MICROENERGY CORPORATION JP MICRO ENERGY HOLDINGS Ltd UK

COMPANY PRESENTATION

July 2014
Micro Energy Holding Limited (MEH) is a company incorporated in Jersey (Channel Islands) in July 2011, and owned 100% of Micro Energy Japan (MEJ) that was established in Japan in 2003 and successfully developed Tri-Generation System with Biomass Gasification and Fuel Synthesis commonly known as Biomass to Liquid (BTL) technology which provides solutions to the environmental and energy issues.
Microenergy Holding (Jersey)

Board of Directors
Y. Hashimoto (Shareholding 50.1%)
D. Wijsmuller
F. Deacon
K. Patel
A. Williams
Company Profile

Micro Energy Co., Ltd. (Japan)

Address: 1137-4, Kaneda, Atsugi-city, Kanagawa, Japan
Tel.: +81(0)46-240-7088; Fax: +81(0)46-240-7098

Year of Establishment: April 2003
Capital: ¥ 336,125,000, (Capital Reserve: ¥ 267,100,000)
Main Shareholder: Microenergy Holdings, Ltd (UK Jersey)
Representative: Yoshiro Hashimoto (Chairman of Microenergy Holdings Ltd Jersey UK)
Main Product: BTL Production & Power Generation System
(100 kg/hr verification stage, 1,000 kg/hr under development)
Gas/Fuel Mixed Combustion Power Generation System

Parent company: Microenergy Holdings Limited (Jersey UK)
1st Floor, 17 Esplanade, St, Helier, Jersey JE1 1WT, Channel Islands

Brief background description of the representative

Date and Place of Birth: 17 April 1949, Tokyo
Academic Background: 1973: Graduated from Chiba University with Bachelor’s degree in Mechanical Engineering
2004: Admitted to Graduate School of Tokyo Institute of Technology, Department of Integrated Science and Engineering as visiting scientist, 2007: Left the School without diploma
Professional Background: 1973: Joined Caterpillar Mitsubishi Co., Ltd., Production Engineering Department
1996: Joined Nihon Electric and Chemical Engineering Co., Ltd.,
2003: Established Micro Energy Co., Ltd., as President
Experiences: Product Management Planning & Design for painting, welding and ssembling,
Planning of the production line and factory of large scale construction machinery.
Microenergy Corporation organizational chart (current)

- **CEO**
  - Planning
    - Promotion activities
    - Business scheme
  - Administration and accounting
    - Administration
    - Accounting

- **Sales Department**
  - Market research
  - Planning of Sales
  - Market development
  - Use survey

- **CTO**
  - R & D
    - Research
    - Development
    - Demonstration project promotion
  - Production Control
    - Procurement
    - Manufacturing
    - Maintenance

- **Managing Board**
  - Microenergy Japan
    - Production Control
      - Procurement
      - Manufacturing
      - Maintenance
Demonstration facility-B
Naka-Town, Tokushima Prefecture

Microenergy, Holding Ltd. (Jersey, UK)

Demstration facility-A
Yamanashi City

Microenergy, Corp
(Kanagawa)

Demonstration facility-C
Aira-cho, Kagoshima Prefecture
MEH/MEJ Mission is to spread worldwide our BTL technology to create large amounts of renewable energy, thereby contributing to “Early Realization of the Hydrogen Society” and “Prevention of Global Warming” as the results.

- MEH wants to be recognized as a competitively successful company that continuously delivers shareholder value by designing and selling BTL units to small and medium sized businesses, municipalities, and communities around the world that will help them to solve environmental and energy problems.

- The MEH has a fundamental belief that we can make a difference in the world and, in particular, we aim at turning untapped resources like biomass and waste into heat, electricity and ultimately biodiesel.
The only system in the world
Integrated small / medium-scale BTL

High Temperature Anaerobic Gasification Furnace

Heat Recovery

Gas Purification

Offgas

Mixed Combustion Generator

Supplemental Fuel

External Load

BTL

FT Synthesis

Mixed Combustion Generator

Steam

Electric

Ash

Supplemental Fuel
Local production for local consumption
Geographically distributed BTL system

- **Biomass**
- Municipal waste and medical waste
- All organic matter etc.

**BTL-SYSTEM**

- FT synthesis technology
- Diesel fuel (Light oil equivalent)
  - 2,000L/日
  - 20,400Mcal

- Excess gas

**Electricity and heat**
- (250kw, 5,160Mcal)
- Low-calorie gas power generation technology
- 100kw
- 2,060Mcal
MEH/MEJ is well beyond the experimental stage with 2 commercial scale operational units

MEH/MEJ’s BTL systems simultaneously tackle two major social challenges:
- Reducing dependence on fossil fuels
- Dealing with solid waste

MEH/MEJ is focused on small scale units targeted at a niche market, this significantly reduces technical risks associated with scaling up technology

MEH/MEJ is IP rich and now wishes to develop a standard package to facilitate sales of it’s BTL solution for the world.
 According to the World Energy Outlook 2010 produced by International Energy Agency (IEA) renewable energy sources will have to play a central role in moving the world onto a more secure, reliable and sustainable energy path.

According to the IEA Clean Energy Progress Report 2011, biofuels have seen steady growth during the last 10 years. Further, many countries are accelerating their investments in advanced biofuels, with large-scale demonstration plants under construction in many regions.
BIOFUEL DEMAND BY REGION

Note: FSU = Former Soviet Union.
Source: IEA, 2010c.
2.5 tpd BTL Unit at Naka Town, Tokushima Prefecture, JAPAN

2.5 tpd of biomass

2 Gcal per day of heat

2 Gcal per day of heat

600 kWh per day of electricity

450 Litres per day of biofuel

at Aira Town, Kagoshima

at Yamanashi City

Power Generation

Biomass/Waste Feedstock

Feeder

Carbonisation & Gasification

Gas Purification

Fischer-Tropsch

Electricity/Heat

BIOFUEL
MEH/MEJ successfully developed unique and advanced two Stages Gasification system that in comparison with conventional ones achieved remarkable difference in syngas composition:

* Syngas production with high concentration of hydrogen, maximum of 70% compare with average 60%
* More than 90% of syngas content is available for Fischer-Tropsch synthesis to produce BTL,
* Effective in hydrogen production device from biomass, 99.999999% purity after membrane separation
Comparison of the MEH gasification performance (gas composition and (H2/CO)) Vs. competitors shown in the table below.

<table>
<thead>
<tr>
<th>Gasifier</th>
<th>Gasifier heating</th>
<th>Oxidant</th>
<th>H2:CO ratio</th>
<th>H2 (%)</th>
<th>CO (%)</th>
<th>CO2 (%)</th>
<th>CH4 (%)</th>
<th>N2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEH*</td>
<td>Indirect</td>
<td>Superheated Steam</td>
<td>2.30</td>
<td>66.5</td>
<td>28.1</td>
<td>0.4</td>
<td>0.3</td>
<td>4.4</td>
</tr>
<tr>
<td>CHOREN</td>
<td>Direct</td>
<td>O2</td>
<td>1.02</td>
<td>37.2</td>
<td>36.4</td>
<td>18.9</td>
<td>0.06</td>
<td>0.1</td>
</tr>
<tr>
<td>Enerkem</td>
<td>Direct</td>
<td>Air</td>
<td>0.80</td>
<td>12.0</td>
<td>15.0</td>
<td>17.0</td>
<td>4.0</td>
<td>58.0</td>
</tr>
<tr>
<td>Pearson</td>
<td>Indirect</td>
<td>Steam</td>
<td>2.14</td>
<td>51.5</td>
<td>24.1</td>
<td>17.8</td>
<td>5.8</td>
<td>0.5</td>
</tr>
<tr>
<td>Solena</td>
<td>Direct</td>
<td>None</td>
<td>0.94</td>
<td>42.5</td>
<td>45.3</td>
<td>4.3</td>
<td>no data</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Source: E4tech Review of technology for the gasification of biomass and wastes, June 2009

* MEH data from Tokushima plant, Feb 2010

High hydrogen concentration, H2: CO = 2:1. and Stability for a long period of time are located in the world's top level!
The analysis of biofuel produced by BTL at Naka Town

The characteristics of biofuel show that:

* Heating value is equivalent to fossil diesel
* High ignition performance due to high centane value
* Sulfur free leading to no SOx in exhaust

### Comparison of Characteristics of Liquid Fuels

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Diesel[1]</th>
<th>BTL Produced at Naka Town</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Heating Value</td>
<td>43.5</td>
<td>43.0</td>
</tr>
<tr>
<td>Air-Oil Ratio</td>
<td>14.6</td>
<td>-</td>
</tr>
<tr>
<td>Density (@30°C)</td>
<td>802</td>
<td>827</td>
</tr>
<tr>
<td>Cetane Value</td>
<td>59.9</td>
<td>71.2</td>
</tr>
<tr>
<td>Kinetic Viscosity (@30°C)</td>
<td>2.20</td>
<td>5.70</td>
</tr>
<tr>
<td>HFRR (Lubricity at 60°C)</td>
<td>440</td>
<td>405</td>
</tr>
<tr>
<td>Oxygen Content</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Carbon Content</td>
<td>87.5</td>
<td>85.5</td>
</tr>
<tr>
<td>Hydrogen Content</td>
<td>12.5</td>
<td>14.4</td>
</tr>
<tr>
<td>Sulfur Content</td>
<td>&lt; 10</td>
<td>0</td>
</tr>
</tbody>
</table>

1 JIS Level-2 Diesel 2010/2/20
Is conducting a long-term verification of BTL fuel in public institutions.

* At National Traffic Safety and Environment Laboratory (Tokyo)

http://www.ntsel.go.jp/css/img/logo.jpg

As a project commissioned by the Ministry of the Environment, is conducting a long-term analysis test of BTL fuel.
Shortest path to the hydrogen society: Bio-hydrogen gas generation technology in the world top level.

- H₂ and CO gas are used as fuel for the MCFC, SOFC type of “Fuel cell system”.
- 80% of the produced gas is used as fuel, and power generation efficiency will be improved dramatically to 60% from 30%.

<table>
<thead>
<tr>
<th>Refinement Gas Vol%</th>
<th>H₂</th>
<th>O₂</th>
<th>N₂</th>
<th>CH₄</th>
<th>CO</th>
<th>CO₂</th>
<th>HHV</th>
<th>LHV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>53</td>
<td>0.6</td>
<td>4</td>
<td>0.4</td>
<td>25</td>
<td>17</td>
<td>2410</td>
<td>2158</td>
</tr>
<tr>
<td>Champion data</td>
<td>63</td>
<td>0.8</td>
<td>7</td>
<td>0.9</td>
<td>27</td>
<td>1.3</td>
<td>2,823</td>
<td>2,519</td>
</tr>
</tbody>
</table>
**International Application No PCT/JP2009/003928 for GASIFICATION DEVICE, FUEL GENERATION SYSTEM, GASIFICATION METHOD, AND FUEL GENERATION METHOD that was patented on 25.04.2014 under the No 5527743.**

This patent was filed on 18.08.2009.

* In order to assist the decontamination and reconstruction of the disaster area caused by the Great East Japan Earthquake and the Fukushima No.1 Nuclear Power Plant accident that occurred on March 11, 2011, "Purification Processing Method for Radioactive Contaminated Water" was patented on 25.07.2013 under the No. 5322335. This date was only three weeks after the filing! This patent was filed on 13.06.2013.

* The MEH/MEJ is in the process of registering further intellectual property arising from the development of the BTL system.
Various types of biomass and waste can be used as feedstock for MEH BTL units.

The feedstock used has a great impact not only on technical side of the process such as syngas quality and biofuels volumes but also on BTL economics.
**Governmental Organisations:**
- Japan Ministry of Economy, Trade and Industry (METI)
- Japan Ministry of Agriculture, Forestry and Fisheries (MAFF)
- New Energy and Industrial Technology Development Organization (NEDO)
- Ministry of the Environment
- Ministry of Defense Central Technology Division

**National research and development institutions:**
- National Traffic Safety and Environment Laboratory

**Universities:**
- Tokyo Institute of Technology (Gasification system)
- Toyama University (FT Catalyst)
- Tokyo University of Technology (Introduction of BTL in Hachioji-City)
- Azabu University (Introduction of BTL in Kanagawa prefecture)
* Small businesses to deal with biomass and wastes management (2.5 to 10 tpd units);
* Remotely located onshore and offshore oil and gas production installation to deal with waste management (from 2.5 tpd or less, up to 10 tpd units);
* Remotely located villages, communal facilities and medical institutions, condominium and apartment for dealing with wastes and biomass management and production of biofuel, electricity, heat for own use (1.0 to 10 tpd units);
* Small towns to deal with municipalities solid wastes (2.5 to 100 tpd units);
* Private organisations for commercial production of biofuel, electricity and heat (10 to 100 tpd units).
* Initial response of disaster (Electricity, heat, fuel)
BTL APPLICATION

Scale-up is the development of urgent theme.

10 t/d Scale

50 ~ 100 t/d Scale

2.5 t/d Scale

Agriculture, Fishing, Forestry, Industry, Municipal solid waste, Mass fuel production, Medical institutions such as hospitals, Public facilities such as gymnasiums and libraries, School, University, etc.
The optimum plant configuration depends very much upon local conditions and will be determined by (inter alia):

- Government policy with regards to the production of green energy and availability of subsidies;
- The price and quantity of available feedstock;
- The ability to sell side products (heat to the local population/business and electricity to the local grid)

For this reason each BTL will largely be bespoke and will be adjusted to the local conditions. The table in the next slide compares the possible economics for end users of a 10 tonne per day raw material input plant.
### Illustrative economics of 10 tonne per day raw material BTL/WTL plant with different feedstocks

**Units:** GBP annual

<table>
<thead>
<tr>
<th>FEEDSTOCK</th>
<th>Building waste</th>
<th>Woodchips</th>
<th>General waste disposal</th>
<th>Plastic disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue from sale of biodiesel</td>
<td>580,800</td>
<td>479,160</td>
<td>717,288</td>
<td>1,713,360</td>
</tr>
<tr>
<td>Revenue from heat sales</td>
<td>197,600</td>
<td>197,600</td>
<td>197,600</td>
<td>197,600</td>
</tr>
<tr>
<td>Revenue from electricity sales</td>
<td>145,600</td>
<td>145,600</td>
<td>145,600</td>
<td>145,600</td>
</tr>
<tr>
<td>Revenue from waste disposal</td>
<td>264,000</td>
<td>-</td>
<td>396,000</td>
<td>1,056,000</td>
</tr>
<tr>
<td><strong>Total revenue</strong></td>
<td><strong>1,188,000</strong></td>
<td><strong>822,360</strong></td>
<td><strong>1,456,488</strong></td>
<td><strong>3,112,560</strong></td>
</tr>
</tbody>
</table>

| Raw material purchase                    | 0              | 0         | 0                      | 0                |
| Equipment expense                        | 142,933        | 142,933   | 142,933                | 142,933          |
| Maintenance cost                         | 128,640        | 128,640   | 128,640                | 128,640          |
| Labor cost                               | 216,000        | 216,000   | 216,000                | 216,000          |
| **Total costs**                          | **487,573**    | **751,573**| **487,573**            | **487,573**      |

| Operating cash flow                      | 700,427        | 70,787    | 968,915                | 2,624,987        |

| Capital expenditure and start-up costs:  | 0              | 0         | 0                      | 0                |

| BTL system                               | 3,600,000      | 3,600,000 | 3,600,000              | 3,600,000        |
| Installation and trial run              | 208,000        | 208,000   | 208,000                | 208,000          |
| Construction                            | 480,000        | 480,000   | 480,000                | 480,000          |
| **Total capital related costs**         | **4,288,000**  | **4,288,000**| **4,288,000**          | **4,288,000**    |

| Government subsidy as % capex            | 0              | 0         | 0                      | 0                |
| Adjust capex post subsidy               | 4,288,000      | 4,288,000 | 4,288,000              | 4,288,000        |
| **Implied payback years at full capacity**| **6.45**      | **60.58** | **4.43**               | **1.63**         |
* The key driving factor is the cost of feedstock and/or gate fees earned by utilising feedstock, essentially BTL will be economic when utilising harmful waste such as plastics, but will not be viable where feedstock needs to be purchased on the open market.

* The high level economics have been produced on the assumption that no government subsidies will be used; however in reality significant government funding is being made available to co-finance green energy related initiatives. MEH believes that various types of capital expenditure subsidies could effectively reduced CAPEX by up to 50%, therefore halving the time to end-user payback.
MEH/MEJ is planning to raise USD 100 million in equity in order to the development of BTL-Model of a variety of specifications for respond to a wide range of applications, to get the break-even cash flow quickly, key initiatives involve;

* MEJ is plan to hire a large number of excellent human resources in order to perform the parallel development of each application model by organizing the development teams;

* To construct the R&D Base of company-owned in order to carry out the development of rapid development of application-specific model and new FT Synthesis Catalyst and Reactor;

* In order to composition the production and maintenance system in a short period of time, to implement the M & A active;
Candidate 1:
Location: Hokkaido Yoichi City
Effective use of aviation maintenance school ruins
Building and construction has been preserved at the time of completing it.

There is also a heliport
1. Tohoku Disaster Area reconstruction projects

- Earthquake rubble and soil decontamination treatment facilities
  ➢ Construction of BTL energy centers as a raw material for organic debris in which it occurs on a disaster.
  ➢ By using the BTL energy, reducing the volume of contaminated waste and operation of purification and recycling system of contaminated soil.
Tohoku Disaster Area reconstruction projects-2

Implementation site

- Naraha town, Fukushima prefecture.
- Iitate village, Fukushima prefecture.

- Scale of the total project cost of each site 100 million US $.
- It is funded mostly by the reconstruction budget of the government.
- It is a concept that go beyond reconstruction project, it will lead to regional development in the future as features a new industrial park be provided cheaper energy by BTL-system.
THE END