power using the fuel. This plan is expected not only to improve the living standard, in which power shortages are common, but also to create employment opportunities, including maintenance personnel, etc. In addition, this technolo- gy was presented at "Rio+20 (United Nations Confer- ence on Sustainable Development)", which was held in Brazil in 2012.

COMPANY DATA: **BGCT JAPAN K.K.**

HEAD OFFICE ADDRESS: Dai-2 Mizuno Building, 5-35-6 Shinbashi, Minato-ward, Tokyo Prefecture 105-0004

ESTABLISHED: January, 2012

CAPITAL: 10 million yen

BUSINESS DESCRIPTION: R&D, manufacturing, sales, and consulting businesses for the new biomass fuel "GREENCOAL" and its raw materials. Opera- tion management for intellectual properties, education/training for human resources development, and consulting business.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: They started the production of approximately 20,000t per year in Higashihiroshima City (Hiroshima Prefecture) in 2014. They supply the fuel to power generation plants, etc. and export part of the fuel to India. Overseas, projects with an outlook of local production in the future are being launched in Asia, Europe, Africa, etc.

CONTACT: **tel** +81-3-6721-5766 | **mail** info@bgct-japan.com

Coating Technology

Coating technology to form a thin film containing ultraviolet ray shielding agent and infrared ray shielding agent

Even if one applies films, etc. to windows to control sunlight exposure, heat penetrates windows. On the other hand, while the type of glass that reflects sunlight prevents heat penetration, it heats up the area that receives the reflected heat; and it is said to be one of the causes of “heat islands”.

This is a new technology that evenly applies a thin film, which lets sun- light brightness through the glass but shuts off infrared ray that causes heat and ultraviolet ray that causes glass tanning. The thin film after coating is resistant to heat crack and scratches because of the superior hardness; therefore, it is not necessary to re-install the coating as with a film type product.

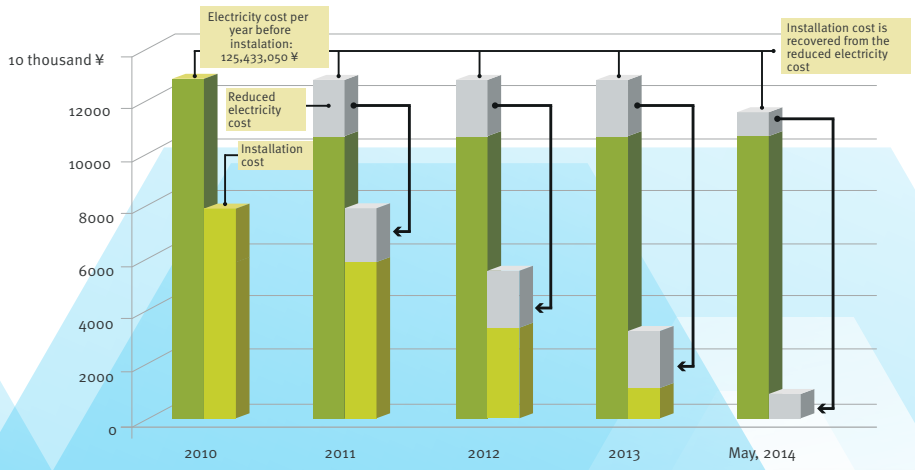
In this coating technology, a strain-free thin film is formed on the glass surface by using a special spray gun to spray conductive metal oxide which, itself, is used in touch panels, etc., on the glass surface. The formed thin film shuts off approximately 70% infrared ray, which causes heat, to control the room temperature rise. The sensible temperature in this case achieves -8°C to -10°C. In terms of air conditioner temperature setting, this can be reduced by approximately 2°C. On the other hand, in cold seasons, the thin film absorbs the heat (far infrared ray) inside the room and thus solves the cool radiation problem, controlling the outflow of heat from the room. As a result, the thin film accomplishes air con- ditioning/ heating cost reduction, energy conservation and CO2 reduction.

In Africa, where warming and population increase are simultaneously escalating, they expect that construc- tion of buildings that do not depend on air conditioners/ heaters or which cause heat reflection will become an issue that must be solved. FUMIN, which developed this technology, suggests that “installation of the FUMIN coating, in which a thin film is applied to glass, is desira- ble when buildings are first constructed.”

CONTROLLING
HEAT AND INSECTS WITH THE COATING TECHNOLOGY THAT SHUTS OFF 70% OF INFRARED RAY AND 90% OF ULTRAVIOLET RAY

COATING TECHNOLOGY TO FORM A THIN FILM CONTAINING ULTRAVIOLET RAY SHIELDING AGENT AND INFRARED RAY SHIELDING AGENT

COST EFFECTIVENESS OF THE FUMIN COATING



This is an installation example for the National Art Center, Tokyo.

The FUMIN coating reduced electricity consumption per year for this museum by approximately 18%. As a result, the calculation shows that they have finished recovering the installation cost in approximately three years and four months.

"ACCOMPLISHES AIR CONDITIONING/ HEATING COST REDUCTION, ENERGY CONSERVATION AND CO_2 REDUCTION."

In addition, this thin film shuts off approximately 90% of ultraviolet ray. Therefore, it not only prevents dis- coloration or deterioration inside the room (due to sunlight exposure) but also keeps insects, which have the tendency to assemble around ultraviolet ray, from gathering. This also contributes to prevention of trans- missible diseases carried by pests. On the other hand, it still secures visible light transmission of approximately 80%, so that it has very little impact on the brightness of the room. It can equally keep the dependency of interior lights using electricity low.

In addition, the coating can be applied to contoured glass, glass containing steel, template/curved/ large glass, and even glass blocks, to which a film cannot be adhered. The FUMIN coating responds as well to au- tomobile glass. Since the spraying work is done from the inside, it is not affected by rain or wind. In addition, the coating is resistant to heat crack and scratches be- cause of the superior hardness (approximate hardness of 7H pencils). Therefore, the effect of the coating is semi-permanent. It is also not necessary to re-install the coating as with a film type product. The installation work is simple, and it is expected that it would direct- ly lead to the expansion of employment opportunities for working staff in countries that newly introduce the coating, such as countries in Africa, etc.

COMPANY DATA: **FUMIN Co., Ltd.**

HEAD OFFICE ADDRESS: 21 Gonome Aza Kami, Fukushima City, Fukushima Prefecture 960-8161

ESTABLISHED: November, 1978

CAPITAL: 10 million yen

BUSINESS DESCRIPTION: Sales/installation and technical instructions for energy conservation window coating material. Manufacturing/sales of agri- cultural/environmental measure materials.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: The total installation area in Japan is 65,000 m^2 (2,200 cases) as of 2014. The total installation area overseas is 4,100 m^2 (60 cases). They have acquired patents in seven countries and one region, including the U.S., China, etc.

CONTACT: **tel** +81-24-544-0223 | **mail** fumin@fumin.jp | **url** www.fumin.jp

Amorphous Alloy

Amorphous metal material for energy efficiency distribution transformers

Amorphous alloy, made into a ribbon form by using the ultra-rapid cooling casting technology, has characteristics that are suitable for transformer cores. It can keep the no load loss to approximately 1/3 of that of conventional transformers that use directional electromagnetic copper foil for the core. Introduction of transformers using amorphous alloy for the core is expected to be highly effective in Africa, etc., where additional distribution networks will be constructed in the future.

Transformers made with amorphous metal will provide increased power generation volume, and desired efficient utilization of energy.

Ultra-rapid Cooling

“Amorphous” refers to the point in which metal turns into a liquid-like solid material with irregular atomic ar- rangement. This results from ultra-rapid cooling (over 1million °C per second) of high temperature molten metal. Amorphous metal containing a high percentage of iron is a great soft magnetic material, which is suita- ble for transformer cores.

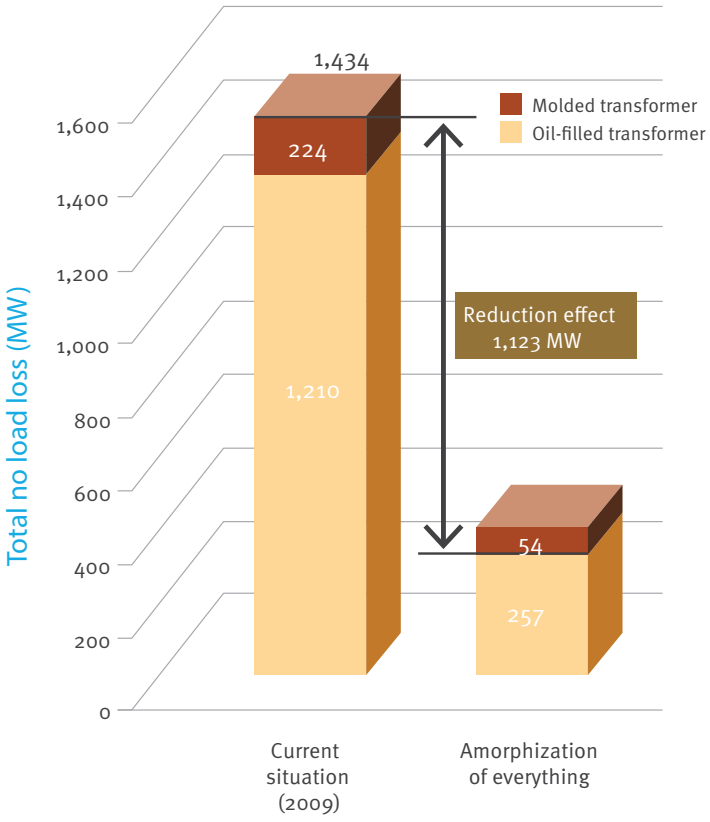
There are two types of transformer losses, including no-load loss (iron loss), which is equivalent to stand-by loss from consumption even when the power is off, and load loss (copper loss), which is equivalent to the load squared. In order to reduce no-load loss, it is neces- sary to use magnetic material with less iron loss for the core. Transformers using amorphous alloy can reduce no-load loss to approximately 1/3 compared to con- ventional transformers that use a directional magnetic copper foil.

According to the calculation by the International En- ergy Agency (IEA), the world-wide power generation volume in the year 2035 is expected to increase by 71% compared to 2010, with most of the increase expected to be in developing countries, such as in Africa, Asia, etc.

Power infrastructure will be established by construct- ing transmission and distribution networks, etc. along with the increased power generation volume in these countries. To better meet increased demand, it will be important to utilize energy in a more efficient manner in addition to expanding power generation capabilities alone, which had traditionally been the focus. There- fore, introduction of transformers using amorphous al- loy as the core is expected to be highly beneficial.

REDUCED THE NO LOAD LOSS OF DISTRIBUTION TRANSFORMERS TO 1/3 OF THAT OF THE CONVENTIONAL MATERIAL.

REALIZED HIGHLY EFFICIENT ENERGY UTILIZATION



AMORPHOUS METAL MATERIAL FOR ENERGY EFFICIENCY DISTRIBUTION TRANSFORMERS

ENERGY CONSERVATION EFFECT CALCULATION FOR AMORPHOUS TRANSFORMERS

If all of private sector demand transformers (total of molded transformers and oil-filled transformers) were converted to amorphous transformers, the following benefits would be expected:

1. **No-load loss reduction effect:** 1,123MW → 9.8 billion kWh/year (1.1% of the 858.5 billion kWh/year, which was the domestic demand power in 2009) was the domestic demand power in 2009)
2. **Power cost reduction effect:** 107.8 billion yen/year
3. **CO_2 emission reduction effect:** 41 million ton CO2/year (0.34% of the 1.209 billion CO2/year, which was the domestic CO2 emission in 2009)

"TRANSFORMERS USING AMORPHOUS ALLOY CAN REDUCE NO-LOAD LOSS TO APPROXIMATELY 1/3 COMPARED TO CONVENTIONAL TRANSFORMERS THAT USE A DIRECTIONAL MAGNETIC COPPER FOIL."

Since manufacturing of amorphous alloy cores is gener-ally done by local people in the countries in which the transformers are introduced, this is also expected to lead to expansion of employment opportunities. Hitachi Metals, Ltd. will provide the technical instructions/sup- port for manufacture of amorphous alloy cores in each country.

Additionally, an amorphous core recycling pilot plant of Hitachi Metals, Ltd. launched its operation in Japan in 2013. The world's first recycling process enabled the company to recycle 99.5% of the amorphous material previously used in cores of disposed transformers, as a raw material for new amorphous alloy.

COMPANY DATA: **Hitachi Metals, Ltd. (Soft Magnetic Materials Division, High-grade Metal Company)**

HEAD OFFICE ADDRESS: Seavans North, 1-2-1 Shibaura, Minato-ward, Tokyo Prefecture105-8614

ESTABLISHED: April, 1956

CAPITAL: 26.284 billion yen

BUSINESS DESCRIPTION: Manufacturing/sales of amorphous alloy thin foil "Metglas®". Manufacturing/sales of amorphous cores for energy efficiency transformers which use Metglas®.

IMPLEMENTATION AND ACHIEVEMENTS, ETC.: Introduction results of each country as of March, 2014 (Power conversion: Unit is 1 million VA): 22,000 in Japan, 11,000 in Korea, 185,000 in China, 6,700 in Taiwan, 2,200 in the Philippines, 48,000 in India, 320 in Poland, 1,100 in Italy, 100 in South Africa, 3,100 in Canada, 56,000 in the U.S., 13,000 in Mexico, and 1,600 in Brazil.

CONTACT: **tel** +81-3-5765-4054 | **mail** masahiro.okada.dp@hitachi-metals.com
url www.hitachi-metals.co.jp

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INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna International Centre · P.O. Box 300 · 1400 Vienna · Austria
Tel.: (+43-1) 26026-0 · E-mail: info@unido.org
www.unido.org