

A Comparative Analysis of Energy Policies and Joint R&D Programs in Advanced Nations

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Abstract—Currently, advanced countries such as European countries and Japan invest lots of efforts to develop improvement of electric power production and supply, environmental countermeasure, and renewable energy development. Accordingly, Korea has been putting efforts to all kinds of electric related technical development based on the mid-long term plan. Further, it is necessary to increase effectiveness of R&D investment by propelling joint research activities with advanced countries for development of important technologies.

Based on this background, this study tries to find thought-provoking suggestions of energy projects, programs and policies. For a comparative analysis, Japan which is similar to Korea in terms of market size and policies, and EU where joint research has been actively carried out among nations are analyzed and compared to policies and joint R&D activities of Korea.

Index Terms—Renewable energy, Joint R&D, Energy Policy, Energy Program, the 5th Framework Program, the 6th Framework Program

I. INTRODUCTION

Advanced nations have made an endeavor in the development of renewable energy technologies and the improvement of energy efficiencies. Energy policies as well as joint R&D activities which support long-term energy plan and object of EU and Japan were established and had been stepped up since 1970.

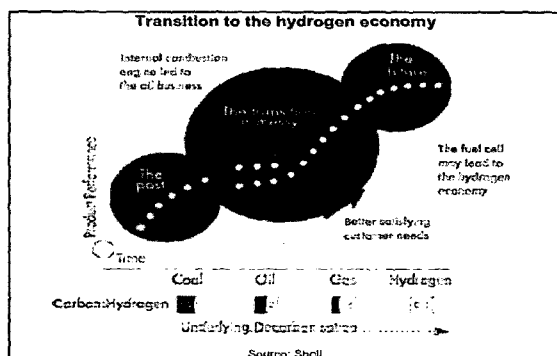


Fig. 1 Transition to Hydrogen Economy

Hereupon Korea has to improve R&D investment efficiency by propelling joint R&D with advanced nations as the measure of acquirement of promising energy technologies. Doing so will be the stepping stone for Korea to gain technological competitive advantages in hydrogen energy society[see Fig. 1].

II. JOINT RESEARCH PROGRAMS IN JAPAN

In Japan, NEDO(New Energy and Industrial Technology Development Organization) is in charge of renewable energy development and related activities, and has been promoting energy technology diffusion owned by Japan focusing on joint research and development with developing countries.

Joint research and development activities that has been executed by NEDO includes energy validity use technologies, coal use technologies, environmental technologies, actual proof development project of solar energies with relative research organizations mainly in the Asia Pacific area [see Fig.2].

In line with those activities, Japan involves in joint R&D activities related to application phase technologies that they have with other nations and tests their technical validity by applying those technologies to new industries which consumes energy in large quantities. This activity is called Energy Validity Use Model Project which has limited its applications to mainly China and developing countries like Vietnam, Thailand and Myanmar in last year.

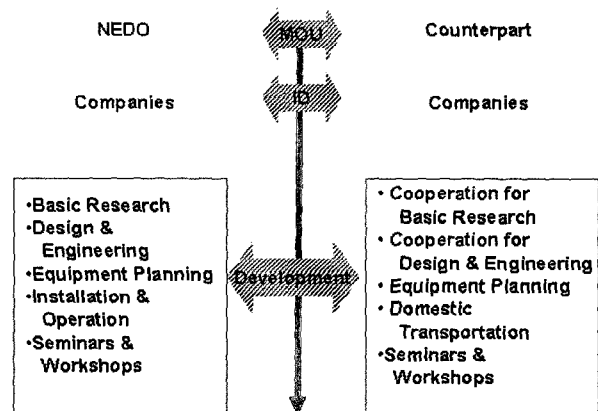


Fig. 2 Project Execution Structure

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The purpose of this project is to use various natural conditions and social systems in other countries that are different from Japan and is to improve the reliability and validity of related technologies by executing joint research and development activities.

Moreover, Japan has been carrying out operation research, technical analysis and receives researchers from other nations based on plants and equipments established by Japan. These activities solve technical problems inherent in developing nations and gives opportunities them to attempt technical improvement required in independent development in the future.

However, in the long run, it plays a crucial role as a bridgehead that Japan could export technologies and related systems continuously based on their indirect investments.

II. JOINT RESEARCH PROGRAMMES IN EU

Whereas Japan has been applying their practical technologies to industry facilities of China and Malaysia to prove of technological validity that are equipped with different technical environment, EU shows different type of R&D activities, co-participation of industry, academia, research institutes and of commercialization activities in renewable energies such as fuel cell, wind power and solar cell. EU sets up relatively long term objectives and plans for the next generation energy development.

Up to now, long-term and short-term energy technology development plans and joint R&D programs have been carrying out on the basis of key action 5(Cleaner Energy Systems including renewables) under the 5th Framework Program(1998-2002) and 6th Framework Program. In addition to this program, there is a separate specific program on Nuclear Energy, based on the Euratom Treaty. Its objective is to help exploit the full potential of nuclear energy to contribute to energy and environmental objectives.

The EU Framework Program is characterized by detailed and concrete subordinate projects under the long term policy as below[see Fig. 3].

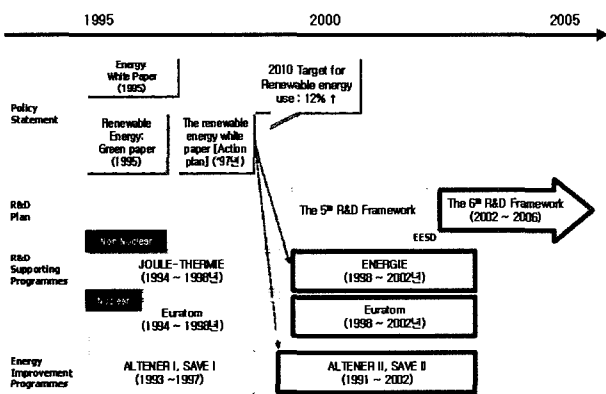


Fig. 3 Roadmap for Energy Programs in EU

While objectives relating to energy, environment and sustainable development are reflected in criteria for selection throughout the Framework Program, the specific programs and projects on Energy, Environment and Sustainable Development (EESD) focuses directly on a number of pressing environmental and energy concerns[see Fig. 4].

Table 1 The 5th Framework Program: Key Action 5

Number of Projects	Programs
125	Technologies for Efficient Energy Use
18	Energy Technologies : Transmission and Distribution
16	Large-Small Scale Energy Storage Technologies
50	Hydrocarbon Production
54	Program Development related to Renewable Energies
14	Technical Changes Forecasting, etc.
244	Total Number of Projects

The strategic goal of this part of the program is to develop sustainable energy systems and services for Europe and contribute to a more sustainable development worldwide, leading to increased security and diversity of supply, the provision of high-quality and low-cost energy services.

It is propelled by part of the 5th and 6th Framework program which is an accomplishment guide of energy field Key Action 5(clean energy system development which includes renewable energies) and Key Action 6(Economic and efficient energy for a competitive Europe).

FP5 Projects

1032 Records were found in the Projects Database. Please click on the project title for more information.

1. * Basic Support for Technology Work 1. Next Step Task Areas 2. Long Term Task Areas

FP5 Programme Acronym: **FP5-EAECTP C**

Project Reference: FU05-CT-1999-00133 Project Acronym: BASIC SUPPORT FOR TE

2. * Basic Support for Technology Work 1. Next Step Task Areas 2. Long Term Task Areas

FP5 Programme Acronym: **FP5-EAECTP C**

Project Reference: FU05-CT-1999-00053 Project Acronym: BASIC SUPPORT FOR TE

3. * Contribution to ITER design studies: plasma control and ac losses

FP5 Programme Acronym: **FP5-EAECTP C**

Project Reference: FU05-CT-1999-00055 Project Acronym: PLASMA CONTROL AND A

Fig. 4 FP 5 Projects

About 244 joint research programs[see Table 1] that have detailed projects by the technical subject are being carried out by various companies, academia, research institutions from all over the world.

For example, the total number of projects related to fuel cells is 189. Among those projects, four organizations from Spain, Norway and France participated in the project called Development of High Effectiveness Solar Cell Intensive Equipment. In other projects, around 5~6 organizations has participated on average. It is turned out that more than 1,000 organizations mainly from Europe participated in the EESD Programs under the 5th Framework Program. Table 2 shows an example of cost-sharing basis cooperation project.

EU gives opportunities of joint R&D project not only to EU but 3rd countries to participate. It is possible for Korean organizations to join in R&D projects irrespectively

of their size and it is necessary for the government to encourage them to attend to various technology cooperation programs that coincide with technology development policies in Korea.

Table 2 Joint R&D Project in the 5th Framework Program in EU

General Project Information	
Project Reference : NNE5/291/2001	Contract Basis : Cost-sharing contracts
Start Date : 2002-01-01	End Date : 2004-06-30
Duration : 30 month	Project Status : Execution
Project Acronym : BIOMAX	Update Date : 2003-09-05
Project Description	
To show the viability of modern DFB technology to maximize the use of biomass-based fuels in power generation.	
To increase competitiveness of biomass-based fuels in power production: logistic, fuel handling and feeding process, and risk for high temperature corrosion	
To boost the environmental benefits by substituting fossil fuels.	
Participants	
Technical Research Center of Finland	AABO AKADEMI Uni. Finland
ALHOLMENS KRAFT Ltd. Finland	FUNCACION CIRCE Spain

EU shows similar approach to Korea in setting up national R&D strategies and plans. When it comes to establishment of research priorities, EU also focuses on life science, information communication, environment energy, Nano technology and space technology and accelerates R&D investment of private and public section in spite of economic slump for many years.

Moreover, EU has been encouraging Korean organizations to participate in the 6th Framework Program that could be the opportunities for Korea to share best practices and to yield synergy effects through joint R&D.

III. CONCLUSION

In conclusion, Korea has to accelerate R&D activities of next generation promising technologies ensuring acquirement of competitive position and it would be possible through joint R&D with advance countries by overcoming technological limitations. This paper proposes the following research development strategies.

Firstly, as Japanese government does, it is recommended to carry out joint research and development with 3rd countries and prove technical validities of renewable energy technologies which have limitations to be applied in Korea.

Secondly, in case of technologies in R&D phase, it is desirable to join in technical cooperation programs in the 6th Framework Program since EU operates various small scale projects where Korean SMEs, research institutions and universities can easily participate in.

Further, it is necessary to draw strategic energy technologies on the national level prior to R&D investment and to attempt to penetrate energy market in advanced nations through the 'choice and concentration' strategy.

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