Slide 1: Technology that Powers the 21st Century
Slide 2: Agenda

Good morning. It is great to be here at the 2nd Workshop. At the outset, I would like to thank DOE, CETC and CANDRA for inviting me for this Workshop. Especially, I should like to thank Mr. Rob Brandon of CETC for his advice on this Workshop. Thank you, Rob.

I am feeling little nervous. I am now like a Michael "Air" (or I should say "Ground") Jordan's Day 1 of his renewed challenge at the basketball court. Regarding the real Jordan, his "Great Air" is back and he is now writing a new chapter of the basketball history.

Slide 3: Introduction of MEIDEN

Meidensha Corporation name consists of MEIDEN (Bright Electric) and Sha (House).Å¡ was founded in 1897. The name has an similarity with of Westinghouse (having a house in our name). Our brand name is MEIDEN. MEIDEN's annual turnover in the fiscal 2000 is about 1.2 billion dollars.

Slide 4: Introduction of MEIDEN: Product Portfolio

MEIDEN's product portfolio is summarized in this slide. As you could observe here and there, we could utilize inhouse engineering resources necessary for making creative cogeneration systems and other microturbine-based applications.

Slide 5: MioSpectrum Platform

Our business strategy is to build a platform for the wide spectrum of applications.Å¡ ur platform will thrive by being open to all potential application service providers.Å¡ building such platform, we utilize our engineering resources available at our company.

First is the expertise on the co-generation system integration and proprietary grid connection technology. MEIDEN has been a leading supplier of the gas engine or diesel engine-based co-generation systems. We have long experiences of the system integration of the power and T & D-related equipment. We have installed over 100 CHP systems in the last two years with a power rating of 2.8 MW. We have a deep knowledge in the power network analysis. These engineering resources contribute in making of the highly reliable grid-connection mechanism.

Second is the power conversion technology. To increase the system reliability, we have Å¡ een supplying UPS products as a mission critical power backup. These systems complement Å¡ e various inverter technology and supports hybrid systems of various energy sources with the microturbine such as the solar cells, windmills, etc.

The other is the fuel-development resources and the proprietary system control. We have been doing the generation system using the livestock waste fermented methane gas. Our system control experiences include the waste disposal system and the water treatment plant-related technology. Newly added engineering resources include; airconditioning technology, dry-distillation type waste disposal system and bio mass technology.

This MioSpectrum platform means the potential application service provider could focus on the creative side of the application without worrying too much on the grid Å¡ nnection, power interruption and the system integration.

Now I would like to talk about "The Landscape of the Microturbine Business in Japan".

Power-related Deregulation as a Driver for Change:

The genesis of the microturbine business in Japan is deemed to start from April, 2000. Japan is behind the U.S. and the Europe in terms of the power-related Å¡ regulation. We could see a sea change here. In

April, 2000, the governmentÅ¢announced that for the microturbine-based system below 300kW, it would lift the requirement to have an on-site engineer then needed to be stationed at the microturbine generating site 24 hours a day . We expect another phase of deregulation package to be effected during fiscal year 2003.

Slide 6: CHP Installed Base in Japan (Aggregated Base)

As this slide shows, we could expect a "Godzilla tail" healthy growth of the cogeneration market in Japan. The growth driver is the straight forward economics and since 1995 other factor is the growing need of high quality reliable power without a microsecond level power interruption. This trend is especially evident in the semiconductor-related factories as even a momentarily power loss causes a significant financial loss.

Slide 7: CHP Installed Base in Japan (Engine Type)

As you could see in the non-factory private sector installation like building, supermaket, etc, the gas turbine-based cogeneration has a small presence. We view this will be the high growth sector if we could introduce the attractive offering like micro cogeneration.

Now, I would like to talk about National Development Program

For the development of new energy and energy-saving business, a Japanese government subsidiary, New Energy and Industrial Technology Development Organization called "NEDO" is offering the development programs. For the large scale new energy development like wind farm and energy-saving project, NEDO provides the half of the capital costs as a grant. In the first quarter of 2002, we will ship 44 units of 60kW microturbine for such a NEDO-financed cogeneration project.

Slide 8: Basic Offering: Micro CHP System powered by Capstone

What you see in this slide is MEIDEN MioSpectrum using Capstone Model 330.Å¢features ultra low noise enclosure. It offers 65 db (A) measured at a distance ofÅ¢meter from the machine side.

If the hot water boiler is installed inside the package, it could produce the hot water at 200 MJ/h or 190 MBtu/h When combined with the power generation, this cogeneration system's total energy efficiency is over 70%. As you could see on this slide, this has a draw-out design like the original Model 330 providing an easy maintenance. Like the gas emission concern, Japan has a strict regulation on the noise pollution which necessitated this type of design approach. The natural gas engine or diesel engine has been the dominance choice as 30kW class power plant but we expect the microturbine will come on strong on this segment. The key advantages are its ultra low emission and an ease of use. The key disadvantage is its price competitiveness vis-à-vis gas & diesel engines. Due to the high energy cost in Japan where the gas price is two times of US level, it will take about 7 years at present for "pay-back" assuming the MioSpectrum micro CHP costs 52,000 Dollars to be installed. To gain more wide-spread acceptance in the Japanese market, we need to promote further cost reduction of the MioSpectrum to realize a five (5)-year-pay-back. We view this five (5) is a magic number in creating the critical mass for the market creation in Japan.

Slide 9: Exploring the Potential of MioSpectrum
Case Study 1: Heat Recovery System

We are exploring the another potential of MioSpectrum in the Heat Recovery Applications.
We have found the followings: This absorption chiller system can provide seven degrees of chilled water and its cool air-conditioning capacity is 38.7 kW, assuming a return water temperature of 7 degree centigrade or 44.6 degree Fahrenheit and a condensing water temperature of 12.5 degree centigrade or 54.5 degree Fahrenheit. Its cooling capacity is 11 USRT.

In the desiccant-based air conditioning (DBAC) system, the waste heat from Model 330 will directly remove the moisture in the air through the desiccant rotor. This reduces the requirement for a heat

exchanger or a gas fired regenerator and provides a cost effective solution. We expect this application to have a business potential in the super market and hospital sector.

Another application is the area of waste disposal or reduction This is the area that reflects a spirit of eco-consciousness in Japan. It is an area of high potential at this time. The reduction of waste by a factor of one-fifths also means the reduction of the waste processing charges into one-fifths. The concept uses the waste heat from the microturbine for a drying and compaction process. And does not produce the dioxin as does incineration. This system combines the benefits ofÅ@waste disposal and the power generation located on a site.

Some customers uses this waste heat as a drying process in the industrial application.ÅTThe low emission waste gas characteristics of the Capstone MicroTurbine enables a wide variety of industrial drying applications.

Last example is the adsorption chiller under development. Note this is adsorbtion and the principle will be explained in the poster presentation by DY Refrigeration here in this Workshop. DY is our business partner. Please take a look. In exploring the effective use of the thermal cascade, the final challenge is to realize how far we could reach below zero degree. MEIDEN is to use a natural chilling catalyst, ammonia. In the alpha model field test, it can produce the ice cubes by using - 27 degree centigrade or -16.6 degree Fahrenheit ammonium refrigerant with a COP(Coefficient of Performance) of 35%.

We are exploring the potential of waste heat utilization from the microturine in close collaboration with Capstone.

Slide 10: Exploring the Potentials of MioSpectrum
Case Study 2: Biomass Energy Solutions

So far we indicated how we made new applications to pursue cost effective solutions for our customers. Other priority consideration for us is the climate control issue. This is another important agenda at MEIDEN.

As you know, the impact of the high economic growth in Japan is public pollution and environmental contamination due to the large scale consumption and production. In a sense, we are producing many things at the sacrifice of future generations.

Back in 1970s, we had a project called “Piggy Project”. This is power generation using methane from the pork, cattle waste and the fishery byproducts. Also we studied the better use of the methane from the sludge of water treatment plants.

But during these periods, we could not effectively solve the significant issues inherent to the internal-combustion gas engine system such as accidental burning fuel predetonation or insufficient combustion of hydrocarbons. The project had been in trouble for a long time until we found the breakthrough: a Capstone MicroTurbine. The “Piggy Project” has come alive and we made an operating project at Hokkaido, Japan. This slide shows the actual methane power plants. This is a power plant using the livestock waste. And the other is a power plant using urine and feces in the water treatment plant. We have now 500 hours of operation on these two plants since 2001.

The last one shown here is “Raw Garbage Refuse Methane Generation System”.

Slide 11: Case Study 2: Biomass Energy Solutions
How Bio-mass System works.

This slide shows how the biomass system works. As explained earlier, we have a longÅ@history and rich experiences in this field. We undertook the system engineering notÅ@only the microturbine but also the intake and bio fermentation processing of theÅ@urine and feces and the sludge. This offers the minimum recycling of the energy flows.

The main feature of this system is that the power plant burning the methane has been changed from the reciprocating piston engine to a Capstone Model 330. This entirelyÅ@and simply solves the issue of the unstable combustion of the reciprocating engine by the continuous burning microturbine.

Considering climate control, the promotion of the distributed generation is vital for Japan and the rest of the world. In addition to methane, we are exploring the application of the resource recovery in other areas where waste fuels are available.

Slide 12: New Resource Recovery
Our Challenge to the Climate Control Issues

MEIDEN is pursuing a new application of resource recovery. This is the "Waste Edible Oil" Power Plant. We are applying a grant from the New Energy and Industrial Technology Development Organization (NEDO), a government subsidiary.

Our initial idea was to utilize the waste edible oil used for the frying potatoes or chickens as fuel for the power application. Our chemist gave it a try in November 2000. We thought we might have to scrap one microturbine unit for this field test. Although we had some issues, the operation went well without the breakdown of the machine.

By improving the performance of the fuel reformer* which improves the quality of the waste edible oil, we expect we could offer an ease of use comparable to the other widely available fuel like kerosene, natural gas or city gas.

* Note: This fuel reformer reforms the waste edible oil by adding the methanol and sodium hydroxide.

Talking about the general trend of waste edible oil use, some community buses in Kyoto and Tokyo use these fuels. Only problem with this diesel engine-powered bus is that it produces a tantalizingly good smell and makes you feel you want to eat a fried chicken.

When we use the reformed edible oil for the Capstone MicroTurbine Stationary Application, it leaves no such smell due to its ultra lean burn technology.

Our current plan of the waste edible oil resource recovery is to field test the beta product of the fuel reformer and complete the pre-production stage by the end of the 2nd quarter of year 2002.

Slide 13: What's New?

When MEIDEN and Sumitomo Corporation, our partner for the distribution, jointly concluded the distributorship agreement with Capstone in January 2000, there was no such thing as Internet-based power plant remote control. All of such control was done by dedicated phone lines.

We started Web-based remote monitoring and control services from December 2001. The main objective is to achieve the best power and heat performance and monitor the operational and fault status around the clock. It also offer the daily and monthly cost performance in the energy management.

By using the virtual private network (VPN), the service provider could monitorÅ@the operation status, presence of fault alarms,, and could give a notice to the nearbyÅ@service center or the authorized service providers. In building this remote monitoringÅ@and control system, we have a strategic alliance with NTT Facilities, Japan whichÅ@is a Nippon Telephone & Telegram (NTT) Group Company, a Japanese AT&T.

MEIDEN believes we could utilize the cutting-edge platform of NTT Facilities to develop our business potential as Energy Service Provider (ESP). We currently have 20 microturbines being monitored this way

Slide 14: On the Horizon (Closing Thoughts)

A few closing thoughts.

Our main objective in our MioSpectrum business is: to be a first mover. Like our current application offerings, we would like to pursue creative applications by exploring the potentials of Capstone MicroTurbine and our MioSpectrum Platform together with our creative partners and Capstone associates.

The current state of the microturbine-based distributed generation is like the automobile market of the early 20th Century. The automobile was a revolutionary product but back then its demand was minimal and people could not believe it could replace the dominant transportation which was horse carriage. It is now a big market and has become a vital commodity for people's transportation needs.

Slide 15: Invisible Continent
Microturbine: A Revolution in the 20th Century
Technology that powers the 21st Century

We view the current microturbine-based distributed generation market rather like an invisible continent. It is an unchallenged vast market somewhere out there in Japan and I suspect, from your market perspective, also in the North America. This invisible continent is created by the emergence of microturbine and other distributed generation technologies, the series of power and gas utility deregulation, a growing collective awareness of the global climate control, straight forward economics and the arbitrage opportunity to change otherwise wasted resources to viable fuels. It seems very risky to explore and to bet your financial, human and engineering resources on such invisible continent. The microturbine is a revolution made right here in the United States in the late 20th century. The microturbine's compact design, multi-fuel and ultra low emission features are enhancing the invisible continent. Only the visionary leaders like you all who are attending today's Workshop can imagine the depth, width and dimensions of such an invisible continent.

We guess you all encountered the various resistances inside and outside of your company to move forward. We hope that together and by exchanging ideas and experiences we can conquer such odds in each turf and make the invisible continent into a truly rewarding market recognizable to many people. In so doing, we will make microturbine "the Product of the Century".

We believe the microturbine is a technology that powers the 21st Century.

We wish you all the best of luck.

Thank you.