PERSPECTIVES FROM LOCAL OR NATIONAL POWER COMPANIES

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Technical Characteristics

1.1 *Technical characteristics of Japanese Electric Power System*
The Nautilus cordially invited me to the Workshop on IEGI for NEA asking me to present participants technical characteristics of Japanese Electric Power System, in the first place. They are shown in Tables, **T-1** for the current electricity demand, **T-2** for the current sources of electricity supply and **T-3** for the demand forecasts and planned capacity additions in Japan

1.2 *Status of transmission grid in Japan*
In summary of the status of transmission grid in Japan, a figure (**F-1**) shows the main transmission system and power stations. As is well known, the land of Japan is composed of four major islands and the trunk power line runs through the islands, building not the “mesh type” but “fishbone type” network. Though Okinawa islands are still isolated, the trunk power line includes several marine cables between islands, HVDC transmission lines and AC/DC converter stations. They are not necessarily for the bulk power transmission but for the stable operation of power systems interconnected. As supply and demand in the local power systems, each maintained and operated mainly by 9 private power utility companies, is well balanced independently, they are interconnected with each other in a “loose” manner

1.3 *Major issues in terms of Japanese power systems*

Two of the major issues in terms of Japanese power systems will be the way to face with the new systems conditions developed by the introduction of the followings:

Distributed small power sources, like MGT, PVC, FC, WP, etc, from technological point of view

Competitive market which will make charges of transmission one of the serious issues, for instance, from corporate point of view.

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Institutional Characteristics

2.1 *Overall electricity authorities in Japanese government*

Then, the Nautilus asks me about the institutional characteristics of Japanese Electric Power System, that is, overall electricity authorities in Japanese government. Under the current dynamic circumstances in political and economic arena in Japan, none can tell the correct feature of the Japanese government. One fact without doubt is that the tide of deregulation strongly forces everyone concerned to make the authorities kept aside from the competitive market operation. Another explicit fact is the restructuring of government organizations, but, as experts often point it out, this kind of restructuring in Japan will not necessarily mean any substantial change in authority. Anyway, the name of authority in charge of energy and power policy, "Notorious MITI," has replaced with "Ministry of Economy and Industry."

2.2 *Electricity supply companies and their organization*

In regard to the electricity supply companies and their organization **F-1** and **T-2** shows their geographical location and generation capacities. Those private retail sellers of electricity are organized in the Federation of Electric Power Companies. (FEPC) There are many whole sellers of electricity in Japan, two majors of which being Electric Power Development Company (EPDC) and The Japan Atomic Power Company. (JAPC)

These whole sellers could be identified as IPP, but recent and upcoming changes in electricity sector institutions in Japan makes them identified as Power Producers and Suppliers (PPS), except EPDC and JAPC. The ongoing power sector reform makes the new comers participate in the Japanese power utility industries. They are, for instance, Diamond Power, Ennet, eREX, Summit Energy, etc. Enron Japan and its affiliate, E-Power, has been established but not registered as PPS yet, as of April 01. EPDC has long been quite active as a government supported power utility and is now on the way of privatization and restructuring since 1986, 35 years after its establishment in 1952.

2.3 *Ongoing power sector reform*

Needless to say that it is quite important to find the reality and to find the right path for our final goal, particularly at a time of such a chaotic confusion as today. In case of the power utility industry, its final goal is to provide customers with the best service, that is, to supply high quality, reasonable price and enough amount of electricity. Then a question will naturally be raised to ask what are the most important national priorities for the future in terms of electricity service. The most popular and general answer to the question in Japan will be the followings:

To give harmonious solutions between the stable supply of electricity and the dynamic restructuring of market mechanism and corporate organization for free competition, deregulation and effectiveness.

To solve the environment protection problem particularly with regard to CO_2 emission and nuclear power development.

All of the power utility company in Japan are positively making every effort to find and implement the solution, which will guide them to the right path for their final goal under the current dynamic circumstances in the power utility industry all over the world. During the course

of the effort it is well understood that these two answers mentioned above shall not be achieved independently but that they are two aspects of the same issue.

Financial Characteristics

3.1 *Feature and technology for IEGI*

According to my definition, "engineering" is composed of two factors of technology and finance. From technological point of view there will be little difficulty to construct IEGI facilities in any place on the globe. Not only Japan but also every major country in North East Asia has established its technology needed for IEGI. (**F-2**) (**F-3**) HVDC is one of these technologies featuring the high potential of implementing IEGI projects. (**T-4**) Every engineer pays serious attention on the development of super conductivity technology. (**F-4**) Experts always point out the merit and demerit of power systems interconnection. Particularly in Japan the power system interconnection will be introduced to improve the security and the stability of system operation. Another merit of interconnection is, as is often cited, the bulk power supply from natural energy resource area far away from the demand area. As the case in California, US, last summer, power systems interconnection could make wide area supply failure, even though the failure is initiated in a small area in the system. To prevent such a heavy disaster to happen there must be a very sophisticated system control and careful maintenance of facilities.

3.2 *Promotion of IEGI: Meetings and Ideas*

In order to promote IEGI project many ideas have been proposed in many important international meetings including ICEE and WESC (**T-5**), in which they discussed the matter mainly from technological point of view and talked about their dream. Even though there are so many projects proposed (**F-5**) (**F-6**) (**F-7**) and sound bases of engineering in regard to the promotion of IEGI, why the promoting thrust is not strong enough at this moment? One of the reasons will be that there is not enough review of the other factor of engineering, i.e. finance.

3.3 *What is the Reality in front of Competitors?*

If asked of the Japanese view on potential international grid interconnections, particularly of the view of Japanese electric power companies regarding power grid connections with other countries, I can not help pointing out the fact that executives show little interest in IEGI. The institutional reasons for the positions will be simply that they will not be able to find any financial interest, or to say, favorable opportunity of capital gain, in the investment in IEGI. This is the reality not only in Japan but also in the world, where there are many potent competitors in the field of energy supply industries. As we saw in Irkutsk, last September, the discussion was much more "hot" in the conference for gas pipe lines, partly due to the positive support of one of oil companies and to the fantastic idea proposed by a Japanese think-tank.

3.4 *The Silk Road Model: Will it be DSS?*

In order to analyze the reality and to find the potential benefits and liabilities of grid interconnection for Japan and for the region as a whole, I have developed a feasibility study model, "The Silk Road Model" (SRM), in cooperation with my colleague, Dr. KATO, Masakazu. The core of SRM is a formula, or an objective function, to annually calculate the capital and O/M cost of interconnected systems covering the area from Moscow to Tokyo under several constraints on generation plants, converter stations, transmission lines and demand/supply balance. (**F-8**) Several cases have been studied, one of which shows the feasibility of transmitting low cost solar and hydropower generated in Gobi desert and on Yenisay River respectively to Japan in some optimistic conditions. (**F-9**)

It is quite personal view of mine to point out the followings;

There will be little financial merit in IEGI between Japanese islands and Eurasian Continent, as there is little need for Japanese systems to have bulk amount of energy in the form of electric power.
People in the area of North East Asia will be able to share large amount of merit, if they make full use of Japanese faculty in both technology and finance in order to promote IEGI in the area. It is also quite meaningful as a global contribution by the Japanese.
In order to implement the view mentioned above, I believe, SRM will provide people concerned with a tool for practical review and discussion for the project promotion, as the computer model is a flexible decision support system (DSS) under the uncertainty that can be used in discussions between decision makers and specialists to study power systems interconnection. Participants in the discussion can exchange practical views and rational opinions on the data and scenarios shown on the computer view panel.

Conclusion

4.1 *Money is not the problem: it is the answer.*
It is the last but not the least to answer the question, "Could, and under what conditions would, Japan help to secure financing for a regional grid project?" I make it a rule to quote an interesting remark made by Mr. Churchill, Anthony A., on the occasion of the 16th WEC, held in Tokyo, October, 1995. (**F-10**) He says "Money is not the problem: it is the answer." So fur as I understand, it means that executives will be interested in the project, on the condition that specialist will be able to present the project as a technologically sound and financially feasible to provide enough return to the investment.

4.2 ***Restructuring Needed for IEGI***
The condition mentioned above will be met and IEGI project will be promoted, in case we are successful to restructure the government and the corporate organization really effective, the market mechanism freely competitive and the project promotion system productively well organized from engineering point of view. Then my dream embraced for a long time of more than 40 years will come true. I will never give it up!

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