

# Energy Management for Economic and Environmental Sustainability in East Asia

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by

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(Panel Speaker)

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Good morning, everyone!

The founder of Hitachi was Mr. Namihei Odaira. Many of you have a chance to be the next Namihei Odaira. He was a so-called entrepreneur at that time, and maybe you have a chance to achieve success like him.

We have a memorial replica of this old factory at the site of Hitachi Works in Ibaraki Prefecture, which you can see if you like, if you visit there. It contains the first product of Hitachi, a five horsepower induction electric motor.

Hitachi has expanded its business over this past one century, and now it includes power and industrial systems, digital media and consumer products, information and telecommunication systems, electronic devices, and high functional materials and components. Hitachi is also doing many kinds of sub-businesses now.

Hitachi is now worth approximately 10 trillion yen in sales. This figure was 1 trillion in 1970, so it has increased by 10 times over the last 38 years. I don't know whether Mr. Odaira predicted this kind of rapid growth for his company or not, but now Hitachi is a big, diversified electric manufacturing company.

He read many messages to Hitachi's people, one of which I'd like to quote here: "The basic principle of Hitachi is to further enhance its founding concepts of Harmony, Sincerity and Pioneering Spirit, with a steadfast pride in being a member of Hitachi, and thus contribute to society through the development of superior and original technology and products".

He read another message to the people of R&D when he founded the Central Research Laboratory: "Although our lifetime may not span a hundred years, we have concerns of a thousand years". This comes from a famous Chinese classical poem.

There are three main environmental topics. The first one is the prevention of global warming. There are two types of approach to reaching a solution for this problem, low carbon energy emission and energy saving. The second subject is the cyclic use of resources. Hitachi has recycling companies in Japan, which just assemble used home electric appliances to re-cyclic use and resell variable materials and components. And the third subject is the protection of ecology. Air pollution control devices from thermal power stations protect forests from acid rain damage. Hitachi also has electric and mechanical devices for electric water pollution control systems. There are new machines in some Asian countries that are supplied by Hitachi Construction Machinery.

The second topic is the CO<sub>2</sub> Kyoto Protocol, with regard to private companies being consistent about their CO<sub>2</sub> programs. Japan accepted and ratified the Kyoto Protocol in 2005 so it has to reduce its CO<sub>2</sub> emissions by 6% from the base year 1990, but in fact its emissions went up by 8% so now Japan has to reduce its CO<sub>2</sub> by 14% so as to meet the Kyoto Protocol. As the G-8 Summit opens, it is now discussing the Kyoto Protocol. Hitachi has set out its Environmental Vision 2010, which includes the numerical target of 3% reduction of CO<sub>2</sub> emissions from its factories. The second target was a 7% reduction, which we have already met, so we set out another Environment Vision 2025. In this vision, we are trying to contribute to the reduction of

CO<sub>2</sub> emissions by 100 million tons through our production technologies.

Below is the trend in the world's CO<sub>2</sub> emissions. Asian countries are increasing their CO<sub>2</sub> emissions year by year. This is mainly caused by China and India.

The following diagram shows coal, oil, natural gas, which are sources of CO<sub>2</sub>, and solar, wind, nuclear, hydro, which are carbon free energy sources. Coal has a bad name at present because of its high CO<sub>2</sub> emission intensity, but we may strongly depend on coal for power generation in the future because we have a lot of coal all over the world.

In the next diagram we see power generation in 6 Asian countries: Vietnam, Singapore, Thailand, Philippines, Malaysia, Indonesia. Coal, oil, and gas, these fossil fuels are heavily and widely used in these countries.



In the early 1970s, oil shocks hit the world two times. At that moment, Japan strongly depended on oil for its power generation. The Japanese government prohibited the construction of new oil power stations so we switched fuel from oil to coal and natural gas, and nuclear power stations showed the largest growth.

This diagram shows the history of progress in coal power generation. It has taken approximately 10 years to increase the thermal efficiency by 5% each time. Progress has proceeded very slowly because we need new materials to increase thermal efficiency. The higher the temperature, the higher the efficiency is. So we need a heat resistance alloy to increase the efficiency. The current project is aiming at developing a coal power station at several hundred degrees C. Now, CCS (Carbon Capture and Storage) is thought to be a good solution for global warming programs

but this is an energy consuming technology that reduces thermal power efficiency.

The US, France, Japan, Russia, Korea, Germany, Ukraine, Canada, UK, Sweden and China: these countries have nuclear power stations now.

In the history of nuclear power stations, we have tried to increase the unit capacity compared with prior stations. Now the latest power stations have a capacity of 1300 MW in one unit.

The third topic is energy saving technologies. Electrification will be promoted in the future, and in the case of automotive vehicles, hybrid electric vehicles provide higher fuel economy compared to other improvement technologies over internal combustion engines.

Inverters, electric motors, batteries and DC equipment are key components of hybrid electric vehicles. We can store energy directly in the battery and then use it when we accelerate the car.

This hybrid technology has been applied to train systems. Trains are much better than cars for transporting large numbers of people long distances. And of course we have tried to improve diesel engines. Next is the reduction of the weight of the body, and third is hybrid technology.

Hitachi and East Japan Railway Company have commercialized hybrid trains on the Koumi Line in Japan. We increased fuel efficiency by 20%, reduced emission of particulates and nitrogen oxide by 50%, and also cut noise around stations by stopping using diesel engines. It's very quiet around stations.

ICT stands for Information and Communication Technology. Even in this sector, we have to be concerned about power saving design.

We have many kinds of technologies to reduce the energy used in data centers. Of course we need techniques for IT equipment, air conditioning, and power supply related devices, and also we have to reduce the power rating and so on, so we'd like to reduce energy used by 50%.

I would like to summarize my presentation by two sentences: we need nuclear and renewable energy, but also fossil fuel such as coal, for energy security; and also maybe batteries in energy storage systems will play a dominant role in the future.

Thank you.