

# Speech by Senator Daniel K. Akaka in Taiwan to a general audience

Senator Daniel K. Akaka Papers

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**SPEECH BY SENATOR DANIEL K. AKAKA  
IN TAIWAN TO A GENERAL AUDIENCE  
Monday - January 6, 1992**

**Aloha and thank you very much for your generous introduction.**

**The history of the Republic of China is very similar to that of the United States. We both fashioned a democratic form of government and attained economic success. Our countries have had continued friendship and cooperation with important social, financial and geopolitical ties.**

**In particular, as we approach the 21st Century with a new set of challenges and opportunities facing the world, I would like to play an integral part in further strengthening our relationship. Millie and I are the only couple of Chinese extraction in the U.S. Congress. We thus feel that we have a special responsibility to serve as a cultural bridge between our countries.**

**I can talk about our trade options into the future or defense implications brought on by the Soviet Commonwealth. I can comment on your recent elections,**

which established a pattern for clearer long-term cooperation with the Peoples Republic of China. However, as everyone, everywhere I go has already expressed an opinion, let me instead focus on a topic which not only poses a problem to your nation, but could serve as an area for cooperation between Taiwan and the U.S.A.

In a world growing at the rate of almost 100 million per year, the world use of energy is expected to double in 25 years. Considering that 1967 was not that long ago, it is frightening to consider where this "new" energy will come from, especially when people all over the world have successfully forestalled nuclear power. There is a growing concern about global warming from fossil fuels and petroleum supplies will begin to decline in a decade or two.

As we all know, energy powers the engine of modern civilization. Peking Man is credited by many as having kindled the first fires some 400,000 years ago. World War II in the Pacific was to a good degree sparked by an energy embargo. Our recent energy crises in 1973, 1979 and 1990 can be considered to be oil wars.

The curious aspect of this critical element in our lives is that we generally take it for granted until its availability is interdicted. We rarely concern ourselves

with where it comes from, where it goes, or what other impacts its usage may have on us today or for our children's children.

What is the real cost of energy? Should we begin to charge for the materially corrosive and fish-killing aspects on acid rain, health effects of waste emissions and effluents, military costs to protect supply lines, and, of course, the possible coming of a warmer climate which could also very seriously cause sea level rise? Last month the U.S. Department of Energy, by philosophy, a very conservative organization, released a report that said a carbon tax to cause a 20% reduction of carbon dioxide emissions would double the cost of gasoline, and increase the price of electricity by 230%, and heating oil by 260%. Keep in mind that this is only to combat the greenhouse effect--there are also the other externalities which by themselves could again double and more the price of energy.

In the short term, we need to more efficiently use what is available and develop sound policies to get us into the 21st Century. We can't help but for the present continue fossil fuel and even introduce cleaner and safer nuclear options, but clearly, we must consider more progressive ways to develop energy systems which are

acceptable by our people and uncontrollable by a remote cartel.

This solution for Taiwan, the U.S. and mankind shines above us--the SUN. Solar radiation on Earth in one year provides 15,000 times the world's present known total energy supply. An important point is that the ocean traps the bulk of this energy. The economic tapping of that stored energy can eventually supply our needs for a sustainable and environmentally secure society.

I know you share these feelings, since recently your Republic of China Assessment Committee for the Multiple Product Ocean Thermal Energy Conversion Project (MP-OTEC) held its first meeting in May 1991, chaired by Dr. Shu-Jun Lee, Vice-Minister for Economic Affairs, and approved the project. I was very excited when I heard this news, for over the past few years I have learned more and more about the promise of OTEC and have become a advocate.

OTEC, I believe, is a stirring giant among the renewable energy technologies that is poised to enter the arena of commercial competition. Several pilot plants have been tested in Japan and the United States. Just last month, I participated in the ground-breaking ceremony for a 210 kilowatt open cycle OTEC experimental plant

which will be operational at Keahole Point on the Big Island of Hawaii later this year.

Normally, when one thinks about a powerplant, electricity is all that is produced, plus waste products. With coal, there are emissions, effluents and solid waste. With nuclear, highly toxic radioactive wastes remain a concern. Even windpower, solar photovoltaics and hydropower only produce electricity. But OTEC, in addition to electricity, brings no environmental problems and a cornucopia of co-products: fresh water, air conditioning, and mariculture.

I will not go into the technical details of how this can be so, you can ask your staff. However, those who looked at OTEC a few years ago and wrote it off as being too costly should look again. In addition to the co-product revenue flow, research has reduced the price of OTEC heat exchangers by at least a factor of two; and I've even heard a cost reduction by a factor of four or five when mass produced.

Of course, the very first pre-commercial plant will be very expensive. Any first of its kind item brings with it a learning curve benefit that puts the developer at a significant advantage. The U.S. alone has invested over \$250 million in this technology.

An OTEC plant of 10MW size producing fresh water would be economically competitive with oil at \$25 per barrel and freshwater at \$3 per kilo-gallon. If you include air conditioning, the economic scenario is even more attractive. At 100MW, OTEC electricity become cost competitive.

The national engineering design center for OTEC is the Pacific International Center for High Technology Research, or PICHTR. I met with PICHTR officials before starting on this trip and received assurance of their full assistance on your proposed 5 megawatt OTEC project, and their willingness to help train your team of engineers. This is an ideal project for cooperation. It would be equally appropriate, I believe, for your government to share in the development of turbine and cold water pipe technology with PICHTR, and participate in experiments at the Natural Energy Laboratory of Hawaii.

A particularly attractive option for your government to consider is to utilize OTEC in your foreign aid package. One of ten MW integrated OTEC systems can help to bootstrap a developing island economy. PICHTR studies have shown that nearly every major island system in the Pacific has the bathymetric potential to use OTEC.

In the longer term, your Exclusive Economic Zone (EEZ) has the potential for thousands of megawatts of OTEC power. You will someday be able to transfer your chemical and industrial plants to floating structures at sea, thus removing a dirty neighbor which can operate in an environment where the effluents can possibly be recycled. Artificially upwelled fisheries can be created through careful use of the cold water stream. By having open ocean ranches, you will also ameliorate many of the plagues of coastal or land based aquaculture. Marine biomass plantations can also be cultivated, where the feedstock can be converted on these floating platforms into biomethanol, a much cleaner fuel to replace gasoline, thus further reducing air pollution and your need to import petroleum products.

The key to all the above is OTEC. I welcome the Republic of China to join me in helping develop this new technology for the benefit of our two countries and world. The opportunity to meld our efforts provides a target of opportunity to strengthen our ties, enhance the environment, and bring this economic package to the forefront of commercialization for the huge market of tomorrow.

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