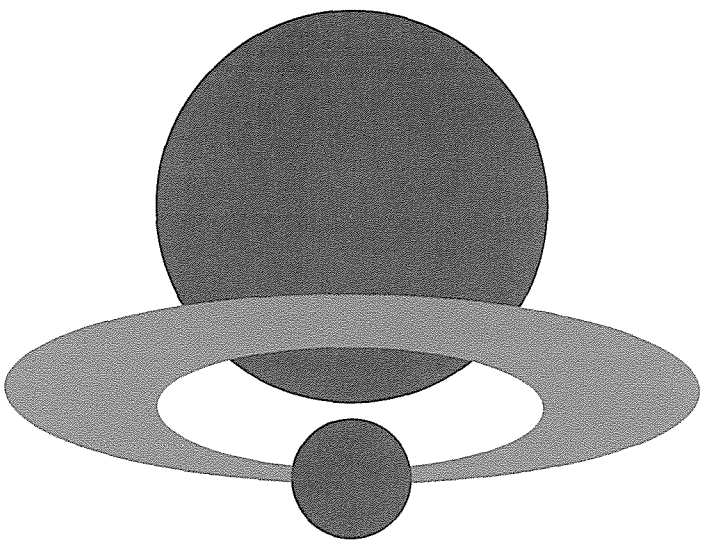
THE 33RD JAIF ANNUAL CONFERENCE

第33回原産年次大会



APRIL 26~28, 2000

JAPAN ATOMIC INDUSTRIAL FORUM

日本原子力産業会議

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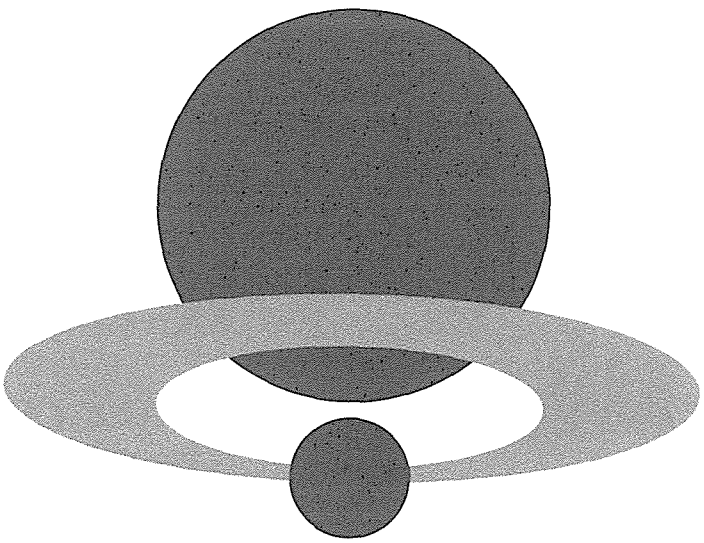

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JAPAN ATOMIC INDUSTRIAL FORUM

日本原子力産業会議

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第３３回原産年次大会　原産会長所信表明

向坊　隆

議長、並びに国内、海外からこの年次大会にご参加下さいました皆様に、心から厚くお礼申し上げます。

第３３回原産年次大会の開催に当たりまして、主催者を代表いたしまして、一言、申し上げさせていただきます。

さて１９６８年に東京で第１回の会合を持った原産年次大会も、今回で２０世紀最後の大会となりました。

おもえば今世紀は、科学の力が経済社会の未曾有の発展を可能とし、同時に様々な新しい問題をも生じさせた時代であったように思います。その代表的な例を挙げよといわれれば、それは大量破壊兵器である核、それに対する平和利用としての原子力発電と、放射線利用でありましょう。また、様々な公害問題や地球温暖化は、科学技術のもたらした負の遺産であります。

つまり、２０世紀において人間は、その頭脳をバランス良く使って、真に人類の幸福をもたらすという目的を、達成することができなっかったわけで、来世紀への大きな宿題として遺されております。

私たち原子力界が遭遇した昨今の事故や不祥事を考察すると、科学技術のもたらした便益と社会の要請とを、私たちが調整しきれていない、ということを痛感致します。

今回の年次大会においては、こうした反省に立って、社会のニーズに対応した原子力利用の在り方について、活発な意見交換が行われることを期待します。 また、ご案内の通り、大会の三日目を東海村で開催することといたしました。多くの方が東海大会に参加され、地域の方々と胸を開いて、率直な話し合いをされることを望みます。

今回の年次大会の準備委員長には、名古屋大学・法学部・学部長をつとめられ、地球環境戦略研究機関の理事長である森島昭夫（もりしま あきお）先生にお願いいたしました。森島先生には、ご多用中にもかかわらず、快くお引き受けいただき、ご指導いただきました。厚く感謝申し上げますとともに、先生のお考えを後ほどご披露いただきますので、みなさまにはご注目していただきたいと存じます。

最後になりましたが、改めまして森島準備委員長をはじめ、準備委員の方々、国内、海外の発表者、議長、会場にお集まり下さいました方々に、厚くお礼を申し上げます。

ご静聴、ありがとうございました。

以上

JAIF Chairman's Address

Dr. Takashi Mukaibo
Chairman of the Japan Atomic Industrial Forum

Mr. Chairman, ladies and gentlemen: I would like to first express my most heartfelt appreciation to all of you -- from Japan and from overseas -- for being here for the JAIF Annual Conference.

It is my great personal pleasure, on behalf of JAIF, to now open the proceedings.

The first JAIF conference was in 1968 in Tokyo. This one is last of the 20th century. Looking back at that century, one of the most striking things is the way science has made possible such remarkable economic development -- and given us many new problems at the same time. If I were asked, I would be forced to say that nuclear power is a typical example. We have the generation of vast amounts of electricity and an array of beneficial uses of radiation on the one hand; and such awful weapons of mass destruction on the other.

Environmental pollution and global warming, too, are negative legacies of scientific and technological advancement. With all that it has achieved in the 20th century, humanity did not, we must admit, make the best use of its brains in attaining the well-balance happiness that our knowledge and abilities would seem to promise. That task is left for us in the 21st century.

Thinking of the various accidents and mishaps that we, the nuclear industry, have experienced in recent years, we must realize that we have not yet reconciled our professional understanding of the benefits to society that our science and technology bring, with the expectations that that same society holds for us.

I hope each of you will reflect on this, and, in your discussions at this conference, explore freely the ways in which nuclear power can be utilized to give society what it wants.

As you all know, the third day of the conference will be in Tokai. I look forward to seeing as many of you there as possible. Please use it as an opportunity to hear first-hand what the residents there think.

Chairman of our Program Committee this year is Dr. Akio Morishima. Dr. Morishima is chairman of the board of the Institute for Global Environmental Strategies, and is a former dean of the Faculty of Law of Nagoya University. Although he is busy, he graciously agreed to serve and has guided us most ably. He will be speaking later, and I look forward to listening to him. But I would like to thank him now.

In closing, I would also like to offer my personal appreciation to the members of the Program Committee, our overseas and domestic presenters, our chairman, and -- last but never least -- all of you here today.

Thank you.

第３３回原産年次大会
中曽根原子力委員会委員長所感
（案）

（はじめに）

本日、第３３回原産年次大会が、内外から多数のご参加を得て、かくも盛大に開催される運びとなりましたことをお喜び申し上げます。また、向坊会長、森島大会準備委員長をはじめ、大会の開催に尽力された方々のご苦労に敬意を表します。

原産年次大会は、原子力発電をはじめとする原子力平和利用を進めるための様々な課題について、国内外の専門家及び有識者による活

発な討論の場として、昭和４３年より毎年開催されてきたと承知しております。今や本大会は、各国の原子力関係者が一堂に集う国際的にも著名なものとなっており、毎回、各国から政府関係者をはじめとする多くの方々が参加していることを非常に頼もしく思っております。また、原子力関係者のみならず、広く地方自治体や一般市民の方々のご参加を得ることにより、原子力開発利用に対する国民の理解促進にも大きく寄与されてきたことを高く評価しております。

今回の年次大会は、基調テーマを「信頼される原子力を、今ここから」としておりますが、原子力に

対する国民の信頼の回復を図ることが喫緊の課題となっている中、誠に時宜を得たものと考えております。また、３日目には我が国の原子力の発祥の地であり、臨界事故が発生した東海村において東海大会が開催されることとなっているなど、東海村民の方々も含めた幅広い方々の参加を得て、２１世紀を目前にした今世紀最後の大会として、後世に残る画期的な大会となることを期待しております。

なお、折しもニューヨークにおいては、世界の原子力平和利用の堅持と核軍縮の促進に向けて、ＮＰＴ再検討会議が開会したところであります。本大会を通じ、我が国

の原子力平和利用への決意を新たにするとともに、今後の原子力と国際的な不拡散についても大いに議論していただきたいと考えております。

（安全・防災対策の充実・強化）

さて、昨年９月のウラン加工工場における臨界事故は、４０年余りにわたる我が国の原子力開発利用の歴史に例をみない極めて重大な事故であり、残念ながら、国民の原子力に対する信頼を大きく揺るがすこととなりました。政府としては、健康管理や損害賠償など地元の方々への対応に万全を期すべく努力するとともに、事故の教訓

を踏まえ、安全規制及び防災対策の抜本的強化に取組んでまいりました。

安全規制につきましては、原子炉等規制法の改正を行って運転管理に対する検査制度を創設し、加工施設を含む主要な原子力施設に保安検査官を配置するなど、厳しい緊張感を持続するための枠組みの整備を行っております。また、原子力安全委員会の事務局機能は、人員の大幅な拡充により安全審査や検査の充実が図られると同時に、科学技術庁から総理府に移管され規制機関としての独立性が高められました。

防災対策につきましては、原子力

災害対策特別措置法の制定により、迅速な初期動作、国と地方公共団体の有機的な連携、事業者の責務の明確化などを図ることなどにより、原子力災害固有の事態に対応できるよう抜本的な強化を図ることとし、あわせて、補正予算により、オフサイトセンターや放射線監視設備の整備を行うこととしました。

今後、両法を適切に運用することによって、より実効性の高い安全規制体制及び防災体制を構築していく所存です。

民間においては、昨年末、ニュークリア・セイフティー・ネットワークが設立されておりますが、今

後、活発な活動が行われ、原子力産業界全体の安全意識の高揚、モラル向上や原子力安全文化の共有化が図られることを強く期待しております。

私は、官民がそれぞれ、国民の安全と安心のために最大限の努力をしていくことが、失われた信頼を取り戻す唯一の手段であると考えております。この場にお集まりの関係者の方々におかれては、そのことを肝に銘じて、それぞれの任務を遂行されるよう強くお願い申し上げます。

（国民の理解）

あらためて申し上げるまでもなく、原子力開発利用を進めるに当たっては、国民の理解と協力を得ることが不可欠であります。政府は、これまで、原子力委員会における審議を公開とするなど、率先して情報公開を徹底するよう努め、原子力政策に対する理解を求めてまいりました。また、原子力政策に国民や地域の意見を幅広く反映させ、国民的合意の形成に資するための場として、原子力政策円卓会議を開催してまいりました。

原子力政策に対して真に国民の理解と協力を得るためには、情報や意見の流れは一方通行であってはなりません。原子力関係者は、様々な場において立地地域の方々

を含めた国民の方々と対話を行い、お互いに理解を深め、できる限り多くの認識を国民と共有していくよう一層の努力を行っていくことが必要です。

政府としては、今後とも、積極的に国民との対話を行っていくとともに、国民一人一人が自らの問題として考え、判断するために必要な情報が分かりやすい形で提供されるよう様々な工夫をしつつ、情報公開の徹底に努めていきたいと考えております。また、教育等の場においても、放射線や原子力に関する正確な知識を提供し、生徒自らが考えられるような環境整備に向けた取組みを行ってまいります。

（原子力エネルギーの意義と今後の開発の方向）

さて、２１世紀も間近に迫り、新世紀への新しい日本の国づくりを目指した政策を積極的に実行すべき時を迎えております。この「次なる時代」に向け、政府としては、「安心して夢を持って暮らせる国家」、「心の豊かな美しい国家」、「世界から信頼される国家」の実現を目指した取組を進めているところです。

このようなビジョンに沿った諸政策を確実にかつ迅速に実行するに当たって、重要な鍵の一つとな

るのは、エネルギーの安定確保と地球環境保全を両立させ、長期的な持続的発展を確保していくことである考えております。この命題を達成するためには、省エネルギーの推進、新エネルギーの開発・導入等に努力するとともに、資源論的視点からも、また、地球温暖化防止のための地球環境的視点からも、原子力発電に重要な役割を期待していくことが不可欠です。今後とも原子力発電を着実に進める必要があり、さらにはそれを長期的に支える核燃料サイクルを確立していくことが非常に重要です。

我が国の原子力政策の基本としている核燃料サイクルの確立は、

短期的なコストや燃料資源の需給バランスを越えて、長期的に、また、全地球的に重要な意義を有するものであり、今後とも、我々は、放射性廃棄物対策を含めた核燃料サイクルの確立に向け努力を継続していくことが必要です。

（核燃料サイクルの確立とプルトニウム利用）

核燃料サイクル計画の中核ともいえる六ヶ所再処理工場については、その着実な建設・運転が原子力政策の遂行上極めて重要であり、スケジュールに沿って実現されるよう最善の努力を傾注すべきものと考えております。また、昨年の

通常国会において原子炉等規制法の改正が行われ、使用済燃料の中間貯蔵を行う法的な枠組みが整いました。今後、事業の具体化が着実に進められることを期待しております。一方、プルサーマルにつきましては、昨年発生した英国におけるＭＯＸ燃料の製造データの捏造問題が、初期の計画に影響を及ぼすこととなっておりますが、今後、一刻も早く国民の信頼回復につながる適切な対策が講じられることが必要であり、プルサーマル計画が着実に進められていくよう関係者が一致協力して取組んでいかなければなりません。

さらに、将来の高速増殖炉による

核燃料サイクルを実現するための研究開発についても着実に取組んでいくことが必要です。政府と致しましては、将来に備えて実用化の可能性を追求するため、フランス・ロシアをはじめとする国々とも協力しつつ、高速増殖炉の研究開発を着実に進めてまいります。そのためにも「もんじゅ」の運転を地元の理解を得て再開し、高速増殖炉の国際的な研究開発拠点として行きたいと考えております。また、これまでの研究開発で得られた知見を踏まえ、官民が一致協力して、より経済性を重視したＦＢＲサイクルの実用化概念の構築と実用化のための研究開発シナリ

オの策定を行っていくこととしております。

（高レベル放射性廃棄物の処分）

高レベル放射性廃棄物の処分は、今後の原子力政策の中でも残された最も重要な課題のひとつであり、これまで原子力委員会において方針の検討等を行うとともに、関係機関において研究開発が進められ、処分の具体化に向けた取組は着実に進展しつつあります。

地層処分の技術的信頼性を示し、今後必要となる安全基準等の技術的な拠り所となる「地層処分研究開発第２次取りまとめ」が核燃料サイクル開発機構によりとりまと

められ、現在、原子力委員会で幅広い観点から評価を行っているところであります。

また、処分事業の実施主体の設立、立地地点の選定の進め方、資金確保などの制度面を整備するための法案が閣議決定され、今国会で審議が進められています。

これらにより、我が国における高レベル放射性廃棄物の処分は、具体化に向け技術的にも社会的にも大きな一歩を踏み出すことになるものと認識しており、より一層の力を傾注してまいる所存です。なお、サイクル機構をはじめ関係機関において引き続き所要の研究開発を進めていく必要があります。

岐阜県及び北海道において計画している深地層の研究施設は、地層処分の推進を図る上で技術的にも社会的にも重要なものであり、地元の理解を得て進めてまいります。

また、処分を具体化していくためには、国民の理解が非常に重要です。政府としては、これまで全国各地で放射性廃棄物シンポジウムを開催し、正確な情報の提供と対話に努力してまいりましたが、今後ともこのような取組みを充実してまいります。

（核不拡散への取組）

我が国は、原子力基本法に則り、厳に平和利用、非軍事利用に限って原子力の研究、開発、利用を進めてまいりました。核不拡散条約（ＮＰＴ）の義務を誠実に履行し、国際原子力機関（ＩＡＥＡ）が行う保障措置にも積極的に協力して来たところです。また、包括的核実験禁止条約（ＣＴＢＴ）もいち早く批准し、国際監視体制の整備に積極的に取組んでおります。核兵器の廃絶は我が国国民の悲願であり、我が国は、国際的な核不拡散体制の維持・強化に積極的に貢献していく決意です。また、これまで培ってきた平和利用技術を最大限生かして余剰兵器の処分等に協力していく所存です。

（放射線利用と先端的研究開発）

放射線や原子核反応に関する研究、開発及び利用は、２０世紀を通して、人類の社会生活や知的活動に大きな影響を与えてきました。放射線の利用は医療分野をはじめとして国民生活にとってごく身近な不可欠なものとなっており、また、原子力の研究開発は物質やエネルギーの根源に対する知識をもたらし先端的な研究開発を牽引してきたものと認識しております。

原子力発電を中心としたこれまでの多くの原子力技術が成熟期を迎える一方、科学技術創造立国を目指す我が国としては、常に新しい、先端的な領域に挑戦していく

ことが重要であり、産学官の研究者・技術者のポテンシャルを結集し、社会的・経済的ニーズに対応した新たな研究開発を推進していく所存です。

地上の太陽となり人類の究極のエネルギー源と期待されている核融合の研究開発については、1988年より、ＥＵ、ロシア等との国際協力の下に進められている国際熱核融合実験炉（ＩＴＥＲ）計画を推進することが重要であり、その建設に向けて主体的に取組んでまいります。

（むすび）

現在、原子力委員会においては、

２１世紀に向けた原子力利用の全体像と長期展望を提示する原子力研究開発利用長期計画の審議を行っています。地球規模の視点から、現代に生きる我々が後世代に何を残していけるのか、原子力はそのために如何なる貢献ができるのかなど、原子力平和利用の原点に立ち返って、様々な分野の専門家や有識者を集め、幅広い観点から検討を行っており、パブリックコメントの手続きも経た上で、年内にとりまとめる予定としております。

また、来年１月には中央省庁等改革が行われることとなりますが、今後の原子力の高度化と裾野の広がりに対応し、国民や社会の期待

に一層的確に応えられるよう、原子力行政体制の整備を進めていく所存です。皆様方におかれましても、より一層の御支援、御尽力を賜りますようお願い申しあげます。

最後に、本大会が実り多き大会となることをあらためて祈念いたしまして、私の所感とさせていただきます。

平成１１年４月２６日

国務大臣科学技術庁長官
原子力委員会委員長
中曽根　弘文

SECURING OUR GLOBAL ENERGY FUTURE

JOE F. COLVIN
PRESIDENT AND CHIEF EXECUTIVE OFFICER
NUCLEAR ENERGY INSTITUTE

Japan Atomic Industrial Forum
Tokyo, Japan
April 26, 2000

Thank you ... good morning. I am delighted to be back in your beautiful country ... and to have this opportunity to address my colleagues in the Japanese nuclear industry.

I have been asked to discuss global energy security ... and the role of developed countries like the United States and Japan.

The United Nations predicts that the world population will reach ten billion people by the middle of this century. And the world's electricity use is expected to triple.

How can we provide the energy needed to support continued economic growth, while at the same time protecting the environment? The answer is clear.

We can only provide efficient, environmentally friendly generation by using Earth's energy resources wisely—including nuclear energy, one of only two major energy sources that can produce large amounts of electricity without polluting the air.

And nuclear energy, in reality, is the world's only expandable emission-free source of electricity.

A diverse energy mix is the key to global energy security for the future. Nations that have nuclear energy programs—including Japan and the United States—must continue to maintain and further develop this vital energy source.

Our two nations have many things in common besides nuclear energy. We have the largest economies on Earth. Japan produces one-eighth of the world's goods and services—more than double the amount produced in the rest of Asia combined. And nearly one-quarter of the world's 500 largest corporations are based here, in Asia's economic powerhouse.

Notably, the United States and Japan remain heavily dependent on imported oil. The United States imports more than 9 million barrels a day, and Japan more than 4 ½ million. Nuclear energy has played a vital role in both our countries' energy security, replacing oil-fired electricity and providing greater diversity in energy sources. It now provides 20 percent of the electricity used in the United States and more than 30 percent in Japan.

Just two decades ago, oil provided more than 40 percent of Japan's electricity. The increased use of nuclear generation, however, has dramatically reduced Japan's dependence on oil, which now provides about

18 percent of Japan's power. The story is the same in the United States, where oil used for electricity is less than 3 percent.

Yet false perceptions distort the real contribution nuclear energy makes.

The accident at Tokaimura, for example, has temporarily tarnished the Japanese public's perception of nuclear power plants. But this setback must not be allowed to obscure the fact that Japan has one of the most successful nuclear energy programs in the world.

And the task that lies before us is just that: to change false perceptions, and to move beyond conventional views.

As you know, a 19th century educator, writer and journalist named Yukichi Fukuzawa was instrumental in changing conventional attitudes in nineteenth century Japan . . . about expanding Japan's base of knowledge by drawing on other cultures, East and West, both technologically and culturally. Fukuzawa traveled throughout the West, wrote the first Japanese-English dictionary, and recorded and brought new ideas from abroad home to Japan.

The exchange of nuclear safety information today truly embodies this spirit. The work of the Institute of Nuclear Power Operations and the World Association of Nuclear Operators has raised the transfer of safety information to new heights.

Clearly, the worldwide nuclear energy industry has learned the value of sharing lessons learned from events. Now, as the industry grows more competitive, new benchmarking practices are helping plant operators identify and share the best, most efficient processes to enhance performance as never before.

The establishment of the Nuclear Safety Network in Japan is in keeping with these approaches. Those engaged in shaping this new effort have already sought information about fuel facility operations and methods of exchanging nuclear safety information with the Nuclear Energy Institute . . . as well as others in the United States.

This kind of international exchange provides yet more cause for optimism about nuclear energy. We all are seeking ways to improve it . . . to maximize and preserve its benefits.

I read a book about Konosuke Matsushita, the founder of Matsushita Electric. In it is a story about his early years that I'm sure you know, but it is worth repeating. In the Japan of the 1920s, people who rode bicycles at night lit their way with candles. As you can imagine, the candles had to be relit frequently.

Battery-powered lamps were available . . . but they lasted only three hours. Few people could afford to use them.

Mr. Matsushita knew a great business opportunity when he saw one. He designed a miniature bulb that could shine for 40 hours before needing a new battery. A great product, one would think. But he couldn't sell the lamp. Shop owners did not believe it.

This smart businessman was not to be deterred. He had three lamps delivered to each store in Osaka and left one of them burning in each location. Shop owners saw for themselves that the bulbs lasted an unprecedented 40 hours—and then they worked hard to sell them.

In a similar way, nuclear energy has had to prove its worth through an extended period of safe operation, and we are making great progress.

The results are self-evident among those now convinced of nuclear energy's value . . . a new confidence in nuclear generation assets . . . a supportive public . . . and a renewed optimism among policymakers, who are now pursuing policy initiatives to recognize and preserve nuclear energy's benefits.

As you can see, the U.S. industry is well-positioned for competition . . . has declining costs . . . is consolidating . . . is less sensitive to fuel price increases than other generation . . . and is not affected by escalating environmental requirements.

Yet, in the early- and mid-1990s, there was a common belief that nuclear energy would not be competitive in a restructured electricity market, principally because of high embedded capital costs.

But reality has simply not played out that way. The nuclear energy industry is consolidating, reinventing itself for a competitive market. Established, successful companies are merging to get the most economy out of their nuclear units. Companies have formed joint ventures and nuclear operating companies, designed to capitalize on shared skills, resources and nuclear expertise.

Other companies are purchasing a total of 10 nuclear generating plants. Three of those sales have been completed—Three Mile Island, Pilgrim and Clinton.

This is, indeed, a new era for nuclear energy.

The Nuclear Regulatory Commission's landmark issuance in March of a renewed operating license for Maryland's two-unit Calvert Cliffs plant is a case in point. That decision extended the plant's operating life an additional 20 years . . . for a total of 60 years. This summer, we expect renewal of the three-unit Oconee station in South Carolina. And three more units are now in the process of renewing their licenses. Twenty-two others have notified the Commission of their intentions to renew.

This means that already approximately 30 percent of the U.S. nuclear fleet is seeking 20-year license extensions—strong evidence of the U.S. nuclear energy industry's confidence in competing in a restructured electricity marketplace. And this is just the beginning.

This confidence is well founded, as nuclear plants have achieved unprecedented levels of safety, reliability and operating efficiency. Consider these facts:

Nuclear output in the United States last year was up 8 percent over the previous year—about 50 billion kilowatt-hours—for a total of 728 billion kilowatt-hours.

In 1999, the capacity factors for all units set a U.S. record of 86.8 percent, with two of the 103 units shut down all year.

The industry accomplished these feats while keeping production costs competitive with coal, and well below those of other fuels—including new gas plants.

In fact, because of the increased output from U.S. nuclear plants, the equivalent of about 16 large-scale nuclear power plants has come on line since 1990.

The outlook is even better when we examine restructuring status. Officials in 24 of the 50 states have acted to restructure their electric power industries. A total of 60 nuclear units operate in 16 of those states.

These states have provided a reasonable opportunity for utilities to recover their invested capital.

And they have provided for nuclear plant owners to continue to collect the costs of decommissioning their plants.

As this restructuring has evolved, nuclear generating companies have reduced production costs . . . these include the costs of operations and maintenance, fuel, disposal of used fuel, and decommissioning.

The top quartile of U.S. nuclear plants, for example, recorded an average production cost of 1.43 cents per kilowatt-hour, with the second and third quartiles not far behind. Some plants in the lowest-cost quartile are at 1 cent per kilowatt-hour.

And the total costs of nuclear power plants mean that they are clearly competitive with other forms of generation, clearing between 2.5 cents and 3.5 cents per kilowatt-hour.

This sure, steady course toward our current record levels of performance and safety has laid the foundation for a landmark development . . . massive

reform in the Nuclear Regulatory Commission's oversight of United States nuclear power plants.

We applaud the commission for its efforts. The agency worked with the U.S. industry and other stakeholders to shape this revolutionary new approach.

Pilot-tested at nine plant sites last year, the program was expanded industrywide on April 3. The new approach maintains the commission's position as a strong, effective regulator and is centered on objective performance criteria. It enhances safety by focusing management and regulatory attention on areas of greatest significance. And it establishes clear, quantitative thresholds for performance, representing a vast improvement over the old process.

Notably, the program has garnered widespread praise from industry stakeholders because it has the promise of improving safety while significantly reducing unnecessary costs.

Also encouraging is the story of nuclear energy's environmental contribution. We need only look back to the 1960s—and revisit decisions made then to grasp the full impact of nuclear energy's contribution. While energy security and diversity were real considerations at the time, so too was the expansion of emission-free power sources. Avoiding the harmful effects of air emissions from fossil fuels was critical then, as it is today. We see today

what the trillions of nuclear-generated kilowatts over the past four decades provided us. Consider these facts:

Annually, nuclear energy avoids the emission of 155 million metric tons of carbon in the United States.

It also avoids, each year, about 5 million tons of sulfur dioxide and 2.5 million tons of nitrogen oxides.

Given these contributions, nuclear energy is really the "silent partner" in clean air compliance. Its role, for now, is often unrecognized in meeting compliance goals.

Yet nuclear energy dominates U.S. voluntary efforts to reduce carbon emissions.

The United States Energy Information Administration recently reported that increased nuclear generation in 1998 accounted for a 100 million metric ton carbon reduction—almost half the total for all of industry.

Increased nuclear output is the surest route to reducing carbon emissions as envisioned by the Kyoto protocol.

Internationally, we are working cooperatively with JAIF and other members of the International Nuclear Forum to achieve recognition of nuclear energy's contribution in greenhouse gas abatement strategies.

The American public, too, remains remarkably supportive of nuclear energy.

The latest data collected this year are remarkably consistent with that collected since 1998: two out of three Americans support nuclear energy.

And, in a public opinion poll conducted in February this year, those polled were asked if nuclear energy's role in reducing emissions should be a factor in deregulation policy decisions that could influence the energy mix. Eighty-nine percent said nuclear energy's environmental benefits are important in policy decisions affecting continued nuclear plant operations.

In tracking public opinion about nuclear energy, NEI has consistently found that among the most influential public sector—college educated voters—support for nuclear energy remains high.

The support at the policymaker level is also strong. We're witnessing a period of renewed commitment by the U.S. Congress to address a host of issues important to the long-term viability of nuclear energy. These issues include the disposal of spent nuclear fuel . . . funding for nuclear energy research and development . . . industry restructuring . . . and economic recognition for nuclear energy's role in avoiding harmful air emissions.

And as we look to the future, we see yet more to be gained. There is still uncaptured value in our nuclear energy plants. This is a message we are taking to the financial and policymaker communities in the United States. We've identified seven key building blocks of additional value. Allow me to review them briefly.

The first two building blocks are price and plant performance. These are self-evident, as I've indicated earlier.

The third building block is price stability. In an increasingly volatile power market, nuclear energy provides predictable prices for an assured source of electricity.

Fourth is transmission support. As you know, large, baseload nuclear plants provide services such as voltage regulation and frequency support, contributing to the stability of the grid.

Fifth is site value. The plant site itself has embedded value, as many have space for additional generation units . . . coal, gas or even nuclear units.

Sixth is clean air value. This also should be readily apparent as nuclear energy's clean air compliance role increases.

And seventh is management value. Expertise gleaned from well-run nuclear plant operations has a wide variety of applications in other industries. In the United States, for example, one electric utility is providing maintenance services to a major retailer.

And the possibilities are limitless.

I began my remarks today with a reference to the growth of the world's population at a staggering rate . . . to 10 billion people in fifty years. Affordable, environmentally clean energy is critical . . . in sustaining quality of life, and in providing food, warmth and protection from disease.

Nuclear energy, then, is essential in securing the world's energy future.

How fitting it is that the nuclear energy *is* thriving in the United States.

No wonder observers of this vibrant industry are now describing it in terms of a new American renaissance. And well they should. The U. S. nuclear energy industry stands well prepared for a new competitive era, reborn and reinvigorated . . . to the meet the demands of today's world . . . and to provide the leadership to meet the growing challenge of tomorrow.

Thank you.

Current State and Future Development of Nuclear Power Energy in France

P.COLOMBANI, Administrator General, CEA

Mr. Chairman, ladies and gentlemen:

It is a great pleasure to be back in Japan for this 33rd session of the JAIF. Having worked here for more than two years, I was greatly impressed by the country's immense industrial vitality. I also feel honoured by this opportunity to speak on nuclear power, an issue which is crucial to our countries' economic development and to the world's energy supply, with nuclear power generation covering 17% of electric power production and 6% of energy consumption.

I. THE NUCLEAR POWER CONTEXT

As we all know, the nuclear power industry scene is currently one of contrasts. I would like to discuss four specific aspects of this context.

1. The nuclear power industry is confronted with growing, persistent demands for competitiveness, improved safety and reduced environmental impact

In Europe, as in the US and Japan, the massive deregulation of the energy market is committing the industry to a permanent search for the lowest costs and the highest possible return on investment, one of the solutions being to extend plant life. Meanwhile, the industry must take steps which the public will be willing to accept, first to improve plant safety and the protection of plant personnel and the population in general; second, to protect the environment, with special emphasis on an effective and safe long-term policy for the management of high-activity and long-life waste.

2. However, the nuclear power industry has major assets

Now a mature industry, it can draw from **field experience**, essential to support new developments in nuclear power generation.

In the same way as hydraulic plants, nuclear plants have become a **true source of economic rent** for those operators – especially in the US – who have been allowed by the licensing authorities to extend the life of their reactors.

The industry has made an unquestionable contribution to **the reduction of greenhouse gas emissions**, a major commitment made at the Kyoto Conference. Thus, according to a recent European Commission report, the only way the European Union can make good on its Kyoto commitment to reduce its CO_2 emission by 8%

from 1990 to 2010 is to build a minimum of 85 nuclear power plants. There are currently three types of electric power generation patterns, characterized by their CO_2-emitting fractions:

- 20% to 30% or less, as in France (75% nuclear, the balance mainly hydraulic), Switzerland and Sweden (50% hydraulic, 50% nuclear), Norway (100% hydraulic);
- 50%, as in the E.U. as a whole, or in Japan (35% nuclear, the balance mainly hydraulic);
- 70% to 80% or more, as in the US, China and the world as a whole.

Should the climatic impact of greenhouse gases be confirmed in the coming years, nuclear power will be the main way out, even with hydraulic and alternative energies playing a significant part.

Last, the unavoidable growth of the mid-term dependence of the US and Europe on oil and gas supplies makes nuclear power an **essential moderating factor** on the global energy market.

3. **The "energy self-sufficiency" concept, mainly based on the security of supplies, is currently taking on a new meaning**

These days, the energy issue is stated in terms of competitive effectiveness and environmental impact, in a global context. The energy self-sufficiency concept, which had so far applied within a strictly national framework is now evolving toward an "energy supply security" concept, which still covers the securing of primary energy supplies, while addressing the following issues:

- the possibility of substituting one form of energy for another, whether mechanical, thermal, chemical or electrical;
- the final user's level of vulnerability: an illustration of this point is an oil shortage bringing transport activities to a standstill.

4. **The nuclear industry is strengthening its structures through organizational realignments and new partnerships to cope successfully with deregulation**

As major energy markets are being deregulated (the French Parliament has just adopted the European directives to that effect), the business combinations now taking place in the nuclear power industry are a major event which will shape the industry's structure in the coming decades. I might mention alliances such as GE-Hitachi-Toshiba in the BWR area, and, as regards PWRs, BNFL-Westinghouse-ABB and Cogema-Framatome-Siemens; Cogema is now the leading stockholder of Framatome, the NSSS builder, with a 35% interest, other stockholders being the French State, CEA-Industrie, EDF and Alcatel. The new organization will allow Framatome, a public sector company, to take best advantage of the alliance opportunities arising in Europe and worldwide, in the form of industrial partnerships, for example. Thus, Framatome and Siemens have recently announced their interest in merging their nuclear activities.

II. FRANCE'S ENERGY POLICY

The commissioning of Civaux 2, France's 58th PWR, marks the successful completion of the nuclear power generation program initiated twenty-five years ago. French reactors are efficient in operation, safe and reliable, while fully compliant with environmental protection regulations. France must now draft the decisions required to renew its power generation facilities from 2015-2020 onward. To that end, the government has issued broad guidelines, giving consideration to the new international context, which I will new present; but let me first give you a brief overview of the achievements of our national energy program.

A success story

The ambitious nuclear plant construction program, launched in the aftermath of the first oil shock to strengthen energy supply security, has provided France with nuclear power generation facilities having a total installed capacity of nearly 63 GWe. This covers approximately 75% of the country's electricity generation, under fully safe conditions and at a price per kWh which is among the cheapest in Europe. What are the benefits of the nuclear option?

- first, **energy self-sufficiency**: from 20% in the early seventies, the rate of self-sufficiency has now progressed to 50%;
- second, a very large number of jobs have been created. It is estimated that **the nuclear industry, as a whole, employs about 130,000 persons** in France, a large number of these jobs being in economically weak areas, where nuclear power is thus the main industrial activity;
- third, not only was there a drastic cut in fossil fuel imports, but the nuclear industry made a strong contribution to the country's **exports**: electric power exchanges showed a positive balance of 70 TWh in 1999; NSSS export sales include 9 PWRs, and 2 more are under construction; and sales of fuel cycle services such as enrichment and reprocessing also contribute to the positive export-import balance;
- last, nuclear power generation helps France **protect its environment**. The nuclear option was the major factor in reducing the release of acid pollutants, namely nitrogen and sulfur oxides, by more than 60% over the past 20 years; and it made a 60% contribution to the reduction in CO_2 emissions (over 20% by volume during the same period). This has made it possible for France to achieve one of the lowest CO_2 emission rates among OECD countries.

Based on overstated projections of electrical power consumption, the existing nuclear generation facilities are fully adequate to cover the country's demand for at least a decade. Further, French nuclear facilities are still in their prime; average reactor age is 14. The first of the 900 MWe plants, the Fessenheim plant, was commissioned in 1977. Should its life be extended to 40 years – and we know from U.S. experience that it could be even longer – it would not be de-commissioned before 2017.

Nuclear power's share in French electricity generation will therefore predominate in the 15 years to come. A major shift can only be expected when the time comes to **renew the plants.**

The new guidelines

At the meeting of the Interdepartmental Committee on December 8, 1998, the French government confirmed its **choice of nuclear power as the mainstay of the nation's electricity supply.** At the same time, however, the government found it necessary to plan for a true diversification of resources – inclusive of gas and alternative energy sources – to reduce nuclear power's share in French electricity generation, now fluctuating between 75% and 80%. The renewal of the French generating facilities should lead to an "energy mix" designed for adjusting to a changing technical, economic and political context. Such changes are not necessarily unfavourable to nuclear power: it is well known that nuclear plants represent, to date, the best technical and economic solution to meet baseload requirements, while not being the most cost-effective way to meet peak demand. However, when networks are interconnected within a vast economic region such as the European Union, it is possible to exchange power between countries where demand peaks do not necessarily occur at the same time, thus smoothing out the "price per kWh" curve.

In that perspective, the French government is attentive to the **strengthening of the industry's structures**, as was mentioned earlier, while setting two major objectives designed to gain **public acceptance of nuclear power in the long term**:

- the completion of the back end of the nuclear fuel cycle, which requires exploring all the research avenues open in the field of long-life and high-activity waste management, under the provisions of the law dated December 30, 1991;

- improved transparency in nuclear matters, which means reforming the safety and radiation protection monitoring system.

The back end of the cycle

While there are sites for the storage of low-activity and short-life waste, satisfactory solutions remain to be found for high-activity and long-life waste. The law of December 31, 1991, mentions three research approaches: the separation and transmutation of long-life elements (approach 1), deep-formation reversible storage (approach 2), conditioning of waste containing long-life and high-activity elements, and subsequent surface and sub-surface storage (approach 3).

The CEA is directing the investigations of transmutation, aimed at significantly reducing waste bulk (approach 1) and long-term surface and sub-surface storage (approach 3). As regards approach 2, the government authorized the Agence Nationale pour la Gestion des Déchets Radioactifs * (Andra) in 1999 to build and Operate an underground laboratory designed for investigating radwaste storage Conditions in clay formation, located in Bures (Meuse district). Further, a joint task force has been assembled to select one or more granitic sites, to enable Andra to

* National Radwaste Management Agency (NDT)

build another underground laboratory.

The research work now in progress according to the above three mutually complementary approaches should permit exploring all possible avenues and yield the scientific and technical data required by Parliament from the year 2006 to make a fully visible decision on waste management policy.

Transparency

The second objective set by the government, crucial to the public acceptance of nuclear power, is a reform of the safety and radioprotection monitoring system. Although the French nuclear inspection and investigation organization is satisfactory from the technical standpoint, there is still room for improvement in the areas of overall consistency and transparency.

With this in mind, the French government has decided to create an independent authority entrusted with the supervision of nuclear plant safety. A law is being drafted to that effect. As to investigation activities, it has been decided that the Institut de Protection et de Sûreté Nucléaire * (IPSN), which provides technical support to the licensing authority, and has much freedom of action within the CEA, would become a public establishment in its own right, independent of the CEA. The executive order to that effect is being drafted. Last, it has been announced that the government will strengthen its inspection and investigation capabilities in the radiation protection area, and that the Conseil Supérieur de la Sûreté et de l'Information Nucléaire ** and the Commissions Locales d'Information *** (CLI) will see their roles extended.

It should be emphasized that, while regarding a certain diversification of energy sources as desirable, the French government continues to give top priority to the control of emission of the so-called "greenhouse gases", especially CO_2.

The French National Assembly has just approved, by a large majority, the ratification of the Kyoto environmental protocol, which would make France the first E.U. member to ratify the Kyoto protocol.

Meanwhile, the government has instructed the CEA to step up technological research to develop new forms of energy. To that end the CEA has prepared a plan of action which provides for an increased research effort in the renewable and alternative energy field as early as this year, with a threefold increase by 2003. The plan of action is structured along three program lies:

- fuel cells and hydrogen as an energy source;
- energy storage (mainly lithium primary and secondary cells);
- energy saving and photovoltaic generators, as part of joint programs open to industry partners.

However, nuclear technology remains the CEA's core activity.

* Nuclear Protection and Safety Institute (NDT
** Nuclear Safety and Information Board (NDT)
*** Local Information Boards (NDT)

III. CEA's NUCLEAR POWER RESEARCH OBJECTIVES

As a public organization devoted to basic and technological research, the CEA has succeeded, since its creation, in making science an instrument of power at the service of the nation, in the defence, energy and economic areas. The CEA's technological research, supported by world-class basic research, has strongly contributed to giving the French nuclear industry its current prominent position on the international scene

The CEA's leading role in the **development of the nuclear power option** in the coming decades has been recently confirmed by the government. The future growth of nuclear power depends largely on the success of innovative efforts to boost its competitiveness in a deregulation context, while gaining in public acceptance.

Short- and medium-term objectives

The CEA's first priority is to conduct research with a view to providing a firmer base for the industry's technical know-how, and preparing for the seamless replacement of existing plants. To that end, the CEA should contribute to cost reduction while maintaining plant safety at top level and proposing technical solutions to meet the public's expectations, particularly where the environment is concerned.

1) **Making nuclear facilities (i.e., generating and fuel cycle plants) safer and more competitive while reducing their environmental impact:** this requires extending plant life, increasing UO_2 and MOX fuel burn-up, upgrading fuel cycle plants to new specifications and improving the accuracy of tooling and instrumentation. At the same time, permanent efforts are made to reduce waste quantity and activity as well as the amount of gas and liquid released by the plants.

2) **Providing the Government and Parliament** with the data required, from the year 2006, to make a decision on the **long-term management of long-life and high-activity waste**, based on the scientific and technical outcome of the research approaches mentioned earlier.

3) **Preparing for generating plant renewal** by taking the following steps:
   - qualification of the safety options approved for the EPR French-German joint project, especially as regards severe accidents,
   - development of advanced fuel to permit this reactor type to burn more Plutonium,
   - evaluation of alternative technical solutions, among which boiling water reactors.

To support this effort, a materials testing research reactor is needed. The "Jules Horowitz" reactor, currently at the design stage, will take over from the "Osiris" reactor.

4) **Proceeding with the clean-up and dismantling** of old installations, since it is important for the nuclear industry to demonstrate to the decision-makers, as well as to the public, its full control of its plants' life cycle, from green field to

green field. This is why the CEA-EDF joint effort on the EL4 heavy water generating plant site in Brennilis, in Brittany, is of special importance and should set an example.

5) **Promoting the advancement of knowledge in the fields of radiobiology and toxicology** for a better understanding of the effects of small radiation doses on living matter, and for better accuracy in assessing the health and environmental impacts of the toxic elements used in nuclear research and industrial applications. Scientific advances in this field are needed to facilitate the public acceptance of nuclear power, and the research work will continue within the national network coordinated by the CEA.

6) **Evaluating the industrial and economic feasibility** of the "Silva" enrichment process with a view to preparing for the renewal of the plants, making a comparison with the ultracentrifugation process on which the CEA is stepping up its research effort.

Introducing the reactor of the future

The CEA's ambition is to ensure future prospects for the nuclear industry, by brining out innovative concepts and technical solutions qualifying as **technological breakthroughs**.

The reactor of the future should make it possible:

- to conserve natural resources
- to minimize long-life radwaste quantities.

Therefore, the reactor should be capable of burning Plutonium as well as recycled Uranium and incinerating long-life waste such as minor actinides, while showing high efficiency.

The reactor of the future will be of the multi-fuel type and highly fuel-efficient.

Widely open to international cooperation, current research focuses on the development of reactors with energy spectra varying in hardness, on various cooling media such as helium, molten salts, supercritical steam, lead and/or lead eutectoids, on the use of direct and combined cycles; novel fuel types and associated cycle processes are also being investigated. Research is also being done to evaluate the potential interest of accelerator-controlled spallation-fission hybrid systems.

In that context, I should mention the GT-MHR international project (General Atomics, Framatome, Minatom, Fuji Electric), a modular version of the HTR which has been proposed for burning Russia's surplus weapons-grade Plutonium, and Japan's experimental very high temperature reactor (HTTR).

Last, within the framework of its partnership with Euratom, the CEA is conducting research on **controlled thermonuclear fusion**, with the ultimate goal, still in the distant future, of generating power. This is an area where we intend to continue

participating in the ongoing international cooperation between Europe, Japan, Russia and perhaps, at some future point, the United States.

These major developments need to be supported by a particularly productive basic research activity in the field of **nuclear science**. This is an aspect of French science where the CEA has a crucial role to play, in uniting research efforts under its leadership. This is the time for networking, to promote the cross-fertilization of skills and make optimum use of increasingly costly facilities for advanced research. Meanwhile, the CEA is actively engaged in the teaching of nuclear science and technology, disseminating knowledge through the courses of study at the Institut National des Sciences et Techniques Nucléaires * (INSTN), and by developing teaching/research partnerships with French and other European universities. Further, promoting teaching and communication is essential for better understanding and acceptance of nuclear power by the public.

CONCLUSION

In conclusion, I would like to make a few comments on safety issues, of crucial concern to the CEA and generally to all players in the nuclear field. Anywhere in the world, public opinion will be extremely sensitive – and rightly so – to any abnormal condition, however trifling, in the operation of nuclear installations. Due to the complex nature of the subject in itself, and of the specific situations, factual and truthful information is often difficult to understand, or, at any rate, difficult to report in concise form to the general public. This fact should lead us to a dual approach of the issues, which, difficult as it may be, is nevertheless necessary: first, to be constantly on the alert, for safety results from a collective effort, not from a decree; second, to practice absolute transparency with respect to all interlocutors, whether there is a crisis or not. I take this opportunity to praise the efforts made by the Japanese authorities at the time of the recent criticality accident in Tokai-Mura, which set an example for all nuclear countries,

Last, I would like to emphasize that, as I mentioned earlier, we are confronted with many scientific and technological challenges in the nuclear field. In many of these research areas, it is necessary for the CEA to strengthen its ties with the scientific and technical community in France and other countries, especially in Japan, through JAERI, JNC, NUPEC, CRIEPI, NIRS and a number of universities, as part of existing or future cooperation agreements.

For success will reward a mobilization of all nuclear players in the research areas where views on technical and political issues are widely shared, such as safety, long-life waste management and the development of long-term strategies. We will succeed or fail on those terms, and I urge that we all set our course in that direction.

* National Institute of Nuclear Science and Technology

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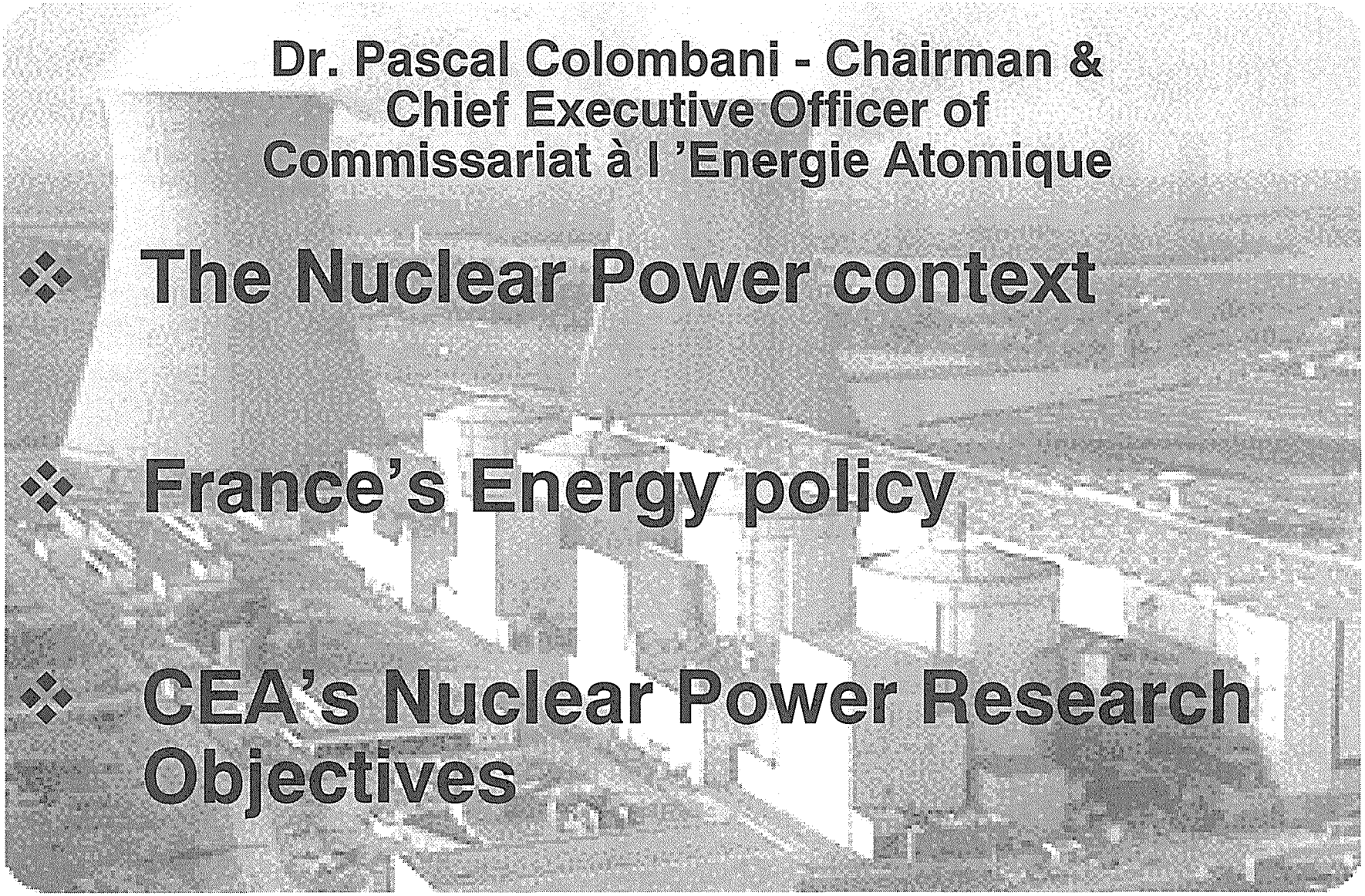

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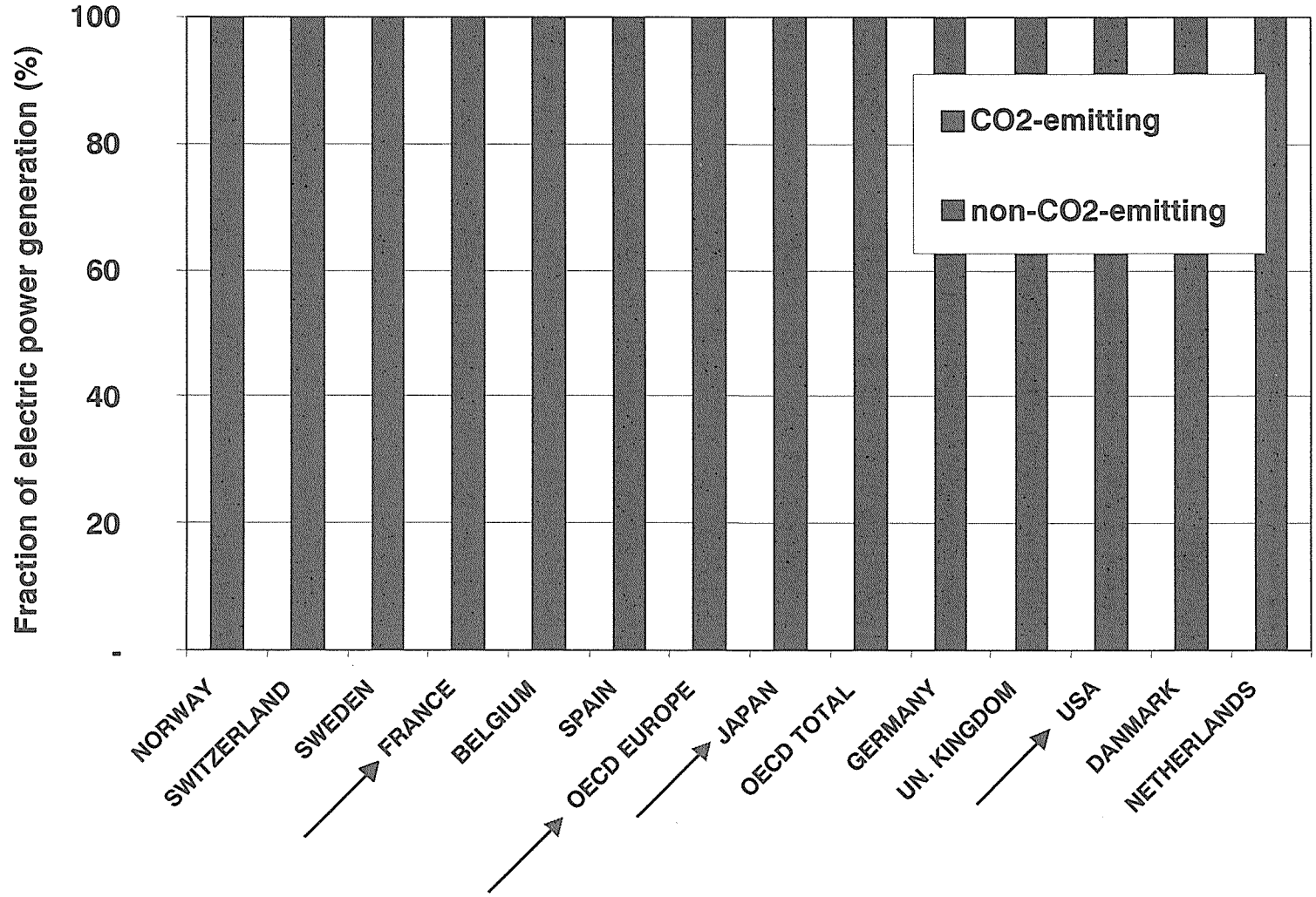
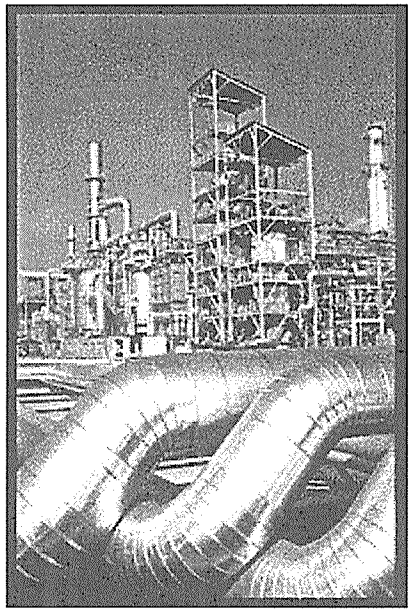
ELECTRIC POWER GENERATION PATTERNS



33rd session of the JAIF

ENERGY SELF-SUFFICIENCY - AN EVOLVING CONCEPT IN A CHANGING WORLD

National self sufficiency



New concept of Energy supply security

- **Security of primary Energy supplies**
- **Possibility of Energy susbtitution**
- **User's level of vulnerability**

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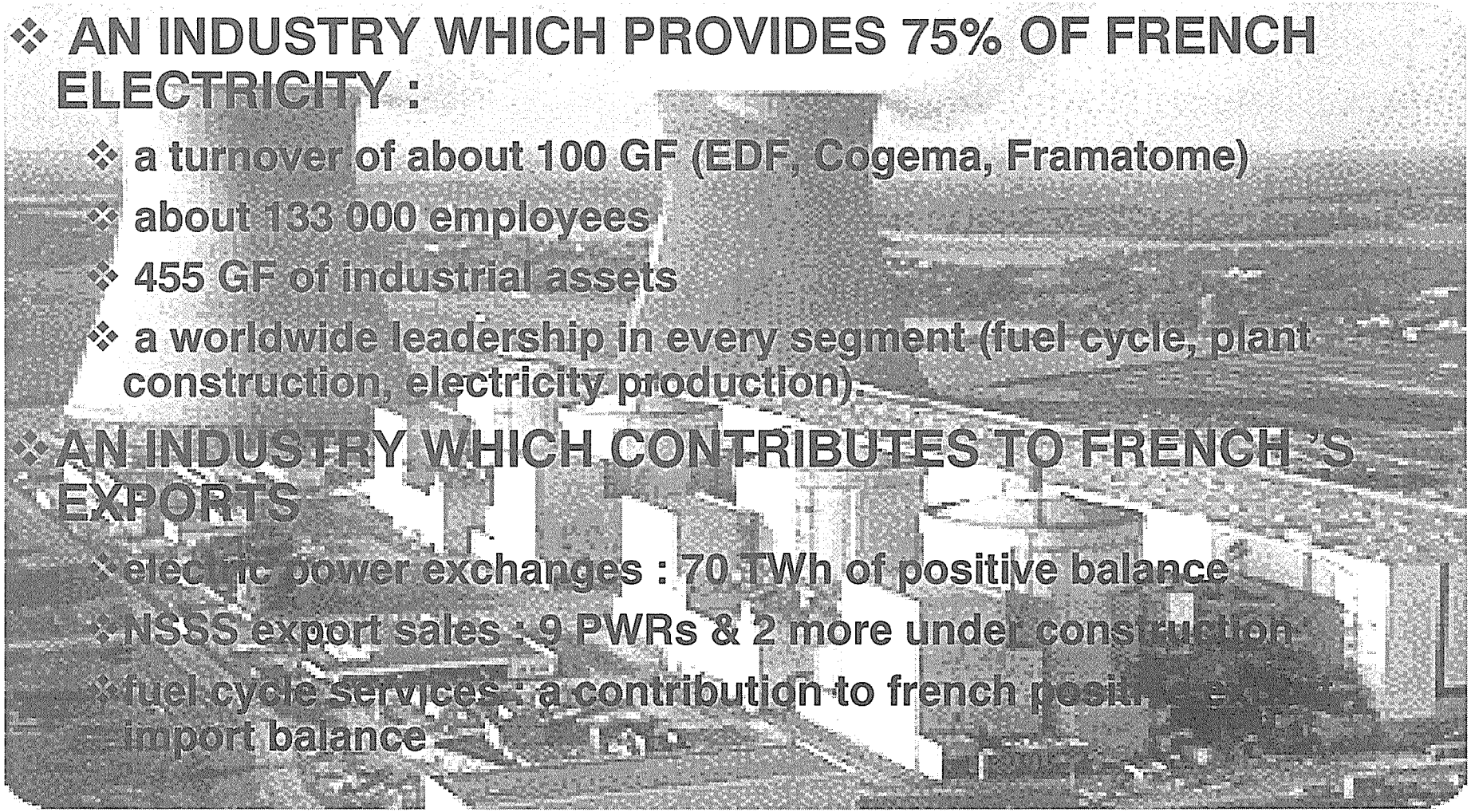
THE FRENCH NUCLEAR INDUSTRY



- AN INDUSTRY WHICH PROVIDES 75% OF FRENCH ELECTRICITY :
  - a turnover of about 100 GF (EDF, Cogema, Framatome)
  - about 133 000 employees
  - 455 GF of industrial assets
  - a worldwide leadership in every segment (fuel cycle, plant construction, electricity production)
- AN INDUSTRY WHICH CONTRIBUTES TO FRENCH 'S EXPORTS
  - electric power exchanges : 70 TWh of positive balance
  - NSSS export sales : 9 PWRs & 2 more under construction
  - fuel cycle services : a contribution to french positive import balance

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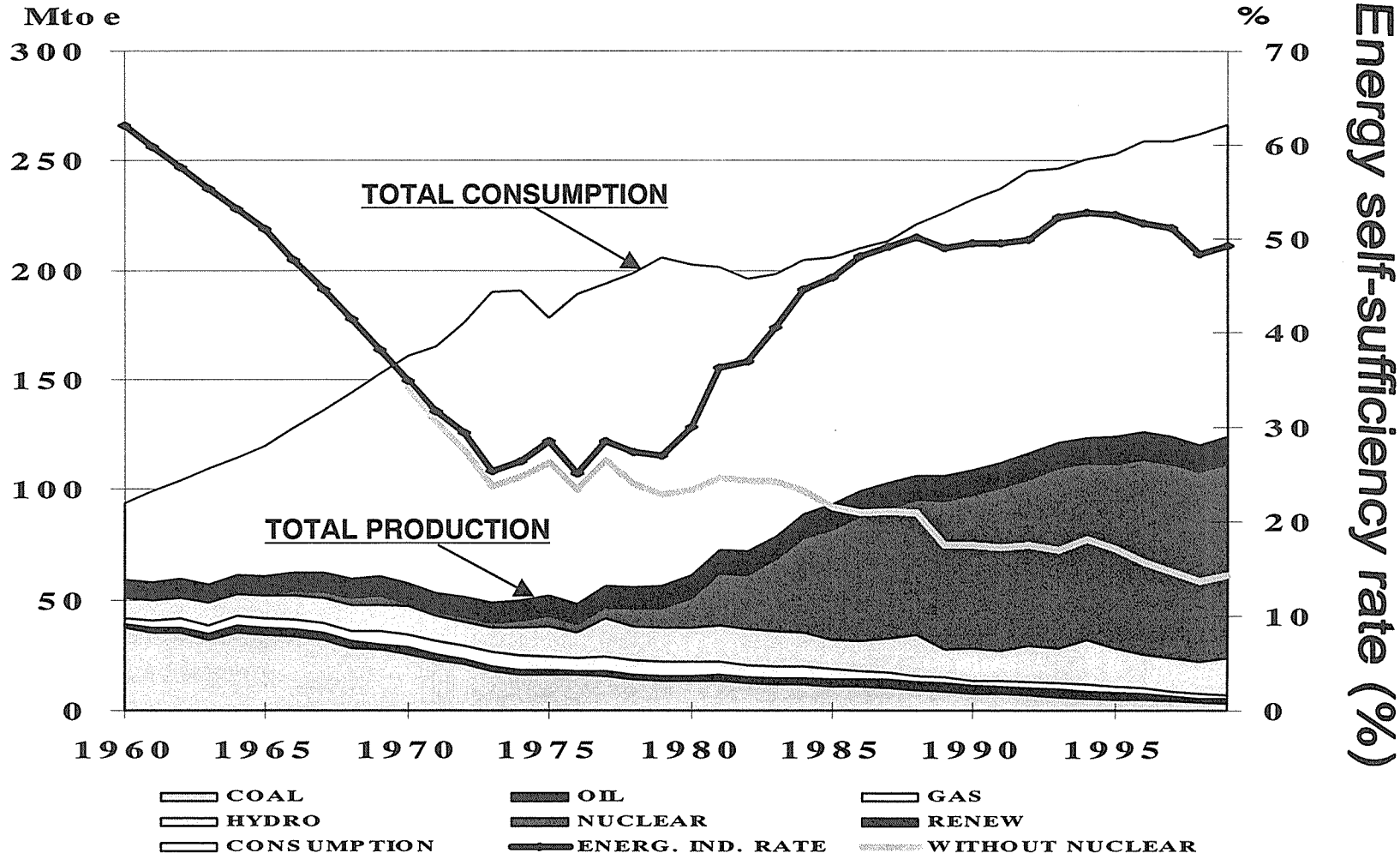
FRANCE - PRIMARY ENERGY PRODUCTION & CONSUMPTION
ENERGY INDEPENDENCE RATE



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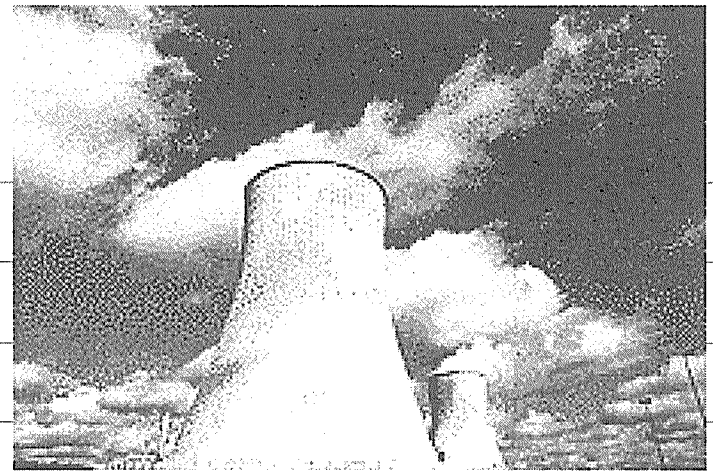
FRANCE - CO2 EMISSIONS



Nuclear Energy helps France protect the Environment

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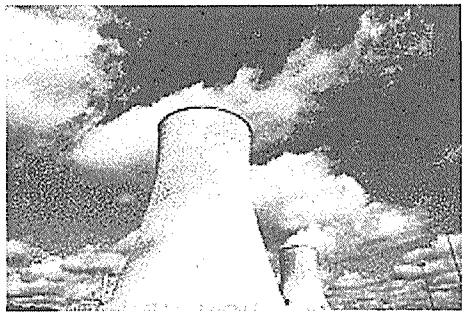
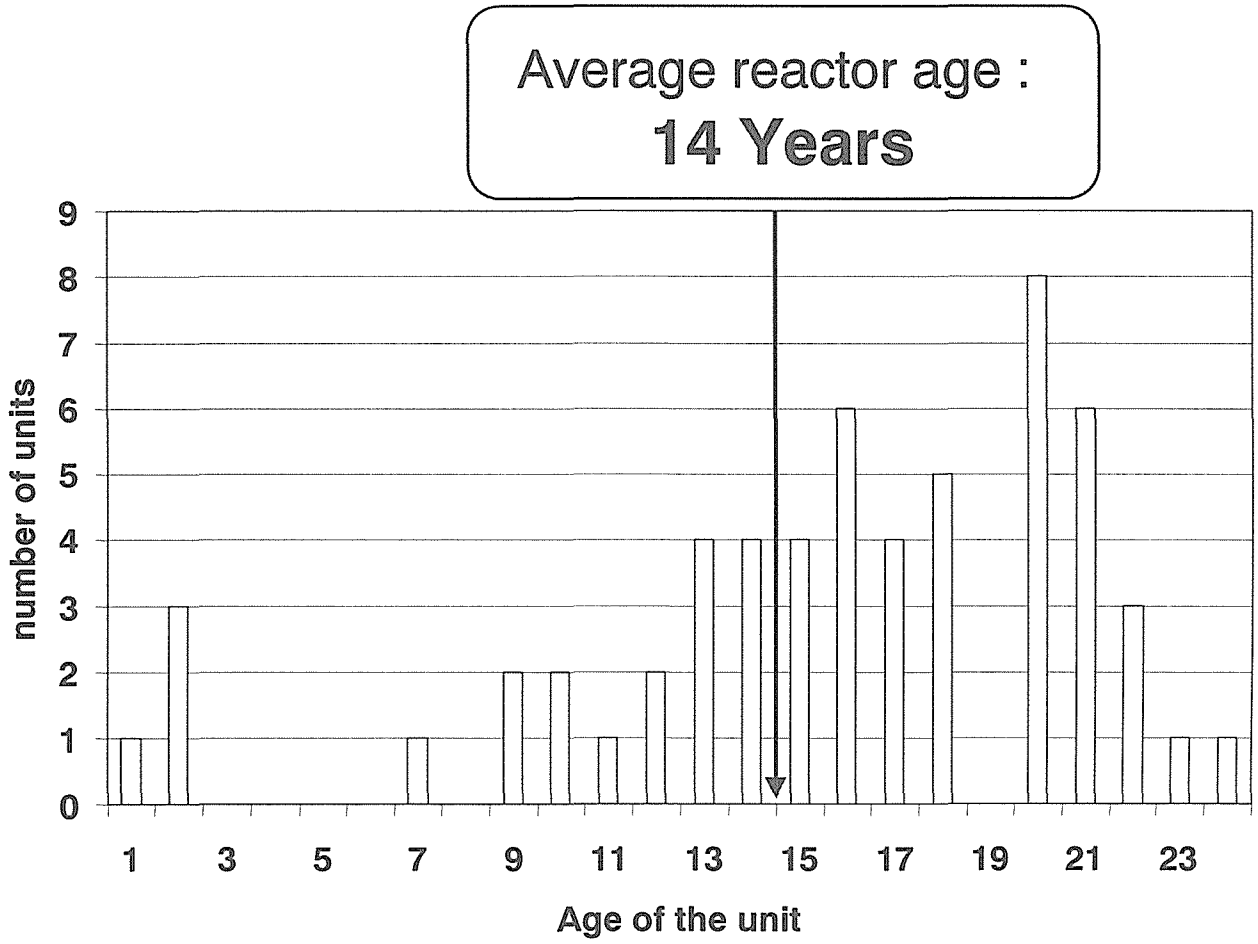
FRENCH NUCLEAR FACILITIES : STILL IN THEIR PRIME...



Civaux : France's 58th PWR

Fessenheim : First French 900 MW Plant



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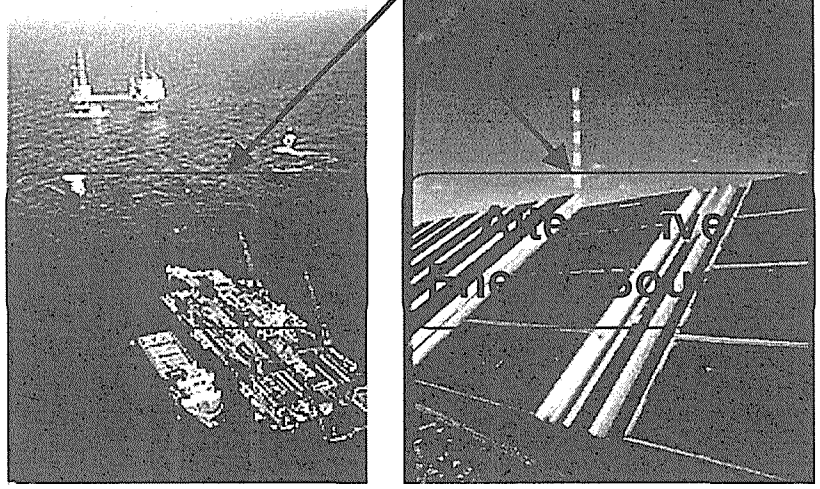
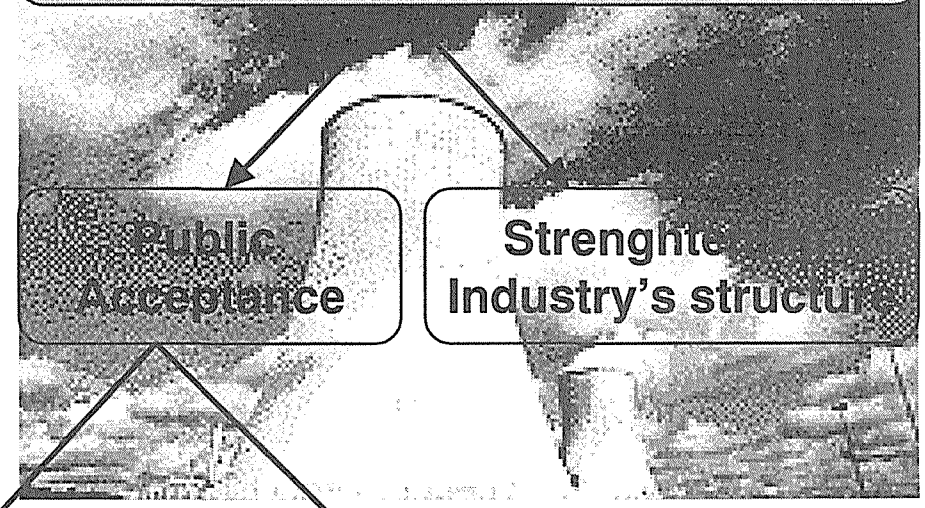
THE NEW FRENCH ENERGY POLICIY GUIDELINES

Diversification of ressources



Nuclear power : mainstay of French's electricity supply



Back-end of the Nuclear Fuel Cycle
Law of December 30, 1991

Transparency

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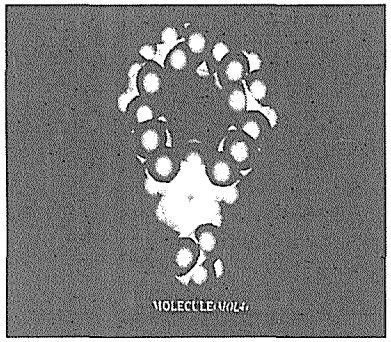
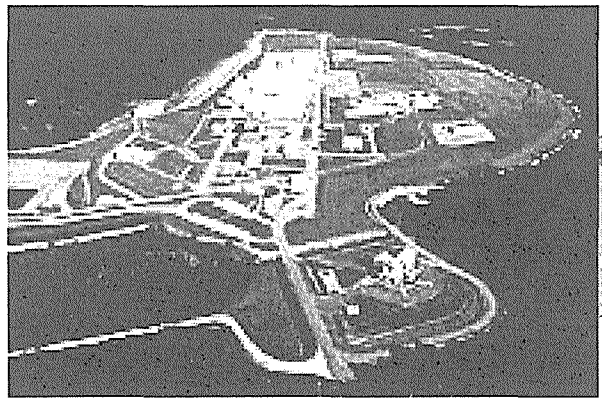
THE 1991 LAW

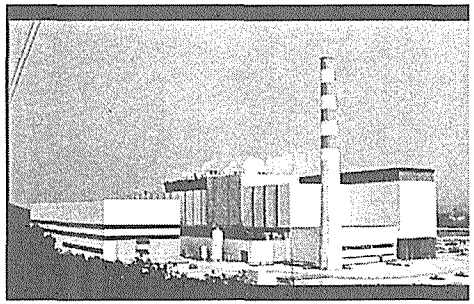
Separation & Transmutation

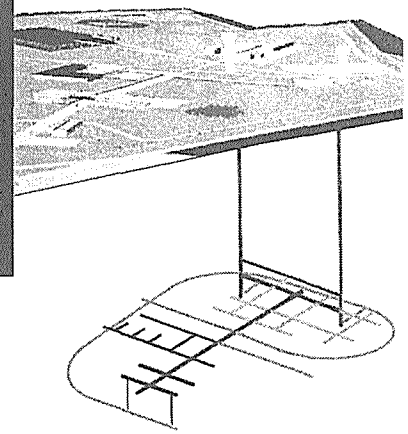
Conditioning & Surface / Sub-surface storage

Deep-formation reversible storage









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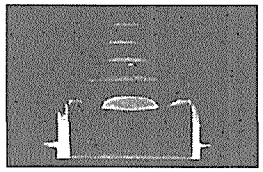
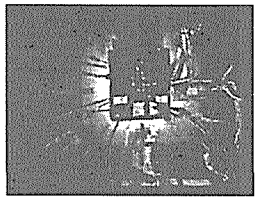
CEA : Making Science an Instrument of Power

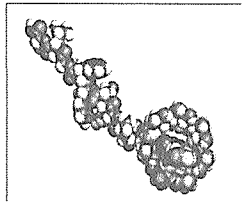


Basic nuclear science



Nuclear technology

Basic science and techniques

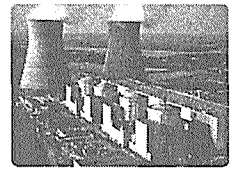


Nuclear power research :

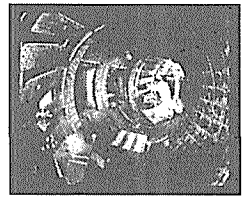
- on short & medium term : safety, waste management, competitiveness, cost reduction, public acceptance ;
- on long term : an optimized system, preserving natural resources, and caring for future generations.

Technological research :

- solutions for value added activities and employment (electronics, materials, biotechnology)
- new technologies for Energy (fuel cells, energy storage, photovoltaic generators)

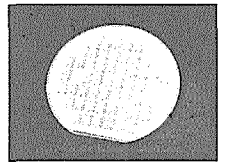


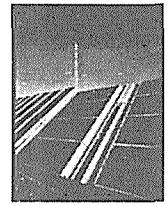
Nuclear power safety



Fusion

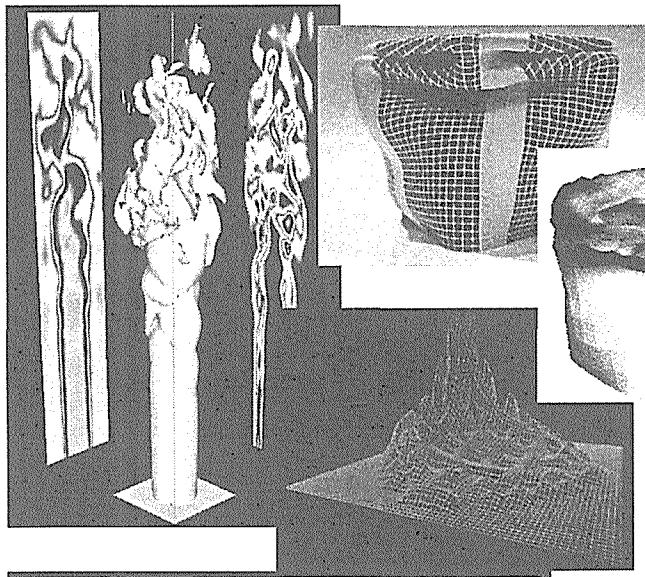
Advanced technological developments

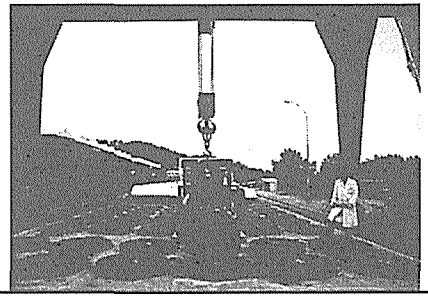


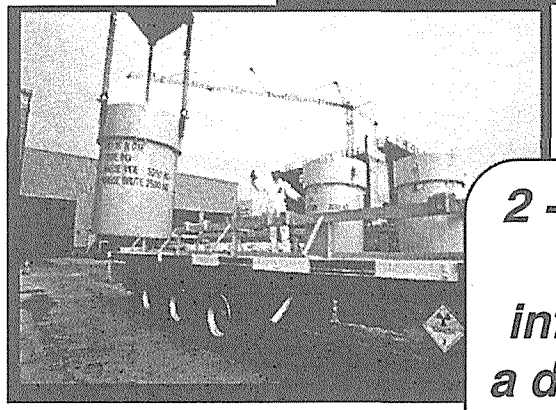


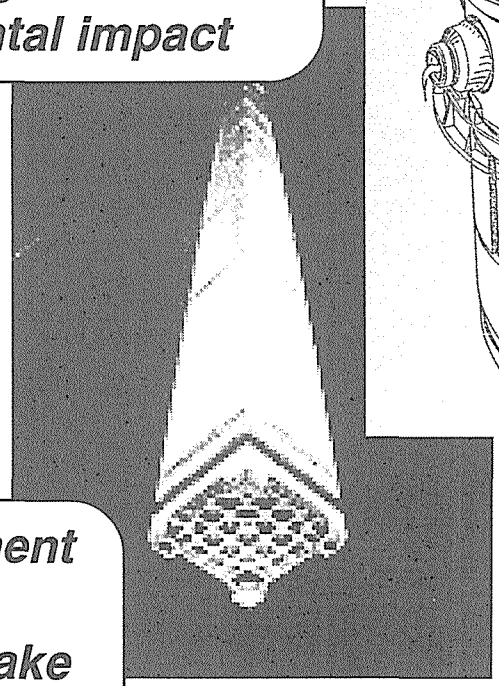
33rd session of the JAIF

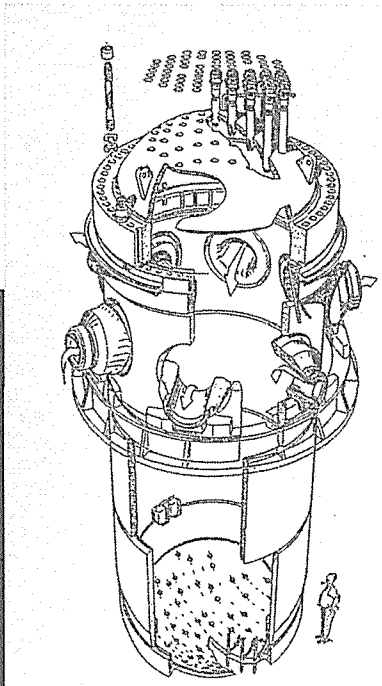
CEA : short- & medium-term objectives











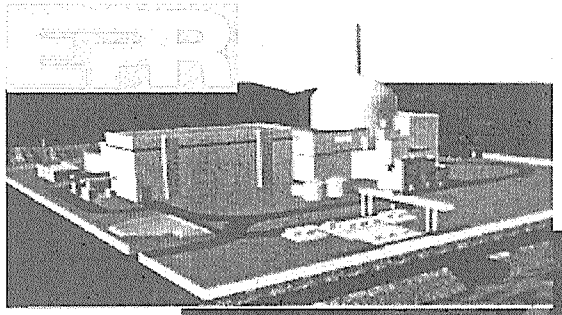
1 - Making nuclear facilities safer and more competitive while reducing their environmental impact

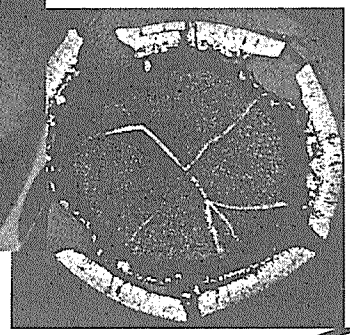
2 - Providing the Government and Parliament with information required to make a decision on the management of long-life high level waste

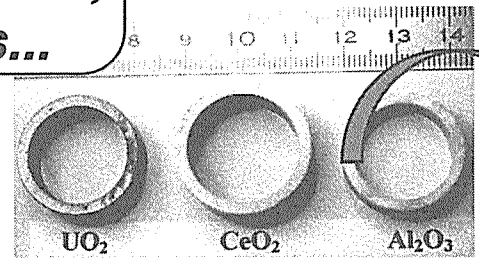
33rd session of the JAIF

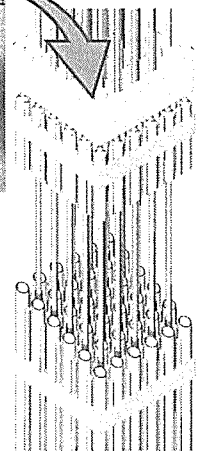
CEA : short- & medium-term objectives

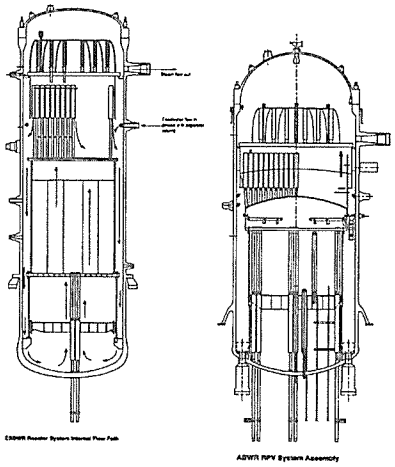
3 - Preparing for generating plant renewal : EPR, Advanced Fuel, RJH, alternative solutions...

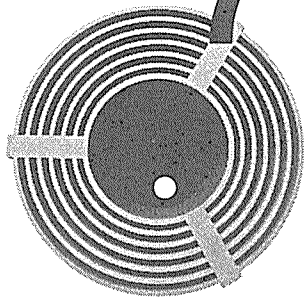


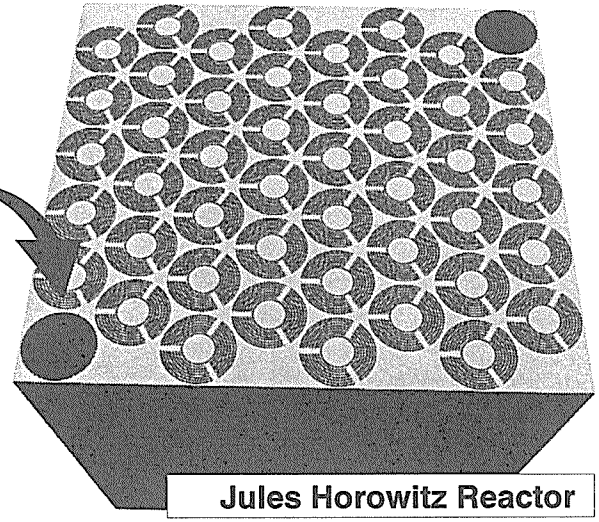










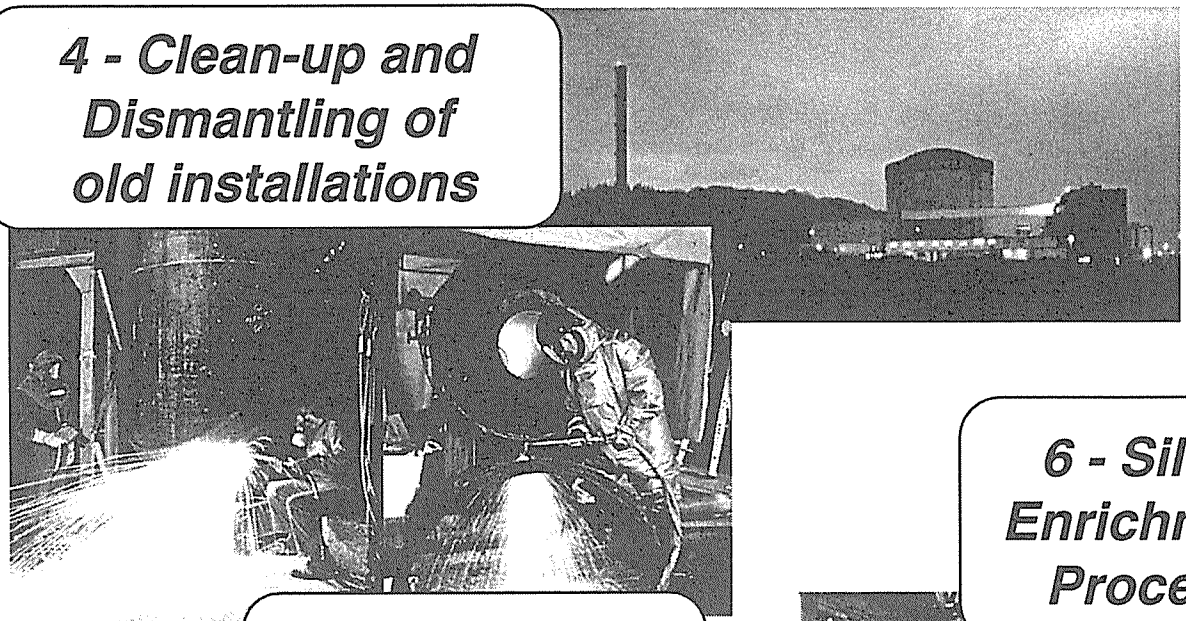


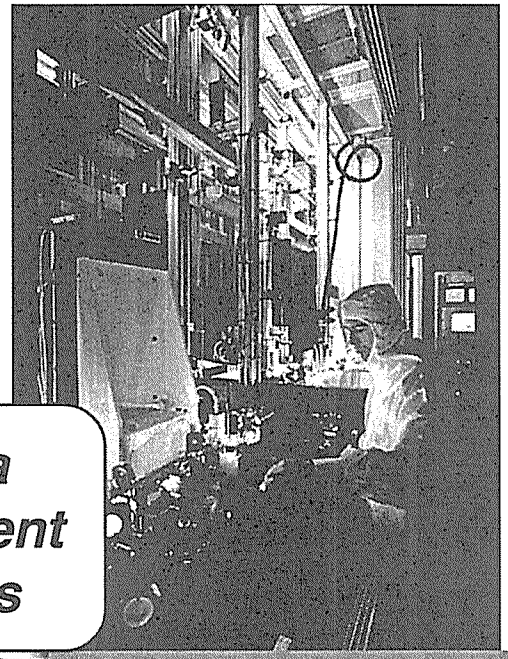
Jules Horowitz Reactor

33rd session of the JAIF

CEA : short- & medium-term objectives

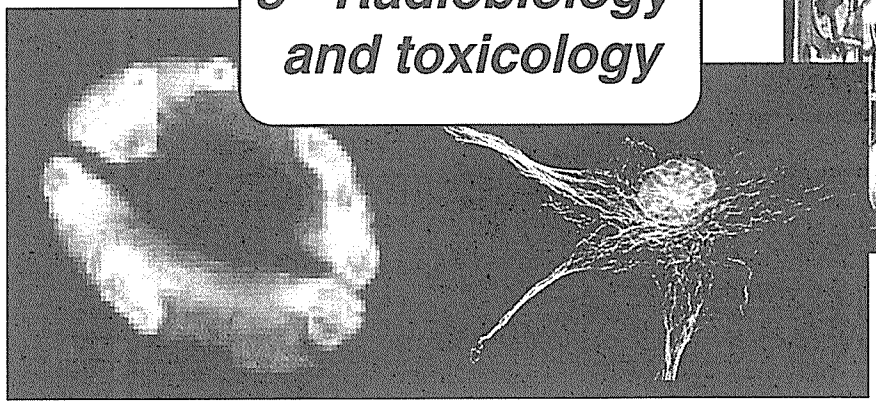
4 - Clean-up and Dismantling of old installations

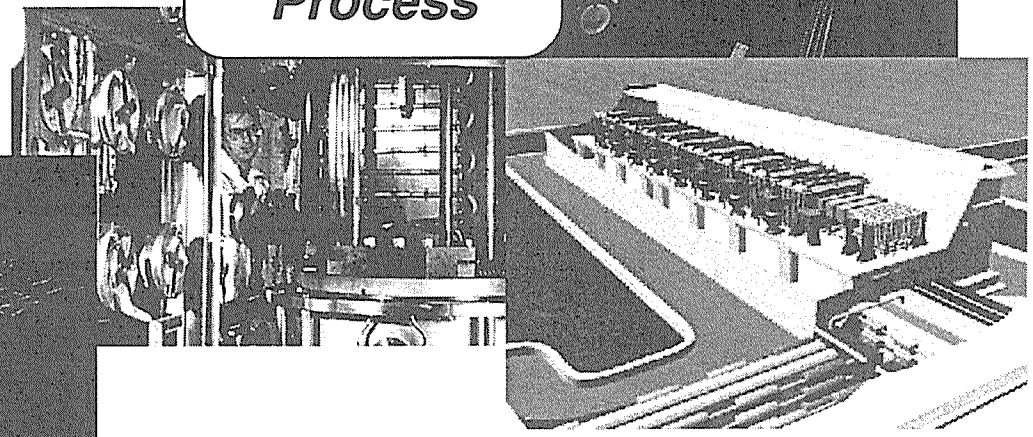




6 - Silva Enrichment Process

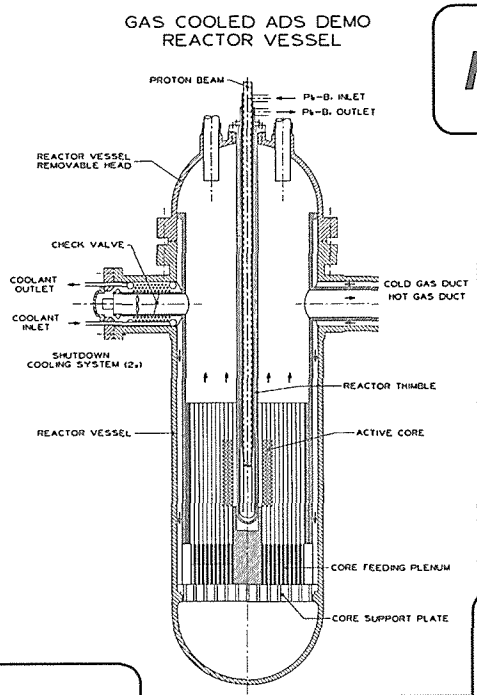
5 - Radiobiology and toxicology



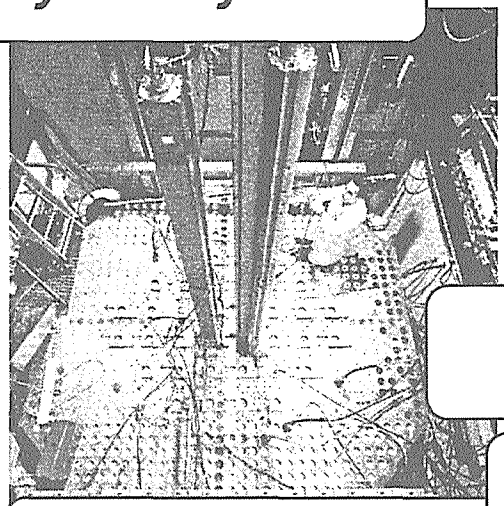


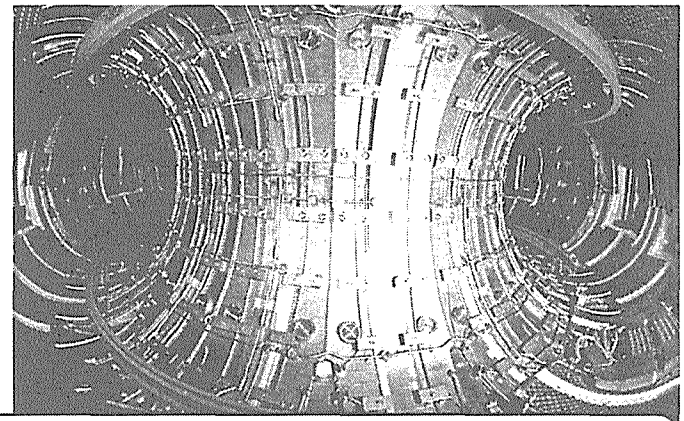
33rd session of the JAIF

Introducing the Reactor of the Future



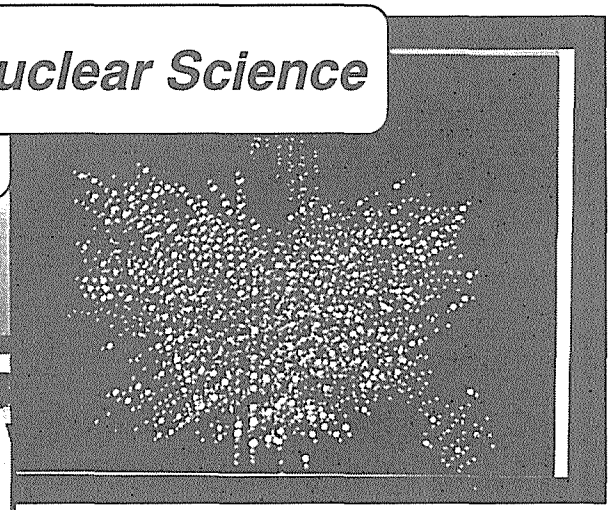
Hybrid Systems



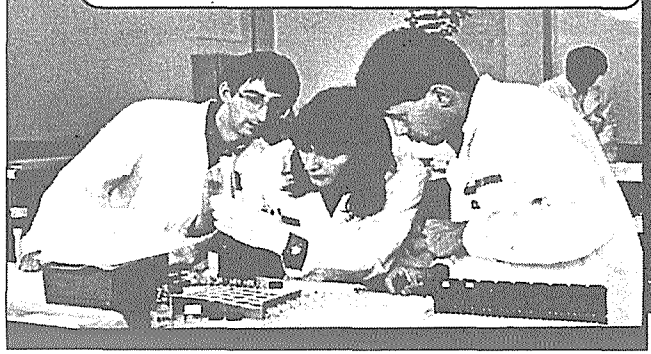


Controlled thermonuclear Fusion

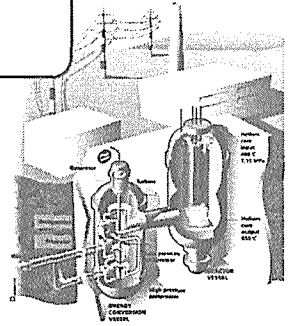
Nuclear Science



Teaching

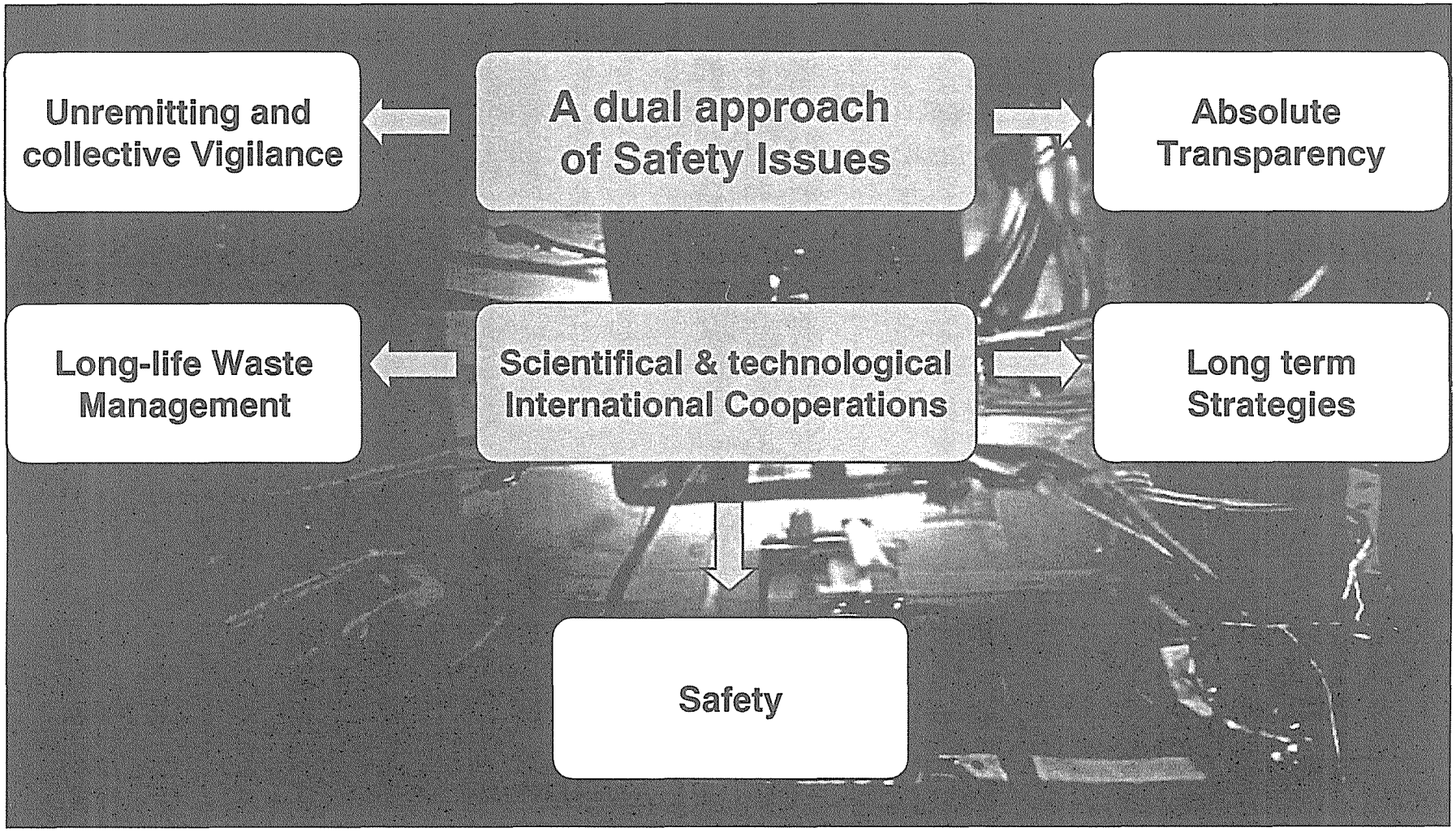


HTR



33rd session of the JAIF

Some conditions for Success...



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President

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REMARKS OF THE HONORABLE KUNIWO NAKAMURA, PRESIDENT OF THE REPUBLIC OF PALAU AND CHAIRMAN OF THE SOUTH PACIFIC FORUM, ON THE OCCASION OF THE 33RD ANNUAL CONFERENCE OF THE JAPAN ATOMIC INDUSTRIAL FORUM

TOKYO JAPAN–APRIL 26, 2000

Good afternoon and thank you for the opportunity to share with you the views of the South Pacific Forum relevant to some of the vital issues the Japan Atomic Industrial Forum will be discussing over the course of its 33rd Annual Conference this week. The South Pacific Forum greatly appreciates this chance to be heard on the issue of energy and the environment. Our members are pleased at this chance to continue working closely with the governments and private sectors of the region to maintain and further develop strong partnerships for safe, clean, and efficient energy generation and distribution for the mutual benefit of all parties. Through meetings such as this one, and the sharing of perceptions that comes with it, we gain the understanding necessary for such partnerships to thrive.

To further our mutual understanding today, I would like to give you some idea of the context in which the SPF member countries exist. The South Pacific Forum members consist of hundreds of islands spread over more than 20 million square kilometers of ocean. Almost all the members are small in size and population and yet span great areas of the Pacific. Five of our members are still classified as Least Developed Countries (LDCs).

Our environments are the key to our respective existences, to our growth, and to our development. In spite of their small land mass, Forum countries are home to an extraordinarily diverse range of species, many of which can be found only in our countries. Our unique and pristine environments draw visitors from around the world. For the most part, ecotourism capitalizing on our special, unpolluted environments is and, for the foreseeable future, will remain crucial to maintaining and expanding tourist arrivals. The region – with its

vast ocean area - contains the world's most productive tuna fisheries, landing over 1 million tons annually, or roughly one third of the world-wide tuna catch. Those tuna stocks are a major renewable resource for member countries and, for many of them, represent the only chance for sustained economic development. For the majority of member countries, marine resources, both living and non-living, represent the best hope (if not the only hope) for improved trade and increased income.

The aspects which make us unique and can support our growth also can limit our prospects for advancement. As a rule, the member countries are extremely vulnerable to economic and environmental shocks. We have a limited range of resources and therefore narrowly-defined economies which depend on fragile commodity markets and tourist income. The same distances which make us exotic and attractive to visitors and which allowed our special ecosystems to form can also serve as a deterrent to visitors. Our isolation has led to high costs for travel to our nations and has resulted in severely limited and irregular air links. Anything which might further discourage visitors can have a terrible impact on our economies: Forum members rely on tourism for between 10% to 50% of their respective gross domestic products. Environmentally, we are like the canary in the coal mine. Our fragile systems are often the first to feel the ill effects of change. We suffer from frequent incidents of cyclones, tsunamis, earthquakes, and volcanic activity. Our ecosystems can be devastated by the introduction of exotic species into our environments, regardless of how or why such introduction occurs. Waste pollution, such as solid waste, sewage, oil spillage, and sedimentation, and atmospheric pollution, relating to global warming and green house effects, also represent imminent threats to our fragile environments.

Once you understand our perspective and the precarious position most members find themselves in, you begin to see why energy issues are so significant to us. Energy is life. All nations must have access to sufficient energy supplies to allow them to deliver the basic necessities of this era to their people. What's more, all nations must have energy supplies to support industry. The Forum island countries in particular require energy to support their continuing development of their infrastructures. Yet, because of our geophysical limitations, we

must be extremely careful about what course we follow to establish and maintain access to energy.

It is clear that we cannot rely indefinitely on fossil fuels. First of all, in part because of our isolation and the lack of accessible reserves in most of our nations, like Japan, we must rely almost entirely on imports of that particular energy source. That means that fossil fuels are expensive. In addition, even when used according to their design, fossil fuels pollute the environment and contribute significantly to global warming. And when an accident occurs in the shipment of such fuels, the damage which will be caused by spillage in our extremely delicate ecosystems will be severe and it will be compounded by our lack of capacity to respond to such a disaster. Note that I speak in definite terms, not conditional. As long as we rely on shipments of fossil fuels, we are playing a numbers game and one day one of our numbers will come up. It's simply a matter of when. Various alternative energies, including wind, wave, thermionic, and solar power, hold great promise for many of our members, but are still in their development phases and largely inaccessible, in part due to capacity constraints and in part due to cost concerns. Nonetheless, we are anxious to explore any and all options for alternative energy and welcome the transfer of technology which would enable practical application of such options. Furthermore, many of our ecosystems are such that they are ideal laboratories and test markets for the new and arriving alternative energies.

Nuclear energy has already been established in many developed countries and some of those attending meetings here in Japan have suggested that Forum island countries consider adopting nuclear technology in their jurisdictions. In part out of desperation, some SPF members have actually expressed interest in that suggestion. However, as with alternative energies, a big question and potential problem is capacity. As a whole, our nations lack the in-house technical expertise to maintain and operate such systems safely. And if we do not have the ability to independently operate and control such systems, we will simply be substituting one kind of dependency in the energy sector for another one. Of course, there is also the obvious concern over potential contamination due to accidents in operation or in transportation of fuels or wastes which would carry harms equal to or greater than any oil spill. Unlike other countries which depend on nuclear energy for part of their energy supply, some of our island countries do not

have sufficient land mass to even allow effective evacuation from tainted areas. Further, because of the great fear of radiation, whether justifiable or not, the possibility of leaks could be enough to discourage tourists from our shores--an event most FIC's cannot afford in the foreseeable future.

It has been made clear throughout our meetings over the last week that the Forum members are anxious to explore any and all viable options for adequate, safe, and sustainable energy supplies. However, any energy source must first and foremost be compatible with our environments in order for it to be considered viable. Any energy which puts our environment at risk, whether fossil fuels with their threat of spillage or other energies such as nuclear power with its threat of radioactive contamination, can drastically depress our economies by frightening tourists, degrading the beauty of our lands and waters, contaminating fish stocks, or all three. Even the perception of harm or the threat of harm can be sufficient to drive away business from our island nations.

So far, I have addressed the concerns of the Forum members regarding their ability to meet their own needs. However, because of our perilous position in the world, there is another dimension of concern for SPF countries. We cannot focus only on our own circumstances, practices, and policies. We must also address the circumstances, practices, and policies of others. I would like to turn to that issue now.

We have known for decades that energy production and consumption are not purely national concerns. The means of energy generation and usage have significant effects which extend beyond national borders. Those effects can be obvious and direct, as when outputs from power plants leave clear environmental footprints in the form of smog or acid rain. Those effects can be subtle and indirect, as when greenhouse gas emissions from half the world away contribute to global warming and sea level rise which threaten island nations. But regardless of the form which those effects may take, the only way to control them and mitigate their harmful impacts is through cooperation across countries, regions, and the world.

The South Pacific Forum has become more and more active in internationally addressing the pressing challenges facing our environment. At COP 5, the Fifth Conference of the Parties to the United Nations Framework Convention on Climate Change, we made

repeated and coordinated interventions which drew attention like never before to our special concerns. As the joint statement issued Saturday at the conclusion of PALM 2000, the SPF and Japan are both committed to seeing the Kyoto Protocol enter into force at the soonest possible date. That is the message our members will be taking to COP 6 later this year. At the U.N. forum on small island developing states, we also made clear how dire our situations are. On other occasions we have taken part in regional, multilateral, and bilateral discussions and conferences with states and entities outside the SPF, like this one, to address those and other issues. On those occasions, however, we have focused primarily on the threats associated with industrialized nations' reliance on fossil fuels and failure to take genuine steps to reduce their emissions, specifically the resulting climate change and sea level rise. It is not necessary to repeat those statements here. Instead, I think this is an opportune time to address SPF concerns with aspects of nuclear energy, particularly the shipment of nuclear materials, fuels, and wastes through the region.

As the Forum has consistently declared, and various members have repeatedly stated in the course of these very helpful meetings this week, one of the major concerns of the members is the shipment of radioactive materials, including mixed oxide fuels, through the region. I previously noted that every nation has to be granted access to the energy resources necessary for it to survive and thrive. As a corollary to that view, if a nation does not have sufficient resources of its own, it must be allowed to import them, necessarily implying a grant of passage through other jurisdictions. Forum island countries understand that and do not mean to suggest that transshipments must be stopped (although some would certainly be happy if that were to occur). However, the transshipments must be conducted in such a way as to answer the fears of Forum members. The difficulty is basically two-fold: the SPF has not been convinced that the most stringent safeguards are being applied to the shipments and the SPF has not received sufficient assurances that adequate remedial measures are in place to address any accidents which might occur in the course of shipments. Needless to say, the recent Takai criticality accident and the discovery of falsified quality control data for MOX fuel for the Takahama 3 plant did nothing to alleviate our concerns. Let me take this chance to clarify what will help ease Forum members' minds.

The Forum position, as set forth in the Forum's 1998 and 1999 communiques, has repeatedly expressed its continuing concern over the shipment of MOX fuel and radioactive materials through the region. As expressed in those documents, SPF members expect that such shipments will be carried out in a manner which addresses all possible contingencies and will be made only if the cargo is of demonstrably minimal risk and the vessels carrying the materials are of the highest standards possible. It is hoped that the shipping states will actively cooperate with states through which the materials are transited to ensure the greatest degree of safety. Furthermore, there should be in place a mechanism to address compensation for all economic damages which result from any accident, as was declared in the joint statement of the South Pacific Forum and Japan at the conclusion of PALM 2000 last Saturday. While we believe that the other points are clear, we understand that the full meaning of the last point deserves some further explanation.

As the Forum has explained in other venues, because of the unique circumstances of its members, the perception of harm can be as damaging as actual harm. No one wants to by contaminated fish. No one wants to dive in contaminated waters. No one wants to travel thousands of miles for a vacation only to learn that they might be exposed to unhealthy levels of radiation. It doesn't matter if the threat is real or the fear is rational, if there is the perception that an accident has made one of our members a risky source of tuna or a risky place to spend a vacation, the harm is still done. The principle is not hard to understand and, in fact, has already been set in a number of jurisdictions. Some states in the U.S.A. which are dependent on agriculture for their revenues have expressly recognized a cause of action for the type of harms we are concerned with. In those states, one who causes harm to agricultural interests by creating the impression that crops are contaminated can be required to compensate the injured agricultural interests. Nations pursue actions against each other when their products are denied the opportunity to enter into foreign markets because of perceptions of taint. Both examples confirm that perceptions alone can create harm and that it is not unreasonable to expect compensation for harm caused by the wrongful (even if accidental) creation of such perceptions which produce loss. And that is the point of the Forum members on this issue: physical harm to persons or

property or even the environment is not the only potential damage which can occur or should be addressed in connection with transshipments of radioactive materials, including MOX fuel.

Existing compensation and liability regimes are quite limited in their ability to address the concerns of Forum states. Some of the international conventions on liability and compensation apply only to members to those conventions, and Forum members are not parties to the agreements. Even if there were coverage for Forum members under those conventions, there must be physical damages carrying economic losses before any compensation scheme is triggered. Insurance is carried by the companies engaged in the transportation, but, again, before any compensation would be made the existence of physical damages would have to be proven. Further, it is likely that any attempt to obtain compensation would have to go through lengthy and expensive litigation in the courts of either or both the shipping state and the harmed state. It is possible that some theories of international common law could provide relief, although actions based on such theories would have to establish state liability–international law is still not so evolved as to allow general jurisdiction over individual, non-state entities. And state liability, as opposed to contractor or agent liability, would most likely prove difficult to establish.

Because of the shortcomings of existing compensation and liability mechanisms, the SPF has sought to negotiate an understanding with the three transporting states, Japan, the United Kingdom, and France. Forum representatives met with the representatives of those governments in Suva in September of 1999 to establish a dialogue on the concerns of Forum countries and explore ways to address those concerns. It was not anticipated that a solution would be reached at that meeting, but only that a process would begin. That meeting appeared to be a useful beginning and, at the Forum held in Palau in October last year, we agreed to continue to pursue innovative arrangements with the shipping states to ensure that full, just compensation for damages resulting from such shipments, even those resulting from perceived harms, will be available to the states through which the radioactive materials pass. Consequently, we have sought and are continuing to seek further discussions with those countries regarding our concerns. Although the relevant countries appear to have some reluctance to recognize our concerns, we hope to make some significant progress on this issue in the near future.

In fact, one positive result which might come from the Tokai criticality accident and the revelation of fraudulent quality control data may be the willingness of those countries to return to our discussions. We have no doubt that those incidents were atypical and should not be considered anything other than serious departures from the norm. Nonetheless, there can be no denying those events have seriously tarnished the reputation of the nuclear industry and led to fresh concerns regarding its safety. A separate presentation devoted only to the Tokai incident made up a significant part of Monday's meeting, in fact. Therefore, it is reasonable to expect that the shipping nations will come to better understand our view. Specifically, we hope that they will now appreciate from their own first-hand experiences of late that even mere perceptions, regardless of the reality of a situation, can have genuine effects which must be addressed. And the best way to address those damages is to establish policies and procedures which ensure that the highest degree of care is observed in order to avoid incidents and to jointly prepare for and plan responses to incidents which cause economic harm as well as incidents which cause physical harm. As I said, we remain hopeful that the other parties will return to discussions in the near future.

To summarize, both energy and the environment are global issues requiring global coordination. From the perspective of the South Pacific Forum, our environmental and economic vulnerability mean that we must walk a tightrope, balancing between the risk of damaging our greatest assets and the risk of becoming thoroughly marginalized. We have great hope that promising new technology will continue to develop and that it will be appropriate for our island nations. Yet, we cannot wait indefinitely and must take steps within the existing context that will allow growth and preservation to go hand in hand.

At the same time, we must work to ensure that events outside our borders and outside our control do not compromise and undo whatever efforts we undertake to preserve our environment while continuing to develop and diversify our economies. We must ensure that all contingencies are addressed; that the chance of any accident is minimized; that the response to any accident is prepared and ready at all times; and that any incident is remedied as quickly and fully as possible. Obviously, we cannot do that as individual nations or even as the South Pacific Forum alone. That is why meetings such as this one are so important and becoming an ever greater tool

of the Forum: we must enlist the understanding and aid of others outside the Forum and outside our region if our precious island countries are to survive. And that is why it is so important that the Forum accept your kind invitation to speak to you today and share our perspective with such an August body. I hope that this will be merely the first of many mutually beneficial discussions. Thank you very much.

The 33rd JAIF Annual Conference,

April 26, 2000, Tokyo, Japan

The Future Prospects of Korea's Nuclear Power Development

by

Park, Yong-Taek

Executive Vice President

Korea Electric Power Corporation

Thank you, Mr. Chairman, for your kind introduction.

Ladies and Gentlemen, it is my great pleasure to be with you at this distinguished Conference. Today, I will present the future prospects of Korea's nuclear power development.

Since its introduction in the 20th century, the nuclear energy has provided our society with enormous benefits in crucial areas. During the past 40 years, the nuclear industry has maintained rapid and steady growth. As you are aware, nuclear energy has already become a major source of electricity in Korea and worldwide.

If we hope to meet the environmental goals of minimizing greenhouse gas emission, expanded use of nuclear energy for the production of electricity is absolutely indispensable. As of the end of 1999, 436 nuclear reactors are operating in 31 countries. And the accumulated operating time of all nuclear power plants reached approximately 9,400 reactor years.

However, it is also true today that the nuclear industries in the world remain stagnant due to energy supply and demand circumstances, as well as to political and social arguments, over the place of nuclear energy. Some Asian regions, however, are the exception to this general downturn.

Korea, dependent on the import of 97% of its total energy demand due to a lack of domestic natural resources, has extended its nuclear development as an alternative reliable energy source, especially after experiencing the oil crisis of the 1970s. National policy to diversify its energy resources has supported continued construction of nuclear power plants.

KEPCO is currently operating 16 nuclear power units, including Ulchin unit 4, which began commercial operation last December. and 4 additional units, Yonggwang 5&6 and Ulchin 5&6, are now under construction.

Last year, we have produced about 100 billion kWh of nuclear power which is 43% of the country's total electricity generation and the installed nuclear capacity was about 14,000 MW, which is representing 29% of the country's total capacity.

The performance of Korean nuclear power plants has shown continuous improvement over the years, repeatedly ranking well over the world average. Last year, the average capacity factor for Korean nuclear power plants was 88.2% while the world average was 75.6%. Since 1993 the annual capacity factor has been maintained at a high level of over 87%.

With the stabilization of the national economy after the recent recession, a speedy increase in the electricity demand is predicted to accompany sustained economic growth. The growth rate of electricity consumption

decreased to (-) 3.6% in IMF year of 1998, but last year, it increased to 10.7%.

According to the current 5th national long-term power development plan, the nuclear capacity will reach about 26,000MW by 2015. At that time, the share of nuclear capacity will increase to 33%, providing corresponding economic and environmental benefits. Nuclear power will continue to play a key position as a major power source, which will enlarge its role in handling the base load in Korea.

The Nuclear power plants to be built in the future will be mainly Korean Standard Nuclear Power Plant(KSNP) and Korean Next Generation Reactor(KNGR). KSNP is based on the design of Yonggwang units 3 and 4 which have been successfully operating with good performance since 1995. Ulchin units 3 and 4, which came into commercial operation in 1998 and 1999 respectively, are the leading units in a series of KSNP. KSNP will continue to be built until the development of KNGR.

In 1992, the Korean government and KEPCO decided to develop KNGR, a standardized advanced light water reactor, which enhanced both safety and economics. KNGR is being developed in accordance with the mid and long term nuclear R&D programs and in parallel with the long-term power development plan. The goal of the KNGR project is to complete a standardized PWR design by the early 2000s with capacity of 1,400MW, targetting its commercial operation from 2010. The design principle for the advanced PWR looks toward simplicity, proven technology increased safety margins and economic improvement.

KEPCO has made efforts toward the enhancement of public trust and

confidence through comprehensive radioactive waste management. The development of the radioactive waste repository site harmonizing with local public opinion is also a prime KEPCO concern. Due to the increase of operating nuclear plants and RI users, the volume of low and intermediate level radioactive waste (LILW) and nuclear spent fuel has continued to increase. As of the end of last year, about 50,000 drums of LILW and about 4,000 tons of nuclear spent fuel have been stored at power plant sites.

However, the radioactive waste management plan has faced strong public opposition which has hindered the planned schedule for its development. Accordingly, KEPCO has undertaken several measures to increase storage capabilities at plant sites.

Recently, KEPCO have almost successfully completed a pilot-scale demonstration test which uses vitrification process that can considerably reduce the volume of LILW while safely turning these wastes into a durable glass form. KEPCO plans to build a full scale commercial vitrification plant which will begin vitrificating from 2005. Our vitrification technology is composed of complex processes utilizing a plasma torch melter for non-combustible waste and an induction cold crucible melter for combustible waste. Since this technology is able to achieve volume reduction of 95～97% (about 1/25 of the original volume), we anticipate a significant volume reduction of the waste currently being stored and to be generated in the future.

In addition, various measures to increase nuclear spent fuel storage capabilities at plant site, such as installation of high density storage racks and adoption of dry storage are now underway. According to a recent decision on radioactive waste management countermeasures made by the

Korean Atomic Energy Commission, the disposal facility for the LILW will start operation in 2008, after successful site aquisition in accord with the local community. Also, a centralized interim storage facility for nuclear spent fuel will be constructed and operated after 2016, considering the decision time and direction of the national policy on disposal for the spent fuel.

In the future, KEPCO will proceed with the radioactive waste management project, placing safety and national confidence as the top priorities. Also, KEPCO will direct the project in harmony with local communities based on both timely opening to the public and public trust. This will encourage a relationship of mutual understanding and cooperation through contributions to local economic development.

KEPCO also has worked in collaboration with the IAEA to promote the development of operation and maintenance technology for nuclear power plants and the proliferation of a nuclear safety culture. Specifically, over the past several years, KEPCO has successfully carried out many regional and interregional training courses under IAEA technical co-operation activities. KEPCO will make efforts to expand its overseas training services for developing countries. We anticipate our efforts will contribute to promotion of nuclear energy programs worldwide.

One of the most significant opportunities is involvement in the KEDO LWR project in North Korea. This gives us a chance not just to share technology but also to make history. In 1996, KEPCO was officially designated as the prime contractor of the North Korea LWR project by KEDO. Based on a "Pre-Project Service" contract signed in January 1996, site surveys have been performed. Along with the site surveys, the early

stage construction work for the KEDO LWR project, including site preparation and grading, has been carried out through the Preliminary Works Contract (PWC) of August 1997. KEPCO finally signed a Turnkey Contract with KEDO on December 15, 1999, for formal launch of construction work. Of course, there were many difficulties in proceeding with the project but it is now clear that it will go ahead as planned.

We hope that this North Korea LWR Project not only freezes North Korea's nuclear weapons program but also opens a new chapter in South-North cooperation, peaceful coexistence and enhanced economic exchange. KEPCO as the prime contractor will help guarantee the success of the project through its assurance of quality and safety with a thorough project management. Also, the continued support for safe and reliable operation of the power plant will be desirable even after its completion. I sincerely hope that all leaders in the nuclear community including Japan, will continue to have an interest and extend their cooperation for successful implementation of this project.

The Korean government plans to restructure the electric power industry in Korea. The plan calls for the introduction of full-fledged competition in both the power generation and distribution sectors which have been performed solely by KEPCO for decades. The government intends to begin the process of privatization this year by dividing the power generation sector into several subsidiary companies. From 2003, the distribution sector will also be divided and following the completion of the restructuring, consumers will be free to choose among several electricity providers. At present, the power generation sector is expected to be divided into five thermal power generation companies and one nuclear power gen. Due to the special considerations of operational safety and the unique features of

nuclear power generation, the nuclear sector will remain a public enterprise for the time being.

From now on, however, the nuclear industry must adjust to open competition, and these changes must be built on a foundation of safety and economic viability to secure public trust. Nothing is more urgent than the public's understanding and acceptance of nuclear power in order to allow for the steady development of the nuclear business. Despite the successful development of the nuclear industry, the Korean public still remains uneasy about nuclear power. While nuclear operators have consistently maintained an unchanged approach toward public acceptance, numerous anti-nuclear environmental groups, in concert with international environmental organizations, have systematically fostered anti-nuclear activities and that the strength of their influence has steadily grown in Korea.

The TMI accident, the Chernobyl accident and the JCO accident have caused increase of the public's doubt on nuclear power safety and opposition of local residents against nuclear power. The heavy water spillage incident which occurred during an outage at Wolsong unit 3 at the time of JCO accident last year was the case of reaffirming the importance of public acceptance. Although that Wolsong incident had no effect on the reactor nor public safety, and was classified as level 0 according to the event scale by the IAEA, it has a great damage to the accumulated public acceptance in Korea.

I believe that the public's understanding of nuclear power will control the future of the nuclear industry. The public's trust and confidence will be formed by the safety of plants, and timely opening to the public. I would like to stress the fact that this is a common challenge that the nuclear

community must meet collectively.

With the advent of the new millenium, we expect our nuclear industry to face more competition and deregulation as a result of restructuring, as well as limited global resources and environmental challenges, all of which must be met with new strategies for the continued development and success of the industry. In this context, our challenge is to achieve better nuclear performance through improved safety and economic efficiency. This will achieve both nuclear competitiveness and public acceptance. In the decades to come, we will continue to open channels of communication with the public, while continuously striving to improve safety and cost. We will also continue to place greater emphasis on international cooperation for the further enhancement of operational safety in nuclear power plants.

Thank you for your kind attention.
どうも ありがとうございます。

The Future Prospects of Korea's Nuclear Power Development

Park, Yong-Taek
Executive Vice President
Korea Electric Power Corporation

The 33rd JAIF Annual Conference,
April 26, 2000, Tokyo Japan

KEPCO
KOREA ELECTRIC POWER CORPORATION

Introduction

- Nuclear energy, already a major source of electricity
  - Minimizing greenhouse gas emission
  - Expanded use of nuclear energy is indispensable
- Nuclear power reactors in operation (as of 1999)
  - 436 nuclear reactors are operating in 31 countries
  - Operating time : 9,414 reactor years
- Korea nuclear power development program
  - Development as an alternative reliable energy source
  - Continued construction of nuclear power plants

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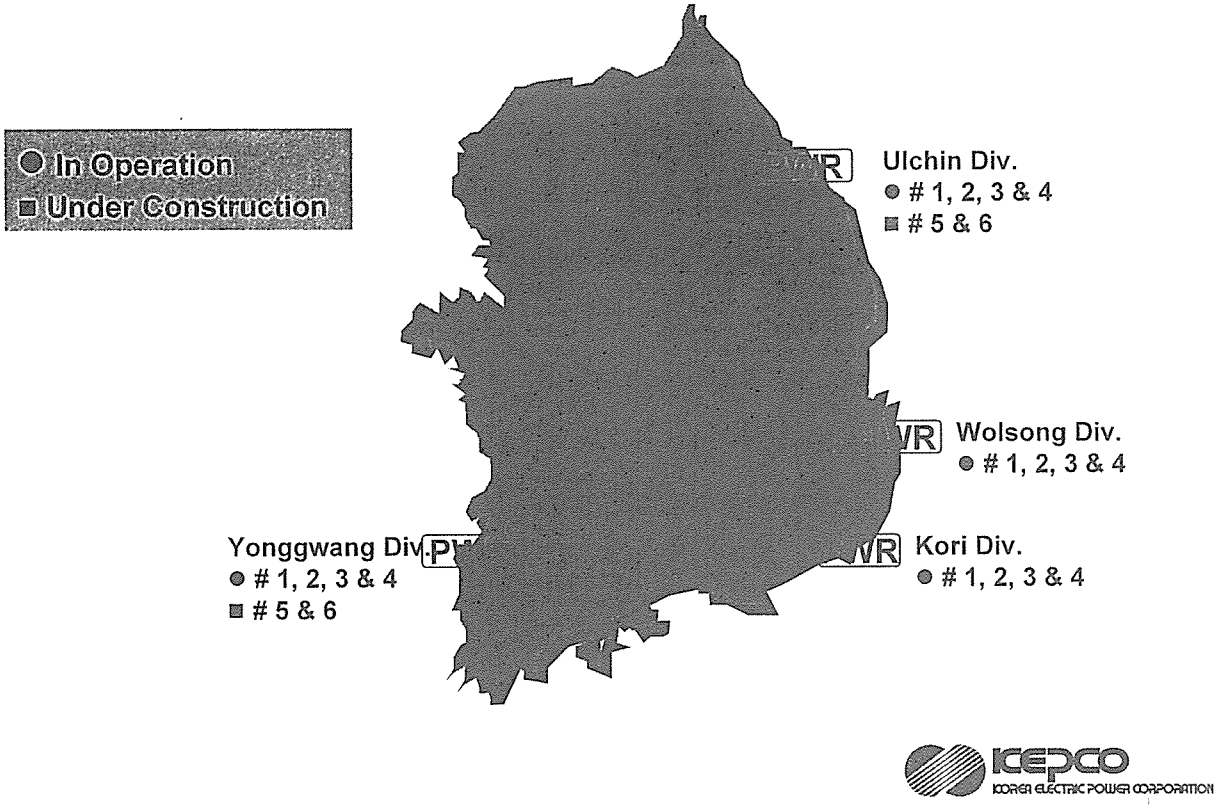
Location of Nuclear Power Plants



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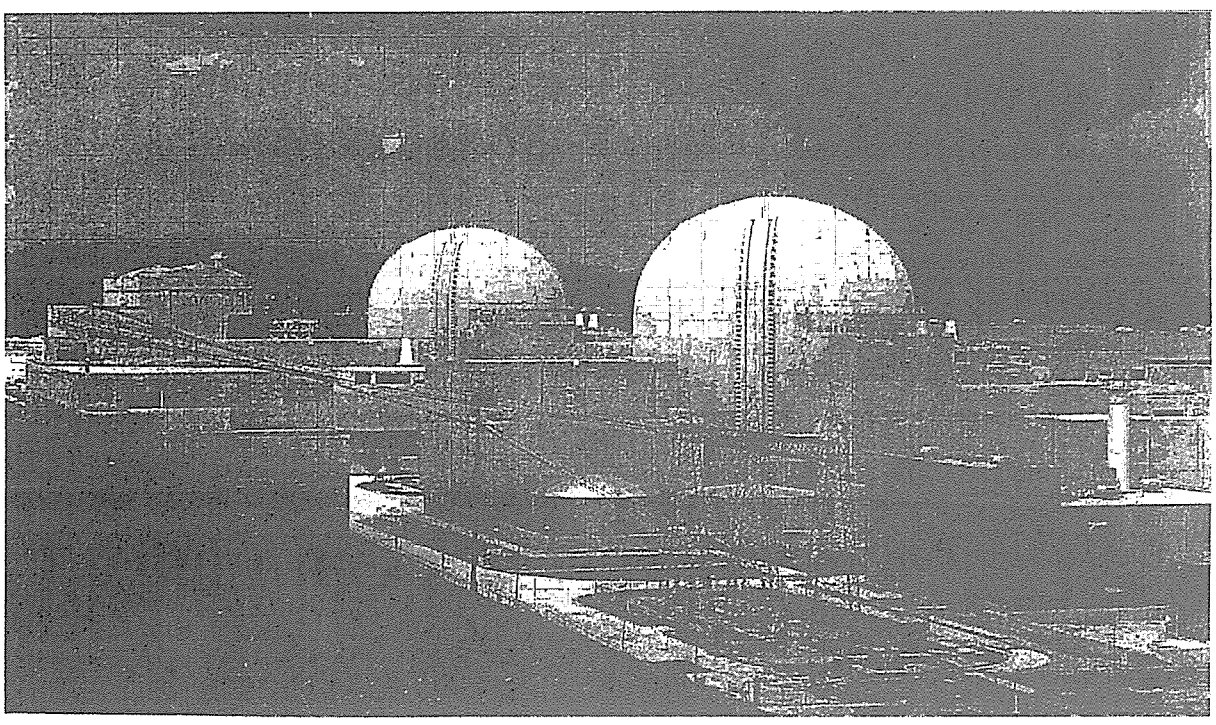
Ulchin Units 1,2,3,4 (PWR)



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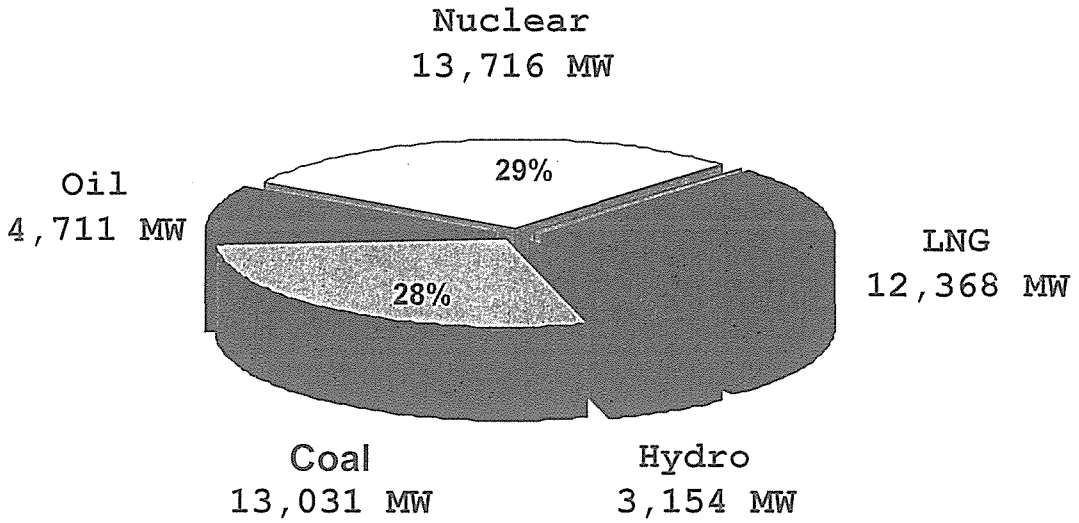
Generating Facilities



Total Generating Capacity:
46,979 MW
(As of the end of 1999)

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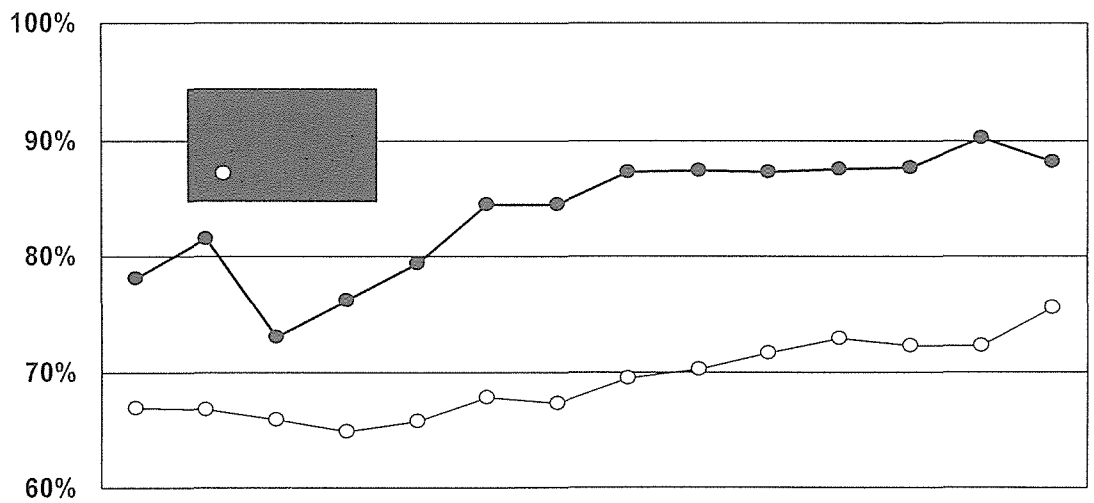
KOREA ELECTRIC POWER CORPORATION

Nuclear Capacity Factor of KEPCO



KEPCO	78.1	81.5	73.0	76.2	79.3	84.4	84.5	87.2	87.4	87.3	87.5	87.6	90.2	88.2
World	66.9	66.7	65.9	64.8	65.7	67.8	67.3	69.4	70.2	71.6	72.9	72.2	73.7	75.6

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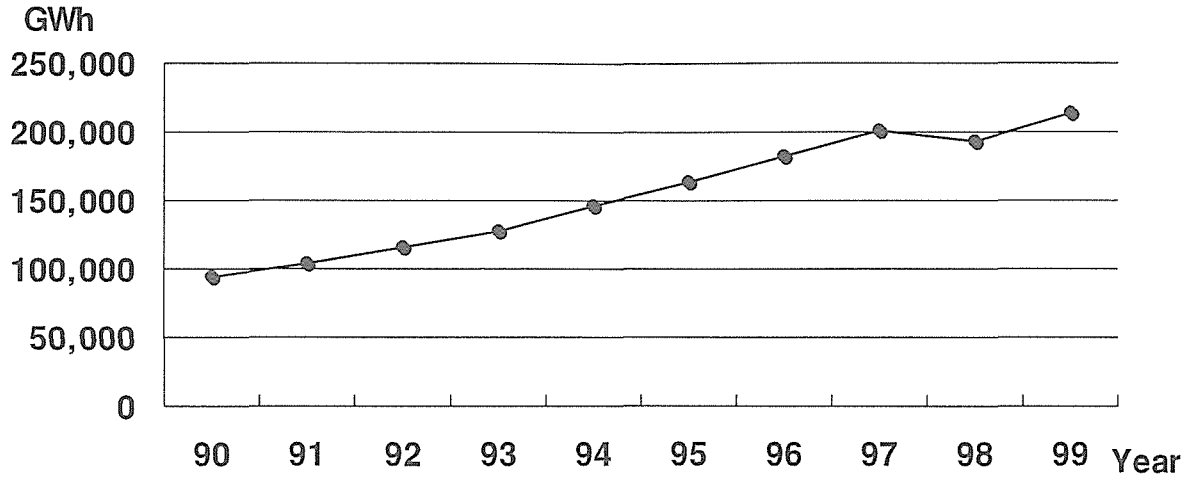
Trend of Electricity Consumption



Electricity Consumption	94,383	104,374	115,244	127,734	146,540	163,270	182,470	200,783	193,470	214,215
Growth Rate	14.8	10.6	10.4	10.8	14.7	11.4	11.8	10.0	-3.6	10.7

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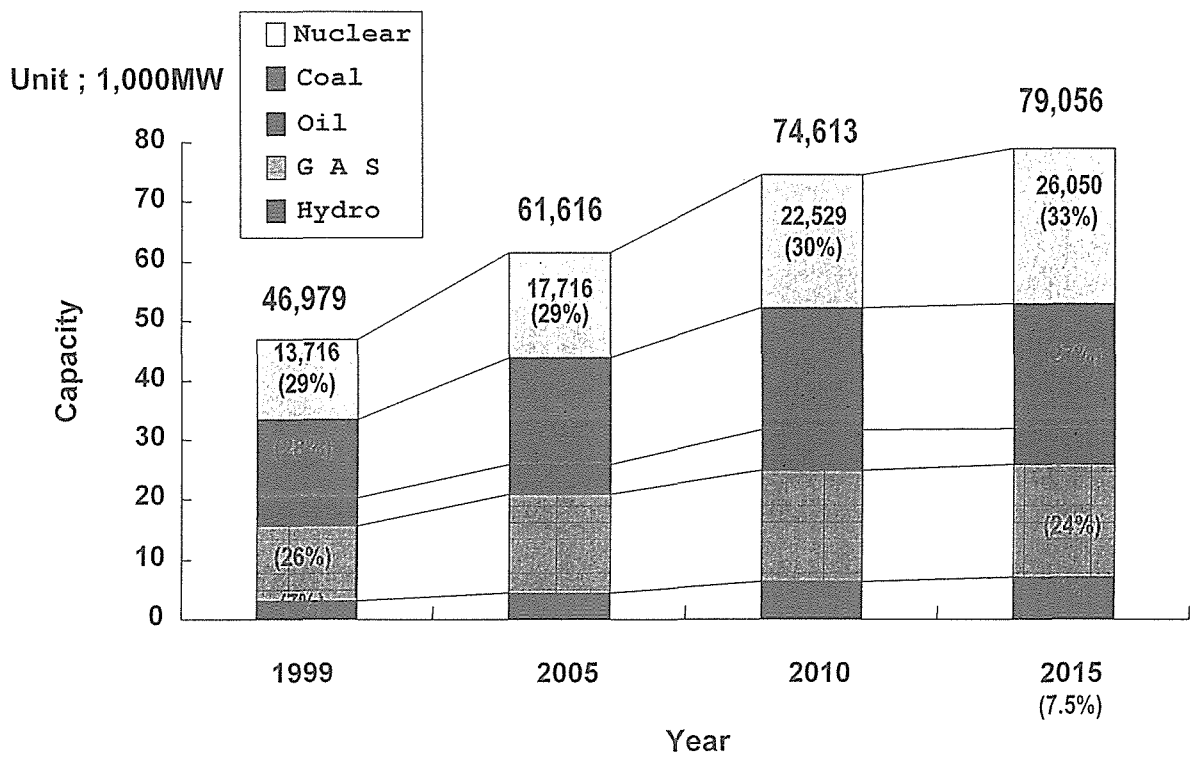
Long Term Power Development Plan



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Nuclear Power Plant Development

- KSNP(1000MW, PWR)
  - Ulchin unit 3&4
    - The leading units in a series of KSNP
  - Continue to be built until KNGR
- KNGR(1400MW, PWR)
  - Enhanced both safety and economics
  - Developed in accordance with the mid & long term nuclear R&D program
  - Begin its commercial operation from 2010

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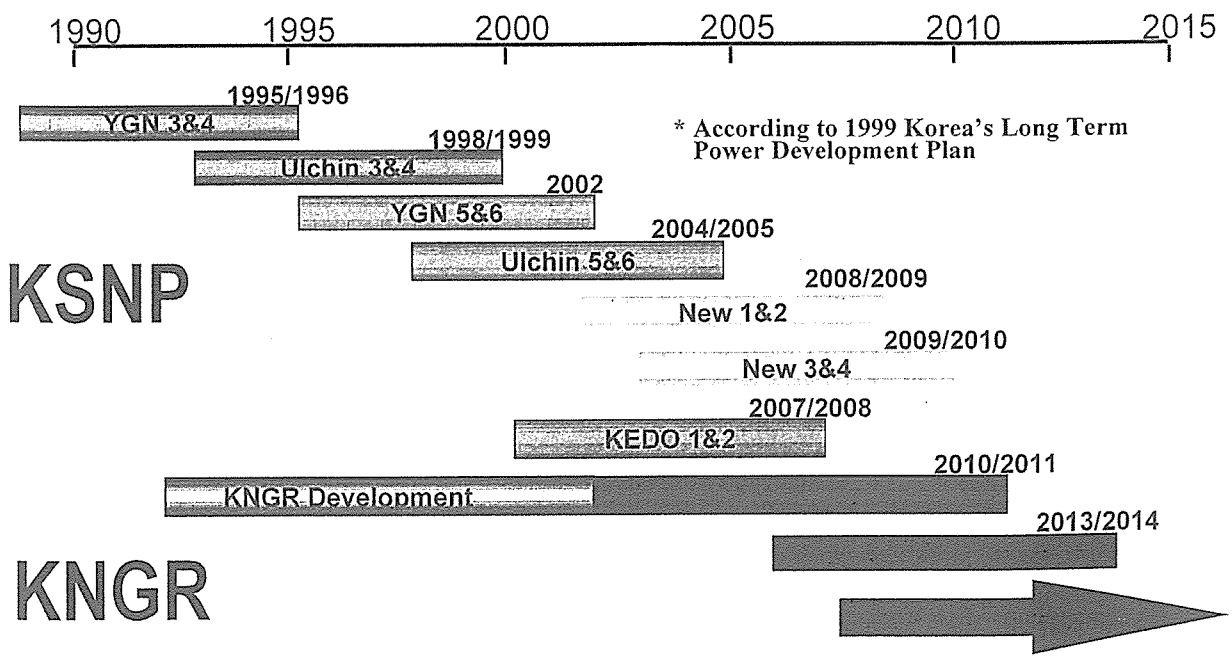
KSNP & KNGR Project



KEPCO KOREA ELECTRIC POWER CORPORATION

Radioactive Waste Management

- Comprehensive management of radwaste
  - Ensure PA and security of the radwaste repository site

- About 50,000 drums of LILW and 4,084 tones of nuclear spent fuel at plant sites

KEPCO KOREA ELECTRIC POWER CORPORATION

Radioactive Waste Management

- Vitrification of LILW
  - Demonstration test of a pilot-scale vitrification plant to be completed successfully in 1999
  - Plans to begin verificating from 2005
  - Composed of complex processes
    - Plasma torch melter for non-combustible waste
    - Induction cold crucible melter for combustible waste
  - Volume reduction
    - 95~97% (remainder of 1/25 of the original volume)
  - Significantly more effective reduction of the waste is anticipated

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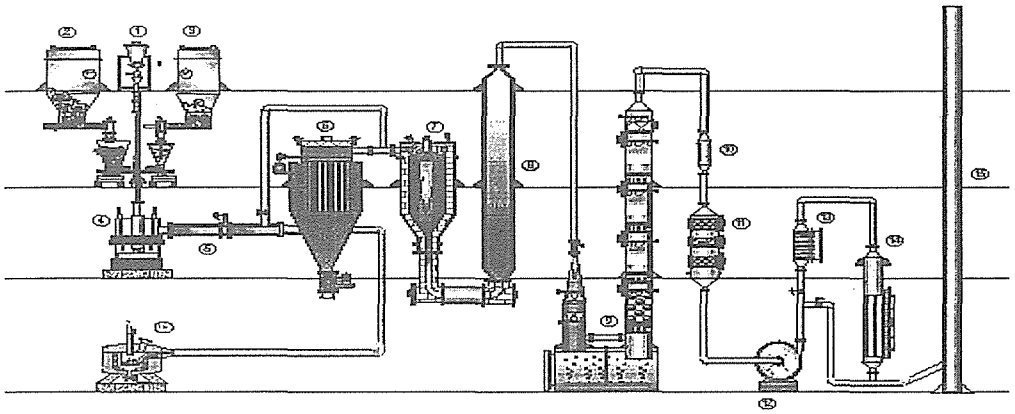
Vitrification Facility

Vitrification Facility



① Glass frit feeder ② Feed for DAW ③ Resin feeder ④ Induction cold crucible melter
⑤ Pipe Cooler ⑥ Hi-temp filter ⑦ Post Combustion Chamber ⑧ Off gas cooler
⑨ Packed-bed scrubber ⑩ Re-heater ⑪ HEPA/Activated Carbon Filter
⑫ Extraction Fan ⑬ Re-heater ⑭ SCR(Selective catalytic reduction) ⑮ Stack
⑯ Plasma torch melter

KEPCO KOREA ELECTRIC POWER CORPORATION

Radioactive Waste Management

- Management Plan
  - A disposal facility for the LILW to start operation in 2008
  - A centralized interim storage facility for spent nuclear fuel to be constructed and operated after 2016
- Management Policy
  - Placing safety and national confidence as top priorities
  - In harmony with local communities based on transparency and reliability

KEPCO KOREA ELECTRIC POWER CORPORATION

International Cooperation

- Collaboration with the IAEA
  - Development of O&M technology
  - Proliferation of a nuclear safety culture
- Promotion of nuclear energy program
  - Training service for developing countries

KEPCO KOREA ELECTRIC POWER CORPORATION

KEDO LWR Project

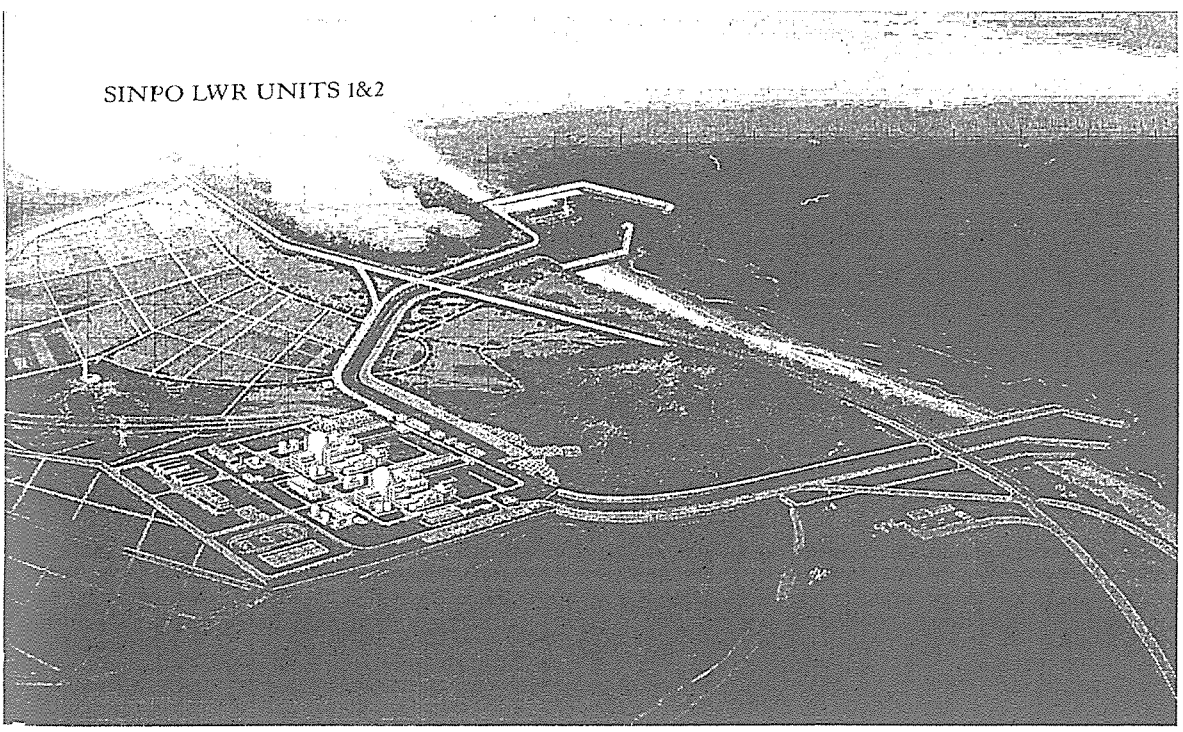
- Chance not just to share technology but also to make history
- KEPCO finally signed a turnkey contract with KEDO on Dec. 15, 1999
  - For formal launch of construction work
- New chapter in south-north cooperation, peaceful coexistence and enhanced economic exchange

KEPCO KOREA ELECTRIC POWER CORPORATION

Signing Ceremony for KEDO LWR Project

KEPCO
KOREA ELECTRIC POWER CORPORATION

A Bird's-Eye View of KEDO LWR Units 1&2



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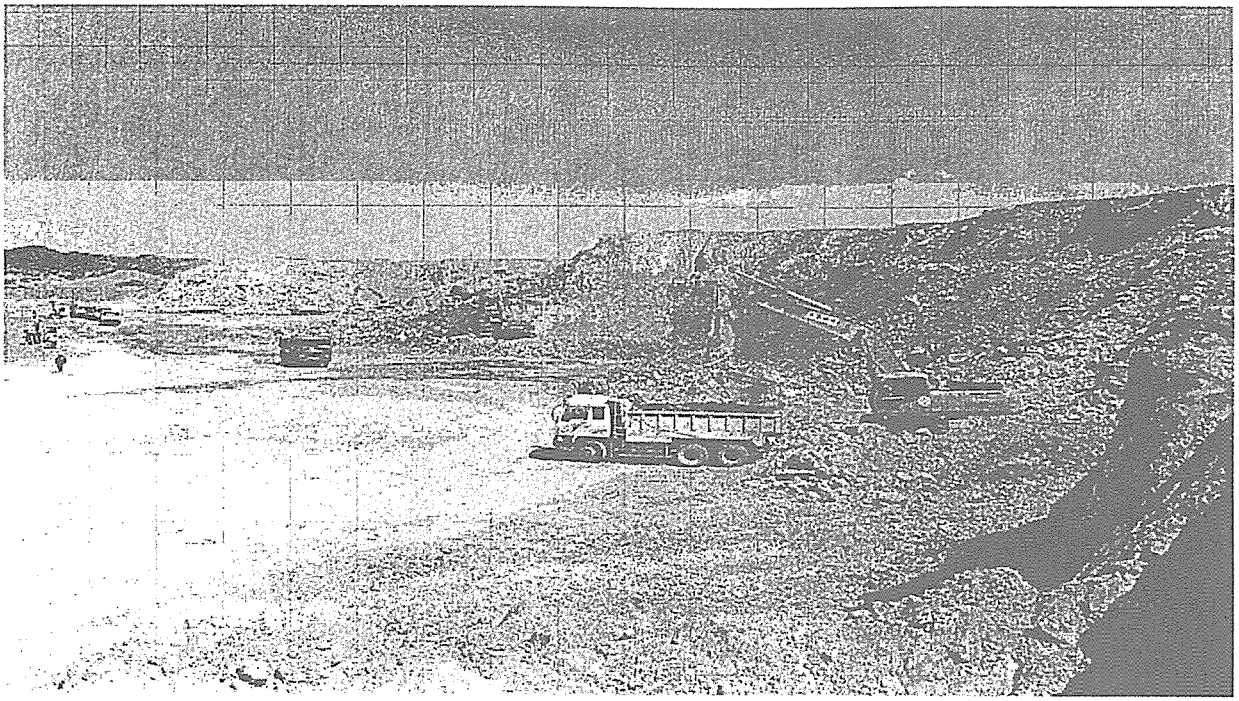
A View of Keumho Site Builded Up



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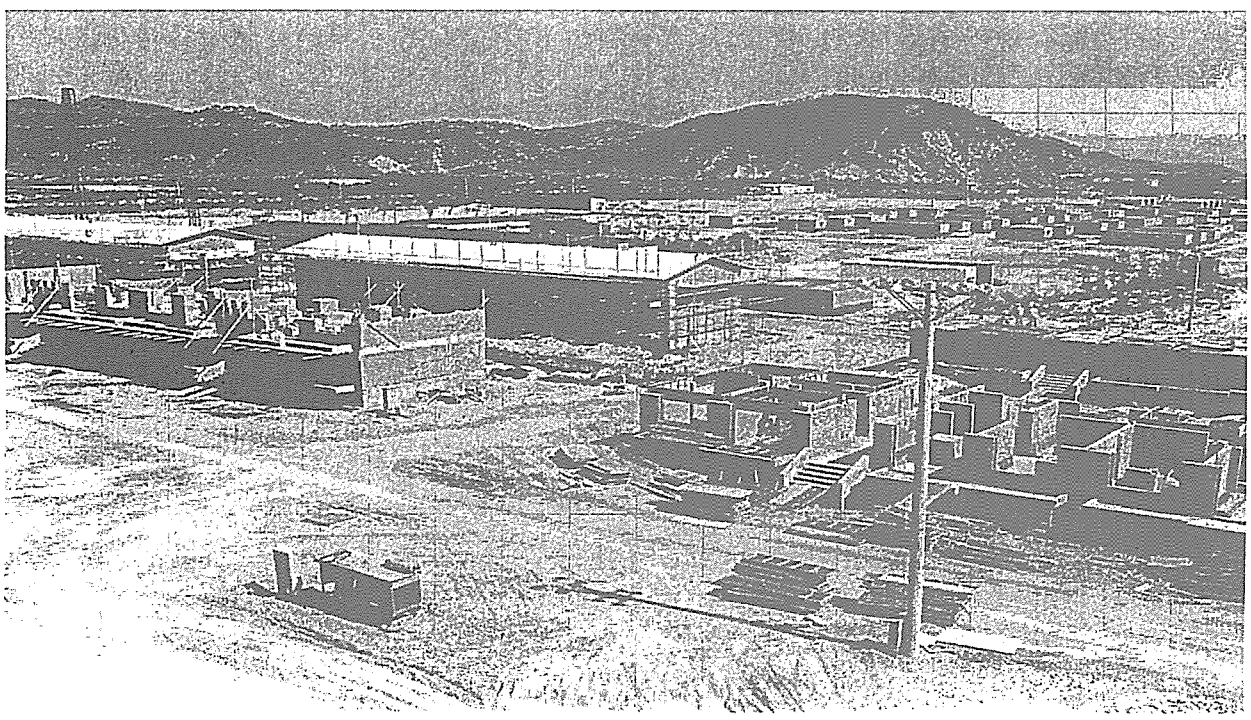
A View of Dormitory Construction



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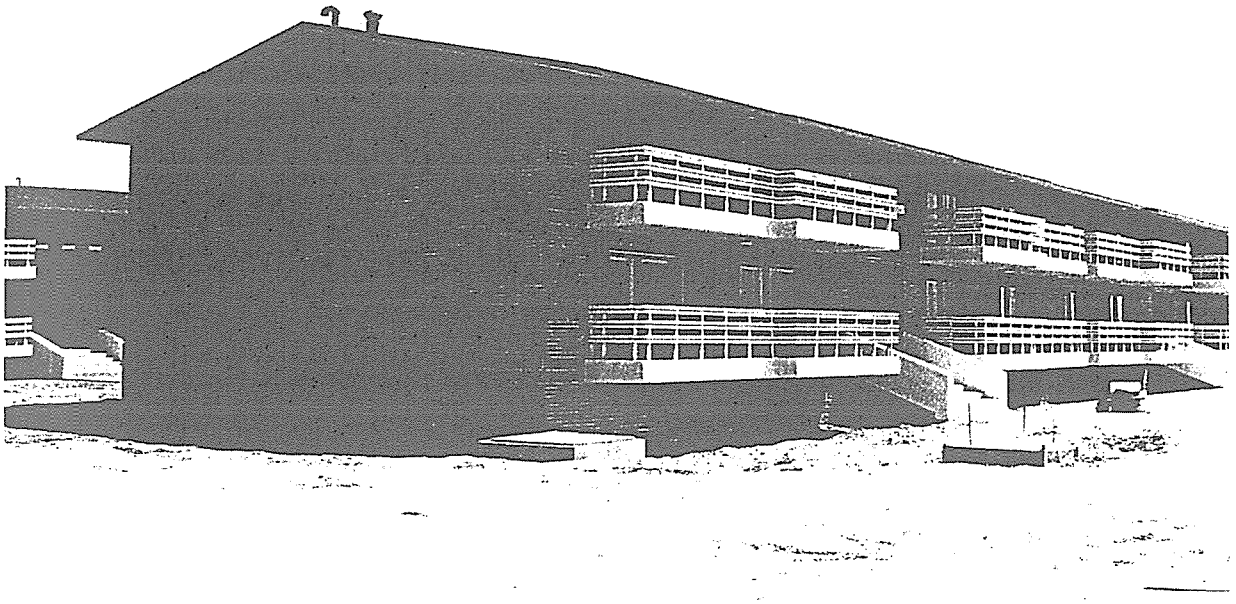
A View of Dormitory on Keumho Site



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Restructuring of Power Industry

- To introduce full-fledged competition in both power generation and distribution
- Privatization process will be continued in stages
  - Power generating sector to be divided into 6 power subsidiaries
  - Nuclear power sector to remain as a public entity for the time being

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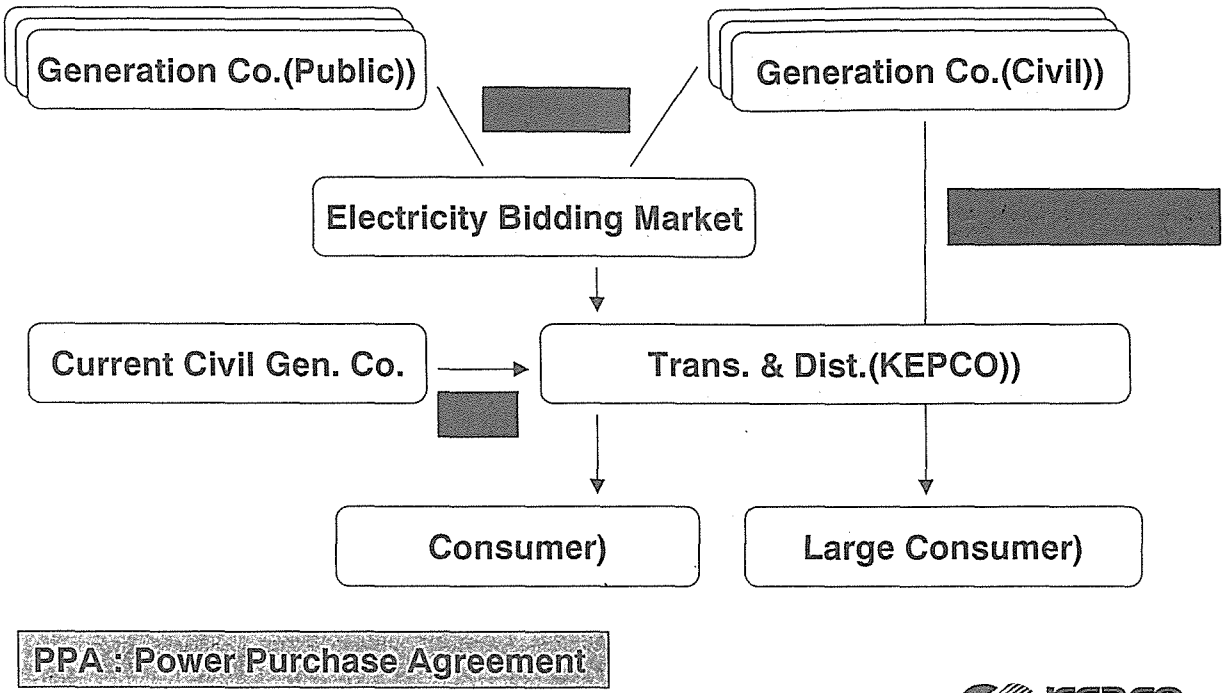
The Phase of Power Generation Competition



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Public Acceptance

- Public understanding, critical factor for the future nuclear development
  - Safety and openness, a common challenge of the nuclear community

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Conclusion

- More competition and deregulation
- A challenge to achieve better plant performance
  - Improved safety and economical efficiency to secure nuclear competitiveness and PA
- Greater emphasis on international cooperation
  - for the further enhancement of operational safety

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Thank you for your kind attention.

どうもありがとうございます

NUCLEAR SAFETY ASSURANCE IN A GLOBALLY CHANGING ENVIRONMENT

Remarks of

DR. RICHARD A. MESERVE
CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION

at the

33rd JAPAN ATOMIC INDUSTRIAL FORUM ANNUAL CONFERENCE

APRIL 26, 2000
TOKYO, JAPAN

INTRODUCTION

Thank you, Mr. Chairman. I am pleased to participate in the annual conference of the Japan Atomic Industrial Forum during my first visit to Japan as Chairman of the U.S. Nuclear Regulatory Commission.

In his letter of invitation, Professor Mukaibo asked me to discuss my perspectives on the assurance of nuclear safety for the future, considering the changing environment for the utility industry around the world and for nuclear power generation. The word "environment" in this context has two possible meanings: first, the operating environment in which utility companies–and regulatory agencies–will find themselves in the 21st century, and second, the global environment in which we live, among increasing concerns about toxic emissions, global warming, and the need for energy technologies that do not contribute to these problems. Both of these interpretations of "environment" are relevant to the issue of the future of nuclear power and the assurance of its safety.

Japan is a particularly appropriate place in which to discuss these matters for two reasons. First, with relatively few domestic resources, this country must carefully weigh the options

available for providing for the current and future energy needs of its people and industries. As the first country to build and operate an Advanced Boiling Water Reactor, Japan is a leader in building a foundation for the future of nuclear power generation. Moreover, Japan has an impressive performance record with its more traditional nuclear plants. Second, the recent tragic events at Tokai-mura have given the world much to consider regarding the subject of nuclear safety assurance. This accident has served to remind us that nuclear technology can be highly dangerous, and we must always be vigilant when we use it. Although the JCO facility was not a nuclear power plant, the repercussions from the accident have had a major impact on nuclear power issues, both in Japan and worldwide.

The international focus of this conference is also appropriate. Nuclear technology is now pervasive throughout the globe. Over 400 nuclear power plants are now operating in more than thirty nations, supplying about one-sixth of the world's electricity. In several countries, nuclear power supplies over 70% of domestic electricity production. New nuclear capacity is planned or is being considered in a range of nations: some with established civil nuclear programs, such as France, Japan and the Republic of Korea; some with mid-size programs, such as India and China; and some that do not currently have nuclear power, such as Turkey, Bangladesh, Vietnam and the Democratic People's Republic of Korea. In the U.S., although new plants are not being built, we have begun to renew plant licenses to permit operation beyond their original 40-year lifetimes. We have heard that up to 85% of our 103 currently-operating plants may ultimately seek license renewal.

Moreover, not only is nuclear technology pervasive, but also the nuclear enterprise in each country is integrally connected with those in other countries. Regulators have frequent interactions on policy matters and leverage research money through joint international activities.

Construction consortia drawn from multiple countries build the plants. And, foreign ownership of plants, while often limited by national laws, is becoming more common.

These developments show we are engaged in a common enterprise and reinforce the demand for even greater attention to the issue of nuclear safety. As we have all experienced, a nuclear accident can have consequences that transcend national borders and, in any event, will affect public attitudes everywhere. If nuclear power is to continue to make a significant contribution to the world's energy supply in the coming century, we–utilities, vendors, researchers, regulators, and policy makers–must all work together to ensure that those who use the technology have safety as their primary goal. Moreover, we must ensure that they have the necessary resources and technical capabilities to achieve that goal.

With that introduction, let me turn to a discussion of the U.S. NRC's approach to nuclear safety assurance, after which I will return to the issue of international cooperation.

THE U.S. NRC'S APPROACH TO NUCLEAR SAFETY ASSURANCE

Under U.S. law, the NRC has the responsibility to protect the health and safety of the public in virtually all aspects of the civilian use of nuclear technology. This includes not only nuclear power plants, but also non-power reactors, nuclear fuel cycle facilities, waste disposal, and the industrial and medical uses of nuclear materials. Although there are only about 40 U.S. companies that own nuclear power plants, the number of licensees in the materials and waste areas is in the thousands. Nonetheless, roughly 65% of the NRC's budget for regulatory activities goes to nuclear reactor safety, and I will focus my remarks primarily on that aspect of our work.

The foundation of the NRC's regulatory philosophy is that our licensees are responsible for the safe use of the technology. Thus, nuclear power plant operators must ensure safe operations. The NRC establishes a regulatory framework; verifies through inspections and other types of reviews that the framework is being followed; ensures that problems that arise are identified and their "root causes" are established, are corrected, and are kept from recurring; and in those instances in which serious violations of our regulations occur, the NRC takes enforcement action to require licensees to focus on significant problems. In rare instances, the Commission may determine that a licensee's operation of a plant does not ensure adequate protection of the public, and order the plant to be shut down until remedial measures are taken.

In the last few years, the NRC has begun a fundamental change in the way in which it regulates. We have established a set of four strategic objectives for our regulatory program: (1) maintain safety; (2) increase effectiveness and efficiency; (3) reduce unnecessary regulatory burden; and (4) increase public confidence. The objective of maintaining safety–rather than increasing safety–reflects a recognition of the established safety record and maturity of the nuclear power industry in the United States. The objectives of increasing efficiency and reducing burden respond directly to the deregulated business environment in which some utilities must now operate, and which we expect will become dominant in the next few years. As for the fourth objective, increasing public confidence, I cannot stress too strongly the need for all of us to communicate effectively with the national and international public about nuclear technology. It is the public that will determine the future for nuclear power.

I would like take a moment now to expand on the context for achievement of these objectives. Deregulation of electricity pricing in many parts of the U.S. means that electricity generators must compete in an open market in which the cost of generation will determine what types of

plants are built and operated. We recognize that our regulations have an economic impact on our power plant licensees–not only because of the costs of regulatory compliance, but also because, under U.S. law, the costs of NRC's operations are largely recovered from our licensees. Because in a deregulated electricity market every form of electricity generation must compete with all others, the costs of regulation come directly from the bottom line. As a result, we make every effort not to impose excessive burdens on licensees.

Coupled with the deregulation of electricity prices has come a significant restructuring of the utility sector of the U.S. economy. In contrast to many countries that have only a few nuclear plant operators or one national utility, we have over 40 companies that operate nuclear power plants. Some of those companies own as many as 10 plants, but many own only 1 or 2. In an environment of price deregulation, many utilities are choosing to sell their generating assets and become distribution companies. This has created an active market in "used" nuclear plants as some smaller utilities get out of the nuclear business, and several plants have already been sold at prices far below their original capital costs. We anticipate that this trend will continue, and the consolidation process will result in a few large nuclear operators, which may be either single companies, partnerships, or operating consortia.

The NRC views these developments with cautious optimism. The companies that are acquiring these plants are generally good performers, and we expect that consolidation will bring their good operating practices into more plants. We must, however, ensure that, as these large operators acquire more plants, they devote adequate resources to fixing any existing problems and that they do not stretch themselves too thin by taking on more facilities than management can handle.

Consideration of our strategic objectives is also causing the NRC to change the ways in which we undertake our mission. In the early 1990s, the Commission determined that the science of quantitative risk assessment had matured sufficiently, and that the underlying database on equipment reliability arising from approximately 2000 reactor-years of operation was sufficiently robust, as to permit the use of probabilistic safety assessment in "risk-informing" our regulations. By "risk-informed," we mean that risk insights are considered, along with more traditional deterministic assessments, in evaluating licensee performance and proposed actions, such as in-service inspection and technical specification changes. We are also making our regulations more "performance-based," so that licensees are given more latitude in how they meet regulatory requirements. These new directions have, for example, been applied in the overhaul of our plant oversight process; we now use objective performance indicators (e.g., number of scrams per year) along with risk-informed inspection techniques to provide a better focus on safety. We believe that these changes directly address the goals of maintaining safety and increasing efficiency and effectiveness, by permitting us to focus on the most risk-significant safety issues. However, I must also point out that this new focus on risk has not affected other aspects of our regulatory philosophy, such as the concept of "defense-in-depth," which is still a fundamental part of the NRC's approach to safety.

The technical bases for accomplishing our new regulatory approach rest largely on the work of our Office of Research. It might have been difficult to foresee in the early 1970s, but the NRC's pioneering work in probabilistic risk assessment–the WASH-1400 study–has ultimately led to our capability to incorporate quantitative risk evaluation into our decision-making processes. Our research program is currently preparing to support new agency work in areas such as mixed-oxide and high-burnup fuels; it is providing the basis for adoption of new technology, such as digital instrumentation and control systems; and it is continuing to provide the

foundation for risk-informed regulation and our new reactor oversight process. The thermal-hydraulics program, which sponsored development of the widely-used RELAP and TRAC computer codes, is using state-of-the-art techniques to develop new analytical tools that will remove excess conservatism from reactor safety analyses while maintaining adequate safety margins.

The fourth of our strategic objectives, to increase public confidence, may be the most challenging task of all. It is essential that our regulatory actions both be fair and be perceived as fair. This does not mean that outcomes of our actions will be completely satisfactory to all interested parties, but rather that those parties must be confident that their concerns have been heard and taken into consideration as the NRC reaches its conclusions. A key to achieving this perception of fairness is to be open and accessible. New initiatives we have undertaken in this connection include establishing a website on the Internet through which the public may get information about our activities, and increasing our interactions at all levels with our "stakeholders"–those with an interest in the NRC's activities–through public meetings, workshops, and other outreach efforts.

As I indicated previously, much of the initial work in implementing these new initiatives has focused on nuclear power reactors. However, we are extending these basic concepts to our materials and waste regulatory activities as well. This is not an easy task, nor a small one. We estimate that it could take as long as 10 years to implement our new regulatory structure fully.

To summarize, we believe that the NRC's efforts to apply our strategic objectives, as perhaps best revealed by our efforts to risk-inform our regulations, will serve to focus our regulatory activities on the issues of highest safety significance. In this way, we expect to meet the

challenge of the changing economic environment for nuclear power in the U.S. and to assure that our licensees maintain a vigilant approach to nuclear safety. At the same time, our approach to regulation should permit the U.S. to retain nuclear power as a part of its energy strategy, thereby helping to meet the challenges associated with reducing greenhouse gas emissions. It is also important to note that many of the activities underpinning our new regulatory approach are international in scope. We could not accomplish our objectives without the participation of our international partners. This leads me to my other major theme: the role of international cooperation in meeting the challenges of the future.

INTERNATIONAL COOPERATION IN NUCLEAR SAFETY ASSURANCE

Whether or not to use nuclear power; the number, size, and location of the plants; and the methods used both by plant operators and regulatory agencies to ensure their safe operation and public protection are matters of sovereign concern. But there is a vital need for international cooperation to ensure that safety is *the* fundamental consideration in the use of nuclear technology. As we have seen many times over the years, an accident involving nuclear power or nuclear materials can have psychological impact far beyond the physical consequences of the event. In some instances, such as the Chornobyl accident, the physical consequences are international as well.

When we speak of international exchange and cooperation, the two organizations that usually come to mind first are the International Atomic Energy Agency and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development. Both of these agencies play crucial roles in fostering the exchange of technical information in areas as diverse as safety, safeguards, materials and waste. However, this is just the beginning of the story. As important

as the programs of the IAEA and the OECD/NEA are in helping to ensure nuclear and radiation safety, the extent and scope of international cooperation go far beyond the activities of these two bodies.

As I mentioned earlier, nuclear power has clearly become an international business in every aspect: design, construction, operation, and regulation. Most of the major nuclear steam supply system vendors are now multinational corporations or have international partners. Of the vendors operating in the U.S., B&W is owned by Framatome, Westinghouse is owned by BNFL, and Combustion Engineering soon will be a BNFL subsidiary, as well. Outside the U.S., Siemens and Framatome have joined their nuclear businesses. There are French plants operating in China, Canadian plants operating in the Republic of Korea, and the ABWRs in Japan are a product of a cooperative venture between Japan's Toshiba and Hitachi and GE Nuclear Energy from the United States. The deregulation of the utility sectors in the U.S. and in other parts of the world has resulted in numerous acquisitions and joint ventures. One of the most prominent partnerships, Amergen, formed by British Energy and the Philadelphia Electric Company, is actively engaged in buying U.S. nuclear plants. We expect these trends to continue.

The nuclear industry has clearly recognized the need for and value of international cooperation and technical information exchange. Organizations such as the World Association of Nuclear Operators (WANO) promote the exchange of information on operating experience to improve nuclear plant operations. The International Nuclear Forum represents international industry interests in such matters as the consideration of nuclear power in contributing to a reduction in greenhouse gases under the Kyoto Protocol. We also see broad international participation in industry organizations based in the U.S. For instance, the Nuclear Procurement Issues

Committee, or NUPIC, originally consisting of representatives from all U.S. nuclear utilities, was formed to promote a coordinated approach on oversight of nuclear vendor quality assurance. NUPIC now includes members from Mexico, Brazil, Spain, Slovenia, and Sweden. The Nuclear Energy Institute, based in Washington, D.C., has developed a substantial international membership including more than a dozen countries and international organizations, and is active in international exchanges and cooperation on many levels.

Information exchange is also fundamental to the mission of the professional societies in the nuclear field. The American Nuclear Society, the European Nuclear Society, the Atomic Energy Society of Japan, and many other such groups hold numerous international conferences every year covering virtually every aspect of nuclear technology. They promote free and open discussion of research, operational experiences, emerging technical and safety issues, development of new technologies, and other related topics. I should note that these professional conferences are often cosponsored by other organizations, including the IAEA, OECD/NEA, national regulatory agencies, and commercial research and development establishments, which increases their value to the international audience.

In a similar fashion, nuclear regulation has become international in scope. Cooperation between the national regulatory agencies has grown, and it is imperative that this type of cooperation continue and expand. For countries with mature nuclear programs, exchanging information on operating experiences and regulatory issues and approaches helps to promote good safety practices and to discourage poor ones. Information on emerging safety issues with regard to a particular reactor type or design may be relevant to reactors in many different countries, as well. Even more important, perhaps, is international cooperation involving countries with small programs, those considering acquiring nuclear plants for the first time, or

those with relatively weak or inexperienced regulatory organizations. For these countries, international cooperation can help develop the regulatory infrastructure and strong safety culture that are essential to assuring safe plant operation.

An umbrella of international legal instruments provides the basis for this cooperative activity. I will name just a few of the multitude of agreements which undergird nuclear use and commerce: The Nuclear Non-Proliferation Treaty balances forbearance on acquiring or using nuclear weapons with promotion of the peaceful uses of nuclear energy. The Convention on Physical Protection of Nuclear Material establishes basic criteria for safeguarding materials. The three most recently negotiated conventions, on Nuclear Safety, on Liability, and the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management create guidelines for safe regulation and use of nuclear power. Each of these instruments reflects the recognition that, although having nuclear power is a sovereign decision, there are legitimate transnational interests in the technology being used in as safe and responsible a manner as possible.

I am firmly committed to continuing the U.S. NRC's role in international cooperative exchanges at all levels. NRC staff members participate in international conferences, such as the professional society meetings that I previously mentioned, and on many international working groups, such as those organized by the IAEA and OECD/NEA. On the Commission level, my fellow Commissioners and I have met with many of our counterparts around the world to discuss perspectives on nuclear regulation and ways in which to promote adherence to the highest degree of safety assurance. The NRC's Office of International Programs coordinates technical information exchange agreements with 34 other nations. One of the most valuable methods for sharing information and experiences is through the assignment of staff to other

organizations, and the NRC is proud to have hosted regulatory staff from many other countries who work at the NRC for periods ranging from a few weeks to many months. We have also sent our regulatory staff to other countries, both to provide assistance in building and improving regulatory infrastructure, and to learn from the valuable experiences of our international colleagues. NRC staff have also been key members of U.S. delegations negotiating the instruments composing the international nuclear legal regime.

One other subject in the area of international cooperation deserves special attention: the role of international cooperative research programs. As I mentioned earlier, the contributions of our international research partners are essential to the vitality of the NRC's research program. Another aspect of our changing environment–particularly in the United States–is the tightening of the NRC's budget, in general, and of the research budget in particular. In my meetings with representatives from many other countries I have heard that this is the situation almost everywhere. However, the need for research continues: to provide the technical foundation for new regulatory initiatives, such as risk-informed regulation; to position nuclear safety regulators to deal with new technology and new industry initiatives; to develop state-of-the-art analytical tools; and to respond to emerging technical and safety issues as our operating reactors grow older.

The NRC currently maintains 45 bilateral or multilateral cooperative research with more than 25 other countries, and thereby is able to greatly increase the value of the research in which we participate. While I could not possibly list all of the international cooperative programs in which the NRC takes part, some of the more prominent ones include the Halden project in Norway, the Cabri program in France, severe accident-related testing at the Kurchatov Institute in Russia, and the Surtsey program that was conducted in the U.S. I must also mention our very

valuable collaboration with the Japan Atomic Energy Research Institute. We have conducted several joint programs with JAERI over the years. One example is the AP600 confirmatory testing program conducted in the ROSA-Large Scale Test Facility at JAERI's Tokai laboratory. This extensive series of tests, simulating design-basis accidents and transients, as well as multiple-failure scenarios, provided valuable data for the validation of the NRC's thermal-hydraulic analysis codes, and provided the NRC staff with insights into the way in which the AP600's unique passive safety systems would behave during such events. Another program of note is the ongoing testing program on high-burnup fuel in JAERI's Nuclear Safety Research Reactor. I will be visiting JAERI tomorrow, and am looking forward to seeing these facilities–tangible evidence of the tremendous value of international cooperation.

While I have again focused in this portion of my talk on the issue of nuclear power plant safety assurance, I must add that our concerns regarding the safe use of nuclear technology extend beyond nuclear power plants and supporting facilities, such as fuel fabrication plants and waste disposal sites. The use of nuclear materials and sources in industrial and medical applications is growing rapidly, and we have seen the tragic consequences that can occur when these materials are not properly controlled and handled, as was recently the case in Thailand. These types of events can also have international repercussions, as for instance when radioactive material is accidentally incorporated into finished metal products, which are then exported to other countries. International cooperation in dealing with materials and waste issues is also essential to ensure that radioactive materials are handled in a manner that protects worker safety, public safety, and the environment. We must all make our best efforts, both individually and in collaboration, to ensure that these objectives are achieved.

SUMMARY AND CONCLUSIONS

I have tried in these remarks to give you an appreciation for the NRC's perspectives–and my own–on the issue of nuclear safety assurance as we move into the 21st century. In my view, the assurance of safety is our foremost obligation. I hope that you share this view, and that your members, and the nuclear industry worldwide, will redouble efforts to enhance nuclear safety in the coming years.

Thank you.

Nuclear Power Development in China and China National Nuclear Corporation

LI Zhongliang

Vice President

China National Nuclear Corporation

The 33th JAIF Annual Conference
April 26, 2000
Tokyo, Japan

Nuclear Power Development in China and China National Nuclear Corporation

LI Zhongliang

Vice President of China National Nuclear Corporation

The 33th JAIF Annual Conference
Tokyo, Japan
April 26, 2000

Dear Chairman,
Ladies and Gentlemen:

I appreciate the Conference providing me with this exchange opportunity, and I am very glad to present myself here with so many old acquaintances and new friends. Now, I would like to make a brief introduction to the status quo and perspective of the nuclear power development in China, and the principal attitude and thinking of China National Nuclear Corporation in this regard.

I. The Necessity for China to Continue the Development of Nuclear Power

The current demand on electricity in China has been alleviated for the time being. However, from the long-term point of view, nuclear power development is indispensable to energy supply to achieve the 3rd stage objectives of our national economy development raised by Mr. DENG Xiaoping, i.e. to achieve modernization in the main with GDP coming up to the level of medium developed countries by the middle of the 21st century. China's total power generation ranks second in the world. But the per capita power consumption level of about 0.2 kW in China is still pretty low, which is far behind the per capita level of 1 kW in the medium-developed countries. This contradiction between supply and demand decides for sustained development of power industry. Otherwise, the demand for sustainable development of national economy and improvement of people's living standards will be by no means fulfilled.

The optimization of power structure is raised inexorably for the power development. The current power composition in China takes the thermo-power as the dominant

(81.5%), with the hydropower sharing 17.2%, and the nuclear power sharing only 1.3%. The Chinese government has provided the guiding principle of "optimizing thermo-power structure, devoting major efforts to hydro-power, and developing nuclear power appropriately" for the power development. That is to say, there is still need to develop nuclear power on a moderate scale. Especially in the southeastern coastal areas which are densely populated with rapid economic growth and scarce energy resources, further development of nuclear power will be absolutely a wise option to ease the pressure on transportation and environmental protection. It is not only the need of economic development, but also that of rational energy mix. For this reason, the NPPs in operation, under construction and planned in China's mainland are, at present, all located at the southeastern coastal areas.

II. The Status Quo of Nuclear Power Development in China

There are presently 2 NPPs in operation in China's mainland, and 8 more units in 4 NPPs under construction.

1. NPPs in Operation

- Qinshan NPP

Qinshan NPP is located on the Hangzhou Bay, 120 kms southwest of Shanghai. It is China's first self-designed, -constructed and -operated NPP installed with one 300MW PWR unit. Since the commercial operation in 1994, the NPP has been in good operation. The availability factors before 1998 were all around 80%. The NPP had experienced an overhaul for over 1 year since the later half of 1998, and restored its normal operation on September 19, 1999.

- Daya Bay NPP

Daya Bay NPP is located on the Daya Bay, 65 kms east of Shenzhen. It consists of 2 ×900 MW PWR units imported from France, being put into commercial operation in February and May in 1994, respectively. The availability factors of both units are all above 80% in recent years. In the "Challenge Contest" hosted by EDF in 1999, these 2 units won the championship with a record of accumulative safe operation over 800 days without unplanned shutdown.

Over the past few years, we have nurtured a group of qualified management and technical personnel in NPP construction and operation through the practice of operating these 2 NPPs, accumulating valuable experiences and learning beneficial lessons.

2. Four NPPs under construction

The 4 NPPs that the Chinese government decided to build during the "Ninth Five-

year Plan" (1996~2000) have all commenced construction as scheduled. They include: Qinshan NPP Phase II and Phase III, Guangdong Ling' ao NPP, and Tianwan NPP, totally 8 units with an installed capacity of 6600MW.

The site for Qinshan NPP Phase II is located at Yangliushan, 3 kms south of Qinshan NPP Phase I. It consists of two self-designed and -constructed 600 MW PWR units, with partial equipment imported from overseas. The project saw the first pouring of concrete on June 2, 1996, with unit 1 to be connected to grid in 2002.

Guangdong Ling' ao NPP is 1 km northeast of Daya Bay NPP, consisting of 2× 1000 MW PWR units with the design and equipment both provided by France. The reactor building witnessed the first pouring of concrete on May 15, 1997, and the project is well underway with the scheduled completion and operation in 2003.

Qinshan NPP Phase III is located at Tanglangshan, 800 meters east of Qinshan NPP Phase I, consisting of 2×700 MW CANDU-6 PHWR units. The project is provided with export credit and commercial financing by Canada, and contracted by AECL in turnkey mode. The first concrete was poured for the reactor building in June, 1998, and the NPP is expected to be completed and put into operation in 2003.

Tianwan NPP is located at Lianyungang, 300 kms north of Shanghai, consisting of two advanced VVER-1000 PWR units introduced from Russia, with an installed capacity of 2×1000 MW. The project design and the major equipment of the nuclear and conventional islands are supplied by Russian side, and partial equipment are purchased from the 3rd party, including the wholly-digital I&C system supplied by German Siemens. The Chinese side takes the responsibility for civil engineering, installation and project management. Part of the project construction funds are coming from the government loans provided by Russian side, and the remaining are raised internally by Chinese side, with the utilization of some foreign export credit and commercial loans. The construction of the project commenced on October 20, 1999, with Unit 1 to be completed and operated in 2004.

III. CNNC' s Principal Attitude and Thinking to the Nuclear Power Development

The present China National Nuclear (Group) Corporation (CNNC) grew out of the former China National Nuclear Corporation upon the approval of the State Council on July 1, 1999. The CNNC is a key conglomerate in the country, mainly involving in the R&D, construction, production and management in nuclear and related fields covering nuclear power, nuclear materials, etc. That is to say, the central government still sets the nuclear power development as the major business of the CNNC.

Except that the governmental functions were transferred, the new CNNC plays the same role as the former CNNC in the nuclear power development:

(1) The CNNC is an owner investing in nuclear power. The CNNC enjoys the sole

proprietorship in Qinshan NPP Phase I (100%); acts as the holding company in Qinshan NPP Phase II (50%), Qinshan Phase III (51%) and Tianwan NPP (50%); and joins as a major stockholder (45%) in the Daya Bay and Ling' ao NPPs.

(2) The CNNC is a supplier. The CNNC undertakes the NPP design, the exclusive management of nuclear fuel assemblies, the supply of certain nuclear equipment and instruments, and various technical services.

(3) The CNNC is a R&D organization on nuclear power. The CNNC undertakes the R&D on related advanced technologies and advanced reactor types.

The leading business of the CNNC is nuclear power. We are therefore expecting more and earlier establishment of new nuclear power projects. That is where the CNNC' s interests lie. But it is the relevant governmental departments who decide when, where, how and how many the follow-up projects are commenced. The CNNC enjoys the right to make suggestions. It ought to say that our suggestion is of great significance to the government' s decision.

At present, the Chinese government is drawing out the short-term plan, and the mid- and long-term programs for the energy development in China. It could be expected that the nuclear power in China should see development in appropriate scale during the 1st decade of the next century. From the long-term point of view, it will achieve further development. Summing up the past experiences, we must take the following factors into consideration:

1. Adopting the approach of localization and standardization

Although the nuclear power cause in China has made significant achievements over a dozen of years, there are still some problems. Among them, the prominent one is that different financing parties brings about the diversification of reactor types, ranging from the LWR to PHWR, with the LWR types including China' s self-designed 300 MW & 600 MW units, and the 1000 MW units introduced from France and Russia. Different reactor types call for different fuel element production lines, which give rise to inconvenience as in management and technology. If things go on like this, it will definitely influence the development of nuclear power in China. However, in some sense we could accumulate experience and foster personnel in nuclear power construction.

In order to cut down the nuclear power construction costs, shorten the construction period, and ensure the sustainable development of nuclear power, China has no choice but to adopt the approach of localization and standardization, and to be geared towards new development of nuclear power cause in the 21st century.

2. Making full use of the existing technical basis in China

Twenty years of unremitting efforts brought us 2 as-built NPPs, 8 more units under

construction, and one 300 MW unit exported to a neighboring country in turnkey mode. We have now fundamentally developed a contingent of well-qualified management and technical personnel involving in nuclear power design, research, construction and operation, and a complete PWR nuclear fuel cycle system as well. These are the foundation and motive force for the sustained development of nuclear power, and we will make full use of the existing technical basis to meet the new challenge of nuclear power cause.

3. Adopting advanced and mature nuclear power technology

The safety and economy of nuclear power is of vital importance to its existence and development in China. The advancedness and maturity of nuclear power technology is ultimately a question of harmonious balance between the objectives of safety and economy. Under the prerequisite of serving customers' needs, ample feasibility shall be ensured during the project implementation.

In order to make full use of the existing technical basis, we have determined to take PWR as the dominant technical route. In the long run, we would not say no to other nuclear power technologies with obvious advantages on safety, advancedness and economy.

With the support of the Ministry of Science and Technology, China is carrying out R&D on fast reactor and high-temperature gas-cooled reactor (HTGR).

- Fast reactor

Fast reactor is the type of breeder reactor with a closed fuel cycle, which could considerably raise the availability of uranium. It is of great importance for the full utilization of uranium resources and the peaceful uses of nuclear energy. Therefore, under the frame of the national "High-Tech" program, the project was established in 1987 to construct a 65 MWt thermal power experimental fast reactor (CEFR).

The conceptual design of CEFR was finished in 1992, and the preliminary design was approved by the former State Science and Technology Commission in 1997. The initial safety analysis report and environmental impact assessment report are now being reviewed by the National Nuclear Safety Administration and the China State Environmental Protection Administration, which are expected to be approved in May 2000 when a construction permit will be issued. At present, the preparations for availability of water, electricity, road, communications, and leveling of ground have been accomplished at the site of CEFR in China Institute of Atomic Energy. The first concrete is to be poured in May 2000, which marks the commencement of construction. The CEFR is expected to reach criticality in 2005.

- High-temperature gas-cooled reactor (HTGR)

China's first 10MW HTGR designed and constructed by Tsinghua University was

formally started in June 1995. The reactor building was domed by the end of 1997. The pressure vessels of reactor, steam generator, heat-removal loop were hoisted into the reactor by the end of 1998. The reactor core was installed by the end of 1999. It is planned to finish all the installation and start commissioning of sub-systems in the first half of this year, and strive to reach criticality by the end of the year. Through the construction of the 10MW HTGR, we have had a good command on the complete design techniques ranging from physics, thermohydraulics, mechanics, developed and tested the key equipment such as helium blower, fuel handling system, control rod driving system, realized the localization of major equipment like pressure vessel, core vessel, steam generator, and graphite component, carried out R&D on digital protection system and advanced control system, set up the unique one ball-type HTGR fuel element production line in the world, and initially formed the independent intellectual property right on HTGR.Like other technologies, the nuclear power technology is also experiencing steady perfection, improvement and innovation, and seeing a continuous deepening of public awareness. We have been paying close attention to the development trend of foreign nuclear power technologies, especially the successful experience of Japan deserving drawing upon. We are also showing great concerns over the latest tendency of advanced nuclear power technologies in Europe and USA, e.g. EPR, APWR, ABWR, SYSTEM 80+ and AP 600.

Therefore, what deserves cautious deliberation in our future nuclear power development program is to select an appropriate and feasible technology in accordance with the requirements of localization and standardization, and on the basis of existing technologies.

Taking the domestic exiting technical basis and the international tendency into full consideration, the CNNC has set the CNP-1000 unit (a 1000MW-scale unit with 300MW capacity for each of the three loops) as the first choice recommended to our government and the owners. This design has seen remarkable improvement on safety and economy, with better integration of advancedness, maturity, economy and practicability. Through the construction in small lots before 2005, localization of 1000 MW PWR NPP could be realized on our own.

4. Mainly relying on our own while pursuing Sino-foreign co-operation

The reform and opening policy being pursued in China is certainly applicable to the nuclear power construction. Actually, the successful nuclear power cause in China has benefited considerably from the reform and opening policy. Qinshan NPP is China' s first self-designed and -constructed NPP, with partial major equipment imported from overseas. Daya Bay NPP was designed and constructed by French companies, with the whole equipment imported from overseas. In recent years, we have carried out various co-operations with foreign companies in the nuclear power construction, and achieved good results.

Thanks to almost 20 years of unremitting efforts, we have possessed certain

capabilities on the nuclear power industry, but still fall a certain distance behind the world advanced level. We will, as always, follow the guiding principle of " Mainly relying on our own while pursuing Sino-foreign co-operation" , and continuously call for and welcome international co-operative partners. We will take full advantages of the existing basis of self-reliance in design and localization of equipment, draw support from foreign counterparts, and be endeavored to keep abreast with the international level. Therefore, the following aspects shall be taken into consideration when selecting co-operative partners:

(1) Compatibility with the existing domestic foundation in addition to the advancedness and maturity;

(2) Economicalness — favorable price;

(3) Co-operative attitude — assisting China to realize localization of nuclear power in real earnesty.

In summary, China' s nuclear power is one member of the international nuclear power community. We should learn from, support, share our strength with each other, and make common progress. We could make the nuclear power a public-accepted clean, safe and economical energy source through joint efforts, and turn it into a part of the long-lasting energy mix for sustainable development. As far as I can see, all peers present here know well of the status quo of nuclear power in China owing to years of international exchange. We are sincerely and genuinely expecting your outspoken and penetrating views to facilitate us to better our NPP construction from 2000 hereafter.

Thank you!

Erlangen, 2000-04-22
KWU NV, B. Kalthoff

Contribution to the Panel Discussions of the JAIF, Tokyo:

Continuing Reorganization of Nuclear Power Industry Outside of Japan: Europe

Despite political obstructions, total output from nuclear power plants in Europe rose by about 3 % last year, which means that Nuclear Energy provided about 35 % of the European Union's electricity demand. This is as low as 4 % in the Netherlands with its one single Borssele nuclear plant, or as high as 75 % in France with its most ambitious nuclear programme in Europe and 58 operating nuclear power plants at present.

Thus Nuclear represents more than a third of the European Community's energy mix for its electricity production capacity and contributes significantly to Europe's economic growth.
Phasing out Nuclear would mean increasing fossil fuel dependency and consequently increasing energy import dependency with their economical and political risks.
In addition to imported oil and coal, the dependency on natural gas is estimated to rise from 40 % at present to nearly 70 % in 2020, endangering security of supply at stable economic conditions.

But Nuclear should not only be considered as an economic stabilizing factor in the European Community's energy mix, the most beneficial impact of nuclear energy is Zero-emission.
The European Union's nuclear reactors reduce the pollution by 800 millions tons of CO_2 each year.

If the European Union takes its Kyoto commitment of 8 % CO_2 reduction by 2008-2012 from the 1990 level seriously, all environmentally friendly forms of energy production should be favoured, in particular nuclear power production with its recognized high safety standards. The European Union's present scenario anticipates, however, an increase of 8 % CO_2 emission by 2020, due to the increased use of coal, gas and the shut-down of older nuclear reactors.

The anticipated decrease of the nuclear share by 2020 is only partly due to the present anti-nuclear political climate. The liberalization of the European Electricity Market has created a highly competitive environment where Nuclear has to compete with gas, oil, coal and also with regenerative energy sources i.e. hydropower, solar, wind energy, etc.
Highly competitive markets have the tendency to favour short investment cycles, which have an adverse effect on investment in nuclear power stations, even if their long-term generation costs are equal or below short term costs from combined-cycle gas-fired stations. However, if all the costs of the power generation technologies are taken into account, including the environmental and socio/economic impact, Nuclear Energy proves to be the most economic form of electricity generation in the long run, as shown by a joint study of the European Commission and the US Department of Energy.

Despite Nuclear's safe, clean and favourable long-term economics, the "short-termism" caused by the liberalization of the electricity market does not attract investors for new nuclear power plant

generation capacity.
On the other hand, existing nuclear power plants, especially those which have already recovered their investment, produce electricity at marginal cost and are highly competitive. Their reliability and availability are crucial points for competitivity in the liberalized electricity market.

The utilities still see room for improvement in efficiency of operation through maintenance, modernization, uprating and life extension without compromising on safety, thus delivering the KWh at a cost level which can compete easily with any other form of electricity generation. Apart from their own in-house efforts, utilities rely on the skills of the highly developed European Nuclear Industry.

Siemens/KWU has accumulated vast experience as a turn-key reactor supplier for both types of light water reactors, BWR and PWR, as well as heavy water reactors and research reactors. Our total competence is based on the 5 columns of our business:

- **Modernization and Upgrades**, in comprehensive refurbishing projects for extended economical operation at state of the art safety standards.
- **Integrated Services and Maintenance** as an optimized approach to shorter outages.
- **Instrumentation & Control and Electrical Systems** for maximum safety and reliability i.e. the digital I&C systems TELEPERM XP/XS.

- **Nuclear Fuel** for all types of Light Water Reactors and associated services.

- **New Reactor Designs**, the large European Pressurized Water Reactor (EPR 1500 to 1800 MWe) and the mid-size boiling water reactor (SWR 1000) with a new passive safety system concept.

This accumulated know-how allows us to offer full support to our customers for services, maintenance, backfitting or major modernizing projects such as the Dutch Borssele plant, a 24 year old 480 MWe PWR which has been brought to the current state of the art by means of a perfectly planned 5 months backfitting project, involving up to 1500 people on site around the clock, seven days a week.

These kinds of complex, multi-discipline refurbishing projects, together with standard and specialized servicing and maintenance work, support not only a reasonable business volume of the nuclear industry but also maintain our engineering know-how. In order to maintain and enhance this know-how, find innovative and cost efficient solutions, a partnership will be established to provide a broader basis and synergies for further development.

In December 1999 Siemens and Framatome announced their intention to join their nuclear activities.

Siemens with it's background as turn-key reactor supplier, has the expertise to offer comprehensive and customer tailored solutions for the maintenance, modernization and fuelling of both Boiling and Pressurized Light Water Reactors.

Framatome benefits from the experience of the biggest national nuclear program in Europe based on a fully developed nuclear support industry including the complete nuclear fuel cycle.
Both together, Framtaome and Siemens have some 1100 years operating experience in France and Germany and have expanded their business to the US, South America, South Africa and Asia, as well as the Eastern European Countries.

Framatome and Siemens have not only worked together for the last 10 years in developing the European Pressurized Water Reactor (EPR), but also teamed up for major projects all over Europe such as steam generator replacements. They also combined their expertise to upgrade Russian designed nuclear power plants to western safety standards – like the two units of the Mochovce and Bohunice plants in Slovakia and we have joined forces for Kozloduj 5 and 6 in Bulgaria.

The merger of Framatome's and Siemens's nuclear activities will combine the expertise of the two leading European companies and extend their existing cooperation in the development of the EPR to the total field of nuclear capabilities including the nuclear fuel cycle.

This merger will benefit the customers and more generally the public as a whole.

The Joint Venture will

- increase the competitive strength of its products and services

- ensure overall plant expertise by maintaining – on account of a broader personnel basis – the manpower required for the conservation and extension of know-how.
- provide integrated technical know-how through utilization of Framatome's and Siemens' joint experience for the operation of nuclear power plants.
- enlarge the scope of supply through the integration of complementary products and services, e.g. in the nuclear fuel cycle sector.

Our customers are the foundation of our business. We are confident that the Joint Venture will serve the nuclear electricity production worldwide by providing improved products and services, safely and economically.

I shall be pleased to answer any questions.

Thank you for your attention.

Nuclear Power Generation in EU countries 1999

Country	1999 Production (TWh)	1999 Nuclear share (%)
Netherlands	3	4
UK	91	29
Spain	56	31
Germany	161	31
Finland	22	33
Sweden	70	47
Belgium	47	58
France	375	75
Total	825	

Source: International Atomic Energy Agency (IAEA)

Costs in total for Power Generation (in Euro cents/kWh)

Technology	External Cost	Operational, Fuel, Financing Costs	Total
Coal	2.0	5.0	7.0
Oil	1.6	4.5	6.0
Gas	0.36	3.5	3.9
Wind	0.22	6.0	6.2
Hydro	0.22	4.5	4.7
Nuclear	0.04	3.5	3.5

Source:
Foratom Bulletin nº 62

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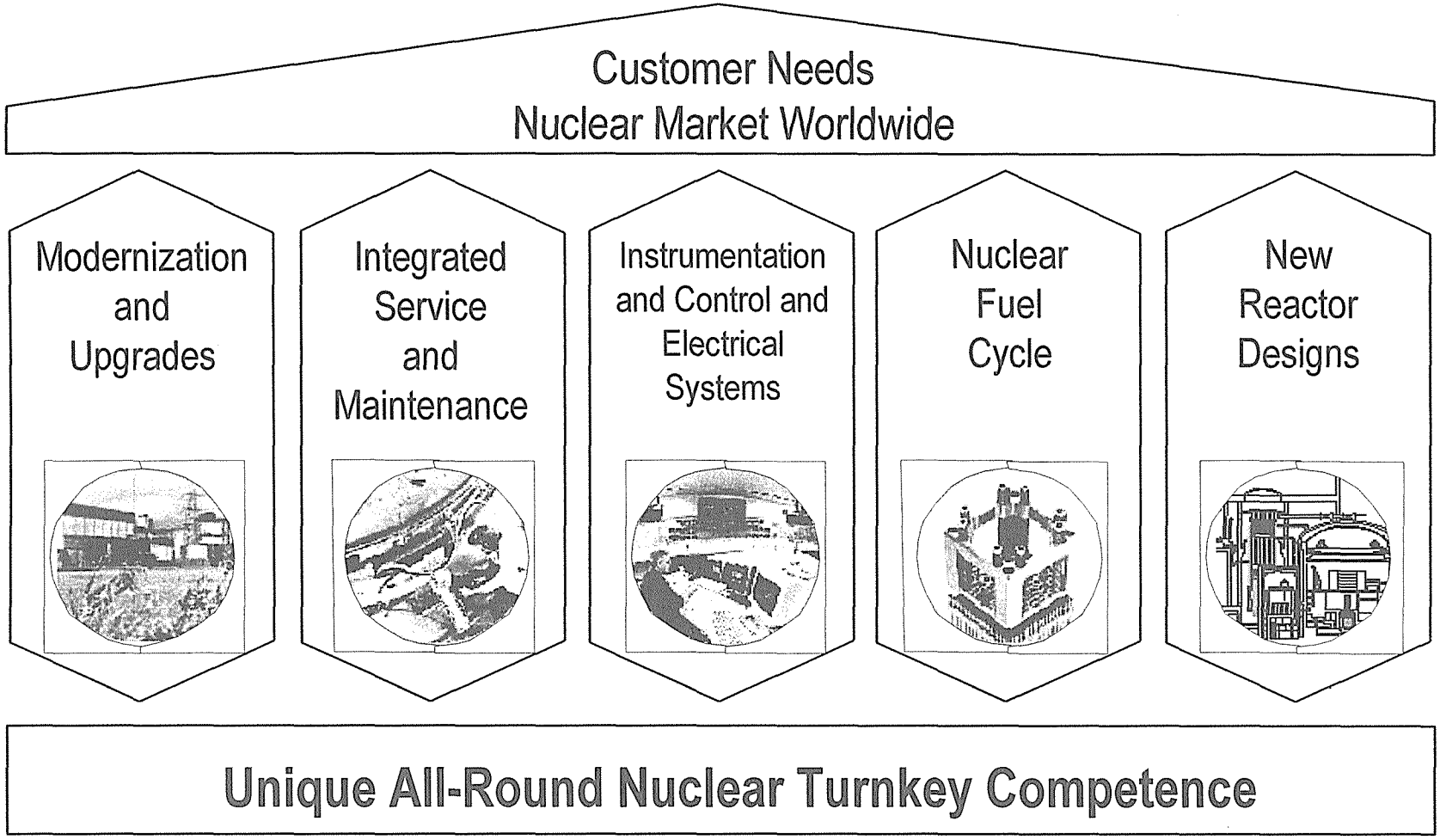
Power for Generations



日本の原子力産業の現状

社団法人日本電機工業会　原子力政策委員長
株式会社　日立製作所　　副社長　川村　隆

１．原子力発電の現状

我が国の原子力発電は１９９８年度実績で全需要電力量の３６．８％を供給し、全エネルギー供給量の約１４％を占めるに至っている。原子力は我が国のエネルギーの安定供給及び炭酸ガス排出量の削減に貢献するなど、我が国のエネルギー供給の機軸として重要な役割を担っている。

我が国の１９９８年度から２００９年度までの需要電力量は至近の景気動向及び更なる省エネ効果を織り込んでも、年平均伸び率は経済成長率とほぼ同水準の１．８％と想定されており、電源の多様化と非化石エネルギーの中核として原子力は引き続き推進されるものと予想される。本年３月通産省で取り纏められた「平成１２年度電力供給計画の概要」によると今後１０年間で１０基１２６２．９万ｋＷが運転開始し、２００９年度末において合計出力が５７５５万ｋＷと計画されている。（２０１０年度末までに１３基運転開始）　本年度には８基１０８７万ｋＷが電源開発調整審議会に上程される予定である。

プラントサービスの分野でも、現在、日本ではＢＷＲ２８基、ＰＷＲ２３基の合計５１基の商業用原子力発電所が運転され、合計出力は４４９１．７万ｋＷに及んでおり、アメリカ、フランスに次いで３番目の規模である。また、運転開始後２０年間以上のプラントが２０基あり、今後プラントの予防保全・長寿命化が注目される。

２．原子力供給産業界の対応

（１）安全性の確保と信頼性の醸成

経営トップから実務者まで安全を最優先させる風土を醸成させる必要がある。組織内部での安全性確保に対する取り組み、及び、第三者機関による評価・監査の導入に加え、ＪＣＯ事故以降、原子力産業界は安全行動指針を定めると共に、「ニュークリアセイフティーネットワーク」、「世界核燃料加工安全ネットワーク」を設立し活動している。

（２）軽水炉における技術開発

軽水炉時代の長期化に備え、軽水炉の経済性・信頼性の更なる向上を図っている。安全性・信頼性と経済性の向上を目的にＡＢＷＲ、ＡＰＷＲの改良標準化プラントを構築し、更にプルトニウムの有効利用を図るべくプルサーマル炉を推進してきた。次世代炉として、１５０万ｋＷを超える大型炉と中小型炉の開発を進めている。また、ウラン資源節約の観点から高転換軽水炉の可能性についても検討している。

（３）核燃料サイクルの開発

我が国は準国産エネルギー確保の観点から燃料リサイクルの政策を採っている。ウラン濃縮では青森県六ヶ所村に１０５０tSWU／年の日本原燃株式会社ウラン濃縮工場が稼動しており、更に、４５０tSWU／年の設備の建設が計画されている。再処理では、同じく六ヶ所村に、８００t－U／年の処理能力を持つ日本原燃株式会社再処理工場が２００５年試運転完了を目処に、建設中である。一方、高速炉については核燃料サイクル開発機構の実験炉「常陽」が１９７７年初臨界以来、順調に運転している。原型炉「もんじゅ」は１９９５年のナトリウム漏洩事故以来、停止しているが、地元の了解を得た上での早期の運転再開に備えている。高速炉の商用化については経済的なプラント概念の構築を目指した検討が進められている。

原子力プラントメーカは、これらの研究開発、プラント及び設備の設計・建設に参画しており、引き続き、国及び電気事業者の方針に則り取り組みを進める所存である。

（４）国際展開

アジアでのエネルギー消費量増大で原子力への期待が高まっている。アジアのエネルギー安定供給と環境問題の解決に貢献するため、日本の国際協力と輸出の推進を一層図る必要があると考えている。中国においてＧＥ／日立／東芝で国際ジョイントベンチャーを組み、中国へのＡＢＷＲのＰＲを行っていることや、日立は大連に中国との合弁会社を作り、秦山Ⅲ期のＣＡＮＤＵ炉の機器を製作・納入していることなどが、国際展開の一例として上げられる。

イギリス・フランスを中心として原子力産業界の国際的な再編が進んでいる。我が国においても、原子力発電所の立地難、電力需要の伸びの鈍化によって、従来計画していた原子力発電所建設計画をスローダウンせざるを得ない状況になっている。また、電力市場の自由化によって、原子力産業についても経済性の向上が緊急の課題である。今年の１月、ＧＥ，日立、東芝は、共同出資で設立した燃料製造会社の業務範囲を販売、計画・設計を含む燃料ビジネス全体に拡大しGlobal Nuclear Fuelとして再発足させた。このような、国際的な連携も広い意味では再編といえる。

我が国では、電力の安定供給と地球温暖化対策上原子力発電所の建設は必要とされ、「平成１２年度電力供給計画の概要」では２０１０年までに新たな原子力発電所１３基の運転開始の計画が示されている。今後も着実に核燃料サイクル、軽水炉建設等原子力開発は進むものと見ており、これに対応するのが原子力産業界の責務と考えている。

Nuclear Energy in the United States: A Time of Opportunity

Steven R. Specker, President
GE Nuclear Energy
San Jose, CA USA

As little as three years ago it was commonly thought that about 20% of U.S. operating plants might be shut down for economic reasons. Today these plants are considered to be valuable assets and are actually being bought and sold. What has transpired in those three years is nothing short of remarkable.

Deregulation of the electric utility industry has provided an impetus for improving the performance of nuclear plants in the United States. The average capacity factor of all U.S. plants in 1999 was 86%, an increase of over 10% from three years ago. Since 1990 the increase in output from these plants, from power uprates and improved capacity factors, is the equivalent of 12 new plants. The best nuclear plants today produce electricity for 1.5 cents per kwhr, which, in some places, is half that of plants using natural gas. These well run plants are valuable assets for their owners.

An unblemished safety record is a business imperative. The closure of a nuclear facility for even a short time can wipe out a company's annual earnings. A prolonged shutdown can destroy the business altogether. The NRC's improved regulatory process, which took effect earlier this month, puts the burden of safety exactly where it belongs--upon those who have the most to gain from safe operations.

There are at least two economic challenges that need to be tackled. The first is to reduce the disparity between the best plants and those in the last quartile of performance. The second is to avoid complacency. The future may very well bring us

even higher efficiency gas turbines or lower natural gas prices, in which case today's nuclear costs may only be marginally competitive

We firmly believe that productivity can take the nuclear industry to the next level of competitiveness. Productivity improvement has propelled other industries into a position of global competitiveness and it can do the same for ours. Moreover, increasing productivity means that no one will ever find themselves in a situation in which there is a temptation to cut corners on safety and quality in a vain attempt to lower costs.

Imagine if the productivity in our industry was equal to that of fossil fuel generators. What does a 3-fold increase in productivity mean? We would operate our nuclear plants with 250 people per 1000 Mwe plant, which would result in an annual savings on the order of $40M per plant. This represents a reduction of 0.5 cents per kwhr or about a 50% reduction in O&M costs.

This improvement will be the result of many factors. Consolidation will contribute to more efficient operations. We think that the e-business revolution will also play a huge role. In fact, the nuclear industry, which is characterized by large flows of information, is ideally suited to the productivity benefits of e-business.

Global Nuclear Fuel, GE's new joint venture with Hitachi and Toshiba, officially opened its doors for business on January 1, 2000 and we are making a smooth transition from 3 companies and businesses to one. GNF has created a deeper pool of experience, talented people, know-how, and R&D capability. The benefits will be advanced fuel designs with higher margins and improved reliability.

米国の原子力発電：チャンスの到来

スティーブン・R・スペッカー
GE ニュークリアエナジー社長

米国で運転中の原子力発電所の約２割が経済的な理由から閉鎖に追いやられるのでは、と一般に危惧されたのは、つい 3 年前のことである。今日、これらプラントは価値ある資産とみなされ、実際に売買されている。この 3 年の間に明らかになった事態は、まさに瞠目すべきというほかない。

米国では電気事業が規制緩和され、原子力発電所の運転実績を高める弾みとなっている。全米の原子力発電所の平均設備利用率は 1999 年には 86％で、３年前を 10％以上上回った。これらプラントの 1990 年以降の出力増強と設備利用率の向上による発電量増加分は、新規プラント 12 基分にも匹敵する。最も優秀な原子力発電所は現在、ｋＷｈあたり 1.5 セントで発電しており、天然ガス火力発電所の半分程度の地域もあるほどである。こういう原子力発電所の運転は良好なので、その所有者には価値ある資産となっている。

汚点なき安全記録の達成こそ、ビジネスの至上命令である。少しでも原子力施設を運転停止にすれば、企業の年間収益は帳消しになる。運転停止期間が長引けば、ビジネスを完全に台なしにするケースもある。原子力規制委員会（NRC）の規制手続きが改められ、今月初めに施行された。これは、安全運転をすることで最も多く利益を得ている者に、まさに安全性の重荷を負わせるものである。

少なくとも２つの経済的な課題があり、敢然と取り組む必要がある。第１は、運転実績最優秀のプラントと、実績不調な下位４分の１のプラントにみられる格差を縮めることである。第２は、自己満足を避けることである。今後、ガスタービンの効率が向上したり、天然ガス価格が安くなることも、十分考えられる。そうなれば、現在の原子力コストの競争力は、ぎりぎりのものでしかなくなるだろう。

原子力産業が生産性を高めれば、一段上のレベルの競争力を身に付けられると、われわれは固く信じている。他の産業も生産性を改善し、地球規模で競争力を身に付けている。原子力産業も同じである。しかも、生産性が増せば、無理にコストを引き下げようと、安全性や品質を切り詰める誘惑にかられる者ももういなくなるだろう。

原子力産業の生産性が化石火力発電事業者のそれと同一であると仮定してみよう。生産性が3倍高まると、どうなるのか。100万kW級の原子力発電所を250人で運転することになり、1基あたり年間4000万ドル程度の節約になろう。つまり、kWhあたり0.5セントのコスト削減、あるいは運転保守費用の約5割の削減が可能となる。

このような生産性の改善は、数多くの要因が重なり合って達成される。企業の合併は、より効率の良い運転に資する。電子ビジネス革命もまた、巨大な役割を果たすだろう。実際、大量の情報流通を特徴とする原子力産業界は、電子ビジネスによる生産性向上に理想的に適している。

GE社が日立、東芝と作った新たな合弁企業、グローバル・ニュークリア・フュエル（GNF）社が2000年1月1日に正式にビジネスを開始した。いま3社のビジネスを1つに円滑に統合しているところである。GNF社は、経験、人材、ノウハウ、研究開発能力を数知れず蓄積している。裕度を高め、信頼性を改善した先進的な燃料設計が業務の中心となる。

A BNFL GROUP PERSPECTIVE ON CONTINUING REORGANISATION OF THE NUCLEAR POWER INDUSTRY

BNFL

Charles W. Pryor

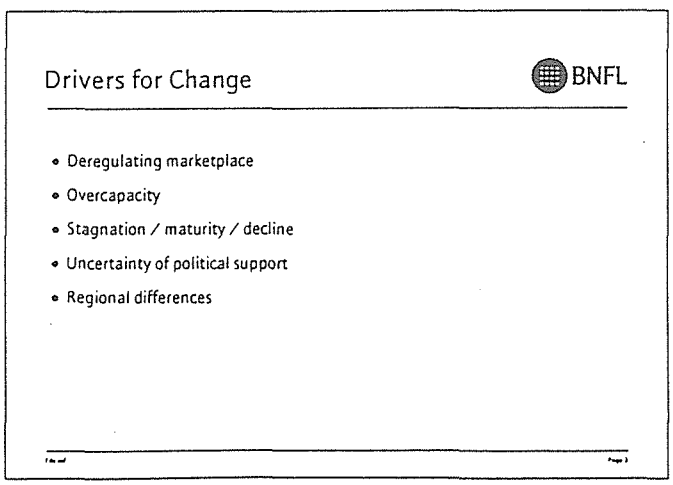
INTRODUCTION

The electricity market – like many aspects of life today - is constantly changing due to the influence of a wide range of factors. These changes in the market bring with them new opportunities and constraints for electricity providers.

In this paper I will briefly consider the drivers behind recent changes in the structure of the nuclear industry and the broader electricity supply business. I will also look at the current status of the electricity markets in the UK and the US. I will look at some of the implications of reorganisation for the nuclear industry and some of the benefits which can arise from it, together with some of the key barriers to successful implementation. I will demonstrate that the issues facing the re-structuring of the electricity industry are in many ways no different from those facing other industries, and we should not be surprised if some of the consequences are similar also. Finally, I will look at some of the key issues and questions which the nuclear industry must face as it progresses through the coming period of change.

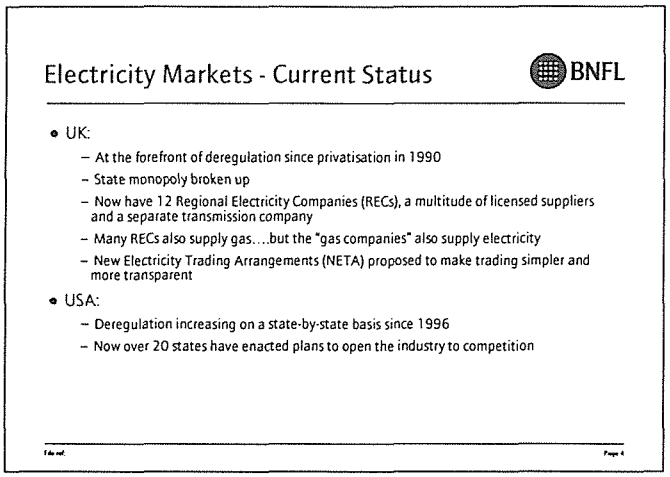
EXTERNAL FORCES

One of the key drivers for recent change - particularly in the UK and US - has been electricity market deregulation, and I will say more about this in a moment. Other factors include overcapacity in the provision of nuclear fuel cycle products and services, largely brought about by the slow-down in the nuclear industry, which in most of Europe and North America is currently stagnant or in decline.



Equally important in driving change has been increased uncertainty over the level of political support which the nuclear business can muster. Finally, regional variations in the extent and balance of these different drivers - particularly between the West and the East - have caused companies to re-think their strategies as they strive to respond to some of these drivers.

ELECTRICITY MARKETS



The UK has led the way in electricity industry privatisation, and the historic public sector approach has successfully been replaced with a more commercially focused one.

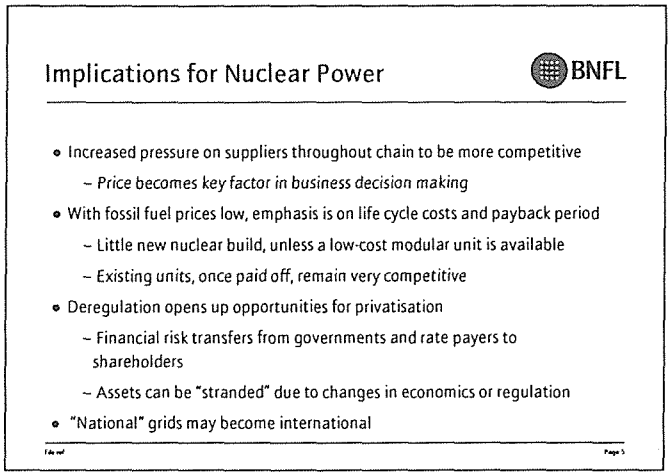
The market in the UK has proved attractive to investors – over 60% of the UK market is currently owned by overseas (mainly US) energy companies. In addition to the sound commercial reasons for their presence in the UK, a number of these overseas owners are using the UK as a "learning ground" prior to the onset of deregulation in their own countries.

In the US progress is on a state-by-state basis, but the majority of the population now live in the 20 or so states which have passed deregulation legislation.

IMPLICATIONS

These changes place ever greater pressure on all players in the market to be more competitive and, more and more, price will be the determining factor in the business decision making process. With respect to new nuclear build this means that a plant must have a much reduced capital cost, compared to traditional designs, and must be capable of being built and brought on line quickly, in order to deliver an early return to the provider of the funds. The Westinghouse AP600 design is one such reactor which can meet these needs.

Looking at existing nuclear units however, gives a different picture. Once capital costs have been paid off these units offer a competitive source of electricity There will be a growing emphasis on lifetime extension for these plants, as we have



recently seen at Calvert Cliffs in Maryland, USA. This plant has just become the first US plant to receive NRC approval for a 20 year extension.

Until nuclear units are mature their ownership inevitably presents risks as well as opportunities. A particular risk to nuclear utilities is that regulatory or economic change may impose new, unforeseen challenges to commercial operation. Larger operators, managing a portfolio of units, may be comfortable balancing this possibility against the upside opportunities, but increasingly smaller operators find this situation difficult. This is one factor which has led to recent acquisitions of nuclear stations in the US.

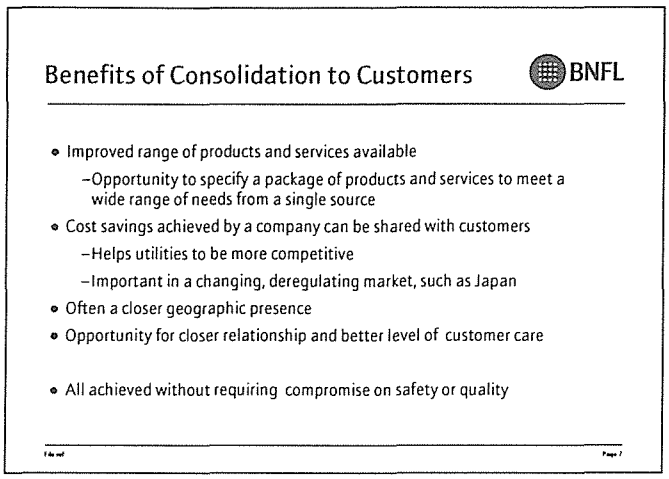
A further implication of the removal of barriers in the marketplace is increasing internationalisation of the market. A prime example is Scandinavia, which has had an open electricity market – the "Nordic Pool" – since around 1996. Prices in this market are on average 30% lower than they were prior to the market opening up – further evidence of the competitive pressure mentioned earlier. Across the European Union, there is a policy to move to more open competition in electricity supply, as in other areas of commerce.

Overall, the combination of increased deregulation, market maturity and overcapacity leads to reorganisation, and in such a market this generally means consolidation. I will now proceed to look at what some of the benefits of consolidation can be.

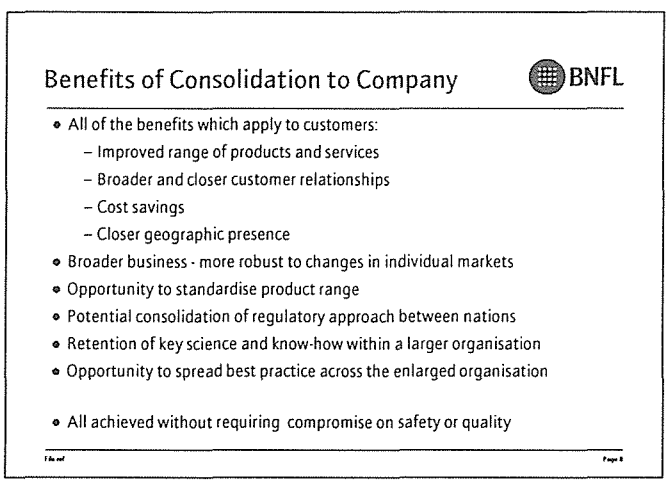
BENEFITS OF CONSOLIDATION

There are many benefits to both customers and companies themselves arising from consolidation. For the customer a greater range of products and services may be available from a single source. There is the opportunity for cost savings generated to be shared with the customer, thereby helping competitiveness. Also, a larger company may have a closer geographic presence to some of its key customers, which promotes a closer relationship and a higher level of customer care and communication.

Crucially – these benefits do not imply any compromise on safety or quality.



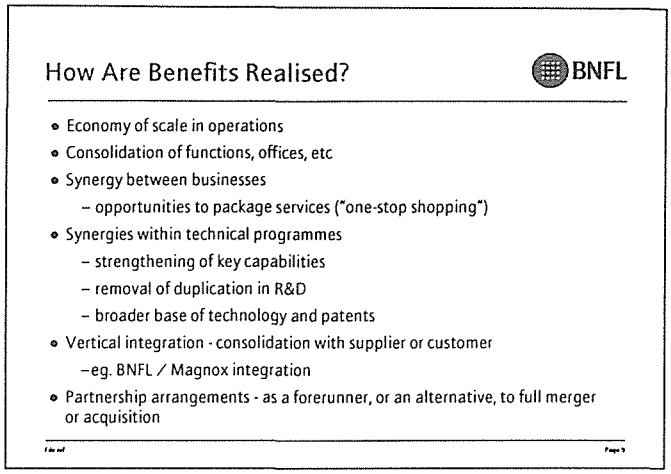
Benefits also result for the company itself.



These include all of the benefits which apply to their customers and also others, such as potentially a more robust customer base (covering more products and across a broader range of countries), possibilities for standardisation, both within the product range and across the regulatory framework of different nations. Also, retention of key technical skills within the organisation, where it can be difficult to sustain a core team in a smaller company. Finally – and very importantly – the opportunity to identify and propagate best practices in all aspects of business performance across the organisation should not be overlooked.

It is, however, *real* benefits, rather than potential ones, which deliver business advantage, and so it is important to achieve benefits where this is possible.

One way in which this is done is by improving plant effectiveness and utilisation, through economy of scale and throughput. A similar activity is in the consolidation of functions, offices and so on, such as the recent combination of the BNFL and Westinghouse offices in Japan.



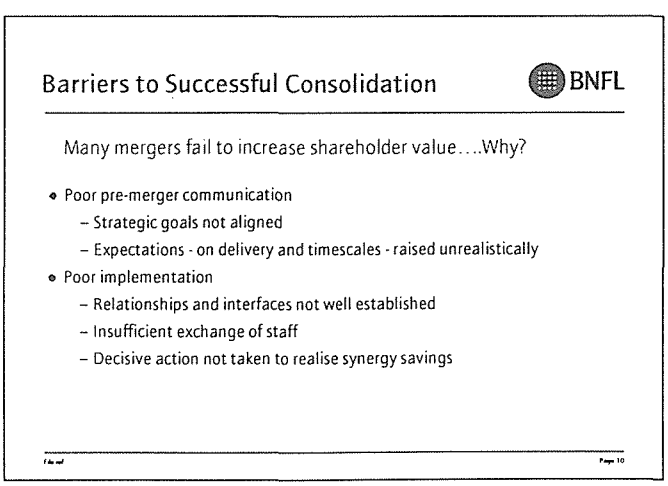
It is also important to identify synergies within and across businesses, such as the ability of BNFL and Westinghouse to package a full range of fuel cycle services from reactor design through fuel supply, spent fuel management and decommissioning. Such services can be packaged in whatever way suits the customer best.

Similar synergies can often be found within technical and development programmes, reducing duplication and building on a stronger platform of patents and know-how.

Consolidation with suppliers – "vertical integration" – can also allow a more effective overall operation. That is the aim as BNFL consolidates its Magnox electricity generation business in the UK.

Finally, it is often desirable to use a partnership arrangement as a pre-cursor or an alternative to full consolidation, particularly in relation to research and development collaborations.

Many of these mechanisms are in place within BNFL and Westinghouse. As the family extends to include ABB we will ensure that the same principles of learning from one another, optimising the services we offer to customers and identifying and exploiting synergy will continue.



Major barriers to achievement of these benefits faced by consolidating organisations are often poor interchange and communication (both before and after formal merger),

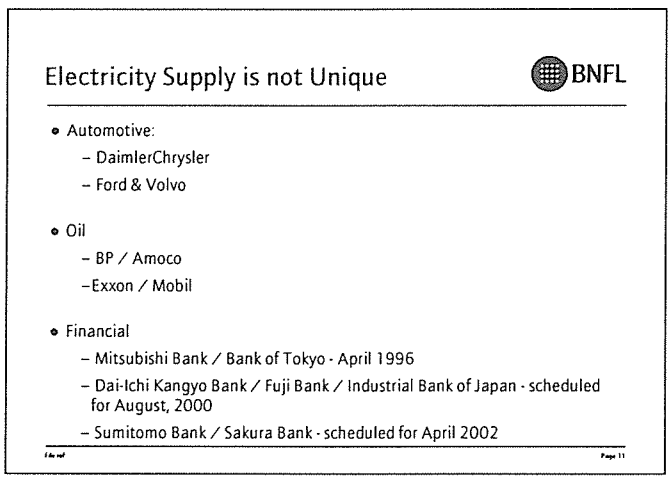
management of over-optimistic expectations and lack of decisive action to realise the achievable results.

As we implement our integration plans between BNFL and Westinghouse, and as we move forward to include ABB, we are aware of these potential difficulties, and will continue to strive to avoid them.

OTHER INDUSTRIES

Nothing I have described about the electricity marketplace is unique. It is in many ways typical of an evolving trend in commerce as a whole. We should therefore not be surprised if the outcomes in other industries are similar to those already seen and foreseen for the future of the nuclear power industry.

The slide indicates other recent and planned consolidation examples in the automotive, oil and financial services markets.



CONCLUSIONS

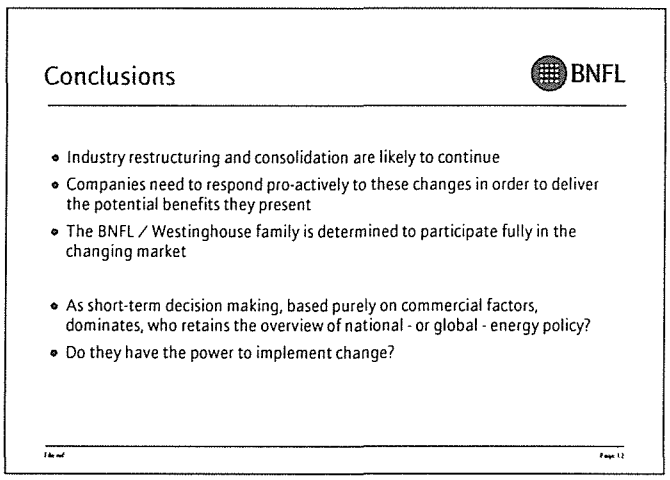
It is inevitable that the current position in the nuclear industry is not a long-term equilibrium state. As market changes continue around the world and their effects continue to propagate, we should expect reorganisation to become a way of life for our industry, as it is for many others.

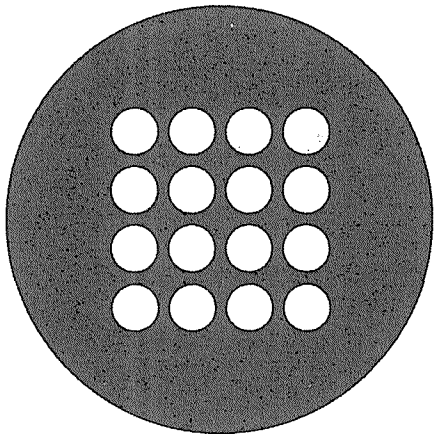
It is possible that in a few years time the nuclear industry will be dominated by three or four global corporations, each created from consolidation of some of today's players. The BNFL Group is determined to make sure it remains at the forefront of the industry throughout the changing times ahead, for the benefit of our customers and our shareholders.

We should however – both as individual companies and as an industry - be aware of some of the pitfalls which these changes may bring. Whilst it is right that commercial considerations play a major part in decision making, it is also important that somehow

an overview is retained of the bigger picture and that the long-term sustainability of a nation's - or the world's - electricity supply is safeguarded.

We need to ensure that such an overview is retained somehow. A key challenge facing energy policy makers is to consider how far market and regulatory reorganisation can proceed before it threatens our ability to deliver the obligations signed up to at Kyoto.





BNFL

A BNFL Group Perspective on Continuing Reorganisation of the Nuclear Power Industry

April 2000

Outline

BNFL

- Drivers for change
- Current status of electricity markets in UK and US
- Implications for nuclear power
- Benefits of reorganisation to customers and companies
- How are benefits realised?
- Barriers to successful implementation
- Electricity supply is not unique
- Conclusions

Drivers for Change

BNFL

- Deregulating marketplace
- Overcapacity
- Stagnation / maturity / decline
- Uncertainty of political support
- Regional differences

Electricity Markets - Current Status

BNFL

- UK:
  - At the forefront of deregulation since privatisation in 1990
  - State monopoly broken up
  - Now have 12 Regional Electricity Companies (RECs), a multitude of licensed suppliers and a separate transmission company
  - Many RECs also supply gas....but the "gas companies" also supply electricity
  - New Electricity Trading Arrangements (NETA) proposed to make trading simpler and more transparent
- USA:
  - Deregulation increasing on a state-by-state basis since 1996
  - Now over 20 states have enacted plans to open the industry to competition

Implications for Nuclear Power

BNFL

- Increased pressure on suppliers throughout chain to be more competitive
  - Price becomes key factor in business decision making
- With fossil fuel prices low, emphasis is on life cycle costs and payback period
  - Little new nuclear build, unless a low-cost modular unit is available
  - Existing units, once paid off, remain very competitive
- Deregulation opens up opportunities for privatisation
  - Financial risk transfers from governments and rate payers to shareholders
  - Assets can be "stranded" due to changes in economics or regulation
- "National" grids may become international

Overall, when the market is deregulated, mature and experiencing oversupply, "reorganisation" tends to mean "consolidation"

Benefits of Consolidation to Customers

BNFL

- Improved range of products and services available
  - –Opportunity to specify a package of products and services to meet a wide range of needs from a single source
- Cost savings achieved by a company can be shared with customers
  - –Helps utilities to be more competitive
  - –Important in a changing, deregulating market, such as Japan
- Often a closer geographic presence
- Opportunity for closer relationship and better level of customer care

- All achieved without requiring compromise on safety or quality

Benefits of Consolidation to Company

BNFL

- All of the benefits which apply to customers:
  - Improved range of products and services
  - Broader and closer customer relationships
  - Cost savings
  - Closer geographic presence
- Broader business - more robust to changes in individual markets
- Opportunity to standardise product range
- Potential consolidation of regulatory approach between nations
- Retention of key science and know-how within a larger organisation
- Opportunity to spread best practice across the enlarged organisation

- All achieved without requiring compromise on safety or quality

How Are Benefits Realised?

BNFL

- Economy of scale in operations
- Consolidation of functions, offices, etc
- Synergy between businesses
  - opportunities to package services ("one-stop shopping")
- Synergies within technical programmes
  - strengthening of key capabilities
  - removal of duplication in R&D
  - broader base of technology and patents
- Vertical integration - consolidation with supplier or customer
  - eg. BNFL / Magnox integration
- Partnership arrangements - as a forerunner, or an alternative, to full merger or acquisition

Barriers to Successful Consolidation

BNFL

Many mergers fail to increase shareholder value....Why?

- Poor pre-merger communication
  - Strategic goals not aligned
  - Expectations - on delivery and timescales - raised unrealistically
- Poor implementation
  - Relationships and interfaces not well established
  - Insufficient exchange of staff
  - Decisive action not taken to realise synergy savings

Electricity Supply is not Unique

BNFL

- Automotive:
  - DaimlerChrysler
  - Ford & Volvo
- Oil
  - BP / Amoco
  - Exxon / Mobil
- Financial
  - Mitsubishi Bank / Bank of Tokyo - April 1996
  - Dai-Ichi Kangyo Bank / Fuji Bank / Industrial Bank of Japan - scheduled for August, 2000
  - Sumitomo Bank / Sakura Bank - scheduled for April 2002

Conclusions

BNFL

- Industry restructuring and consolidation are likely to continue
- Companies need to respond pro-actively to these changes in order to deliver the potential benefits they present
- The BNFL / Westinghouse family is determined to participate fully in the changing market

- As short-term decision making, based purely on commercial factors, dominates, who retains the overview of national - or global - energy policy?
- Do they have the power to implement change?

我が国のエネルギー政策の今後

東京大学名誉教授　茅　陽一

1。基本問題

1）４つの要請

＃安定供給／環境保全／自由競争／経済発展

＃その相克性：環境保全と自由競争／経済発展と環境保全

＃整合性と実現可能性

2）要請を阻む要因

＃増エネルギー傾向／原子力への逆風

3）COP3 合意にどう対処するか

＃６％への対応：森林吸収の非現実性／排出権での対応可能性

＃エネルギー対策による２０１０年安定化案の困難性

経済成長と CO2 排出の強相関をどう解決するか

2。需要面での対応の問題点

1）産業

＃自主行動計画と達成可能性

2）民生／運輸

＃トップランナー方式と大型化問題

＃一般消費者の対応をどう刺激するか

3）炭素税問題

＃世界の情勢

＃意義：PPP、需要の価格弾性

＃問題点：一般消費者需要の低い弾性値／産業国際競争力への影響

＃解決策？：小額の消費末端課税とグリーン税制の部分適用

3。供給面での対応の問題点

1）新エネルギー

＃現状と問題点：コスト／ポテンシャル／出力時間変動

＃拡大策の是非：買い上げ義務づけ／グリーン料金／助成

2）都市分散電源

＃マイクロコジェネレーションと FC の可能性

＃集中と分散のバランスの必要

3）原子力

＃原発増設の意義：安定供給／環境保全／経済性

＃核燃料サイクルの今後：ウラン資源をどう考えるか

東海村 村長　村 上 達 也

第33回原産年次大会

事故からの再生と再出発

1 はじめに

福岡大学の大嶋仁教授は著書「新潮選書」「福沢諭吉のすすめ」の中で諭吉は実学の奨励者、実利主義者、功利主義者と言われているが、諭吉のいうその実学とは社会科学のことであって、諭吉は「日本における社会科学のパイオニア、社会科学の道を拓いた人」と規定し、そして「危険な『実学』」という言い方をしています。

何故「実学」が、即ち社会科学が危険なのか。それは共同体社会にとって危険なので、共同体社会とは神話幻想に支えられた社会であって、社会科学はその神話幻想を対象化してしまう。社会科学が発達すれば人々は神話幻想をそのまま信じることは困難となり、共同体の存続そのものが危うくなるだから実学＝社会科学は危険なのだと、大嶋氏は言っています。

2．原子力「共同体」意識からの脱却

ＪＣＯ臨界事故の後、事故に関して政府や原子力関係機関に対しての私の発言が、様々な波紋を投げ掛け、各方面で懸念している向きもありやと聞いています。事故の渦中は勿論、事故後の処理でも私は立脚点を村と村民の生命と生活に置いて考え、発言してきました。私の良心にかけ当たり前のことを発言してきただけでありますが、だがそれは「『原子力の村』東海村の村長は原子力共同体の一員である」とのこれまでの論理からすれば、「共同体を対象化、客体視する行為」であり、共同体の一員としての逸脱発言だったのだろうか。

今度の臨界事故で、原子力の安全神話は脆くも崩壊しました。これは否定すべくもありません。事故調査委員会も「いわゆる原子力の『安全神話』や観念的な『絶対安全』という標語は捨てろ」と言っています。

しかし「安全神話」に呪縛されている共同体の仲間は私の発言に随いてこれないようで、あの事故は不心得な一民間企業の起こした事故であって、原子力事業全体の問題ではない、しかも僅かウラン 1mgが燃えた小規模な事故だと。しかしこのような考え、事故の認識だとすれば日本の原子力の未来はないと思うし、原子力施設を受け入れている住民として安心して住むことができません。

大嶋氏はこういっています、「神話的なものの見方をする人間は自分のしている

ことに少しも疑問を持たないものである。全てはかくあった、だから現在もかくあり、未来もかくあらんと」

原子力界に関係する人達が、あの事故をどう考えるか、事故を契機に厳しさを増した原子力に対する世論、批判を含めてどう考えるか、それがこれからを決定づける。それには仲間内の閉鎖的な共同体社会から意識して外に出てみる努力が必要ではないかと思うのですが。

原子力事業推進には世界的に「逆風」が吹いており、日本でも「もんじゅ」の事故のあった'95 年から「逆風」が強まっていました。その世論に対抗するが如く「安全神話」も自己増殖してきました。この空気の中では国の原子力事故に対する法整備も組織整備も遅れ、今回の事故には有効に対処できなかった。因みに一例を挙げれば、科学技術庁の指針の下に策定された県の「原子力防災計画」がありますが、原子力事故は現実には起こらないことを前提に立てられています。「『仮想事故』であるから具体的措置対応は必要としない」という表現であり、対応を要しない防災計画とは一体なんぞやと言えませんか。

反原子力や脱原子力の主張はイデオロギーだとの考えがあります。それでは推進派はイデオロギーから自由だったのでしょうか。正義は我に、反論を許さないという姿勢、自分たちの考えを集団、共同体の力で押しつけるということはなかったのだろうか。日本の原子力利用は誕生からイデオロギー論争に晒された不幸がありますが、住民としては今回の事故を契機にその世界から脱してもらいたいものです。その際重要なのは、当たり前ですが双方とも自身のイデオロギー体質、姿勢を自覚し反論にも謙虚となることではないかと思います。

3．二度の重大事故が何故東海村で

東海村は'56 年日本原子力研究所を誘致以来原子力と共に約45年間歩んでき、それ故に「原子力発祥の地」の言われ日本の原子力推進の中心的役割を担ってきました。この「原子力の村」で僅か2 年半の間に2 度も立て続けに日本の原子力事故史上最悪の事故が起きたのです。皮肉な言い方をすれば「国策に従ってなんでもかんでも取り込んできた『原子力の村』だから起こった、原子力の先進地だからこそ起こった」とも言いたい。私が村長になって原子力関係者から何度か言われ、耳にした言葉があります。それは「東海村は気持ちがいい所だ、原子力に理解があって気

分がホッとする」と。確かに東海村は過去にさしたる反対運動もなく、しかも'97/3の動然の火災爆発事故までは原子力事故もなく40数年が過ぎ、原子力からの利益を享受してきたのですから。この相互に緊張感の欠ける、甘い関係が事故の背景にあったとも反省しています。

東海村は全国の町村会などで、よく過疎地と間違えられます。原子力は過疎地と結び付けて連想されるから。ところが東海村は縦横 6Ｋｍ、36平方Ｋｍに34千人が住む人口ちょう密な村、ここに14もの原子力関係事業所が置かれています。ＪＣＯのような燃料加工会社 3社、原発 2基（内 1基は癈炉）、再処理工場そして原研の研究炉他各施設など、村内だけで国策である「核燃料サイクル」が完結できます。

このような村の村長の発言は国の原子力政策に与える影響もあるだろうし慎重な発言が望まれる、そのとおりだと思ってきました。だが臨界事故の後、村民の立場に立って言うべきことは言おうと腹を固めました。「原子力の村」東海村にあっては村長が原子力について自由に語れないでは、村政について語れないことになる、ひいては村の将来や運命について語れないことになりかねないからであります。

昨年12月実施の村民アンケートでは村民の意識は劇的に変化しています。原子力は危険と考え原子力施設は廃止、少なくも現状維持に止めよという村民が激増しています。

4．原子力発祥の地の現実

歴史を紐解けば東海村は原子力のお陰で発展してきましたが、貢献もしてきています。動然の再処理工場は茨城県議会、隣接の勝田市議会、日立市議会、県漁連などが反対決議をしたが東海村議会が最後まで反対しなかったので出来たし'77 年再処理工場運転にカーター大統領から待ったが掛かって暗礁に乗り上げたとき、時の村長が大統領に親書を送った、これが奏効し運転できたということも聞いています。

原子力は東海村の発展の基盤であった、だがそれよりも「ひとつの小さな村」が「国策」を背負ってここまでやってきたのです。これをどう評価してもらっているのだろうか。「国策」を背負ってきた、その結果が村の現在、将来に対し計り知れないダメージを与えたのが今回の事故でありました。動然の事故の後、国と原子力界は安全確保、事故防止のため何をどれだけの努力をしたのか疑問に思えてならなりません。

そればかりではなく、東海村は施設受入れを容認したがため、将来の約束もなく核廃棄物が蓄積され核のゴミの山となってしまっています。低レベル廃棄物は全国の約1/3 、ドラム缶約330 千本、高レベル廃棄物に至っては不安定な溶液のまま450 ～480 立方mも固化体処理もせずに置かれています。原子力を受入れ担ってきた村民を大事にする配慮があればこうしたことも、事故もなかったのではなかろうか。昭和31年、当時の村長は「原子力の安全は科学者の英知と良識にに任せよう」と原子力を誘致し、そして「国策」を背負って歩んできました。それに対し国や原子力界からはこの言葉に見合うケアがなかったと言われて、反論できるのだろうか。

5．地方の論理、地方の主張

原子力発電は電気エネルギーの36% を占めている少資源国日本のエネルギー確保、安全保障に原子力は不可欠だ、COP3 による二酸化炭素削減にも原子力発電は欠かせない、だから原子力発電立地に理解を。全体論、一般論としては尤もであると思います。だがこの論理には地方の視点や地方の感情が十分に考慮されているのだろうか。高度経済成長下、地方は過疎化の脅威に脅かされてきた、過疎化防ぎ地域振興のため潜在的な危険性を意識しながら、また住民間の軋轢を生む源となりかねないことを懸念しつつも原子力発電を受け入れてきた。原子力発電でなく地域振興ができればそれに越したことはない、これが本音であったのではないだろうか。

2/25報道関係の科学論説委員が東海村に大挙してきての質問に次のようなものがありました。「原発がなくなったらどうするか」「東海村は電源交付金で潤ってきたのではないか」。これは地方の心の分からない、まして原子力事故に遭遇した地方の人の心に無神経な都会人の質問だと即座に感じた私は「東京も財政で困っているし、臨海副都心の土地利用に困っているようだから、そこに原子力施設を誘致したらどうか」と答えました。全国を一つの単位ではなく、地方ごとに、地域ごとに細分化して考えれば、今では風力や太陽光発電などの自然エネルギーで間に合わせることも可能です。間に合わないのは東京や横浜、大阪などの大都市であることを知るべきだと思います。

土台「国策」とはなんだろうか。原子力利用、原子力発電は「国策」といいますが、エネルギー問題について国会の場で十分議論し、国民的な議論が成されてできたものなのだろうか。全原協は原子力推進には「国民的合意形成」をと言って、立

地側すなわち地方から異議申し立てをしています。今は地方も金は要らないから中央でも責任分担をしろ、少なくも地方の心が分かれと言っています。

地方分権時代となり地方自治論が盛んですが、そこで取り上げられている先駆的自治体のほとんどが北海道や東北、九州の中山間地の小さな市町村であります。高度成長経済路線の中で地方は衰退した、地方に残ったものからすれば衰退させられた。しかしここにきて地方は自信を回復しつつあるように思います。それは戦後日本の経済発展主義一辺倒の価値観とは別な価値を地方の自然の中に見いだし始めたから。このような中山間地に最近金を餌に、大量生産大量消費の結果、都会で生み出されたゴミ、産廃物の処分場を造る動きが盛んです。当然地区を挙げての反対に出会っています。都市のゴミ捨て場にされる、地方のプライドが許すだろうか。

産廃物と同じにされては、それこそプライドが許さないでしょうが、金を出すから原子力発電をと言われても聞かない、無理強いが効かない時代になってきているのでは。原発立地はＪＣＯの事故後ということばかりでなく、地方の論理や主張を尊重しないでは立ち行かないということではないかと思います。

6．エネルギー問題の複眼的視点

昨年末「自然エネルギー促進議員連盟」が愛知和男衆議院議員を会長に国会内に誕生し、「自然エネルギー促進法」の制定の動きも出てきています。「原子力の村」の村長だが、否だからこそこの動向には注目し関心をもっています。日本の将来のために複眼的アプローチの誕生を歓迎したい。原子力推進派こそ新エネルギーに真であるべきと思うからであります。

日本の原子力推進での複眼の反対、単眼的という意味で気になりますのは、国内の論理だけしかみえないことで、少資源国云々もＣｏｐ３云々も、さらに2010年までに20基の原発建設という目標が変更できないこともそうです。原子力先進国日本ならば世界的視点にたった方策が必要ではないか。すでに世界には430 基もの原発が稼働している、原子力の安全性も地球規模で考えていかねばならない。果たして技術レベルの低い地域にまで原子力発電をこれ以上増やしていっていいのか、そして原子力の事故の大部分はヒューマンエラーで起こっていることを考えれば、原子炉の炉型は今のままでいいのか、安全規制体制も他国をリードできるものといえる考慮されているのだろうか。今の貧弱な安全規制体制では他国に何も言えないの

では。

核廃棄物処分問題は法制定の検討を進めているが現実は東海村の実態にみるように具体化されているものがよく見えません。このまま原発に頼っていったら地球規模で負の遺産を蓄積することにならないか。自然エネルギーをまじえ、自分の国の視点だけではなく地球規模での複眼的な原子力推進が必要と思います。

7．おわりに

高度成長経済の徒花バブル崩壊以後、日本社会は閉塞状況に陥っており、未だそのトンネルから抜け出せないでいます。原子力界も逆風の中であがいできました。ＪＣＯの臨界事故はこれまでの原子力行政の問題を一気に表面化させたばかりでなく、閉塞状況下にある日本社会への警鐘でもあったのではなかろうか。

東海村の村長としては、事故後の健康調査問題、損害賠償問題を解決し、しかる後防災対策の強化策を講じ安心して住める村とし、更には長期的な問題として風評に対峙していかねばなりません。それを原子力との関係を大事にしつつも「国策」にすべてを任す事でなく、村民の英知を集め自主独立の精神の思想に立ち、21世紀に相応しい関係を作り上げていく中で成し遂げていきたい。

そして原子力産業界に望むものはＪＣＯの臨界事故と矮小化しないで、そこから吹き出した全般的な環境とエネルギー問題を社会科学的な意味を含めて考え教訓としてもらいたいということです。ご静聴ありがとうございました。

第３３回原産年次大会東海大会

－事故を乗り越えて－

科学技術庁原子力局長
興　直孝

１．　序

皆様ご存知のように、昨年９月３０日に発生した㈱ジェー・シー・オーにおける臨界事故は、我が国のみならず世界中に大きな衝撃を与えました。これまで我が国においては、ジェー・シー・オー東海事業所のようなウラン加工施設が安全上の懸念を惹起するようなことはありませんでしたが、そのような施設で、我が国の４０年余にわたる原子力開発史上最悪の事故が起こりました。周辺住民への避難要請が行われたのも、放射線被ばくによる死亡者が出たのも初めてのことでした。

事故の直接の原因は、定められた作業基準を逸脱した作業によるものでしたが、本事故の発生を単なる一事業者における違法行為として片付けることは到底できるものではありません。間接的原因も分析した上で、我が国の原子力行政全般について、総合的な視点から評価、見直しを行う契機としたところであります。初めて実際の対応を求められた原子力防災対策も既存の体制では不十分であることが明らかになり、原子力災害対策特別措置法が制定されることになりました。

ジェー・シー・オーの事故は、このような制度、体制面の変革をもたらす契機となっただけでなく、原子力に対する国民の意識にも変化が生ずるなど、今後の我が国の原子力開発利用の進め方に大きな影響を及ぼすものになりました。２１世紀を目前にした現在、私共が、今一度、本事故とこれまでの我が国の原子力開発利用について振り返り、原子力が直面する諸問題について考察することは、今後の我が国の原子力開発利用の方向性を決めていくにあたって、極めて意義深いものであると考えます。

２．　事故後の対応

今回の事故では、災害対策基本法に基づく防災基本計画に従って、科学技術庁長官を本部長とする政府の事故対策本部が設置され、関係省庁において所要の措置がとられるとともに、原子力安全委員会の緊急助言組織が召集され、臨界の収束等に大きな役割を果たしました。また、原研、サイクル機構、原電などの東海村内の事業者が、周辺のモニタリン

グや事故の収束にあたって大きな役割を果たしたことは高く評価されるべきことと考えております。また、海外からの支援の申し出も多数ありました。この場をお借りして各国の政府関係者に感謝の意を表したいと思います。

事故後、政府としては、健康管理や損害賠償など周辺住民の方々への対応に万全を期すべく努力するとともに、事故の教訓を踏まえ、安全規制及び防災対策の抜本的強化に取組んでまいりましたが、それらの概要を以下にまとめて述べます。なお、民間においては、昨年末、ニュークリア・セイフティー・ネットワークが設立されておりますが、今後、活発な活動が行われ、原子力活動に携わる関係者全体の安全意識の高揚、モラル向上や原子力安全文化の共有化が図られることを強く期待しています。官民がそれぞれの役割に応じて、安全確保に努め、原子力に対する国民の信頼を取り戻すべく、努力することが重要であると考えております。

（１）損害賠償と健康管理等

ジェー・シー・オーの事故では、３５０m圏内の住民へ避難要請、１０ｋm圏内の屋内退避勧告等、我が国で初めて原子力防災のための対応が行われました。また、放射性物質の施設外への有意な放出はありませんでしたが、臨界反応に伴い放出された中性子線に多くの周辺住民の方々が曝されました。

これらにより、商工業者や農林水産業者は、営業休止や風評により、経済的な損失を被ることとなり、１２月１５日には、衆議院本会議において、被害者救済に関する決議が全会一致で採択されています。昭和３６年に制定された原子力損害賠償法が適用される初めての事例となり、政府としては、同法に基づき原子力損害賠償紛争審査会を設置し、併せて原子力損害調査研究会を開催して具体的な損害認定を行うための基本的考え方を整理・集約しています。また、迅速かつ適切な賠償が行われるよう、ＪＣＯを指導し、親会社である住友金属鉱山㈱にも全面的な支援を要請しました。さらに、昨年末には、県や市町村の協力も得て、補償金の仮払いが行われたほか、政府系中小企業金融機関を通じた災害復旧貸付も適用されています。さらに、農水省等の関係省庁の協力により、風評被害防止のための広報活動等が行われました。その後、補償の合意に向けた交渉が進められた結果、本年３月末には、総請求件数の９割を超える約６０００件について合意がなされております。残りの請求については、現在、ＪＣＯが解決に向け個別に対応しているところです。

被ばくした周辺住民の方々の被ばく線量評価は、個人の行動調査等に

基づき行われ、その結果は、１月３１日に原子力安全委員会に報告されました。また、健康管理については、原子力安全委員会の健康管理検討委員会の基本方針を踏まえつつ、健康相談を含め、国と地元自治体が連携して取組んできましたが、４月２１日には、科学技術庁、茨城県、東海村及び那珂町の四者により平成１２年度からの具体的な健康管理のあり方が決定され、今後は、これに基づき健康診断や健康相談等に取組んで行くこととなっています。

（２）原子炉等規制法の改正と原子力災害対策特別措置法の制定

事故を教訓として、事故の再発防止のための安全規制及び万一の事態に備えた防災対策の抜本的強化を図るため、政府は、昨年の臨時国会に原子炉等規制法の改正法案及び原子力災害対策特別措置法案を提出し、両法案は同国会において可決成立しました。

原子炉等規制法の改正は、運転管理に対する検査制度を創設し、加工施設を含む主要な原子力施設に保安検査官を配置するなど、厳しい緊張感を持続するための枠組みの整備を行うためのものです。また、原子力災害対策特別措置法は、災害対策基本法の特別法として、原子力災害特有の事態に対応できるよう、迅速な初期動作、国と地方公共団体の有機的な連携、事業者の責務の明確化などを規定しています。あわせて、補正予算により、立地地点にオフサイトセンターや放射線監視設備の整備が行われることとなり、さらには関係省庁により避難道路の整備や緊急被ばく医療設備の整備なども図られています。

現在、両法の施行令や施行規則が整備されたところであり、これらの法令を適切に運用することによって、より実効性の高い安全規制体制及び防災体制が構築されていくこととなっています。

（３）原子力安全委員会の機能強化

原子力安全委員会は、昭和５３年、原子力船「むつ」の放射線漏れのトラブルを契機として、原子力行政体制の見直しがなされた結果、原子力委員会の機能から安全規制に関する機能が切り離され安全規制体制を強化するために設置されました。原子力船「むつ」は、洋上における出力上昇試験中に、原子炉を取り巻く遮蔽体の設計が十分でなかったことから、速中性子線のストリーミングという現象が起きて、放射線が漏出したものでした。これにより、国の安全審査体制を見なおすべきであるということで、現在の安全審査体制―行政庁と原子力安全委員会によるダブルチェックの体制―が出来上がりました。この安全審査のシステムは我が国特有のものであり、科学技術庁や通産省における安全審査を充

実した上で、さらに原子力安全委員会が、専門的かつ大局的な見地から行政庁の規制をチェックし、安全規制の中立性、客観性を確保することとしたわけです。

ジェー・シー・オー事故の反省を踏まえ、原子力安全委員会は、設置許可段階以降の建設・運転段階においても規制行政庁の安全規制活動の監視を一層強化するとともに、委員会の独立性及び機能の強化を早期に実施すべく、４月１日から事務局機能が科学技術庁から総理府本府に移管され、人員も専門的スタッフ等を含め大幅に拡充されることとなりました。

なお、原子力安全委員会の機能の強化は、来年１月に迫っている中央省庁再編に際して実現されることとなっていました。すなわち、原子力安全委員会は、新しくできる内閣府におかれ、現在科学技術庁にある事務局機能も、人員を増強した上で内閣府に独立しておかれることが決められておりました。今回の措置はそれを９ヶ月前倒しし、人員を増強したもので、当初の計画は更なる充実強化が図られることとなりました。行政のスリム化と公務員の削減が叫ばれている中、原子力安全委員会は、スタッフを増強して、我が国の原子力安全の確保のために今まで以上に大きな役割を担っていくことになります。

なお、原子力安全委員会の機能強化にあたっては、米国の原子力規制委員会（ＮＲＣ）のような機関が必要であるという声もあります。行政体制は、その国の様々な事情に応じ、実効的で最適なものにしていく必要がありますが、安全規制体制も例外ではありません。我が国は、昭和５３年以来、ダブルチェックという独自のシステムで安全規制を行って来ており、実績をあげてまいりました。また、昭和５３年当時には、そのあるべき姿としては独立の事務局を設けることが望ましいとしながらも、当面、科学技術庁に置くこととしたのですが、今回、やっと当初思い描いたあるべき姿の事務局ができ上がったわけです。また、原子力安全委員会の下に設けられている審査会や専門部会には、外部の有識者として大学や研究機関の専門家のポテンシャルを活用しておりますが、今回の機能強化では、これに加え、前述の通り事務局の専門的スタッフを拡充しました。これにより我が国の専門家の技術ポテンシャルを安全確保のために最大限活用するシステムができ上がったものと考えております。

３．原子力をとりまく環境の変化と今後の展開

我が国の原子力開発利用は、１９５６年、原子力基本法が施行され、翌年にはここ東海村で初めての原子炉（ＪＲＲ－１）が臨界を達成して

以来、着実に拡大してきました。初めての原子力発電は１９６３年でしたが、それから４０年も経っていない現在、５２基の原子力発電所が運転されており、米仏に次ぎ世界第３位の発電容量を有するまでに至っています。反面、国民の原子力に対する意識は、当初の期待感に満ち溢れたバラ色から、安全性に対する疑問や不信を背景に灰色へと変化しています。

私共は、これまで我が国が歩んで来た原子力開発利用の道程をどのように理解すれば良いのでしょう。そして、今後どうすれば良いのでしょうか。

我が国の原子力開発利用の初期における国民の最大の関心は、非軍事への限定を含めた開発体制そのものでした。戦前戦中の体制がまだ人々の記憶に新しい頃、我が国としての原子力研究開発利用の在り方に関し、科学者をはじめとする有識者の間で議論が高まりました。その結果、誕生したのが原子力基本法であり、平和利用の堅持という大前提に加えて、民主、自主、公開という三原則が掲げられることとなりました。その後、原研における数々の試験研究用原子炉や原電東海発電所１号機の運転など東海村を中心とした原子力研究開発利用の成果は、国民に概ね肯定的に受け止められ、動燃の発足、燃料加工事業の産業化など我が国の原子力開発利用は本格化、多様化していきました。

一方、佐世保港の異常放射能事件や原子炉運転に伴う不具合の発生など、安全性確保、環境保全の問題が徐々にクローズアップされてきました。そして、原子力船「むつ」の放射線漏れを契機として、国民の間では、安全規制に比して開発面にウェイトをかけすぎているという不信が生じることとなりました。また、その頃になると、海外における原子力事故の情報も沢山入って来るようになりました。折りしも、オイルショックを契機として、我が国のエネルギー供給構造を見直し、原子力を石油代替エネルギーとして、一層の供給の拡大を図ろうとしていた時でした。その後、国内の原子力発電所における数々のトラブルやＴＭＩ原発事故、チェルノブイリ原発事故など国民の安全上の懸念を呼び起こす様々な出来事の中、原子力発電所の建設が進められて行きます。

その過程で、政府及び関係者は様々な努力を重ねてまいりました。原子力安全委員会の設置と規制の一貫化による安全規制体制の強化、原研を中心とした安全性研究の実施と各種の安全指針の整備等、そして原子力発電所では各種のトラブルを技術的に克服した上で徹底した安全管理が行われてきました。我が国の原子力発電所は、欧米の発電所に比べても特にトラブルの発生率は低く、高い稼働率を達成しております。

また、原子力の必要性や安全確保のメカニズムについて、国民の方々

に情報を提供し理解を得るための活動を積極的に行って来ました。なお、ＴＭＩ事故では、我が国独自の調査を行った上で原子力発電所の安全確保の充実を図るとともに、原子力防災のあり方にメスを入れ、その体制の整備が行われています。さらに、チェルノブイリ事故に関しては、たとえ国や原子炉のシステムが違っても事故が起これば国民の方々の不安に直結するという認識の下、旧ソ連・東欧の原子力発電所への技術支援も実施して来ました。

我が国の原子力発電が全発電量の４割近くを占めるまでに至ることができた理由は、何よりも立地地域をはじめとする国民の方々が原子力発電所の必要性を認識していたからに他なりません。エネルギー資源に乏しく、化石燃料の大部分を輸入に頼っている国として、また、世界的にも化石燃料はその埋蔵量に限りがあることは自明である中、技術先進国として、人類が２０世紀後半になって手に入れた原子力というエネルギー源を利用していくことは必然であるという認識があったのだと思います。現在においても長期的な原子力の意義に変わりはなく、さらに、地球温暖化を防止するための二酸化炭素排出削減が先進国を中心とする世界各国の課題となっている中、原子力の必要性は更にその説得力を増しているはずです。ところが、もんじゅの事故以降、原子力に対する国民の不信や不安が高まり、安全性のみならず、核燃料サイクルを含む原子力政策そのものに対する不信となって現われて来ました。特に安全問題が住民の方々の生活に直接影響する立地地域においては、それが顕著に現われ、立地自治体は国と住民との間にあって苦しい立場に立たされてきました。現行の原子力長期計画が策定されたことに伴いプルサーマル計画の推進が図られてきた中で、その推進に努力されてきた福島、新潟、福井の三県の知事から、もんじゅ事故を契機に今後の原子力政策についての提言がなされ、これを受け、原子力委員会の審議の公開、原子力政策円卓会議の開催など、従来の情報公開等の取組みに加えて、原子力政策に対する国民的な合意形成のための取組みがなされることとなりました。平成９年２月には、「当面の核燃料サイクルの推進について」の政策が閣議了承され、新しい展開をみたところですが、翌３月に東海再処理工場の火災爆発事故が発生し、その原因究明と対策を図り、更には、人心一新の下サイクル機構への改組が図られたところです。また、原子力の長期的な定着のために、施設と立地地域の共生の必要性がより強く認識され、地域振興等に向けた取組みの強化が図られているところであります。ジェー・シー・オー事故はこうした努力を行っている最中に発生したものであり、結果として、茨城県や東海村のみならず全国において更に厳しい不信感が広がってしまいました。私共は、これまでにも増し

て信頼回復の努力をする必要性を痛感しております。

４．国民の信頼回復に向けて

ジェー・シー・オー事故の貴重な教訓を踏まえ、安全対策、防災対策の抜本的な強化が図られることとなりましたが、今はまだその枠組みが整備されたにすぎません。この６月からは原子力災害対策特別措置法が、７月からは改正後の原子炉等規制法が施行され、全国に国の防災専門官と保安検査官が配置され、現場における体制が整い機能を開始するのはこれからです。また、オフサイトセンターや地域の防災計画の整備もまだ進行中であり、これらに引き続き全力で取組んで行くことが求められております。

行政を取り巻く環境や国民のニーズが時代によって刻々と変化していく中、行政システムや政策もそれに合わせ常に最適なものを目指して変化していく必要があります。防災対策や原子力安全規制の強化は、今回の事故を教訓として緊急に措置されることとなりましたが、これらは事故発生以前からより良い対応を図ろうとしていたものでした。すなわち、原子力安全委員会の機能強化は、前述の通り中央省庁再編に合わせ内閣府において措置されることとなっておりましたし、防災対策についても、昨年５月に出された原子力安全委員会防災対策専門部会の報告書等を踏まえて強化を図ろうとしている最中でした。その整備が１年早ければと考えられるところはありましたが、実際の事故の経験を踏まえて、原子力災害対策特別措置法案を極めて短期間のうちに提出できたのも、こうした背景によるものでありました。

一方、国民の方々の原子力に対する不安と不信は、安全・防災対策を講じるだけで拭い去ることはできません。今回の事故の根幹にある社会的な問題をも掘り下げて対策を講じ、二度とこのような事故が発生しないようにした上で、安全運転の実績を着実に積み重ねていく必要があります。今日、原子力について、その意義等を今一度検証し、原子力を進めることについての国民的合意を形成していくことが強く求められております。原子力委員会では、昨年５月から新しい長期計画策定のための審議を行い、２１世紀を迎えるにあたっての原子力の全体像と長期展望を明らかにしようとしています。審議にあたっては、安全確保と企業経営の関係、関係者の安全意識・モラルの向上、技術の継承の問題などジェー・シー・オー事故が提起した諸問題についても検討がなされています。

事故がもたらした影響は国内にとどまらず、我が国の国際的な信頼をも失墜させることとなりました。今日、冷戦構造の崩壊とその結果生じ

た国際情勢の変化に伴い、国際的な核不拡散の枠組みについても、その強化が図られてきておりますが、我が国が核燃料サイクルの確立に取組みながら原子力を平和利用に徹して進めていくためにも、我が国は、国際的な核不拡散体制の維持・強化に貢献することはもちろん、安全確保と平和利用堅持に関する国際的な信頼を得ることが不可欠です。我が国は、これまでにも増して、原子力の分野で世界のフロントランナーとなっていることを自覚しつつ、今回の事故の経験も含めて、その成果を世界に対して発信していく必要があると考えております。

今、原子力に携わる関係者にとっても最も大切なことは、今回の事故のような取り返しのつかない事態が発生しない様万全を期すのはもとより、社会の変化を的確に捉え、速やかな対応を講じていくことであります。そういった努力の積み重ねにより、国民の生活に安全と安心を与えることが国民の信頼を得る唯一の道であり、それがジェー・シー・オー事故の残した最も大きな教訓ではないでしょうか。今後、それを肝に銘じて行政の責務を果たして参ります。

（了）

Recovery and Restart from the Accident

By Tatsuya Murakami, Mayor of Tokai-mura.

(Tentative translation)

1. Preamble

In his book titled *Fukuzawa Yukichi no Susume* ("Reading Yukichi Fukuzawa" pub: Shinsho Sensho), Professor Hitoshi Oshima of Fukuoka University writes that Fukuzawa is said to have been a proponent of pragmatism, utilitarian or philistine, but that he equated pragmatism with social science. "Fukuzawa was the father of social science in Japan", Oshima writes, and he also uses the phrase "dangerous pragmatism".

How can pragmatism, or social science be dangerous? Well, what Oshima is saying is that social science is a danger to any community founded on myth and illusion, since it objectifies those myths and illusions, showing them for what they are. The more progress made in social sciences, the harder it becomes to accept myths without questioning them, and if those myths crumble, so the community shall be at stake. As a result, pragmatism is dangerous.

2. Shaking off the "nuclear community" mind-set

I have heard that my comments after the JCO nuclear accident regarding the government and nuclear power authorities have caused eyebrows to be raised in various circles. Both as the accident unfolded, and afterwards, I have always spoken from the point of view of the lives and livelihoods of the inhabitants of the village. But despite the fact that I never said anything that one would not expect a person with any conscience to say, my comments could no doubt be construed as deviating from the viewpoint appropriate to a member of the "nuclear community", insofar as the mayor of Tokai-mura, "the nuclear village" has to date always been a member of that community, and my comments dared to objectify that community, to question the myths on which it is built.

The myth of nuclear safety crumbled disastrously with the JCO nuclear accident. This is something which just cannot be denied. The accident investigation committee itself advised that "we need to abandon such abstract slogans as "absolutely safe", and the whole myth regarding the safety of nuclear power generation".

However, there are among my colleagues in the nuclear community some who are so totally under the spell of the safety myth that they find my comments unacceptable, insisting that the accident was nothing more than an isolated incident caused by the imprudence of a single, private enterprise rather than a problem of the nuclear power industry as a whole, and that it was a very minor accident anyway, involving the meltdown of about only one milligram of uranium. The way I see it, however, is that this way of thinking, this kind of perception of the accident spells the end for the nuclear power industry in Japan, and makes it impossible for civilians who have accepted nuclear power facilities in their community to live their lives with any peace of mind.

Oshima has the following to say: "People who have an mythical (unquestioning) view of the world also tend to have no doubts about the propriety of their own actions. They tend to assume that what has been is what exists now and shall forever exist".

The way that people involved in the nuclear power industry view the accident, and the way they react to the mounting criticism leveled at the industry since the accident will decide the fate of the industry. I feel that if there is to be a future, these people need to make a conscious effort to break out of their own narrow, closed community.

The nuclear power industry is feeling the winds of adversity throughout the world. Even in Japan, the 1995 Monju accident had the effect of strengthening the opposition to nuclear power. As if in response to that adverse public opinion, ironically the safety myth grew rather than

receded, and in that atmosphere, the nation dragged its feet over legal and organizational preparations necessary to deal with a nuclear accident, and proved incapable of effective crisis management when last year's accident occurred. As just one example, Ibaraki Prefecture's "Nuclear Disaster Prevention Plan" formulated under the Science and Technology Agency guidelines operates on the premise that nuclear accidents will in reality never occur. There is a phrase which goes: "Because the occurrence of an accident is hypothetical, no concrete measures need be taken". Well, I ask you, what use is a disaster prevention plan which proposes that no measures need be taken?

There are those who think that ideology is behind opposition to nuclear power, but I wonder how free of ideology its proponents have been. Haven't they been guilty of thinking that justice is on their side and refusing to listen to any opposing arguments, and of using the power of their community to force their ideas on others? Japan's use of nuclear power has had the misfortune of being exposed to ideological debate from its outset, and I'm hoping that this accident can provide us with an opportunity to put dogma of any color behind us. In order to do so, though this is almost too obvious to mention, both sides need to be aware of their own ideological bias, and prepared to listen respectfully to opposing arguments.

3. Why two major accidents in Tokai-mura?

Ever since it first welcomed the Japan Atomic Energy Research Institute 45 years ago in 1956, Tokai-mura has been known as the birthplace of Japan's nuclear industry, and lived up to that name by playing a central role in the promotion of nuclear power in Japan. The same Tokai-mura, "the nuclear village", has in the space of a mere two and a half years experienced the two worst accidents in the history of Japan's nuclear power industry. If I wanted to be sarcastic, I would say "Well, what else could one expect of "the nuclear village" which has accepted everything the country has asked of it? The accidents happened because we were pro-nuclear" Since I became mayor, I've been told time and time again by nuclear industry people that "it's great to be here in Tokai-mura. It's so pleasant to be somewhere where nuclear power is appreciated". It cannot be denied that there has never been any serious opposition to nuclear power in Tokai-mura, and up until the Power Reactor and Nuclear Fuel Development Corporation accident of March 1997, forty years had gone by without accident, and Tokai-mura reaped the benefits of playing host to the nuclear power facilities. On reflection, one could say that it was this relationship of mutual benefit, and the lack of vigilance that such a relationship spawned, that was behind the accidents.

At nationwide meetings for local governments and such like, Tokai-mura is often mistaken for an underpopulated district, since people tend to associate nuclear power with thinly populated areas. However Tokai-mura measures six kilometers by six kilometers, a borough of 36 square kilometers with a population of 34,000, which means that on the contrary it is densely populated. And in those 36 square kilometers, there are no fewer than fourteen nuclear-related facilities, including three nuclear fuel processors like JCO, two nuclear reactors (one de-commissioned), a nuclear reprocessing plant, and the research reactor and other facilities of the Japan Atomic Energy Research Institute. The whole nuclear fuel cycle, the realization of which is a national policy, could in other words be carried out in Tokai-mura alone.

I am aware that the comments of the mayor of such a borough can have an influence on the nuclear power policy of the nation, and so have always taken a cautious approach in voicing my opinions. However after last year's accident, I decided that I had to say what needed to be said as representative of the villagers. If I as mayor of "the nuclear village" of Tokai-mura were unable to speak freely about nuclear energy, that means that I would be unable to speak about the administration of the borough, and by extension, the future of Tokai-mura.

According to the results of the opinion survey we conducted in the borough in December, the views of the villagers have undergone a dramatic change. The number of residents who regard

nuclear power as a threat, and would like to get rid of the nuclear power facilities, or at least not see any further development, has increased remarkably.

4. The reality in the birthplace of Japan's nuclear power industry

History would show that Tokai-mura owes its development to nuclear power, but it has also contributed a great deal. The Power Reactor and Nuclear Fuel Development Corporation succeeded in getting its reprocessing plant built only because, despite the assemblies of Ibaraki Prefecture, Katsuta City next door, Hitachi City and the Ibaraki Prefecture Fishermen's Union all passing resolutions opposing the plant, Tokai-mura's village assembly refused right to the end to join them. And I heard that when operation of the reprocessing plant was stalled by President Carter in 1977, it was the personal letter sent to the president by the mayor at that time which paved the way to the commencement of operation.

There is no question that it was nuclear energy which fueled Tokai-mura's growth, but more significant than that is the fact that this little borough of Tokai-mura has carried the national nuclear policy on its shoulders all this time. What kind of regard has Tokai-mura earned for doing so? In return for shouldering the national agenda, the borough has been rewarded with an accident which has caused and will continue to cause untold damage to it. I can't help wondering what efforts, if any, the nation and the nuclear power industry made to prevent accidents after the [1997] Power Reactor and Nuclear Fuel Development Corporation accident.

And accidents are not the only problem. As a result of playing host to the nuclear power facilities, Tokai-mura is now blessed with a veritable mountain of nuclear wastes without any promise of a solution. We harbor 330,000 drum barrels of low-level nuclear waste, one third of the national total, and as for high-level waste, we have between 450 to 480 cubic meters still in unstable liquid form and awaiting solidification treatment. If there were really any sincere concern for the community that accepted and shouldered Japan's nuclear power industry, I feel that neither this state of affairs, not the accidents would have happened. In 1956 the mayor at that time brought the industry to the village with the words "Let's leave the question of safety to the wisdom and good sense of the scientists", and we've carried the national policy ever since. Can the country or the nuclear power industry reply in all good conscience with a "yes" to the question of whether they have sufficiently cared for the community and lived up to the trust bestowed in them by the mayor's words above?

5. The regions must have their say.

Nuclear power accounts for a full 36% of Japan's electricity demand, and from the point of view of both energy supply and national security, is at present indispensable, and even more so if Japan is to fulfill its obligations to reduce carbon dioxide emissions under COP3 (Third Conference of Parties to the U.N. Framework Convention on Climate Change). When asked to show understanding for the need for nuclear power stations, who could deny the validity of such arguments as a general rule? However it is matter of contention whether these arguments pay sufficient attention to regional views and feelings. In the post-war period of rapid economic growth, the regions have suffered significant depopulation, and in order to stem the flow of its population to the cities, the regions have accepted the presence of nuclear power plants, despite awareness of the potential risks involved, and concern that doing so might give rise to frictions within their community. I think it safe to say that beneath any local community's acceptance of a nuclear power facility was the hidden wish: "If only there was some other way of revitalizing the region...".

On February 25th, the science correspondents of assorted mass media descended on Tokai-mura, and among the questions they asked were: "What would you do if nuclear power

disappeared?" and "Isn't it true that Tokai-mura has grown prosperous on electricity generation subsidies?" I felt that such questions could be put only by people who have no thought for the feelings of people living in the regions, and especially for those who had just suffered a nuclear accident, and so I replied, "Tokyo's balance sheet is in a bad way, and I hear it is also having problems finding uses for the new Tokyo waterfront subcenter land, so why don't you put up a nuclear power plant there?" If, rather than viewing the whole country as a single unit, one divides it up into regional and then local blocks, then almost every region could in fact get by with alternative energy sources such as solar or wind power. I think that city dwellers need to know that it's only the big cities like Tokyo, Yokohama and Osaka that couldn't get by without nuclear power.

And what is this "national agenda" which is always given as justification for building nuclear power plants? Nuclear power generation and use is often described as "national policy", but has this country's energy policy been thoroughly discussed in the Diet? Has it been subjected to real debate by the public at large? The Federation of Local Governments with Nuclear Power Plants has expressed its objections from the regional standpoint by calling for the establishment of a nationwide consensus on the endorsement of nuclear power. The local governments burdened with nuclear power plants are in effect saying to the central government that they don't want any more money, that they just want Tokyo to share the responsibility, to at least show them a little more consideration.

They call this the age of decentralization, and we hear a lot about regional self-government. Interestingly, almost all local governments making a name for themselves as pioneers of this movement are small-scale rural towns and villages located in regions like Hokkaido or Tohoku or Kyushu. During the period of rapid economic growth, the regions went into decline – or, as those who stayed put would say, the regions were forced into decline. However the regions are beginning to regain their confidence in recent times. That confidence is born from a newfound recognition of the value of nature, a very different value set from that of the post-war years of utter devotion to economic development at all costs. These rural towns and villages are being targeted these days, with money as the lure, as the location of processing plants for the mountains of waste churned out by cities, the by-product of the mass-production, mass-consumption economic model. Not surprisingly such plans are meeting with a lot of opposition. After all how many communities are really willing to allow their pride to be bought, and become waste dumps for the cities?

And if the pride of local communities prevents them from accepting waste processing plants, the same increasingly goes for nuclear power plants – the days when, in return for some money, such facilities could be forced on a community are in my mind gone. It is not just the JCO accident that has created the problem. Any attempt to find new locations for nuclear plants is in my mind doomed to fail unless more respect is shown for the regional perspective and feelings.

6. Multifaceted approach to energy generation

At the end of last year, the Dietmen's League for the Promotion of Natural Energy was established in the Diet, with lower house member Kazuo Aichi as Chairman, and work has started on the formulation of a Natural Energy Promotion Law. Though I'm mayor of the so-called "nuclear village", or rather *because* I'm mayor of such a village, I'm taking a keen interest in such moves. The birth of a multifaceted approach to energy production is vital to Japan's future and should be welcomed. I also think that it is especially the proponents of nuclear energy who need to devote serious thought to the development of new energy sources.

What disturbs me about single-minded support of nuclear power, and opposition to a multifaceted approach is that such an approach takes into consideration only the domestic perspective, and fails to take into account such matters as the long-term needs of a resource-poor

country like Japan, and of COP3, and the difficulties in changing the target of constructing an additional twenty nuclear power plants by the year 2010. As a leading proponent of nuclear power, Japan needs to formulate a strategy based on a more global perspective. There are already 430 nuclear reactors in operation around the world, and it behooves us to consider the safety of nuclear power from the point of view of the whole planet. Is it really wise to allow further construction of nuclear reactors in regions where the technological standards are not sufficiently high? And in view of the fact that most nuclear accidents are caused by human error, are present-day reactors of the best design to cope with such error? And have we considered whether we can set an example to other countries where safety precautions are concerned? Given the poor state of our safety precautions, I feel that at present we are in no position to say anything to other countries.

The formulation of laws covering the management of nuclear waste is now under way, but as we can see from the situation at Tokai-mura, it is hard to imagine how exactly the word of law shall be put into practice. If we continue to depend upon nuclear energy without addressing such problems, I fear that we are just creating a detrimental legacy of planetary proportions. We should introduce natural energy generation and promote nuclear power as just one component of a multifaceted approach based not on domestic imperatives alone, but on a global perspective.

7. In conclusion

Ever since that worthless product of the rapid economic growth period, the eighties bubble, burst, Japan had been in the doldrums, and the light at the end of the tunnel is still not visible. The nuclear power industry has also had to struggle in the face of adversity. The JCO accident served not only to expose in one fell swoop the problems in Japan's nuclear power administration, but also, I feel, to issue a warning to Japan to wake up from its present standstill.

As the mayor of Tokai-mura, I shall seek solutions to the post-accident health check-up and damage compensation problems, and make Tokai-mura a safer place to live by reinforcing disaster prevention measures. In the longer term, we need to stand up to untoward gossip. While continuing to place import on our relationship with nuclear power, we shall no longer be so ready to drop everything for the sake of "national policy", but use our collective wisdom to arrive at our own, independent viewpoint, and move forward while building a new relationship with the industry which is appropriate to the twenty-first century.

And I ask of the nuclear power industry that they don't play down the JCO accident as an isolated and minor incident, but rather use it as a lesson, a tool with which to consider environmental and energy problems it exposed, from both scientific and societal perspectives.

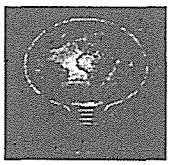
Thank you very much for listening to this talk.

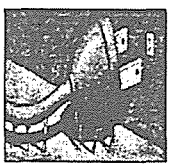
Securing Our Global Energy Future

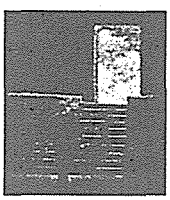
JOE COLVIN
President & Chief Executive Officer
Nuclear Energy Institute

April 26, 2000
Tokyo, Japan

The Status of Nuclear Energy in the U.S. ... At a Glance

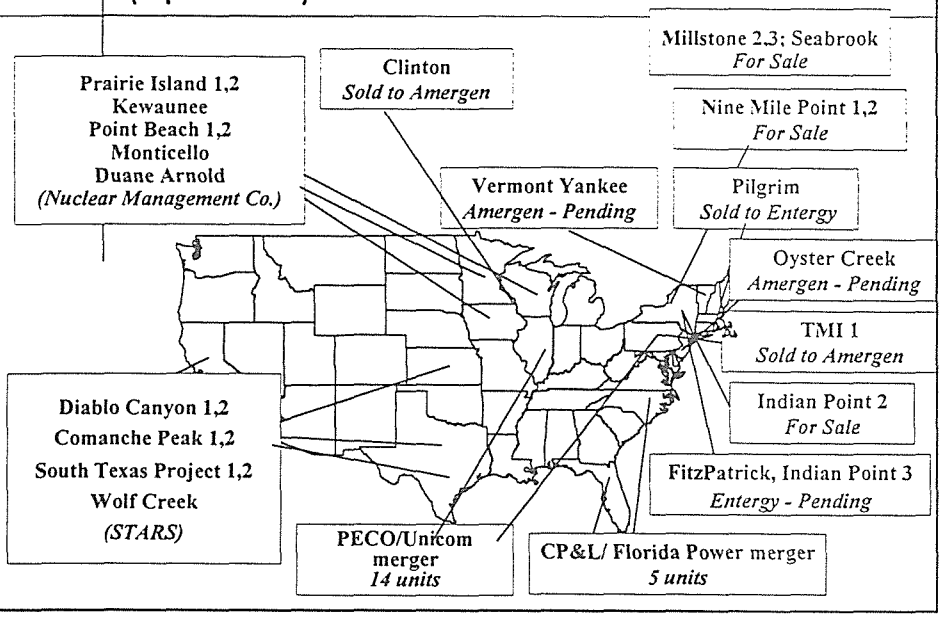






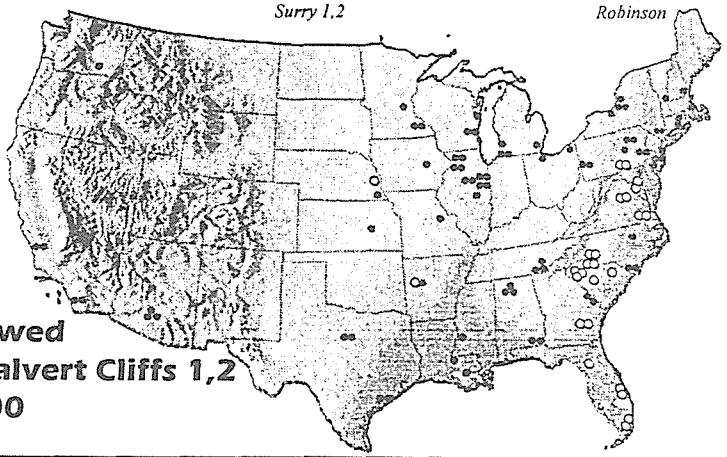
- Industry is well-positioned for competition: focused on improving economic performance since mid-1980s
- Costs declining; no unexpected additional costs
- Consolidation, new business structures
- Not affected by escalating environmental requirements, which have significant impact on economics of fossil generation

Nuclear Generation Consolidation (April 2000)



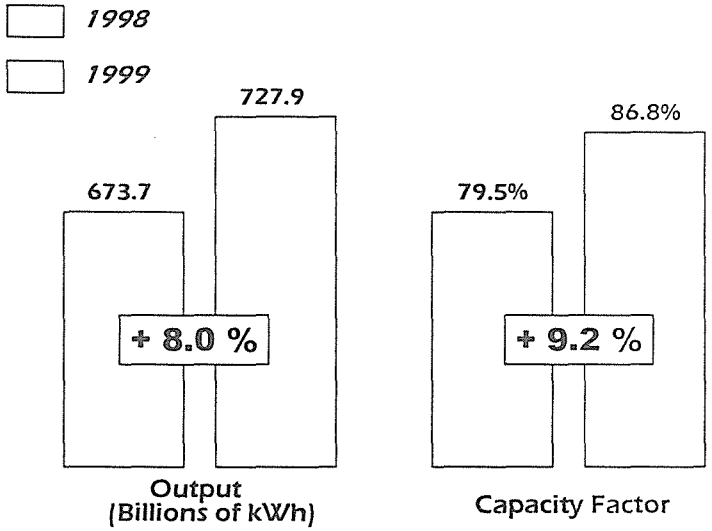
Competitive Market: Major Stimulus for License Renewal

Already filed	2000	2001	2002	2003
Oconee 1,2,3	*Turkey Point 3,4*	*Catawba 1,2*	*St. Lucie 1,2*	*Arkansas Nuclear One 2*
Arkansas Nuclear One 1		*McGuire 1,2*	*Summer*	*Cooper*
Hatch 1,2		*North Anna 1,2*	*Crystal River 3*	*Farley 1,2*
		Peach Bottom 2,3	*Fort Calhoun*	*Robinson*
		Surry 1,2		



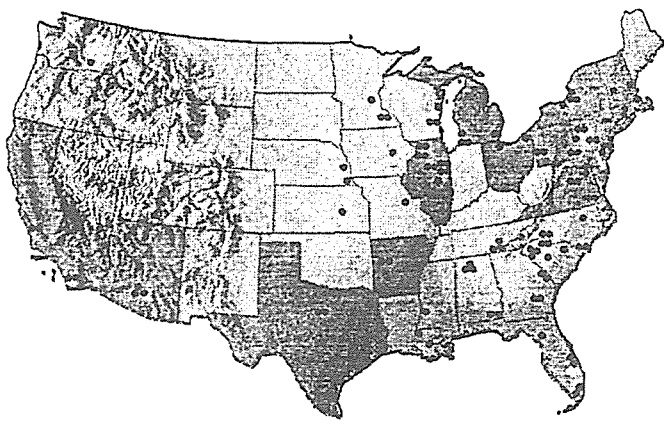
First Renewed License: Calvert Cliffs 1,2 March 2000

U.S. Nuclear Plant Performance

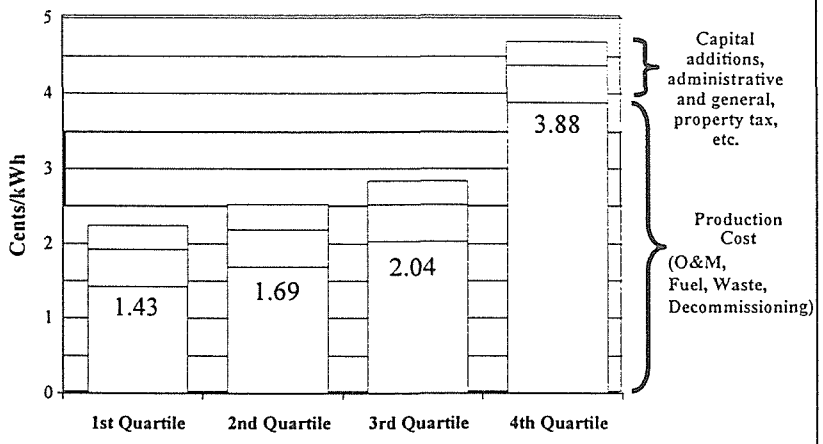


Restructuring Status

- 24 states have restructured their electric power industry
- 16 of those states have operating nuclear plants (60 units)



U.S. Nuclear Plants... Clearly Competitive



Improvements in Regulatory Process and Environment

- Regulatory reform now possible because:
  - industry performance and experience
  - risk assessment tools have been developed, enable focus on safety-significant items
- New openness at the NRC: productive dialogue with industry and public
- Congress playing a key oversight role

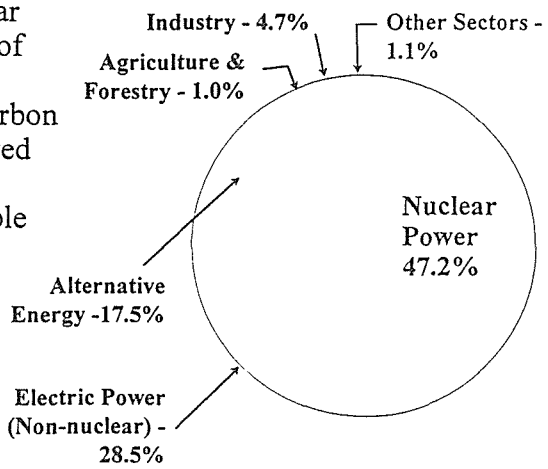
Clean Air Compliance Value of Existing Nuclear Power Plants

- Annually, U.S. nuclear energy avoids:
  - 155 million metric tons of carbon
  - 5 million tons of sulfur dioxide
  - 2.5 million tons of nitrogen oxides

Nuclear energy ... the "silent partner" in clean air compliance.

Carbon Reductions: Nuclear Energy Dominates U.S. Voluntary Program

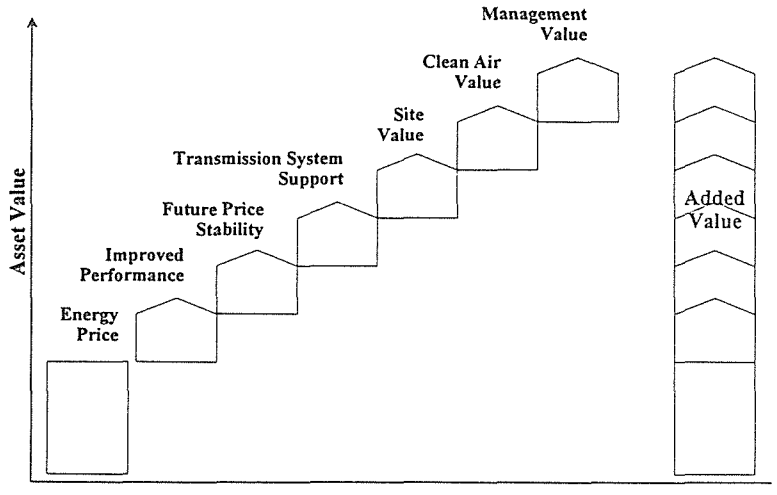
- Carbon emissions avoided by nuclear plants as a result of increased output: Almost half of carbon reductions achieved by all sectors is directly attributable to nuclear power.



Of College-Educated Voters ...

- Support for nuclear energy consistently high
  - Two out of three Americans support nuclear energy
  - Eighty-nine percent favor considering nuclear energy's contribution at policy level

Nuclear Energy: Building the Value



ＪＣＯ事故の教訓と取り組み（要旨）

東京電力株式会社
取締役社長　南　直哉

＜はじめに＞

・ＪＣＯ事故はあってはならない残念な事故であり、同じ原子力産業に携わる者として、被害を受けられた皆様にお詫びとお見舞いを申し上げたい。

＜ＪＣＯ事故の反省と教訓＞

・ＪＣＯ事故については経営管理上の問題が大きく、その背景には、潜在的には危険なものを扱っているという認識の欠如ないしほころびと、社会から遊離した企業内論理に陥っていたことがあったと考えられる。
・これはＪＣＯ自身の責任であるが、同じ産業にありながら、我々もそうした状況を認識していなかったことは原子力産業界として反省すべき問題と考える。
・電気事業者としては、潜在的危険性を念頭に、原子力発電所の安全確保に努めてきたが、安全について、全体への目配りや周辺とのコミュニケーションが不足し、原子力産業の全ての事業者が運命共同体との意識が希薄であったことは反省している。
・安全確保は、第一には個別企業の自己責任であるが、安全情報や安全文化を原子力産業全体で共有し、その状況を互いに確認しあい、社会に発信していく仕組みが必要と考えられる。こうした仕組みは、組織内、業界内論理に陥らないためにも有効であろう。
・安全と経済性は対峙して捉えるべきではなく、安全性が確保されなければ、産業としても成り立ちえないとの意識を持って事業運営にあたっている。

＜教訓を踏まえた具体的取り組み＞

・電気事業としては、発電所の運営に反映すべき事項について、臨界事故調査委員会の提言や原子炉等規制法も踏まえながら対策を検討し、実施に移している。
・防災については、従来から対策を取ってきたが、特別措置法に対応して、国や地元の自治体との連携を念頭に、態勢整備に取り組んでいる。
・原子力産業界全体による安全に関わる協力の仕組みとして、チェルノブイル事故に際してのＷＡＮＯを参考に、３５の事業者が参加してＮＳネットを立ち上げた。また、東海村および隣接地域の原子力事業者間の協力体制や燃料加工会社間のネット

ワークも作られている。
・ＮＳネットの主な活動は、事業所の相互訪問・評価（ピアレビュー）、安全文化の普及、原子力安全に関する情報交換や発信であり、外部から理事長および評議員を迎えて、緊張感の持続と安全風土の向上に努めていく。
・ＮＳネットは本格的に活動を進めつつあり、原子力産業界全体の安全向上に実効を上げるよう支援していきたい。

＜原子力の再出発＞
・ここ数年来の原子力に関わるトラブルや不祥事に加え、ＪＣＯ事故によって原子力および原子力関係者への信頼を大きく損った。
・しかし、大量のエネルギーを、環境への影響を押さえつつ生み出す原子力は、エネルギー供給基盤の脆弱な日本にとって欠くことのできない選択肢である。
・様々なエネルギーを組み合わせたベストミックスによる供給を基本とするが、原子力なしでは困難である。自然エネルギーにも力を入れるが、力不足の自然エネルギーを活用するためにも、ベースを支える原子力の役割は欠かせない。
・安全確保は大前提であり、立地地域の信頼と理解あっての原子力である。原子力産業全体としてＪＣＯ事故の教訓を浸透させ、安全の実績を積み重ねて、信頼を取り戻すよう努力していく決意である。
・電力も市場競争の時代を迎えつつあるが、そうした中にあっても、責任あるエネルギー供給者として安全を第一に原子力を推進し、社会の理解と信頼を得ながら、開かれた健全な原子力の発展をめざして努力したい。

＜おわりに＞
・当地は研究機関の集まる研究開発のメッカであり、東海村という言葉は原子力関係者にとって輝かしい未来と希望を象徴してきた。２１世紀の新しい原子力の展望を開き、次の時代を担う若い世代に夢を与え続けていただければと願っている。
・原子力を担う当事者として、再び「原子力の村」東海村と胸を張っていただけるようになることを確信している。

以上

（第３３回原産大会東海大会講演）

JCO 事故の教訓と取り組み

三菱マテリアル株式会社

取締役社長 秋元 勇巳

昨年９月３０日に発生した JCO ウラン加工工場における臨界事故は、作業者に死者１名を含む重度の被ばく者を生じ、かつ周辺住民の待避を要請するなど、前例のない大事故であり、国内の多くの方にご迷惑を及ぼし、原子力に対する不信感を招いたばかりでなく、世界中の人々に衝撃を与え、原子力のみならず一部に日本の産業や文化に対する不信感さえ醸成したという点でも誠に不幸かつ残念な事故でありました。

しかしながら、わが国のエネルギー資源事情、COP３における温室化ガス低減の約束など、わが国が置かれている状況を考えますと、原子力が一定の役割を担わない限り、わが国のエネルギー供給に支障を来す事は明らかです。これはわが国だけではなく、世界的に見てもあてはまることで、特にこれから急拡大が予想されるアジア諸国のエネルギー需要、原子力への期待を考えますと、ここで日本の原子力が果たすべき責任は、国際的に見ても重大です。

ごく最近電力各社がまとめた２０１０年度末までに運転開始予定の新設原子力発電所は、ＪＣＯ事故の影響等で９９年度計画

の２０基から１３基に変更されていますが、これの達成のためにも我々原子力事業者が安全実績を積み上げていくこと及びこの実績を通して国民の原子力に対する理解と信頼を得ていくことが不可欠であります。
この度のＪＣＯの事故は国民の原子力に対する信頼を根本から揺るがしたと言う点で改めてその影響の深刻さを再認識し従来にも増して安全の確保に努めるべく、決意を新たにしておるところであります。

そこで事故直後から現在にいたるまでの核燃料加工業者が取ってまいりました安全対応についてご説明したいと思います。
まず、事故直後に各社はそれぞれの社内に「緊急対策本部」を設置し対応に当たりました。安全確認のために直ちに各社とも自主的に臨界安全総点検を実施しました。
その過程でJCO社を除く加工施設に対する科学技術庁の立ち入り検査が行われその第一報が１０月１２日付で発表になりました。その内容は「臨界管理を中心として、施設・設計、作業・運転管理方法、教育訓練の観点から総点検を実施した結果、いずれも基本的な安全性の確保はなされている」との評価を頂きました。
またウラン加工業界共通の問題として、各社が所属しております、(社)新金属協会の核燃料部会におきまして、「臨界事故対応対策会議」を設置し、精力的に再発防止策の検討を進めております。

ついで地域、原子力業界、核燃料業界における安全に関するネットワーク作りの状況についてご説明します。

―まず、はじめに、電気事業連合会殿からご提案のありました原子力業界全体としての日本版 WANO 即ち、Nuclear Safety Network (NS　ネット)にも加工業界として積極的に参加することとしております。今回の事故では世間は燃料加工とその他の原子力事業を一体として見ており、原子力全体としての安全文化の構築、信頼の回復が重要であり、NS ネットの設立は誠に意義深いものと考えております。

更に私どもウラン加工業界では、世界の核燃料加工業界での共通な安全文化を確立すべく世界核燃料安全ネットワーク（INSAF）の設立を構想してきましたが、設立総会を昨日東京にて行いました。本構想の重要な意義は、世界中の核燃料サイクル事業者が安全に関する情報を交換することによって、核燃料サイクル事業の安全性向上と信頼回復を目指し
切磋琢磨することにあります。

―次に、東海村、大洗町、旭村、那珂町及びひたちなか市に所在する原子力事業所が相互に協力し、各事業所の施設の安全確保と従業員の資質の向上を図るとともに、その施設において緊急事態が発生した場合に、各事業所が相互に協力して対応することを目的に略称　東海 NOAH という原子力事業所安全協力協定を発足させました。

三菱は日本原子力研究所、原子燃料公社（現核燃料サイクル機構）

等の原子力研究機関がすでにあり原子力のメッカと言われていた東海村に、昭和 36 年に土地を求め昭和 47 年に燃料工場を操業開始以来、常に地元から信頼される会社となるように安全操業に努めて参りましたが、去る平成１０年には、三菱原子燃料（株）の本社を東海村に移し、地域に根ざし、地域と一体となった企業活動を目指してきました。私どもの会社の両隣には、那珂町には三菱マテリアルの環境エネルギー研究所、東海村には三菱重工の研究関連会社のニュークリア・デベロップメント社も操業しており、東海ＮＯＡＨの発足を機に一層地元から信頼される会社を目指し努力していく所存であります。

また三菱マテリアルにおきましては、三菱原子燃料などの関連企業をも含めた原子力安全確保、及び非常事態等危機への備えとその予防を目的として、社長を委員長とする「原子力安全対策委員会」、「原子力安全主任監察役」を設け、グループ内監察（Self Audit）の強化を図ることにいたしました。

今回の事故に対応し「原子炉等規制法」の改正、「原子力災害特別措置法」が成立しました。我々といたしましては、今回の改正、制定された法の内容を正しく理解し、適切に対応していきたいと考えておりますが、今後制定されようとしている政令、省令、指針等につきましては、それが過重な規制、硬直的な管理につながることのないよう切望しております。軽微な変更についての許認可でさえ数ヶ月を要するという状況のままで、規制の振り子の

みが振れすぎますと、かえって従業員の遵守意欲をそぎ、あるいはモラルを低下させる恐れすら危惧されるからであります。

今回のＪＣＯ社の事故は商業炉に低濃縮ウラン燃料を供給する恒常的作業の中で発生したものではなく、より濃縮度の高い中濃縮ウラン原料を高速炉用燃料製造のために不定期に供給するという臨時的作業の中で発生してしまったものであります。
事故発生の背景には、転換試験棟における臨界安全管理の不徹底と、臨界についての保安教育の欠如があると言われています。
我々が、現在採用しておりますウラン燃料加工工程は、取り扱うウランの濃度、濃縮度、
質量を厳重に管理し、さらに減速度管理や形状管理を行っており、これらを基本として、厳重に組み込まれた防護システムで臨界事故を未然に防ぐ構造となっておりますが、これに加え社内検査、NS ネットワークによる業際検査、監督官庁による検査の三重チエック構造の相乗効果をもって、臨界事故の根絶を果たします。

原子力事業の草創期に若さと情熱を持って活躍された多くの技術者が定年退職され、一方で大学で原子力を専攻する学生が減り、大学での核燃料関連の講座もどんどん減ってきつつある現状は、原子力なしには立ちゆかない日本の将来にとって由々しき問題であります。
私どもは、世界最先端の技術を駆使して優秀な製品を作り続けて参りましたが原子力の原点であるここ東海村で事業を営む企業

として、今後とも安全に徹し、誇りの持てる職場作りを行うことによって、もう一度原子力に夢と希望を取り戻す覚悟であります。なにとぞご理解とご支援を賜りたくお願い申し上げます。

以上

（２０００年４月２８日 茨城県東海文化センターにて講演）

(The 33rd JAIF Annual Conference)

Lessons from the JCO accident and our efforts to overcome problems

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The criticality accident that occurred at JCO's uranium fuel manufacturing facility last September 30 was an unprecedented incident on a major scale that resulted in severe casualties from exposure to radioactivity, including the death of one worker, and required that the citizens of the area take shelter. This not only created great annoyance and aroused misgivings about nuclear power among the Japanese, it shocked people around the world and even generated a sense of mistrust regarding parts of Japanese industry and culture — not just nuclear power. This was indeed an unfortunate and regrettable accident.

Considering Japan's circumstances, however — including the country's energy resources and the pledge at COP3 to reduce greenhouse gases — it is clear that if nuclear power is unable to assume its share of the burden, it will create an impediment in the Japanese energy supply. This impediment will not be limited to Japan — it will be affect the entire world. Taking into account the demands of Asian countries for energy, which are forecast to rise dramatically, and the expectations for atomic power, the responsibilities that should be borne by nuclear power in Japan are of international magnitude.

After JCO accident, the number of new nuclear power plants scheduled to begin operation by 2010 has been scaled down from 20 to 13 in the FY 1999 plan very recently compiled by all power companies. To achieve even a total of 13 new plants, it is essential for the operators of nuclear facilities to compile a safety record and gain the understanding and trust of nuclear power on the part of the citizens through this record. The JCO accident has shaken to the core the trust of the Japanese people in nuclear

energy. We should again resolve to reexamine the seriousness of the accident's repercussions and strive even harder to attain the safety levels of the past.

Here, I would like to describe the safety measures taken by nuclear fuel manufacturers during the period beginning immediately after the accident to the present. First, all the companies established in-house emergency headquarters to deal with the situation. Then, each company immediately conducted their own criticality safety inspections to confirm the safety of their facilities.
During this process, the Japanese Science and Technology Agency made a series of on-the-spot inspections of nuclear fuel manufacturing facilities, excluding those of JCO. Their first report was issued on October 12. Its evaluation stated that, "from the perspective of education and training, its comprehensive inspections of facilities, design, and work and operation management methods, with a focus on criticality management, showed that basic safety had been achieved in all cases."

The Committee of nuclear fuel fabrication of the Japan Society of Newer Metals, to which all companies in the uranium fuel manufacturing industry belong, established the Council for measures to respond to criticality accidents. This is assiduously studying ways to prevent a recurrence of these accidents.

Efforts for reinforcing and expanding the safety networks throughout nuclear industries and societies have been continued. First, the nuclear fuel manufacturing industry has decided to actively participate in the Nuclear Safety Network (NS-Net), or the Japanese version of WANO which include all the nuclear power related industry in Japan, as suggested by the Federation of Electric Power Companies. One thing revealed to us was that for the public eyes there is no distinction between nuclear fuel manufacturers and other nuclear power companies. Therefore, in order to regain the public trust, it is necessary to create a culture of safety for the entire nuclear power industry. We believe the creation of the NS-Net was a very significant step indeed.

Further, we in the uranium fuel manufacturing industry have launched an International Network for Safety Assurance of Fuel Cycle Industries (INSAF) aiming at the creation

of common culture of safety in the world's nuclear fuel manufacturing industry. The general meeting convened to establish this network was held yesterday in Tokyo. The importance of this concept is to attain the best practice in every nuclear fuel cycle companies, by continued exchange of information on safety.

Next, the Nuclear Power Office Safety Cooperation Agreement, commonly known as Tokai NOAH, was launched to facilitate the cooperation between the nuclear power businesses located in Tokai-mura, Oharai-cho, Asahi-mura, Naka-machi, and Hitachinaka-shi with the objective of securing the safety of each of the facilities, improving the quality of the personnel, and, in the event of an emergency at these facilities, facilitate a joint response by all the member offices.

In 1961, Mitsubishi sought land in Tokai-mura, dubbed a Mecca for atomic power because it already was the location of nuclear power research facilities such as the Japan Atomic Energy Research Institute and PNC (now known as the Japan Nuclear Fuel Cycle Development Institute). Since Mitsubishi began operating a fuel plant in 1972, it has striven to maintain safe operations at all times to earn a reputation in the area as a trustworthy company.
In 1998, the headquarters of the Mitsubishi Nuclear Fuel Co., Ltd. moved to Tokai-mura with the objective of setting down roots and becoming integrated in the community. Other group companies are in operation on either side of us. Mitsubishi Materials' Energy and Ecosystems Research Center is in Naka-machi, and the Nuclear Development Co., the research arm of Mitsubishi Heavy Industries, is in operation in Tokai-mura. Since the launch of Tokai NOAH, companies are redoubling their efforts to win the trust of the community.

Mitsubishi Materials, with the participation of Mitsubishi Nuclear Fuel and other affiliated companies, has established the Nuclear Power Safety Measures Committee with the company president as committee chair. It also has established the Office of Auditors with the responsibility for inspecting nuclear power safety. The objective of these steps is to obtain nuclear power safety and to prepare for and prevent emergency conditions from arising. It also has strengthened the group's self-auditing function.

The response to this nuclear accident was to amend " The law for the nuclear source material, nuclear fuel material and reactors " and pass a new "Special law of emergency preparedness for nuclear disaster." We are resolving to properly understand and appropriately implement the amendment and the new law. Regarding the move to enact government directives, ministry directives, and administrative guidance into law, however, it is our fervent wish that this does not lead to overly burdensome regulations and rigid management. At present, it takes several months to gain approval for even the most minor changes. If the pendulum of regulation swings too far, it would present the danger that it would weaken the employees' incentive to obey these regulations, or even lower employee moral standards.

The JCO accident did not occur during normal operations to supply low-enriched uranium fuel to commercial reactors. Rather, it occurred during a special operation to supply, on a non-scheduled basis, moderately enriched uranium (at a greater degree of enrichment) to produce fuel for a fast reactor.
Cited as the background of the accident are the inadequate criticality safety management at the conversion trial wing and the lack of education about safety for criticality. We are stringently managing the degree of concentration, the degree of enrichment, and the quantity of the uranium for our present uranium fuel manufacturing process. We also are conducting moderation control and geometry control. These constitute the basis of the structure for preventing criticality accidents before they occur. This has been rigorously incorporated into the accident prevention system.
In addition, the synergistic effect of the triple layer of checks, including in-house inspections, inspections by other members of the industry through the NS network, and inspections by the government agencies with oversight authority, serves to eliminate criticality accidents.

Many of the engineers who joined the nuclear power industry in its infancy and succeeded through a combination of youth and passion have now reached the retirement age. Meanwhile, declining numbers of university students who are specializing in atomic energy, and there has been a steady decrease in the number of university courses

offered on nuclear fuel. This is an alarming problem for Japan, which will not be able to survive in the future without nuclear energy.

We have used the world's most advanced technology to continually produce an excellent product. Here in Tokai-mura, the starting point for nuclear energy, we are resolved as a company in the business to restore our dreams and hopes for nuclear energy through a thorough commitment to safety and creating a worksite of which we can be proud.

We hope that we can receive your understanding and support.