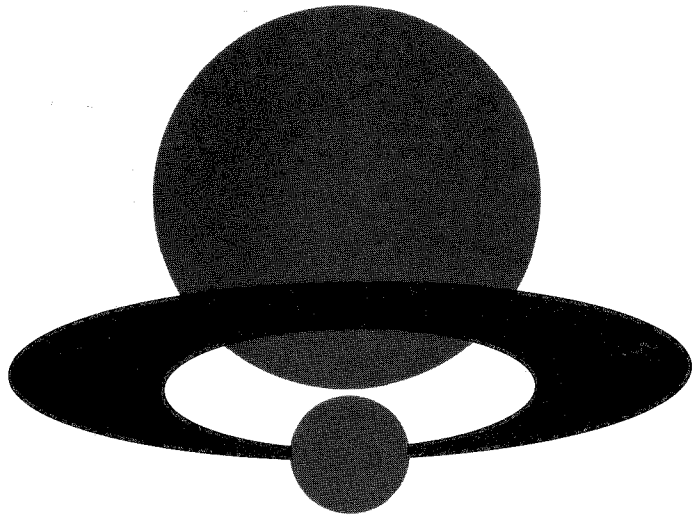
The 23rd JAIF ANNUAL CONFERENCE

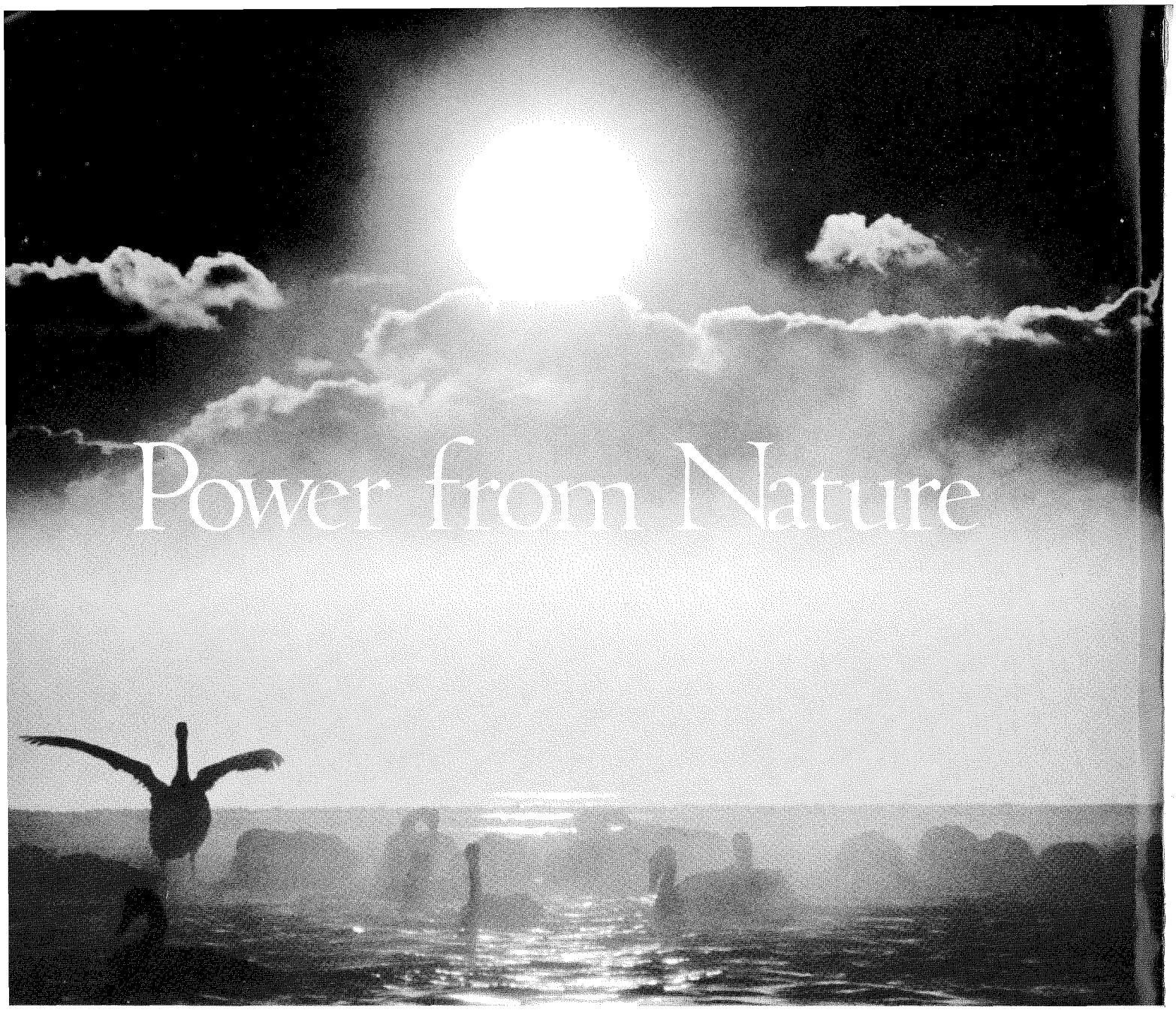
ABSTRACTS



April 9–11, 1990

Kyoto International Conference Hall

JAPAN ATOMIC INDUSTRIAL FORUM, INC.



About 50 years ago mankind first generated nuclear power. It was an experiment. It worked. Commercial power generation began. And plants became increasingly complex.

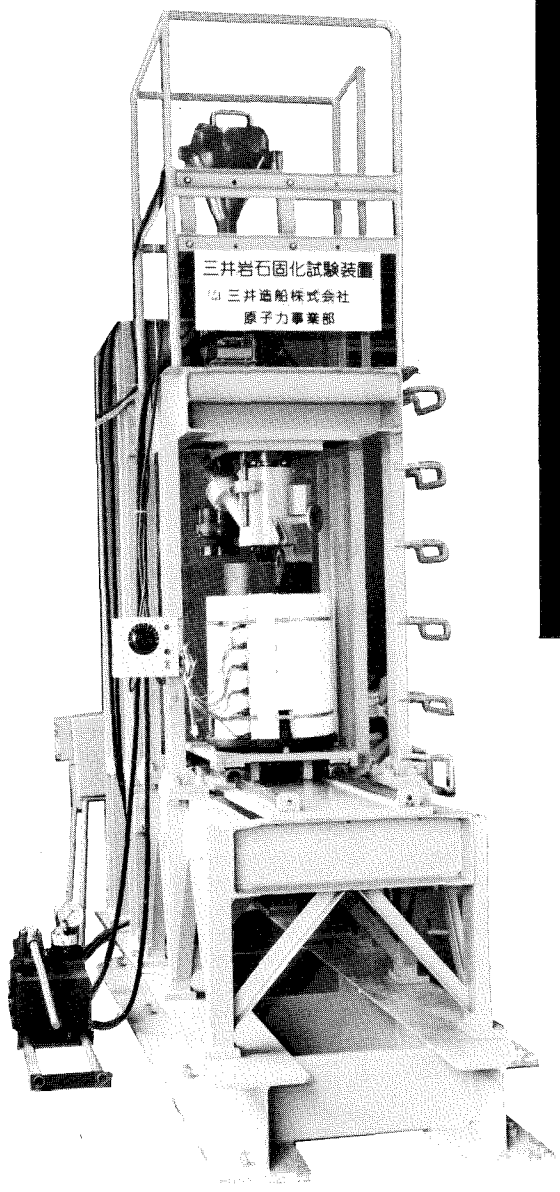
Today the evolution is unceasing. But as our knowledge of nuclear energy increases, the trend is towards simpler systems that employ natural forces. Because, like the sun, nuclear energy occurs in nature. The way we are thinking at Hitachi, it's simply power from nature.

HITACHI

Hitachi, Ltd. : Tokyo, Japan Tel: Tokyo (03) 258-1111
Hitachi America, Ltd. : New York, U.S.A. Tel: (914) 332-5800 **Hitachi Europe, Ltd.** : London, U.K. Tel: (01) 748-2001

MES ROCK

Mitsui Hydrothermal Synthetic Rock System



Solidified product

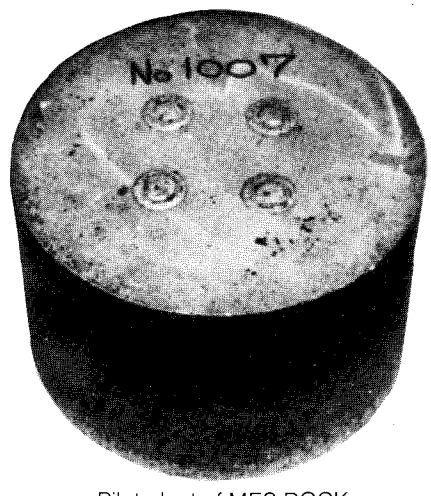
The minerals such as silica (SiO_2) and alumina (Al_2O_3) do not dissolve in water at normal temperature and under normal pressure.
However, they do dissolve or precipitate in semicritical hydrothermal condition, as sand and mud form sedimentary rocks on the sea-bed or underground.
This phenomenon is known as a hydrothermal reaction.
The Mitsui Hydrothermal Synthetic Rock System (MES ROCK) utilizes this hydrothermal reaction and encloses the radioactive nuclides in stable inorganic solidified product.

Solidification Conditions

Reaction temperature — 250 ~ 350°C
Compression pressure — about 300 kg/cm^2
Reaction time — about 20 minutes

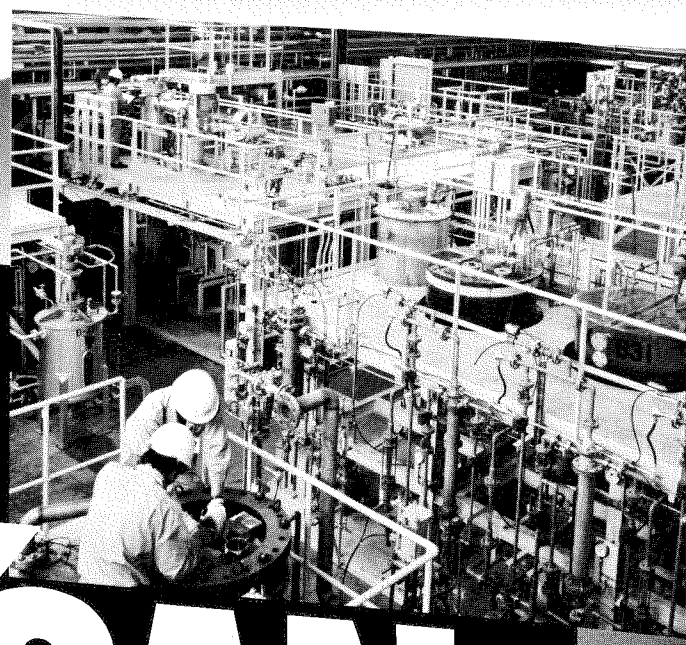
Wastes to be solidified

● Incinerator ash ● Concentrated liquid waste
● Silica-gel ● I_2 absorbent

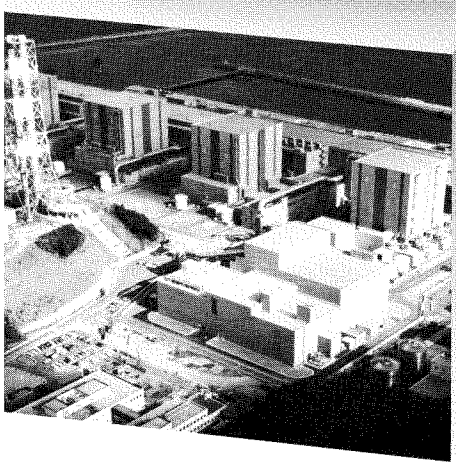


Pilot plant of MES ROCK

MES MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
Head Office Nuclear Energy Systems Division
6-4, Tsukiji 5-chome, Chuo-ku, Tokyo 104, Japan Phone: 03-544-3254



JGC WE CAN PROVE IT



The Expert in Back-end Engineering Services

Ever since our JGC specialists were called on to design and construct Japan's first spent nuclear fuel reprocessing plant in cooperation with SGN of France, we've continued to establish ourselves as the country's leading engineer for radwaste treatment, disposal and other back-end facilities. And through our efforts and achievements, we've earned worldwide recognition for our top-quality engineering services and outstanding expertise in constructing nuclear fuel cycle facilities — particularly for radwaste management and spent nuclear fuel reprocessing.

These are not claims. These are facts. And these facts have led two major Japanese nuclear power service companies to contract us for the delivery of a fuel reprocessing plant and a low-level radwaste storage facility — two important projects which, when completed, will bring Japan a step closer to the completion of its nuclear fuel cycle. Moreover, we were awarded a contract to design and construct radwaste facilities for Virginia Power — the first time a Japanese engineering company has been contracted by a U.S. utility for the delivery of integrated radwaste facilities.

If we haven't convinced you at this point that we're the best when it comes to nuclear fuel cycle facilities, there's only one other way to prove it. Put us to work. You'll find that everything we've told you is true.

Total Engineering and Construction . . . Worldwide

JGC CORPORATION

Head Office: New Ohtemachi Bldg., 2-1, Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan
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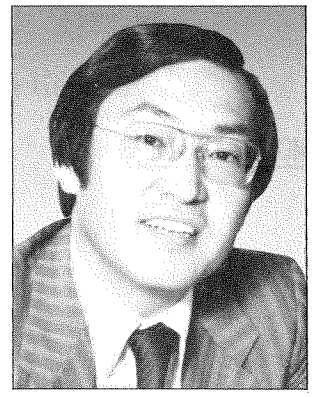
Jiro Enjoji
Chairman, JAIF



Kenichi Ohmae
Chairman, Program Committee

Basic Theme for the Conference

NUCLEAR ENERGY AND SOCIETY — OUR TASKS FOR HARMONY

As the political and economic situation in Eastern Europe changes rapidly, world attention focuses on the international supply and demand picture for energy and the trend of the greenhouse effect and other global environmental issues in the 1990's.

These developments will get this conference to reflect on the position and role that energy and nuclear power should play today and in the future. In view of recent changes in the social climate for nuclear power development, in particular, a vigorous discussion will be devoted to questions that no previous conferences ever took up — why there are so many varying perceptions among the public about nuclear power and what is not understood about it.

Participants from within and outside Japan will be given sufficient time to discuss with speakers on what would be in store for socio-economic society without nuclear power and whether or not European countries and the United States will change their nuclear energy policies. Policy-makers from Japan's two major political parties will be invited to speak out on the above topics, so some propositions will be squeezed out on how to go ahead with the development of nuclear power in the coming years.

In this year's Conference, sufficient time is appropriated for discussions between speakers and participants. Participants are encouraged to exchange views and make comments in discussions in Sessions.

23rd JAIF ANNUAL CONFERENCE
PROGRAM OVERVIEW

MON. APRIL 9

Registration
12:00-13:40 at Hotel
14:00- at Hall

Welcome Reception
12:30 - 14:00
Takaragaike Prince Hotel

Opening Session
14:30 - 16:30

Session 1
16:30 - 18:20

Energy Front --
National Approaches

TUE. APRIL 10

Session 2
9:30 - 11:30

Diversifying Nuclear Power Policies in the World

Luncheon
12:00 - 14:00
Takaragaike Prince Hotel

Films
12:30 - 13:45

Session 3
14:15 - 17:45

Public Awareness of Nuclear Power
-- Why this?

WED. APRIL 11

Session 4
9:00 - 11:30

Economic Society -- Without Nuclear Power?

Buffet Lunch
12:00 - 13:30
Kyoto International Conference Hall

Session 5
14:00 - 17:00

How will Energy and Nuclear Power be Tomorrow?

Farewell Reception
17:00 - 18:30
Kyoto International Conference Hall

Basic Theme
Nuclear Energy and Society — Our Tasks for Harmony

MONDAY, APRIL 9

REGISTRATION
12:00 — 13:40
KYOTO TAKARAGAIKE PRINCE HOTEL

14:00 —
KYOTO INTERNATIONAL CONFERENCE HALL

WELCOME RECEPTION

12:30 — 14:00

PRINCE HALL
KYOTO TAKARAGAIKE PRINCE HOTEL, B2

14:30 — 16:30
OPENING SESSION

Chairman:
Shoichiro Kobayashi
Vice Chairman
Japan Atomic Industrial Forum, Inc.
Chairman
Kansai Electric Power Co., Inc.

JAIF Chairman's Address
Jiro Enjoji
Chairman
Japan Atomic Industrial Forum, Inc.

Remarks by Chairman of Atomic Energy Commission
Tomoji Oshima
Chairman
Atomic Energy Commission
Minister for Science and Technology

"What are not understood — Conference Keynote"
Kenich Ohmae
Chairman
Program Committee
Director
McKinsey & Company, Inc.

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Special Lectures

"Energy, Environment and Policies"
Lamar Alexander
President
University of Tennessee
Former Governor of State of Tennessee
U.S.A.

"On Energy and Nuclear Power in Japan"
Hidezo Inaba
Chairman
Japan Industrial Policy Research Institute

16:30 — 18:20
SESSION 1 ENERGY FRONT — NATIONAL APPROACHES

Chairman:
Toyoaki Ikuta
President
Institute of Energy Economics, Japan

"The Hungarian Government's Energy Policy Conceptions to the Year 2000"
Imre Szabó
Secretary of State
Ministry of Industry
Hungary

"Energy in India — Environmental Problem and Nuclear Power Development"
M. R. Srinivasan
Former Chairman
Atomic Energy Commission
India

"Nuclear Power in the USSR: Status and Prospects"
Erik. N. Pozdyshev
Deputy Minister for Nuclear Power and Industry
U.S.S.R.

Discussions

TUESDAY, APRIL 10

9:00 — 11:30

SESSION 2 DIVERSIFYING NUCLEAR POWER POLICIES IN THE WORLD

Chairman:

Hiroshi Murata
Vice Chairman
Japan Atomic Industrial Forum, Inc.

"Rebirth of Nuclear Power in USA"

Malcolm Wallop
U.S. Senator

"Energy and the Environment"

Jack A. Cunningham, M P
House of Commons
United Kingdom

"Energy Policy of the Social Democratic Party and Nuclear Power Development"

Wolf-Michael Catenhusen
Member of the Federal Diet
Federal Republic of Germany

"Nuclear Energy at the Crossroads — The need for a World Independent Answer"

Gérard Errera
Director for International Affairs
Atomic Energy Commission (CEA)
France

Discussions

LUNCHEON

12:00 — 14:00

PRINCE HALL

KYOTO TAKARAGAIKE PRINCE HOTEL

Special Lecture

"Beauty of Japanese Painting"
Matazo Kayama
Painter

12:30 — 13:45
FILMS (In Japanese only)

Films will be shown on the following topics
——— Culture in Kyoto
——— Reliability of nuclear power
——— Energy in daily life

14:15 — 17:45
SESSION 3 PUBLIC AWARENESS OF NUCLEAR POWER — WHY THIS?

Chairman:
Ryoju Katsube
TV Caster
NHK Enterprises

"Public Consciousness of Energy and Nuclear Power"
Masao Nakamura
Editorial Writer
The Yomiuri Shimbun

Panelists:

Tadao Ishibashi
Attorney at Law

Eiko Oya
Journalist

Tomio Kinoshita
Professor
Kyoto University

Akiyuki Nosaka
Writer

Masao Nakamura

Discussions

WEDNESDAY, APRIL 11

9:00 — 11:30

SESSION 4 ECONOMIC SOCIETY — WITHOUT NUCLEAR POWER?

Chairman:

Junnosuke Kishida
Honorary Chairman
Japan Research Institute

"Living in a Greenhouse — Nuclear Power after Chernobyl"

Richard Wilson
Professor
Harvard University

"Energy Development and Environmental Effects — A Case of France"

Huguette Bouchardeau
Member of the National Assembly
France

"Non-nuclear Power Society and its Socio-economic Impacts"

Mitsuo Takei
Professor
Nagoya Economics University

Discussions

BUFFET LUNCH

12:00 — 13:30

ROOM SAKURA
KYOTO INTERNATIONAL CONFERENCE HALL

Remarks

Kabun Muto
Minister for International Trade and Industry

14:00 — 17:00

SESSION 5 HOW WILL ENERGY AND NUCLEAR POWER BE TOMORROW?

Chairman:

Soichiro Tahara
Critic

Panelists:

Hiroshi Mitsuzuka
Member
House of the Representatives
Former Chairman
Policy Affairs Research Council
Liberal Democratic Party

Shigeru Ito
Member
House of the Representatives
Chairman
Policy Board
Socialist Party of Japan

Kenichi Ohmae
Chairman
Program Committee
Director
McKinsey & Company, Inc.

Discussions

Commentators:

Shunichi Takebe
Editorial Writer
The Asahi Shimbun

Takeko Yanase
Journalist

(Other commentators to be announced)

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"Summarizing the Conference — What have been understood now"

Kenichi Ohmae

FAREWELL RECEPTION

17:00 — 18:30

ROOM SWAN & GARDEN

KYOTO INTERNATIONAL CONFERENCE HALL

14:30 — 16:30
OPENING SESSION

WHAT ARE NOT UNDERSTOOD -- CONFERENCE KEYNOTE

Kenichi Ohmae
Chairman, Program Committee
Director, McKinsey & Company, Inc.

On Energy and Nuclear Power in Japan

Hidezo Inaba
Chairman
Japan Industrial Policy Research Institute

1. As energy situation around the world and in Japan has all become very tense these years, an extensive review has been initiated in the last year on the long-term prospects for Japan's energy primarily by the Advisory Committee for Energy of the government. The conclusion of the review is expected to come out in May or June of this year. Being involed in these efforts, I have become to believe that the "energy issue may become more serious for Japan than anticipated, and therefore it is urgently required for many Japanese people to understand actual status of energy supply and demand and environmental effects it would give and to have clear-cut view on them."

2. In this paper, I will express my personal views for your criticism on energy problems, policy and on how to deal with nuclear energy in this conjunction.

3. As the first point, I think a lot of people in this country are still optimistic about energy, in particular electric power in Japan, but these issues should be studied more seriously from various aspects. As economics and nation's life style have been modernized since 1955 in Japan, energy supply and demand have shown rapid increase. During the period from 1955 to 1973, total energy consumption in Japan increased by 6.5 items and in particular that of oil increased by as much as 26 times accounting for 78% of the total energy. Making the primary oil crisis a turning point, energy-saving and oil-saving policies have been rigorously promoted and the industrial structures in Japan have been changed, and further the energy composition has also been diversified recognizing a number of environmental problems involved. Especially, in the case of electric power, nuclear energy has played a key role as an alternative energy for oil. Entering 1980s, the total energy consumption became absolutely lower than ever before, and overwhelming majority has become recognized that "it is not necessary to worry about energy as once we did in the past".

However, around 1985 as a turning point, the situation of energy supply and demand has been changed lasting up to date. This is not a tendency observed in Japan alone but can be seen worldwide. Japan's long-term energy prospects we are currently reviewing are based on the energy supply and demand growth assuming at 1.6% per year on avarage, but actually it was more than 4% for 1987 - 1989. And it is expected to continue to grow at annually 3 - 5% for some time. What I am worrying about personally on this point is that even energy installations to meet with the abovementioned energy growth by 2000 or 2005 could not be realized if things remain unchanged at all. Should it be well kept withdrawn from consideration?

4. For the second point, considering recent environmental issues around energy in addtion to the fact in belated start in the nuclear facilities construction, it is not a simple thing to obtain minimum energy as may be assumed. In addition, in future such issues as on CO_2 and global warming will become subjects that every and all countries in the world should discuss mroe seriously, and both Japanese government and private sectors should also make positive contribution to the global environmental countermeasures.

5. As the third point, I have become to believe that energy issue should be studied by the nation themselves. This must be considered not one-sided but pluralistically, i.e. comprehensively considering various issues including, "the necessity of serious response to the future energy and electric demand", "adequateness of energy amount and each energy cost", and "environmental issues relating to nuclear power safety and CO^2 release". Thus, it is essential that measures against future energy issue should be carried out in such a way as in solving a "plural equation".

6. And finally, nuclear energy PA has been done mainly for the residents in the area where nuclear power plant in going to be built, however, but as the situation has changed since the Chernobyl accident, and voices calling for nuclear power control have become prevailing widely not only in thepeople living in the vicinity of nuclear power plants but among the residents in urban areas, it is urgently required for us to make possible apeal to many people, in particular to women for more comprehensive energy and environmental issues. Based on such perception, I have continued to make apeal for more than a yeara that more informatifve materials should be provided to the nation to think over the energy issue. This has led me to believe that "in order to sufficiently cope with future energy issue, especially elecric supply and demand as well as environmental issue, we have to promote full-fledged nuclear power in Japan". Thus I am now convinced that, in future, it may be necessary to work out measures in parallel with energy savings by which may of the nation will voluntarily offer their demand saying that "please construct more nuclear power plants".

Indeed, are we Japanese going to face an important turning point to reconsider that nation's energy issue to such an extent?

MONDAY, APRIL 9

16:30 — 18:20
SESSION 1 ENERGY FRONT — NATIONAL APPROACHES

With but ten years till we reach the 21st century, questions on what should be done first in the 1990s to resolve the energy supply and demand issue must be asked and answered. A positive answer is needed and the direction marked out for future plans. Consideration must be given to global environmental issues, reminding us of the need to build a desirable system of energy supply for the future. Possibilities for the way it should be developed will be explored, with the understanding that the development of nuclear power will have to be promoted by joint efforts of all countries, with international collaboration and internationalization.

The Hungarian Government's Energy Policy Conceptions to the year 2000.

Imre Szabó
Secretary of State
Min. of Industry
Hungary

The main characteristic and also requirement of the new Hungarian energy policy is to improve energy efficiency and reduce energy intensity. These could be ensured by restructuring the economy's production and by promoting modernization of energy related technologies and by further development of energy rationalization and energy saving activities. We are willing to realize the latter ones, by means of market economy.

We would like to utilize the domestic energy resources in order to satisfy the moderately increasing energy requirements (0.5 - 0.6 % total increment per year in energy consumption) by conditions which are determined by world market competition. Under these circumstances the domestic crude oil and natural gas production is limited only by geological conditions because in this context, exploitation will decrease the next decade. Marginal costs of coal production is determined by the procurement costs of the replacing energy carriers (communal coal and heating oil). In a competition position like that, production of underground coal mining will likely decrease from the present 15 million to 11-12 million metric ton to the year 2000. At the same time surface mined lignite production will increase from the present 5 million to about 8-9 million metric ton.

Besides the envisaged energy resource developments the import requirements of national economy will increase from the present 51 % to about 64 - 65 %. Technical conditions of the increasing energy imports may be produced but for the necessary procurements, foreign currency should be provided, as well as basic conditions be ensured for standing on sereral pillars, in order to moderate our one-sided dependency. The presently existing pipeline and transmission line system unambiguously ties our country to the USSR. For the sake of safety supply, in the course of diversification, we should create possibility for joining the Western European energy systems.

When satisfying the restrainedly increasing electrical energy demands - about 1.5 %/year - a main concern is the investment resource economy. Taking into account the presently existing power plant capacity, there is no need for building new basic power plant, for about 10 years. To this date, the increasing demands will be satisfied by combined cycle gas turbine power plants, which are cheaper, taking their investment costs and are of better efficiency than the traditional condensing power plants. Commissioning new, high capacity power plant will be necessary by the end of the next decade. Final decision on the question of new basic power plant construction - taking into consideration business aspects as well - should be made in two - three years.

The risk of the outlined power plant construction program is, that demand for hydrocarbon volume of the system is increasing, which - in case of increment of world market price of crude oil - means an inreasing foreign currency burden for national economy as well. Nevertheless the advantage of this program is its flexibility, rapid adaption capability to the requirements and its low capital intensity.

Organic part of Hungary's energy policy is environment protection, and reducing - as far as possible - environmental damages. Technical development is also a matter of great importance, constituting important means of increasing energy efficiency and that of energy rationalization.
We are willing to realize all these within such economic and organizational frames in which energy carrier prices will correctly reflect the costs occuring on national economy level (world market prices, long term increment costs) and economic conditions ensure stable and independent economy for efficiently operating energy producing companies.

Budapest, 1990. február 21.

Prof.dr.Imre Szabó

ENERGY IN INDIA - ENVIRONMENTAL PROBLEM AND NUCLEAR DEVELOPMENT

Dr. M.R. Srinivasan
former Chairman,
Atomic Energy Commission
India

India is a large country with a population of about 800 million which is still growing. The country is going through a process of development in agriculture, industry and services. Understandably the demand for energy is growing, as primary energy in the form of coal, oil and gas and as secondary energy as electricity. India is still dependent to some 40 to 50% of primary energy, on non-commercial sources such as wood, agricultural refuse and cow dung. This heavy dependance on wood is resulting in large scale loss of forest cover. Ideally Kerosene, coke and gas should replace wood as domestic fuel. The electric generation capacity is about 55,000 MW and is likely to go up to 100,000 to 110,000 MW by 2000 A.D. The doubling time experienced so far has been about ten years. Some 65% of the electrical energy is based on coal burning. Coal is unevenly distributed geographically and requires to be transported over 1000 to 1500 Kilometres to consuming centres. The high ash content of Indian coals adds to the transportation cost apart from increasing the capital cost of the power plant. The tempo of development of hydro electric power which was high in the fifties, sixties and seventies has slackened in the eighties and may slow down further in the nineties. Submergence of the remaining forest areas, adverse ecological aspects and opposition from large numbers of people who need to be resettled are the grounds of the opposition. Nuclear power is

currently contributing about 3% of the electricity supply and plans are to increase this to 10 or 15% by the year 2000. India has pursued its own reactor development based on heavy water reactors and has standardised two sizes - 235 MWe and 500 MWe. Twelve each of these reactors will be built by 2000 A.D. India produces all the equipment and components needed for the nuclear plants as also the nuclear fuel and heavy water. India has a strong interest in fast reactors. Following the Fast Breeder Test Reactor (45 MW thermal and 15 MW electrical), a Prototype Fast Breeder Reactor of 500 MWe is being designed. This is expected to become operational in 1998 or so. The first nuclear power station consisting of two Boiling Water Reactors has completed twenty years of successful operation. In 1988, USSR agreed to construct a nuclear power station with two 1000 MWe VVER reactors. Discussions are continuing with the French-German consortium on building a nuclear power station with two units of 1000 MWe PWRs. While energy planners see nuclear power as an important part of the electric supply mix, opposition is building up against nuclear energy amongst ecologists and local interest groups. Considerable efforts are being made to educate the public in this regard. An important constraint to the near term plans for augmenting nuclear power may be the availability of investment capital.

Nuclear Power in the USSR: Status and Prospects

E. Pozdyshev
USSR Ministry for Nuclear Power and Industry

As of beginning of 1990 16 nuclear power plants (NPPs) were in operation in the USSR with 45 reactors having total installed capacity of 36,500 MWe. Operational experience has totaled 420 reactor-years. 3 units with the total capacity of 510 MWe were decommissioned due to expiration of their design lifetime. In 1989 Armenia NPP, a twin-unit VVER-400 plant was closed down due to public protests.

Nuclear electricity is mainly produced by RBMK and VVER type reactor units accounting for 49% and 47% respectively in 1989. Last year 212 bln kWh of electricity was generated by NPPs in the USSR which is 12.5% of total electricity produced in the country. In other countries this share is much higher.

The Soviet NPPs performance is comparable to that of other developed countries. The load factor (LF) for most of Soviet NPPs for several years has been on a stable level of 65 - 75%. VVER 440 and RBMK 1000 reactor plants have the highest LF values (72 - 80%) and the lowest outage duration due to a number of reason. A stable trend towards decrease of the number of plant occurrences/events is observed. In 1988 the number of unplanned shutdowns with emergency protection systems actuation was 2.2 per one reactor-year and in 1989 this figure was only 1.5. In 1989 unit unplanned shutdowns resulted from desigh deficiencies (13.5% of all the shutdowns), equipment poor quality (26%) and personnel errors (40.3%).

The Chernobyl NPP accident has entailed the enhancement of plant safety requirements. Striving for better compliance with international safety standards being developed by IAEA has become the major incentive for elaboration of these requirements. After Chernobyl a detailed analysis of all NPPs safety was performed in the Soviet Union. A set of scientific-technical and organizational measures to improve plant safety level and especially that of RBMK plants has been worked out and implemented.

A programme of simulator construction and development of technical aids for NPP operating personnel training to be installed at Training Centres and Training Points is under way. International cooperation in this area in particular with the USA is promoted.

Presently two full-scope simulators are available for plant operating personnel training. One is at Smolensk NPP for RBMK plant personal training and the other is at Novovoronezh NPP for VVER plant personnel training.

Modifications and retrofitting programmes have been developed to further enhance the safety of operating NPPs.

Maintaining NPP operation and especially construction of new plants as well as the future of nuclear power shall be considered from the viewpoint of general social & economic situation in the country. In particular, the Chernobyl accident gave rise to strong antinuclear movement stemming mainly from the fear of nuclear hazards.

At the same time the Soviet scientists and power engineers are convinced that the nuclear power is the only option for the time being and for the near future. After Chernobyl 8 new units (1,000 MW each) have been commissioned at operating NPPs.

Presently 34 units at 17 NPPs are under construction. However due to public protests on the one hand and the need to account for enhanced NPP safety requirements on the other hand construction of a number of units was deferred or frozen. The siting policy for NPPs to be constructed is being revised.

The decision has been taken to phase out the RBMK plant construction programme.

In the next five years (1991 - 1995) only 6 new VVER 1000 units are expected to be commissioned at operating NPPs. And this is despite the fact that the existing construction capacities and nuclear industry capabilities allow to increase the total NPP installed capacity up to 81,000 - 83,000 MW by the year of 2000 taking into account decommissioning of units with expired lifetime. Further extension of Soviet nuclear programme is expected to be mainly based on the use of VVER type reactors having the properties which meet international safety standards.

TUESDAY, APRIL 10

9:00 — 11:30

SESSION 2 DIVERSIFYING NUCLEAR POWER POLICIES IN THE WORLD

Nuclear power policies of ruling and opposition parties in respective countries, standing on public policies and their current status, will be introduced by representatives from the U.S.A., now taking action for rebirth of nuclear development, from the U.K. where active political discussions are held for general elections approaching, from West Germany giving severe considerations to nuclear development, and from France relying on nuclear power for much of its electricity. Changes of nuclear policy in each country will be reviewed and discussions will be held on what should be nuclear power policy for the world.

SUMMARY OF PAPER FROM JACK CUNNINGHAM, MP, U.K.

ENERGY AND THE ENVIRONMENT

ENERGY PRODUCTION, WHATEVER FORM IT TAKES, POSES PARTICULARLY DIFFICULT PROBLEMS FOR THE ENVIRONMENT. FUEL EXTRACTION, BURNING AND CONVERSION ALL INVOLVE RISK AND CAUSE POLLUTION AND RESULT IN WASTES NEEDING DISPOSAL. ACID RAIN, THE 'GREENHOUSE EFFECT', NUCLEAR DISCHARGES, NUCLEAR WASTE, 'NOX' GASES ARE NOW FAMILIAR WORDS IN THE WELCOME INCREASE IN WELL-INFORMED DISCUSSION OF THE URGENT NEED TO SAFEGUARD FRAGILE ECOSYSTEMS. EVEN RENEWABLE ENERGY SOURCES INVOLVE SIGNIFICANT ENVIRONMENTAL IMPACT.

YET WE NEED ENERGY TO SUSTAIN, LET ALONE IMPROVE OUR QUALITY OF LIFE AND THAT OF MILLIONS OF PEOPLE IN THE THIRD WORLD. THE NEED FOR ENERGY IS LIKELY TO GROW OVERALL IN WORLD TERMS, BECAUSE EVEN THOUGH IT MAY FALL SIGNIFICANTLY IN DEVELOPED NATIONS IT WILL RISE SIGNIFICANTLY IN DEVELOPING COUNTRIES TO COPE WITH BOTH POPULATION GROWTH AND THE REASONABLE WISHES FOR IMPROVEMENTS IN THE QUALITY OF LIFE FOR MILLIONS OF PEOPLE.

ENERGY PRODUCTION INDUSTRIES ARE HUGE CONSUMERS OF LAND, FINANCE AND OTHER RESOURCES SUCH AS WATER, ENERGY PRODUCTION, PARTICULARLY THE ELECTRICITY AND PETROLEUM INDUSTRIES, OFTEN PRE-EMPT LARGE AND ENVIRONMENTALLY SENSITIVE COASTAL AND ESTUARINE SITES.

THERE ARE THUS MANY VERY IMPORTANT REASONS FOR US TO USE ENERGY MUCH MORE EFFICIENTLY THAN WE DO NOW. THE CONFLICT BETWEEN ENERGY NEEDS AND ENVIRONMENTAL PROTECTION AND CONSERVATION PRESENTS US WITH A REAL DILEMMA. FOLLOWING THE DISASTER AT CHERNOBYL, NUCLEAR POWER LOST SUPPORT - PEOPLE WERE RIGHTLY CONCERNED FOR THEIR FUTURE AND THE ENVIRONMENT.

FOLLOWING A RECOMMENDATION IN THE 1984 'BLACK REPORT' ON THE INCIDENCE OF CANCER IN WEST CUMBRIA, PROFESSOR MARTIN GARDNER AND COLLEAGUES HAVE PRODUCED AN AUTHORITATIVE CASE CONTROL STUDY OF LEUKAEMIA AND LYMPHOMA AMONG YOUNG PEOPLE LIVING NEAR THE SELLAFIELD NUCLEAR PLANT.

THIS REPORT SUGGESTS A LINK BETWEEN THE EXPOSURE TO RADIATION OF MEN EMPLOYED AT SELLAFIELD AND SUBSEQUENT LEUKAEMIA AMONG THEIR CHILDREN IS A MATTER FOR GRAVE CONCERN. THIS IS A COMPLETELY NEW FINDING QUITE DIFFERENT FROM PREVIOUS STUDIES. IF CONFIRMED, THE FINDINGS WILL HAVE MAJOR IMPLICATIONS FOR EMPLOYMENT PRACTICES, PROTECTION OF NUCLEAR INDUSTRY WORKERS, AND DOSE LIMITS TO EVERYONE EXPERIENCING THE RISK OF EXPOSURE TO RADIATION IN THEIR EMPLOYMENT.

EVERYONE ON OUR PLANET FACES THE PROBLEM OF 'GLOBAL WARMING' DESCRIBED BY THE WORLD COMMISSION ON THE ENVIRONMENT AND DEVELOPMENT - THE BRUNDTLAND REPORT (APRIL 1987) THUS:

"ENVIRONMENTAL THREATS TO SECURITY ARE NOW BEGINNING TO EMERGE ON A GLOBAL SCALE. THE MOST WORRISOME OF THESE STEM FROM THE POSSIBLE CONSEQUENCES OF GLOBAL WARMING CAUSED BY THE ATMOSPHERIC BUILD-UP OF CARBON DIOXIDE AND OTHER GASES."

AS OUR UNDERSTANDING OF THE SCIENCE OF THE ENVIRONMENT DEVELOPS, SO WE SEE THE PERSPECTIVES CHANGING AGAIN. THE BURNING OF FOSSIL FUELS - COAL, OIL, GAS - IS THE BIGGEST SOURCE OF GREENHOUSE GASES AND THE MOST IMPORTANT CAUSE OF GLOBAL WARMING. REDUCING CARBON DIOXIDE EMISSIONS MUST BE A PRIORITY IF WE ARE TO SLOW DOWN THE INDUCED CLIMATIC CHANGE THAT GLOBAL WARMING WILL PRODUCE. THIS NEED HAS IMPLICATIONS FOR TRANSPORT POLICY TOO, SINCE VEHICLE EMISSIONS ARE MAKING AN INCREASING CONTRIBUTION TO THE TOTAL OF GREENHOUSE GASES.

THE BRITISH LABOUR PARTY BELIEVES THAT THE BEST, THE QUICKEST, AND MOST COST-EFFECTIVE AND ENVIRONMENTALLY SOUND WAY TO BEGIN TO TACKLE THESE PROBLEMS IS A MAJOR LONG-TERM GOVERNMENT POLICY COMMITMENT TO ENERGY CONSERVATION. THIS NECESSITATES INTERVENTION IN THE ECONOMY. IT IMPLIES THE NEED FOR A BALANCED ENERGY POLICY. WE RECOGNISE THAT FOSSIL FUELS WILL BE THE ESSENTIAL MAINSTAY FOR MANY DECADES TO COME, BUT IN ALL THE CIRCUMSTANCES WE SHARE THE VIEW OF THE BRITISH TRADES UNION CONGRESS AND OTHERS THAT:

"IT WOULD BE UNWISE TO RULE OUT NUCLEAR ENERGY AS A STRATEGIC SOURCE FOR THE LONG TERM."

WE RECOGNISE THE NEED TO SUPPORT GREATER RESEARCH EFFORTS INTO IMPROVING ENERGY CONSERVATION, ENERGY TRANSMISSION, COMBUSTION AND ENERGY USE, AND WE ACCEPT THE NEED FOR GREATER URGENCY IN THE DEVELOPMENT OF ALTERNATIVE ENERGY RESOURCES.

IT IS OUR VIEW THAT GOVERNMENT HAS TO SUPPORT THE INVESTIGATION OF THE POTENTIAL OF NEW IDEAS AND NEW TECHNOLOGIES TO ENABLE A SAFE AND COHERENT TRANSITION TO MORE SUSTAINABLE ENERGY SYSTEMS WHICH MAY BE ENVIRONMENTALLY BENIGN.

ENDS

ENERGY POLICY OF THE SOCIAL DEMOCRATIC PARTY AND NUCLEAR POWER DEVELOPMENT

Wolf-Michael Catenhusen
Chairman of the Committee for Research, Technology and Appraisal of Technological Consequences in the German Bundestag

Theses on the SPD's nuclear energy policy

After ten years of controversial debate, the National Conference of the German Social Democratic Party (SPD) finally decided in 1986 in favour of ending the use of nuclear energy in the Federal Republic of Germany. This objective is to be realized within a period of ten years if possible and encompasses the following elements:

- No further development of advanced reactor lines, such as the fast breeder and high-temperature reactors.
- The strategy of waste disposal based on reprocessing spent fuel elements and direct final storage of the nuclear waste already accumulated is to be abandoned.
- The safety of older nuclear power plants is to be investigated so that the plants can be shut down for safety reasons.
- Adoption of a nuclear energy law which will make it possible gradually to withdraw the existing more modern light-water reactors from the national grid within ten years, without immediately having to pay compensation to the operators of these nuclear power plants.

Reasons for ending the use of nuclear energy

1. Despite their low probability of occurrence, the serious accidents which may occur during operation of a nuclear power plant are simply not acceptable. The quality of the risk is such that this source of energy must be abandoned.

2. The use of plutonium will ultimately eliminate the dividing line between the use of nuclear energy for peaceful and military purposes.

3. The problem of disposing of the radioactive waste from nuclear power plants has not been solved anywhere in the world to date.

4. The use of nuclear energy, especially the plutonium industry, must be so closely supervised that society's democratic structures may be jeopardized in the long term.

5. The excess capacities already existing today indicate that nuclear power is already replacing native German coal as the source of energy for the generation of electricity.

Consequences of ending the use of nuclear energy with regard to the supply of electricity in the Federal Republic of Germany

The Federal Republic of Germany has major reserves of native rock coal and brown coal. However, priority must not be given solely to using coal, gas or petroleum in order to generate electricity, almost 40% of which is currently generated by nuclear power plants. Ending the use of nuclear energy must be associated with the objective of ensuring an ecologically acceptable supply of electricity using our natural resources as conservatively and with as few risks as possible.

1. We require an intensive strategy backed by the government encouraging less wasteful and more efficient use of energy. It is both economically and technically possible to cut the consumption of energy for domestic heating by at least 30%, industrial process heat by 10% and electricity by 20% in the course of a ten-year period.

2. Native coal should be used in an ecologically acceptable and more efficient manner during a transition period. In this way, sulphur dioxide emissions can be reduced by almost

70% and nitrogen oxide emissions by more than 50% as the use of nuclear energy is wound down in the Federal Republic of Germany.

3. In the long term, attention must focus on regenerable sources of energy for our electricity supply. The hydrogen derived from solar energy could prove a major source: like nuclear energy, its use does not produce carbon dioxide.

Energy and the environment

The Earth's climate is being jeopardized, in particular, by the emission of carbon dioxide. The SPD considers its strategy of ending the use of nuclear energy to be acceptable, even from the ecological point of view. Firstly, there are the ecological risks associated with the nuclear energy itself. Secondly, the considerable potentials for saving energy in a heating market dominated by oil and gas can be exploited most cost-effectively and most quickly in the highly developed industrialized nations instead of increasing the supply of electricity by building more nuclear power plants and thus altering the industry's underlying structure. In addition, the electricity price must be drastically increased through taxation in order to create the economic pressure compelling consumers to use energy in a less wasteful and more rational manner.

NUCLEAR ENERGY AT THE CROSSROADS
THE NEED FOR A WORLD INTERDEPENDENT ANSWER

Gérard ERRERA
Director for International Affairs
CEA, France

Nuclear energy as of today is at the crossroads. Whatever we do to try to see what the future will look like, we cannot see a possibility to renounce this form of energy in view of the growing needs of energy in the world. However we are getting more and more conscious of the fact that a certain number of problems need absolutely to be solved if we want nuclear energy to have a future.

This presentation will focus on the ways we analyse this situation in France and the way we intend to handle the problem.

1. What about the needs for energy?

a) Forecasting is a very difficult art and the past has shown that many an expert has erred and been off the mark. There is no doubt however that we need some guidance to plan our decisions in particular in view of the fact that lead times are considerable in the nuclear industry, typically five to ten years.

Mostly, we have in the past tended to overestimate the macro-economical factors which led to very potimistic predictions in the seventies. Sometimes our forecasting was just an extrapolation of the current situation in many countries without taking into account the political and sociological situation.

b) The nuclear community believes however that nuclear energy will start up again in the middle or the end of this decade for several reasons:

- The growing need of energy in the world due to the increase of population

- The growing demand for electricity linked to economic development especially in the estern countries

- The possibility for nuclear energy to show a good record as to its impact on environment in particular concerning the greenhouse effect.

2. Nuclear development will resume if a certain number of conditions are met.

Technical and political conditions must be met if nuclear energy is to resume its development.

a) On the technical side the following conditions must apply:

- Nuclear energy must stay competitive or become so where it is not yet the case today with respect to fossile fuels

- Technical solutions must be developed to suit the demand in different situations. For instance, the large size reactors which are operating today are not suited to certain countries or certain grids. New models, of smaller size might be better suited and must be fostered

- Safety must be guaranteed in all circumstances and all types of reactors and the safety level must be increased everywhere to attain the same high level. In this respect, the work done through IAEA in the frame of the

OSART and NUSS is of paramount importance. In this respect, new ideas about a good balance between active and passive safety must be achieved.

- The problem of waste disposal must be solved. The beneficial aspect of nuclear energy as far as protection of the environment goes can be made clear to the public only when the waste problem will have been solved.

b) On the more political side two problems will also have to be solved:

- It is clear today that nuclear energy has in many countries a negative image and even countries like Japan and France which seemed immune for a long time, are facing the problem.

  We have thus to find ways to communicate our beliefs to the public and convince them that nuclear energy is a good choice.

- On the other hand, we cannot ignore the fact that in the minds of the public and of political leaders, there is a link between peaceful applications of nuclear energy and weapons. In the course of time we have set up a rather comprehensive non-proliferation and safeguards system in the frame of the Vienna Agency. We have also to develop our efforts in this respect to foster public confidence.

3. The French develpoment

There is no doubt in our mind that we have to continue to strive for technical excellence and that the best way to achieve this is through internationalization.

Our objectives are today to operate our reactors while improving them in terms of safety and economics. We have also to prepare the future in several ways, by continuing our efforts in the field of fast breeder reactors and by launching innovative programs for other future reactors like advanced pressurized water reactors of smaller size.

These objectives will be best achieved through international cooperation.

Fast breeder reactors are already developed in a totally European frame and will continue to be so.

Pressurized water reactors will also be developed and marketed through the new Franco-German NPI founded by Framatome and KWU.

In the field of the fuel cycle, reprocessing will be mainly carried out in France and Great-Britain, and other schemes are under consideration for the fabrication of Mox fuels in an European context.

Safety is also and international issue and European countries have linked together in many issues (R & D, safety analysis) and this is also being extended to the countries of Eastern Europe.

Conclusion

In spite of many uncertainties which affect the nuclear world today, we remain optimistic about the development of this form of energy.

We have however to strive for excellence and work towards a better acceptance of the public.

The best way to achieve this goal is a broad international endeavor as well through international organisations like IAEA as through bilateral or multilateral cooperation.

TUESDAY, APRIL 10

14:15 — 17:45

SESSION 3 PUBLIC AWARENESS OF NUCLEAR POWER — WHY THIS?

Housewives and youth are among nuclear opponents who have spread the movement around this country, arousing a lively debate on the pros and cons of nuclear power. Here a review will be made on the difference of perceptions concerning energy and nuclear power to see why it has arisen among the people. Intellectuals are invited to speak out from their different positions on the events and the reasons that have led to the present state of affairs.

Public Consciousness on Energy and Nuclear Power

Masao Nakamura, Editorial Writer
The Yomiuri Shimbun

Let us give thought to the present public consciousness as regards nuclear power, as revealed by the results of the analytical survey recently conducted by the Japan Atomic Industrial Forum.

Of those surveyed, 0.8% favored "actively increasing nuclear power," while 28.9% favored a more "gradual increase. These two groups combined, known herein as the promotional group, comprised 29.7% of the total group surveyed. The neutral group, or those favoring "maintain the present level," amounted to 45.7%, while 11.7% favored "cut down" and 7.2% "stop," bringing the opposition group to 18.9% of the total numbers surveyed.

During the year from August 1987 to October 1988, four organizations, namely, the Prime Minister's Office, the Asahi Shimbun, the Yomiuri Shimbun and NHK, conducted individual surveys of public opinions on nuclear power. As compared with these four previous surveys, the opinion of "discontinue" surely decreased in the recent JAIF survey, but the opinion of "actively increase" also decreased at the same time. The majority of people seem to accept the present state but hesitate to support it actively. One reason for

the small support for the promotion may be the fact that the oil supply is abundant and people are not feeling strained by the demand and supply of energy.

The present survey indicates that many people in Japan have an optimistic view of the energy problem. Only one person out of every two is thinking that "the third oil crisis will break out if the world situation is changed."

The most common sentiment shared by people who are against or have a negative opinion on nuclear power is the doubt that "nuclear power is really necessary or not." According to the analysis of factors, this opinion overwhelms all other reasons for opposition, such as "fear of radiation" or "distrust of promotional people."

Promotional information apparently lacks a convincing statement of logical necessity. There is also a problem in the method of promotion, because the information supplied by the promotional people lacks in persuasiveness, compared with arguments of the opposition people. In response to information promoting nuclear power, 17.9% of the group surveyed were "somewhat convinced," and 27.5%, "not quite convinced." In reponse to information in opposition of nuclear power, 37.5% were "somewhat convinced," and 10.9%, "not quite convinced." This clearly indicates the inefficacy of promotional information, as compared with the opposition.

Explaining why promotional information was not convincing, about 60% of the group pointed out that "anything unfavorable is not publicized," that "major accidents actually occurred in the USA and the USSR." that "when an accident occurs, nothing but 'safe' is announced," and that "nothing sufficiently answers people's fears and questions."

The more one thinks that the nuclear power is unsafe, the more preoccupied one becomes with its safety. As many as 45% of those surveyed are feeling that it is unsafe to leave the problem of nuclear power only to the specialists alone. For the appropriate evaluation of safety, the judgment of specialists alone is not enough, consideration of societal safety as well as technical safety are required. Therefore, a means of fully explaining safety, understandable and acceptable to the society, will be needed. The object of such explanation should include the effect of radioactive wastes and radiation, safety measures for reprocessing of spent fuels, the actual state of accidents and failures in nuclear power plants and facilities, and so on.

One thing that must not be overlooked is the fact that the more one opposes nuclear power, the more one is willing to sacrifice his living standard to save energy. This willingness is uncommon among supporters of nuclear power. Many people in the promotional group acknowledge the richness

of social life at present and in the future, but the opposing people reject this view and stay away from the "wave" of richness. What is lacking in the promotional argument is a persuasive justification of nuclear power, while in the opposition argument are global view and philosophy of life.

An important factor in forming positive public opinion of nuclear power is the mass media, which, according to the present survey, is currently in disrepute, at least as far as the perceived "fairness" of the news is concerned. Those surveyed stated that "mass media reports even a failure as an accident" and that mass media deliberately inflames our fears in the interest of sensationalism.

It can be gathered from the present survey that ordinary people believe in the fairness of mass communication more when it reports "fearful" news than when it reportes "no fear". As for newspaper specifically, more larger number of opposition group persons than promotional group persons believe in the trustworthiness of news report.

There are problems also in the present education at schools, where radiation and nuclear power are not taught unless one goes to the science and engineering faculty of a university, and in the attitude of politicians, who have more

interest in their immediate election than in the energy policy of the country. The relation between nuclear power and politicians is a worldwide problem.

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WEDNESDAY, APRIL 11

9:00 — 11:30

SESSION 4 ECONOMIC SOCIETY — WITHOUT NUCLEAR POWER?

The relationship of energy demand to national living will be taken up as a major point for discussion. What is the price that will have to be paid if we abondon nuclear power? Attention will be focused on the cost this would involve and the effects it would create. Violent changes that would be brought about in the international distribution of resources if fossil fuel-burning thermal generation, hydroelectric power and new energy sources are to form the main currents. It would mean that a diversity of lifestyles, environmental pollution and global warming, will have to be taken into consideration in a close study, as to whether or not an energy-based society will be viable with energy other than nuclear power.

LIVING IN A GREENHOUSE: Nuclear power after Chernobyl

Richard Wilson
Professor, Harvard Univ.

The accident at the VI Lenin Nuclear power plant at Chernobyl in the Ukraine on the morning of April 26, 1986, shocked the world. Several countries delayed or slowed their nuclear power programs. On the other hand, in summer 1989 we had the fifth out of six hot summers, which brought to public attention the possibility of global climate change caused by increasing CO_2 emissions. This makes nuclear power more desireable.

When arguing for the desireability of nuclear energy, it is necessary to address the concerns of those who do not understand it. It is not generally realized that the energy content per unit weight of U^{235} (from fission) is 3 million times the energy content per unit weight by burning coal. This enables us to contain combustion products and reduce pollution; it also makes nuclear waste disposal a manageable issue in comparison with waste disposal elsewhere in society which is not so easily managed.

In discussing these, and other, environmental issues it is necessary to make comparisons to facilitate understanding. One can make comparisons of radiation cancers released from radionuclides, with medical effects from coal emissions calculated with similar degress of conservation. I will make and present such comparisons.

Often opponents of nuclear power produce exaggerated claims of effects of radiation. In responding to these it is important to understand the fundamental principles of epidemiology and the types of statistical errors that are commonly made. I will briefly show how two major errors pointed out by Nobel Laureate Richard Feynman and by Tippett explain most of these exaggerated claims.

Energy Development and Environmental Effects

- A Case of France

Huguette BOUCHARDEAU
Member of the National
Assembly
France

France has a very special place as concerns energy production in Europe and throughout the world. Endowed with few natural raw material resources, it built hydroelectric and coal-burning power plants extensively until the beginning of the 1970's. Since 1970, it has developed nuclear energy almost exclusively (80% of all electricity produced). At the same time, France constructed ore-enriching and waste reprocessing installations and developed a prototype of the fast-breeder reactor (Superphenix) which was to give rise to a complete network of this type of plant. Opposition to nuclear energy, which was widespread in the 1970's, has gradually decreased given the number of plants currently in operation and the great attention paid to safety measures. However, today, French public opinion has other questions.

* First, people are concerned about the environment. In this context, it would seem that nuclear plants should be developed instead of hydroelectric or thermal plants. However, the difficult problem posed by the greenhouse effect means that we have to think harder and longer about ways to save energy in the years to come;

* Secondly, the market of energy plants and technology between the North and the South leads to more extensive exploration of what are still called "new" sources of energy (sun, wind, etc.) which are better suited to the economies of developing countries;

* Thirdly, in France, there is dissatisfaction with the lack of democracy in the decision making process. France has only one producer/distributor of electricity with a nationalized company and research and inspection centers directly linked to the Government. This very centralized system is efficient and safe. But it has not always been successful in communicating to the man in the street the full meaning of its decisions. The report on energy that I had the honour to present to the French National Assembly insisted on more open decision-making procedures in the field of energy production and supervision.

Non-Nuclear Power Society and its Socio-economic Impacts

Mitsuo TAKEI
Professor
Nagoya Economics University

Following items should be examined in our discussions on the above subject.

- Energy supply after Oil-crisis and nuclear power

- World energy supply in non-nuclear power society (years of 2000 - 2010)

- Oil economy and nuclear power

- A calculation formula on the projection of future nuclear capacity

WEDNESDAY, APRIL 11

14:00 — 17:00
SESSION 5

This Conference has discussed global issues relating to energy, the real picture of a society without nuclear power, and the public consciousness of nuclear energy. In this session, through reviews of the three-day discussions and hearing the opinions of policy makers of two major political parties in Japan, issues for future development will be sought for proposals on policies. Considering differences of consciousness of nuclear issues among the public, discussion will be made on what is understood and what is not and what are most important matters that will have to be changed will be clarified.

SUMMARIZING THE CONFERENCE -- WHAT HAVE BEEN UNDERSTOOD NOW

Kenichi Ohmae
Chairman, Program Committee
Director, McKinsey & Company, Inc.

［ M E M O ］

Member List of the Program Committee
for the 23rd JAIF Annual Conference

(In alphabetical order)

Chairman

Kenichi Ohmae
Director
McKinsey & Company, Inc.

Member

Yoshihisa Akiyama
Senior Managing Director
Kansai Electric Power Co., Inc.

Fusako Fujihara
Columnist, Editorial Bureau
Nihon Keizai Shimbun

Yuzo Fujii
Executive Vice-President
Tokyo Electric Power Co., Inc.

Tetsuo Hineno
Chairman
Nuclear Energy System Policy Making Committee
Japan Electrical Manufacturers' Association

Masami Hirose
Professor
Hyogo University of Teacher Education

Kozo Iida
Executive Vice-President
Kansai Electric Power Co., Inc.

Takao Ishiwatari
President
Power Reactor and Nuclear Fuel Development Corp.

Shinichi Izumi
Executive Vice President
Chugoku Electric Power Co.

Ryoju Katsube
TV Caster
NHK Enterprises

Minoru Kobayashi
Managing Director
Industrial Bank of Japan, Ltd.

Keiji Kojima
Senior Managing Director
Sumitomo Electric Industries Ltd.

Hiroshi Murata
President
Japan Atomic Energy Relations Organization

Nobuo Nakamura
Secretary General
Agriculture Information Research Institute

Masuhiko Otsuka
Technical Director
Institute of Applied Energy

Mamoru Sueta
Executive Director
Committee for Energy Policy Promotion

Atsuyuki Suzuki
Professor
University of Tokyo

Isamu Takagi
Executive Director
Federation of Electric Power Companies

Shunichi Takebe
Editorial Writer
Asahi Shimbun

Kyoko Tajika
Essayist

Masatoshi Toyota
President
Japan Nuclear Fuel Service Co., Ltd.

Takeko Yanase
Journalist

Eiko Yuasa
Executive Director
Senri Foundation

J A I F — Shoichiro Kobayashi
Vice Chairman
Japan Atomic Industrial Forum, Inc.
Chairman
Kansai Electric Power Co., Inc.

Observers — Katsuhisa Ida
Deputy Director General
Atomic Energy Bureau
Science and Technology Agency

Yasuji Ishigaki
Deputy Director General
United Nations Bureau
Ministry of Foreign Affairs

Junichiro Mukai
Deputy Director General
Agency of Natural Resources and Energy
Ministry of International Trade and Industry

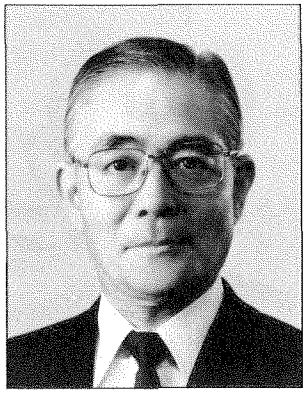
BRIEF PERSONAL HISTORY

OF

CHAIRMEN, SPEAKERS, AND PANELISTS

OPENING SESSION

Chairman



SHOICHIRO KOBAYASHI

Born on July 14, 1922 in Osaka City, Osaka

Sept. 1946 Graduated from School of Economics, The University of Tokyo
Jan. 1947 Joined Kansai Elecric Supply Co., Ltd.
May 1951 The Kansai Electric Power Co., Inc.
May 1965 Manager, Power Sales Department, Office of Sales
May 1968 General Manager in charge of Office of the President and Subsidiary Business Operation
May 1970 Elected to the Member of the Board of Directors with the same office of managership
May 1972 Managing Director
May 1974 Senior Managing Director
May 1975 Executive Vice-President and Director
Jun. 1977 President and Director
Nov. 1985 – Chairman of the Board

Directorship
Jun. 1977 – Director, Japan Foundation for Promotion of Science and Technology
Nov. 1977 – Vice Chairman, Kansai Economic Federation

Publication
"Total Quality Control in the Electric Utility Industry" by Shoichiro Kobayashi et al, October 1986, Publishing Office of the Union of Japanese Scientists and Engineers

Hobby
Reading, Painting, and Golf

JIRO ENJOJI

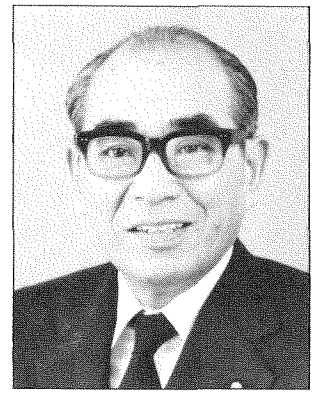
Born on Apr. 3, 1907

Present Titles:
- Senior Counsellor, Nihon Keizai Shimbun
- Chairman, Japan Atomic Industrial Forum

Education:
1933 Graduated from Waseda University (Department of Political Economy)

Professional Career:
1933 Joined Nihon Keizai Shimbun, Inc., publisher of the nation's foremost economic daily newspaper (then called The Chugai Shogyo Shimpo and later renamed The Nihon Keizai Shimbun), as a reporter
1942 Economic and political news editor
1946 Managing editor
1947 Director and managing editor
1954 Managing director and editor-in-chief
1965 Executive director and editor in-chief
1968 President and Cheif Executive Officer
1976 Chairman of the board
1980~ Senior Counsellor

Current Government Posts:
- Member of Advisory Committee for Energy
- Chairman of Petroleum Council
- Chairman of Central Social Insurance Medical Council
- Member of Industrial Structural Council



TOMOJI OSHIMA

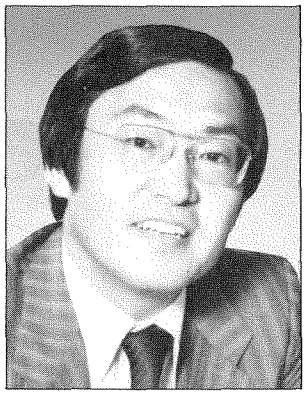
Born on October 2, 1916 in Tochigi Pref.

Graduated from Faculty of Agriculture, Kyoto University in 1941

Elected to the House of Councillors in 1974, 1980, and 1986.

Appointed State Minister for Science and Technology in 1990

Career:
Parliamentary Vice Minister for Science and Technology (1977)
Chairman, Policy Deliberation Commission
Director, Committee on Audit, House of Councillors
Chairman, Committee on the Cabinet
Chairman, Committee on Education
First Deputy Chairman, Committee on Impeachment



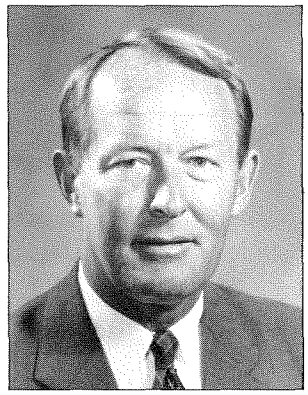
KENICHI OHMAE

As an advisor to top management and govt. leaders, author and speaker, Dr. Kenichi Ohmae has been described as "Mr. Strategy" in Japan, where he heads the office of McKinsey & Company. Some of Japan's most famous and internationally successful companies regularly seek his help in shaping their competitive strategies and his cousel.

As a Managing Director of McKinsey & Company, and cofounder of its strategic management practice, he has served companies in a wide spectrum of industries. His special interest and area of expertise is formulating creative strategies and developing organizational concepts to implement them.

Among his most recent works is Beyond National Borders: Reflections on Japan and the World. The book has proven especially influential in Japan as a challenge to commonly accepted notions about Japan's international role, and as a call for unconventional solutions for Japanese education, land and government reform.

He attended Waseda Univ. (B.S.), Tokyo Inst. of Technology (mS.), and Massachusetts Inst. of Technology, where he earned a Ph.D. in nuclear engineering. Prior to joining McKinsey, he worked for Hitachi Ltd. designing on Japan's prototype fast breeder reactor, MONJU. He now resides in Tokyo with his wife and two sons who share his spare-time interests of playing music, sailing, riding motorbikes, and scuba diving.



LAMAR ALEXANDER

Lamar Alexander is President of The University of Tennessee. His comments on education are featured regularly on cable television's "American Magazine." He is a member of President Bush's Education Policy Advisory Committee.

Mr. Alexander was Governor of Tennessee from 1979 to 1987. As Chairman of the National Governors' Association he led the 50-state education survey, "Time for Results." In 1988 the Education Commission of the States gave him the James B. Conant Award for "distinguished national leadership in education." He was Chairman of President Reagan's Commission on Americans Outdoors and in 1987 was one of the NCAA's six Silver Anniversary scholar-athletes.

Mr. Alexander is a classical and country pianist and author of three books, the most recent being **Six Months Off** (William Morrow & Co., Inc.), the story of his family's "escape" to Australia after eight years in the Tennessee Governor's Mansion. He is a Phi Beta Kappa graduate of Vanderbilt University and was a law review editor at New York University Law School. He was born July 3, 1940.

His wife, Honey, is a member of the Corporation for Public Broadcasting and the board of directors of Family Services of America. With Bob Keeshan, television's "Captain Kangaroo," the Alexanders helped to found Corporate Child Care, Inc., which helps companies solve their employees' child care problems.

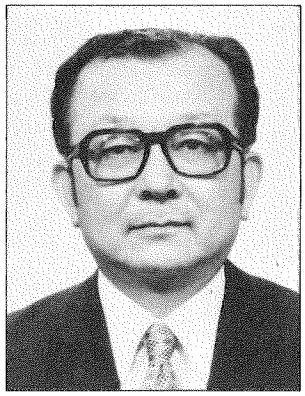
The Alexanders have four children: Andrew, 19; Leslee, 17; Kathryn 15; and Will, 10.

HIDEZO INABA

Present Position
Chairman, The Institute of Energy Economics
Vice-Chairman, Committee for Energy Policy Promotion
Chairman, Japan Industrial Policy Research Institute
Date of Birth April 9, 1907
Education
1931 Graduated from Kyoto University, Dept. of Philosophy
1934 Graduated from Tokyo University, Dept. of Economics
Career
1947 President, the Research Institute of National Economy
1961 Chairman, the Research Institute of National Economy
1965–1968 President, the Sankei Shimbun (News Paper)
1970–1973 President, Japan Information Process Development Council
1973 Chairman, Japan Information Processing Development Center (GIPDEC)
1973–1975 Commissioner, Japan Atomic Energy Commission
1976 Vice-Chairman, Committee for Energy Policy Promotion
1976 President, Japan Industrial Policy Research Institute
1978–1981
Commissioner, Commission for Administrative Management and Inspection
1986 Chairman, Social and Economic Congress of Japan
Additional Appointments
Chairman, Advisory Committee for Energy (MITI)
Member, Industrial Structure Council (MITI), etc.
Award
1977 First Class of the Order of the Sacred Treasure

SESSION 1

Chairman



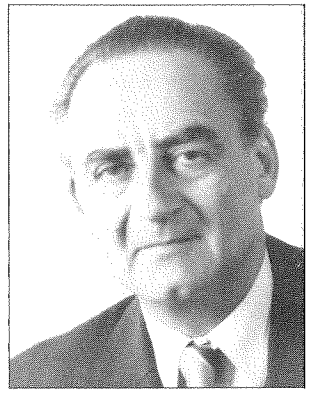
TOYOAKI IKUTA

Date of Birth: July 16th, 1925
Present Titles:
- President, The Institute of Energy Economics, Japan
- Director, Japan Atomic Industrial Forum
- Director, Japan Energy Conservation Center
- Director, Research Institute for Peace and Security, Tokyo
- Director, The Committee for Energy Policy Promotion (Chairman of Experts Subcommittee)
- Member of some governmental councils, such as Industrial Structure Council, Industrial Technology Council, Advisory Committee for Energy (Chairman of Energy Demand and Supply Committee), Petroleum Council, Electric Utility Council
- Member of some International Groups, Namely, Oxford Energy Policy Club, Group of 13, "The Group"

Educational Qualification:
- B.A. (Economics) 1948 Tokyo University, Japan

Publication:
- "Reserved Seats for Energies" – 1985
- "OPEC" – 1980
- "Energy Theory for Citizens" – 1981

and many other articles regarding energy in general, oil, gas and nuclear issue.



IMRE SZABO

He was born at Surd on May 31, 1934. He took diploma with honor at the Technical Univ. of Budapest in 1957. He started his engineering career at Ganz Wagon and Machine Factory.

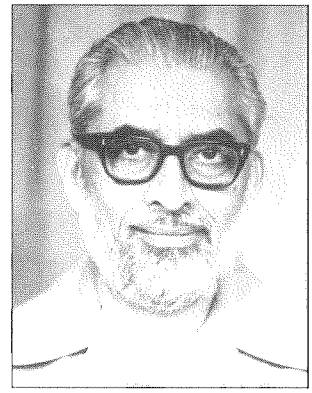
From 1958 to 1972 he worked in part-time employment and since then he has been working in full employment at the Technical Univ. of Budapest.

In 1962 he started postgraduate courses in automatics and took of degree of Doctor of Technical Science in 1973. He is owner of several industrial patents.

In 1973 he was appointed Univ. Professor and charged with organizing the joint Institute of Thermal Energy and System Engineering and he became Director of this Institute. Based on his own research activity he wrote two special books; System and Control Technics and Mechanical System Technics.

He carries on public and social activities as a member of Presidency of Energy Economic Scienctific Association, as President of the National Judical Experts' Committee and as a member of the Scienctific Qualifying Committee and as member of the Committee of System Technics and Energy of the Hungarian Academy of Science.

From July 1, 1989, he is Secretary of State of the Ministry of Industry.



M. R. SRINIVASAN

Dr. M. R. Srinivasan was born on January 5, 1930 in Bangalore. He completed his Bachelor of Engineering (mechanical) from College of Engineering, Bangalore, University of Mysore, 1950. He completed his Master of Engineering in 1952 and was awarded the degree of Doctor of Philosophy in 1954 by McGill University.

He joined the Department of Atomic Energy, Government of India, in September 1955. He participated in the construction of India's first research reactor APSARA.

From 1974, he was the Director of Power Projects Engineering Div. of the Department of Atomic Energy.

He was appointed as the first Chairman of the Nuclear Power Board with effect from May 29, 1984.

He was appointed as Chairman, Atomic Energy Commission and Secretary, Dept. of Atomic Energy, with effect from March 1, 1987.

He also became the first Chairman of the Nuclear Power Corporation of India Limited and was elected as President of the Central Board of Irrigation and Power in 1989.

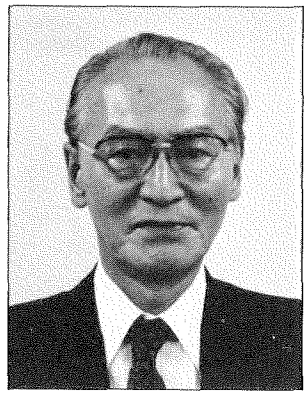
The National Award of 'Padma Shri' was conferred on Dr. Srinivasan by the President of India in 1984.

He was also awarded the Sanjay Gandhi Award for Science and Technology in the field of Energy, 1983.

He completed his term as Chairman, Atomic Energy, Government of India (and also Chairman, Nuclear Power Corporation of Inida Ltd.) on the 31st January 1990, on attaining age of retirement.

SESSION 2

Chairman



HIROSHI MURATA

Born on Mar. 10, 1915

1937 Graduated of from Mechanical Course, Ryojun (Port Arthur) Institute of Technology
1958 First Secretary, Embassy of Japan in U.K.
1963 Director General, Resources Bureau, Science & Technology Agency (STA)
1964 Director General, Planning Bureau, STA
1964 Director General, Atomic Energy Bureau, STA
1967 Executive Director, Power Reactor and Nuclear Fuel Development Corporation (PNC)
1968 Vice President, Japan Atomic Energy Research Institute (JAERI)
1978 President, JAERI
1981 President, Nuclear Safety Research Association
1983~1987 President, Nuclear Safety Technology Center
1987~ President, Japan Atomic Energy Relations Organization

Other Major Positions:

- Vice Chairman, JAIF
- Chairman of the Steering Committee, International Nuclear Cooperation Center, JAIF
- Special Advisor, JAERI
- Advisor, Nuclear Safety Research Association
- Advisor, Nuclear Safety Technology Center

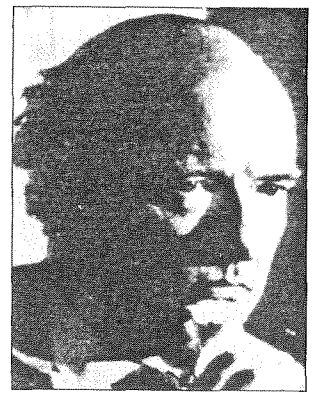
ERIK N. POZDYSHEV

Erik N. Pozdyshev was born on September 1, 1937. He studied at the Leningrad University on Physical faculty.

Has been working in nuclear power since 1960. Occupied different posts at various atomic power plants, including Leningradskaya and Kurskaya NPPs, was director of Smolenskaya NPP. Immediately after the accident at Chernobylskaya NPP in 1986, was appointed director of the plant. Directed the recovery operations and recommissionning of units 1, 2 and 3 of the plant.

Being chairman of the State Commission on starting-up of newly constructed units, he put into service 12 NPP units, both of PWR and RBMK types.

Since 1990, Mr. E. N. Pozdyshev is Deputy Minister of atomic power and industry, managing the NPPs operation. He is an author of various scientific publications in the field of start-up, commissionning and operation of NPPs.



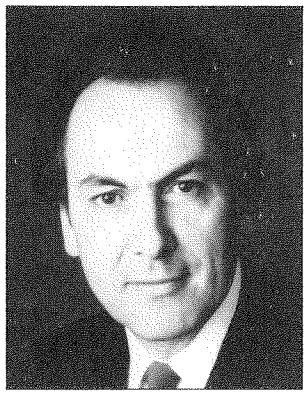
MALCOLM WALLOP

U.S. Senior Senator, Republican

Born on February 27, 1933
in New York

Education:
Yale Univ., B.A. in 1954

Political Career:
Wyoming House, 1969 – 73
Wyoming Senate, 1973 – 77
Sought Republican nomination for Wyoming Governor, 1974



JACK A. CUNNINGHAM M. P.

Jack Cunningham is one of the most senior Labour Members of Parliament at Westminster. He was first elected to the Shadow Cabinet in 1983 and until November 1989 he was Lbour's Shadow Secretary of State for the Environment. After his seventh successive re-election to the Shadow Cabinet last November, he was appointed Shadow Leader of the House and Labour's Capaign Co-ordinator.

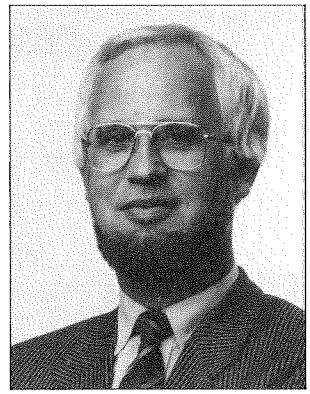
Jack was born on 4 August 1939 in Newcastle upon Tyne. He attended Jarrow Grammar School from 1951 to 1958. He studied at Durham University where he obtained an Honours Degree and then a Ph.D. in Chemistry in 1966.

In September 1976 he became Minister at the Department of Energy under the Rt Hon Tony Benn MP, a post he held until the General Election in May 1979.

In October 1983 he was elected to the Shadow Cabinet for the first time and was appointed Shadow Environment Secretary. His portfolio, was involved shadowing the Department of the Environment on local govt., housing, planning, etc.

In his current appointment as Shadow Leader of the House he has responsibility for all matters relating to the administration of the House of Commons and for Parliamentary Business and Procedure.

Jack and Maureen Cunningham were married in 1964 and have two daughters and one son. His leisure activities include fishing, fell walking, birdwatching, gardening and music.



WOLF-MICHAEL CATENHUSEN

Born on 13 July 1945

Studied Latin, history and socilogy

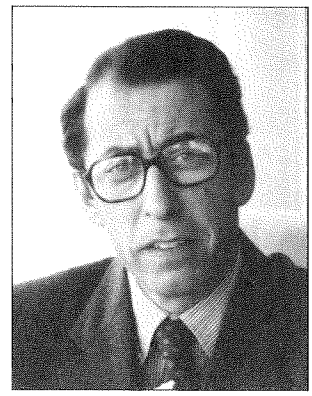
1971–72 Worked for the Institute for Comparative History of Towns in Münster

1977–80 Teacher at Burgsteinfurt Grammar School

Since 1880 Member of the German Bundestag

1984–87 Chairman of the Study Commission on Chances and Risks of Genetic Engineering set up by the German Bundestag in the 10th electoral term

Since April, 1987
Chairman of the Committee on Research and Technology of the German Bundestag



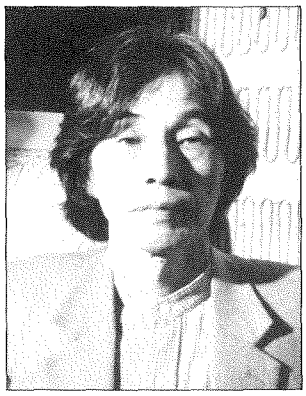
GÉRARD ERRERA

M. Gérard ERRERA, Foreign Affairs Counsellor, is since July 1st, 1985, Director for International Affairs in the French Atomic Energy Agency (Commissariat à l'Energie Atomique) and Governor for France at the International Atomic Energy Agency (IAEA).

Born in 1943, M. ERRERA is a graduate of Institut d'Etudes Politiques de Paris and of Ecole Nationale d'Administration (class of 1969).

He joined the Ministry of Foreign Affairs in the Division of Cultural, Scientific and Technological Relations, was Secretary at the French Embassy in Washington from 1971 to 1975, Technical Adviser in the Foreign Affairs Minister's Cabinet, in charge of East-West relations and military-political affairs from 1975 to 1977, Counsellor at the French Embassy in Madrid from 1977 to 1980, Special Adviser in the Foreign Affairs Minister's Cabinet in 1980 and 1981, Consul General in San Francisco from 1982 to 1985.

LUNCHEON
SPECIAL LECTURE



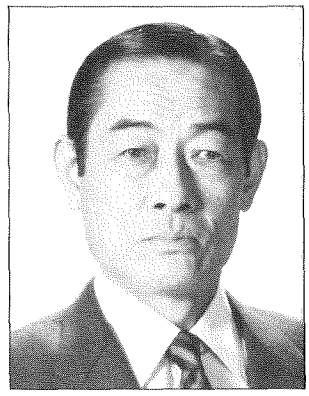
MATAZO KAYAMA

Born on September 24, 1927
in Kyoto

1944 Graduated from the Dept. of Japanese Painting of Kyoto Municipal School of Fine Art and Crafts and entered Tokyo School of Fine Arts.
1949 Graduated from the Tokyo School of Fine Arts.
1954 Formed the art group "Hikobayu."
1957 Held a one-man exhibition at Tokyo Gellery.
1960 Built a new studio at his home in Tsurumi.
1966 Became Professor of Japanese painting at Tama Univ. of Fine Art (~ 1972, 1978 ~ 1988).
1975 Visited China as a member of the Japanese Artists Delegation to China.
1980 Was given the 30th Minister of Education Selective Art Award.
1982 A documentary film, "Matazo Kayama -- An Artist of Japanese Painting," was produced. Received the first Arts and Culture Promotion Association Awards.
1987 Was invited to visit China as a member of the Committee for establishing Contemporary Chinese Art Museum.
1988 Became Professor at Tokyo Univ. of Fine Art.

SESSION 3

Chairman

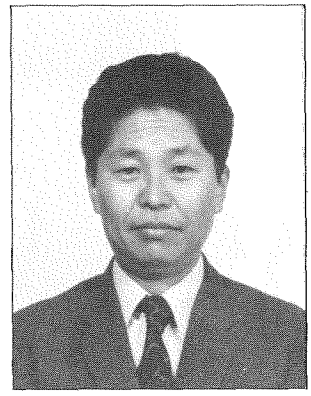


RYOJU KATSUBE

TV Caster, NHK Enterprises

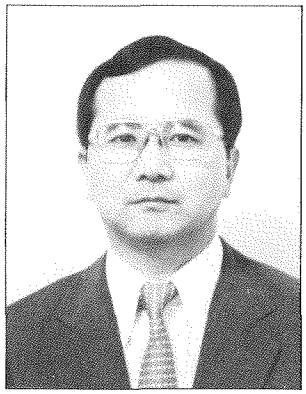
1931 Born in Shimane Pref.
1954 Graduated from Dept. of American and English Literature, Aoyama Gakuin University. Joined NHK (Japan Broadcasting Corp.)
1977– News Caster of "News Center 9"
1979– TV Caster of "NHK Special" TV Caster of the programs on oil, nuclear energy, food, high-technology, computers, etc.
1988 Retired from NHK and joined NHK Enterprises.

Publications:
"The Antarctica"
"Nuclear power"
"Food – warning from the Earth"
"The profile of Japan as the big country of technology"
"Food – the subject for this country"
"Computers change the world"



MASAO NAKAMURA

Date of Birth: April 1, 1933
Present Title: Edication Writer, The Yomiuri Shimbun (Japan)
Discipline, Special Field:
Science and Technology Policy
Education (Degrees):
Kyushu Institute of Technology (1955) (Japan)
Occupational History:
1955–59 Engineer, the Tokyo Metropolitan Government
1959– The Yomiuri Shimbun
1983– Editional Writer, The Yomiuri Shimbun
(Member, Transport Technology Council)
(Member, Industrial Technology Council)
Publications:
Genshi Ryoku to Kankyo (Nuclear Power and Environment), ed. and co-author, The Yomiuri Shimbun Sha, Tokyo, 1975
Kisho Shigen (Meteorological Resources), Kodan Sha, Tokyo, 1976
Kisho Keizai Gaku (meteorological Economics), PHP Institute, Tokyo, 1982
Nihon wo Sasaeru Hito to Gijutsu I, II (People and Technology that Support Japan), co-author, Bungei Shunju Sha, Tokyo, 1985
Koronbusu no Tamago (Columbus' Egg), Kodan Sha, Tokyo, 1987

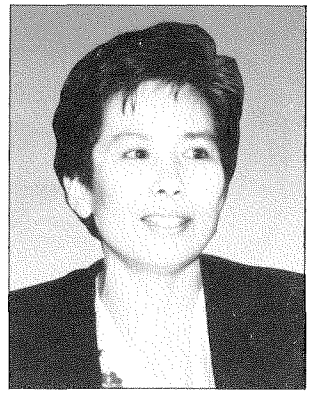


TADAO ISHIBASHI

General: Born in Mutsu City, Aomori Prefecture, in April, 1945.
Graduated from Chuo University School of Law in March, 1968.
Admitted to Daini Tokyo Bar Association in April, 1972.
Admitted to Aomori Bar Association in January, 1982.

Activities Relalated to Japan Federation of Bar Association:
Chairman, The 4th Division Committee on Pollution and Environment, Japan Federation of Bar Associations, April, 1985.
Preparation of "Comments on Revision of Law Concerning Regulations of Nuclear Power Plants and Related Matters" for Chairman of Japan Federation of Bar Associations, April, 1986.
Vice Chairman, Committee on Pollution and Environment, Japan Federation of Bar Associations, April, 1987 to present.
Publication of "Report on Research and Studies on Proposed Nuclear Fuel Cycle Facility," September, 1987.
Organization and hosting of "Aomori Symposium on Nuclear Fuel Cycle Facility" for Japan Federation of Bar Associations, September, 1987.
Now under Research and Studies on HLRW at the 4th Div. from April., 1988.

He deals with nuclear related issues for presentations at symposium publications, and articles.



EIKO OYA

Journalist

1941 Born in Tokyo
1963 Graduated from Social Science Division, International Christian University.
1969 – now
President
Established Nippon Information Systems, Inc.
1978 – now
Has been involved in activities in mass communications.

As journalist she covers a wide range of affairs; international issues, domestic political and economic issues as well as rearing of children, eating, etc.
Currently, she acts as M.C. in a weekly TV program for discussions with Ministers on the governmental policies.

Membership:
Member of the Tax Commission, Ministry of Finance;
Member of the Economic Council, Economic Planning Agency, etc.

TOMIO KINOSHITA

Professor (Doctor of Literature)

Born on March 25, 1930

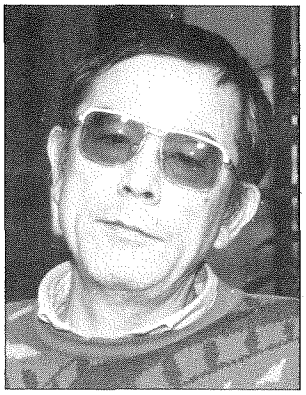
Graduated from the Graduate School, Kyoto University in psychology.

Career:
Assistant, Faculty of Letters, Kyoto University
Assistant Professor, Osaka Women's University
Assistant Professor, College of Liberal Arts and Sciences, Kyoto University

Present position:
Professor, College of Liberal and Sciences, Kyoto University
President, Japan Society of Social Psychology
and others.

SESSION 4

Chairman



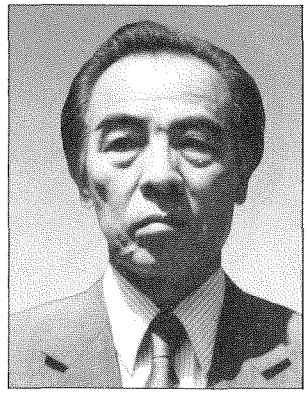
AKIYUKI NOSAKA

Born in Kamakura in 1930.

He studied at former Niigata High School and Dept. of Literature (French), School of Literature, Waseda University.

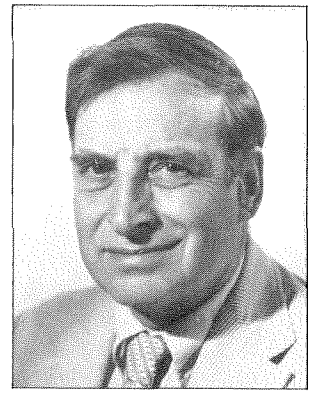
His first novel was published in 1963 and he was given Naoki Award in 1967.

Besides, Mr. Nosaka has keen interest in politics. He was candidate for the election to House of Representatives from Niigata Prefecture, competing with former Prime Minister Tanaka in 1983.



JUNNOSUKE KISHIDA

Mr. Kishida is the current chairman of the Japan Research Institute (JRI), a former chairman of the Editorial Board of the Asahi Shimbun, and the author of a number of publications in Japanese, including *Studies on Negotiations, The New Era of Information,* and *On Technological Civilization.* He was born on 1920 and graduated in 1942 from the Department of Aeronautical Engineering of the University of Tokyo. After graduation, he worked as an aircraft designer at the Naval Institute of Aeronautical Engineering until the end of the war. He joined the Asahi Shimbun in 1946. There, he became an editorial writer and senior staff writer specializing in science and technology, informatization in society, international relations, and disarmament and security issues, and went on to serve as chairman of the Editorial Board of the Asahi Shimbun from 1977 to 1983. From 1974 to 1978, he also served as vice president of the National Institute for Research Advancement (NIRA) and as project leader of the NIRA research projects, "Japan toward the 21st Century" and "Japan in the 1990s" In 1985, he retired from Asahi Shimbun and became chairman of JRI.



RICHARD WILSON

Education:
Oxford University, England
B.A. in 1943, M.A. and D. Phil. (Physics) in 1950

Positions:
1961–83 Prof. of Physics, Harvard Univ.
1982–85 Chairman, Department of Physics, Harvard Univ.
1983 to present
Mallinckrodt Prof. of Physics, Harvard Univ.
1961–81 Chairman, Cyclotron Operating Committee, Harvad Univ.
1977–79 Acting Director, Energy and Environmental Policy Center Harvard Univ.
1979 to present
Member, Advisory Committee, Energy and Environmental, Harvard Univ.
and others.

Committee, consultant, etc.:
1974–76 Energy R and D Administration
Breeder Reactor Safety Committee
1974–77 Consultant to NRC Advisory Committee of Reactor SG
1975–77 Consultant to EPRI
1982 to present
Nat'l Academy of Sciences Energy Engineerng Board
1983–85 Chairman, American Physical Society Study Group on Radiological Consequences of Nuclear Power Plants
1984–86 U.S. DOE Health and Environmental Safety Advisory Committee
1984 to present
Chairman, Visiting Committee on Radiation Medicine, Mass. General Hospital
and others.

BUFFET LUNCH REMARKS

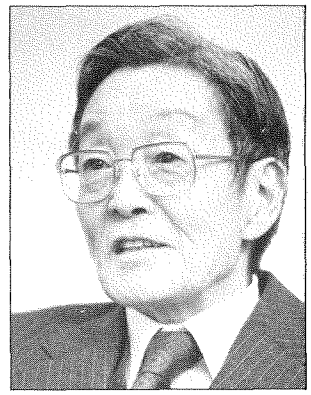
HUGUETTE BOUCHARDEAU

Born on July 1, 1935 at Saint-Etienne, Loire
Married to Mr. Marc Bouchardeau on May 25, 1955

Education: Université de Lyon
Diploma: Agrégation de Philosophie

Career:
1961–70 Enseignante au Lycée Honoré d'Urfé
1970– Maitre de conférences en sciences de l'education à l'Université de Lyon
1978 Fondatrice de la collection Mémoire des femmes aux editions Syros
1979 Secrétaire générale du PSU
1981 Candidate non élue à la Présidence de la République
1983–84 Secrétaire d'Etat auprès du Premier Ministre, chargée de l'environnement et de la qualité de la vie
1984–86 Ministère de l'Environnement
1986 Elue Député du Doubs
1988 Réélue

Publications:
1977 Pas d'histoire, les femmes
1978 Hélène Brion; la Voie féministe
1980 Un coin dans leur monde
1986 Le Ministère du possible
1988 Choses dites de profil

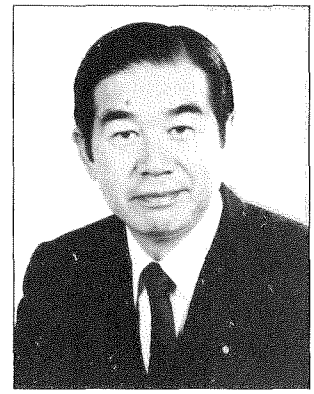


MITSUO TAKEI

Date of birth: March 30, 1921

Education:
Graduated from Faculty of Economics, Tohoku Imerial University (currently Tohoku University).

Professional career:
After graduating from the University, he joined Japan Atomic Energy Research Institute and Institute of Energy Economics, Japan. Since April in 1979, he has been Professor of Nagoya Economics University.
Besides above, he served as Member of a Special Committee of Atomic Energy Commission (1975–1983) and Lecturer of Graduate School at Ookayam, Tokyo Institute of Technology (1977–1987).



KABUN MUTO

Born on November 18, 1926

1951 Graduated from Faculty of Law, Kyoto University
1961 Vice President, Japan Junior Chamber, Inc.
1967 First Elected to the House of Representatives
1972 Parliamentary Vice Minister of Home Affairs
1974 Director, Commerce and Industry Division, Liberal Democratic Party
1976 Deputy Chairman, National Organization Committee, Liberal Democratic Party
1977 Deputy Chairman, Policy Affairs Research Council, Liberal Democratic Party
1978 Deputy Secretary General, Liberal Democratic Party
1979 Minister of Agriculture, Forestry and Fishery
1984 Deputy Secretary General, Liberal Democratic Party
1986 Deputy Chairman, Executive Council, Liberal Democratic Party
1990 Minister of International Trade and Industry

Hobby: Playing sports

SESSION 5

Chairman

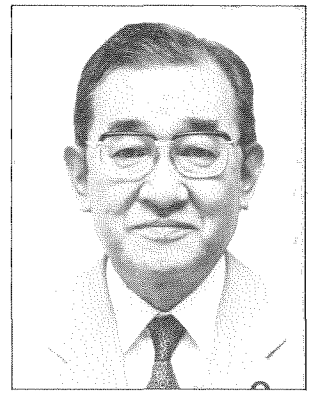
SOICHIRO TAHARA

Born in 1934 in Hikone City, Shiga Prefecture. Graduated from Waseda University. After Working for Iwanami Movies and Tokyo Channel 12 TV (currently TV Tokyo Channel 12), is now active as a non-fiction writer and critic.

HIROSHI MITSUZUKA

Born on August 1, 1927
1951 Elected to the Miyagi Prefectural Assembly
1972 Elected to the House of Representatives
1977 Parliamentary Vice Minister for Transportation
1979 Parliamentary Vice Minister for Education
1985 Minister for Transportation
1988 Minister for International Trade and Industry

Hobbies: Reading
Japanese Martial Arts
"Kendo," "Aikido"



SHIGERU ITO

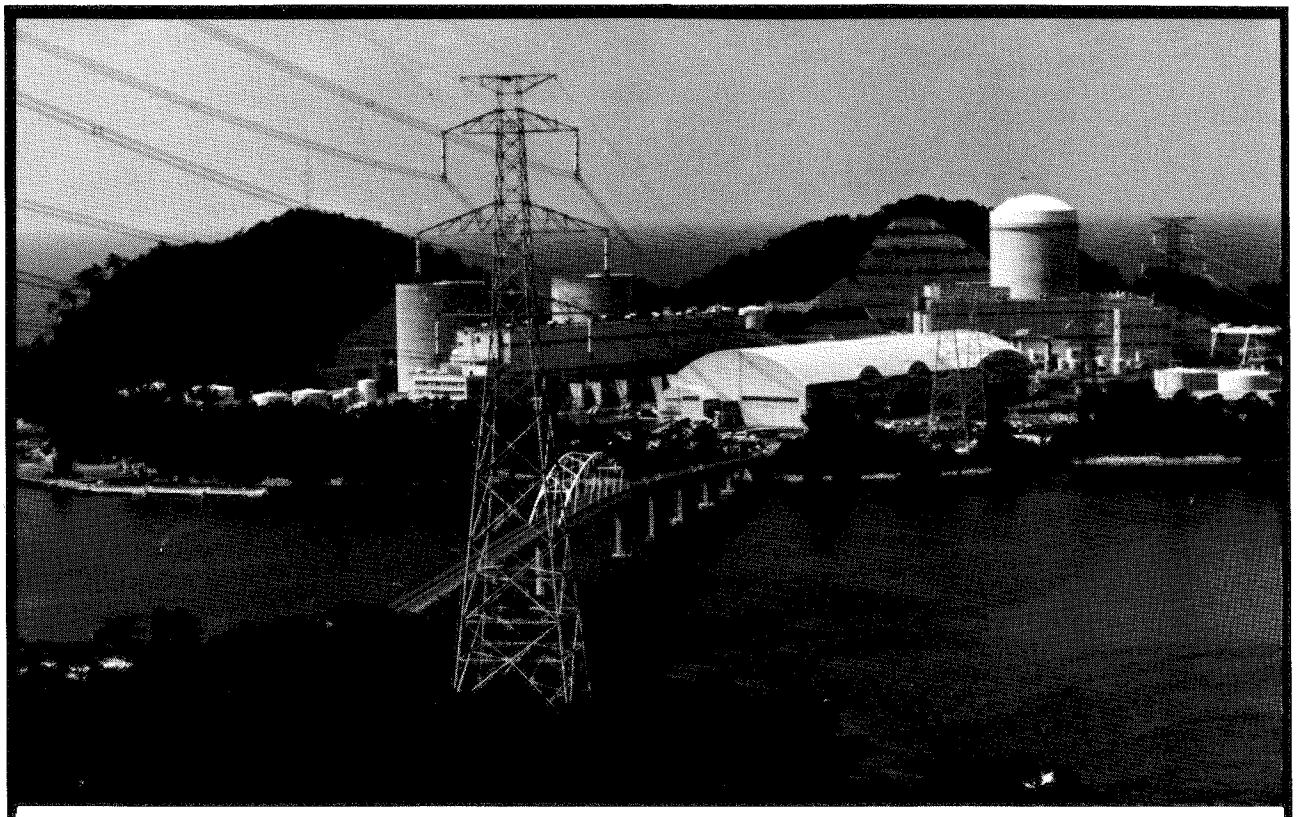
Member of the House of Representatives;
Chairman of the Policy Board
Socialist Party of Japan

Born in Yamagata Pref. in 1928.

Graduated from University of Tokyo.

Elected to the House of Representatives from Kanagawa Pref.

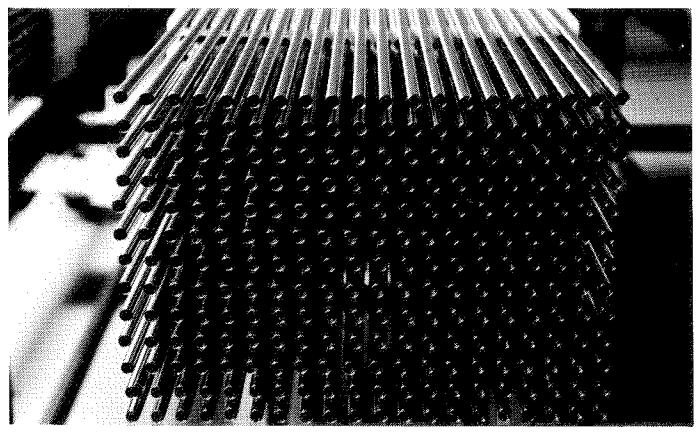
Positions:
Member, Committee on Judicial Affairs, House of Representative
Ex-Director, National Movement Bureau, Socialist Party of Japan



Mitsubishi Metal contributing to the development of the nuclear industry with a high level of technology.

Zircalloy cladding tube

Corrosion resistant, heat resistant and wear resistant alloys



MITSUBISHI METAL CORPORATION

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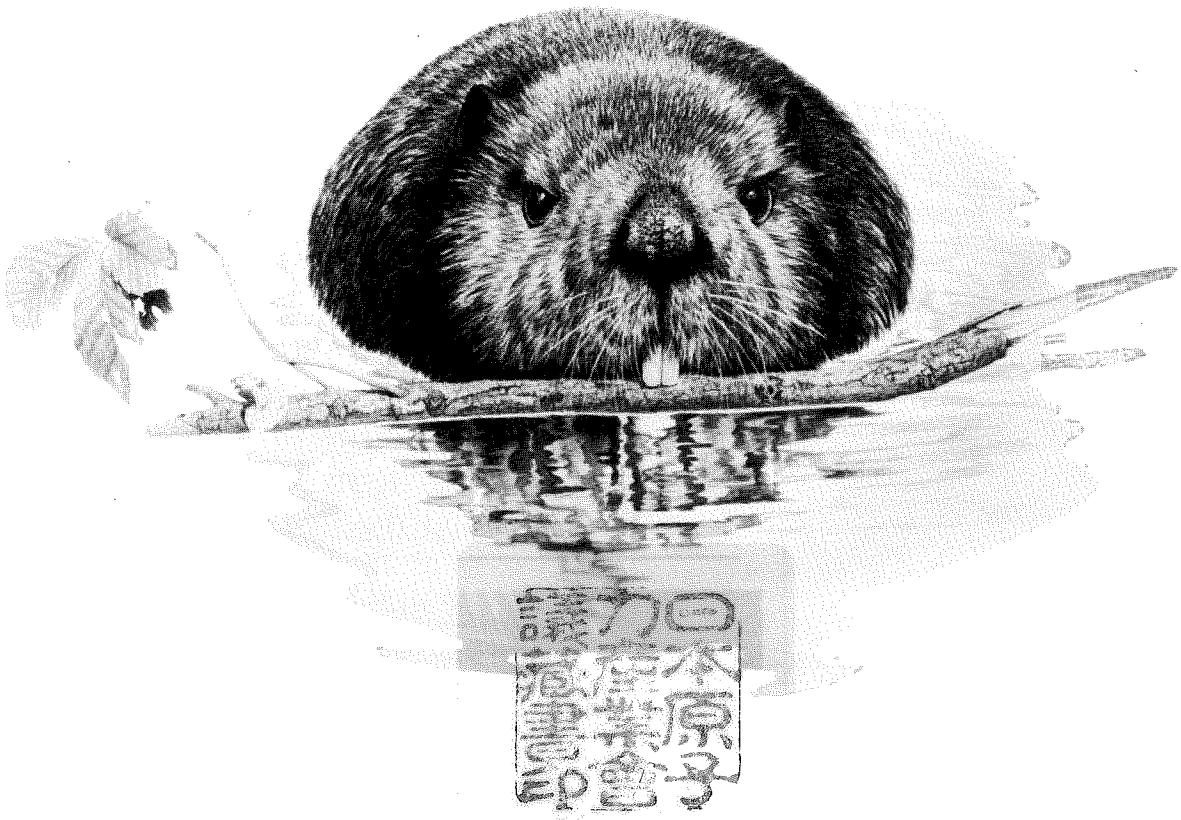
Osaka Branch: Shindai Bldg., 2-6, Dojimahama 1-chome, Kita-ku, Osaka-shi 530 Tel. Osaka (346) 1841

Certainly···



Consider the beaver, though a small creature within the great expanse of nature
in a courageous effort to protect its own life, dams up the stream to build a secure home.
So also the Atomic Power Plant, soundly operating in a facility where safety is most highly regarded
will certainly have a large influence to support and enrich our society for tomorrow.

MITSUBISHI ELECTRIC CORPORATION
ATOMIC ENERGY PUBLIC RELATIONS COMMISSION

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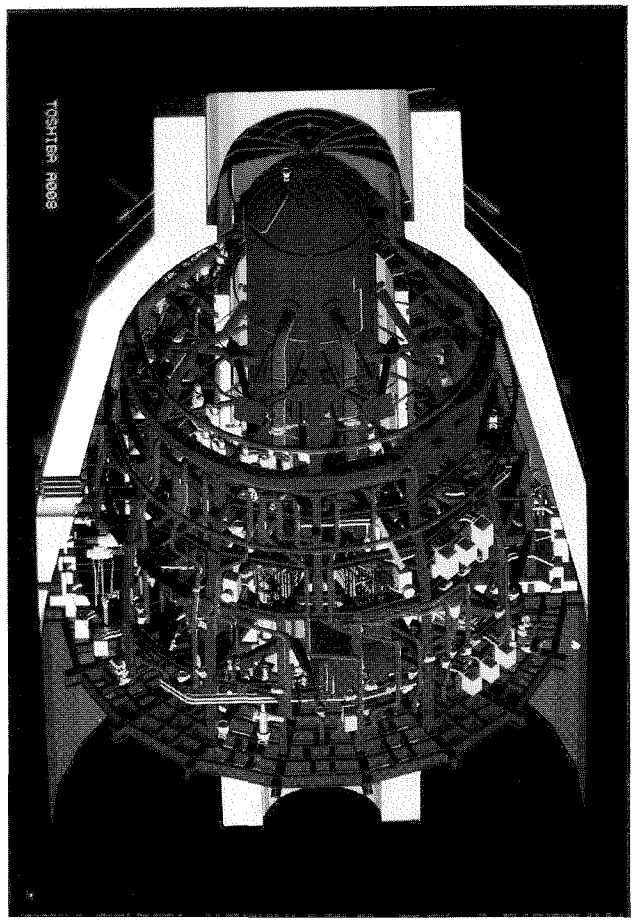

Ready for the future of nuclear energy? Toshiba's already there.

Toshiba, one of the world's largest electric and electronics manufacturers, is today also a leading supplier of nuclear energy facilities and equipment.

Nuclear technology across-the-board

Toshiba is active in *all* aspects of nuclear power generation, from the engineering, construction and maintenance of nuclear facilities, to computers, instrumentation and controls, radwaste treatment systems, and even the supply of fuel fabrication services.

Proven record in nuclear facilities

A major participant in Japan's nuclear development program for the past 30 years, Toshiba has also delivered a significant number of boiling water reactors (BWRs) that are noted throughout the world for enhanced safety, reliability, operability, availability and economy.

Experience in diverse energy fields

Toshiba's activities in nuclear energy come backed by nearly a century of experience in hydro, oil, LNG and geothermal power facilities. While continuing to lead the field in Japan, we are now also fueling advances in these and other energy projects everywhere.

Shaping the future of nuclear energy

Today, Toshiba's experience and vast, integrated technologies continue to play a vital role in Japan's nuclear energy program. And all around the world, they are contributing to new developments that will one day free our dwindling fossil fuel reserves for other, more creative uses, and secure nuclear energy as the cleanest, safest, most viable fuel alternative of all.

That, Toshiba believes, is the future of nuclear energy. And that's what we're working to realize, right now.

In Touch with Tomorrow

TOSHIBA

For further information, contact: Marketing Department, Nuclear Energy Division, Toshiba Corporation
1-6, Uchisaiwai-cho 1-chome, Chiyoda-ku, Tokyo 100, Japan Phone: (03) 597-2084, Facsimile: (03) 597-2678, Telex: J22587

Resurgence of nuclear power plants

makes the world a brighter place to live and saves the environment of our endangered earth. MITSUBISHI Advanced PWR serves better.

Mitsubishi Heavy Industries has been a technological leader in Japan for over a century. Today, backed by one of the most comprehensive research and development capabilities in the world, it continues to act as the nation's pacesetter in the development of high technologies destined to shape the quality of man's life in the 21st century. Mitsubishi plays a leadership role in many fields and nuclear technology is no exception. It has already supplied seventeen PWR plants that are now in operation, and has another six currently under construction. During the past three decades, Mitsubishi has focused an uncompromising effort on developing more reliable, economical and safer PWR plants and on providing improved nuclear services.

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