

# Analysis on the EU Energy Market Trends and Policies

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**Abstract** – In 2000, the EU set up an energy policy related renewables use for electricity demand up to 22% on the purpose of preventing energy exhaustion and world climate exchange.

Technology development and energy production policy on coal, oil and natural gas focus on how to minimize their environmental effects since the world energy system will continue to be dominated by fossil fuels with almost 90% of total energy supply in 2030.

In the long run, the EU drives expansion policy of the renewable energy. If related policies and programs will show successful operation in the near future and will be resulted in increase of budget, we could expect the possibility of expansion of renewable energy market in Korea in the future.

**Index Terms** – renewable energy, energy policy, coal, oil energy, natural gas, nuclear power, electricity production, EU policy

## I. INTRODUCTION

Electricity production increases steadily at an average rate of 3% year. More than half of the production in 2030 will be provided by technologies like combined cycle gas turbines, advanced coal technologies and renewables.

Energy policy in the EU has already gone in advance of other nations in the field of renewable energy and the EU is underway of turning into market-oriented policy.

Technology development and production policy of nuclear energy focuses on having technical competitiveness against the U.S. and in the field of non-nuclear energy; policies have been executed emphasizing renewable energy.

This paper presents market trends on nuclear and non-nuclear energy such as coal, oil and gas and government policies. Further it tries to propose alternatives of energy policies in Korea in the future.

## II. PARADIGM SHIFT

Energy policies in the EU have been carrying out under the Framework Programs and tuning into policies

from R&D to making strong linkages between the EU energy strategies and R&D activities of each nation. Additionally, they try to shift R&D driving policy to enhancing R&D infrastructure and qualitative development.

Among many areas under the 6<sup>th</sup> Framework Programmes, the most budget is allocated in the post genome research area and followed by energy research area. However, energy policy of the EU precedes those of other nations especially in the field of renewables and is underway of turning into market-oriented policy [figure 1].

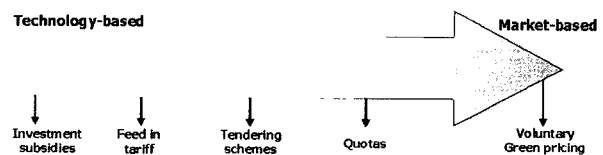


Fig. 1 Paradigm Shift in Energy Policy

## III. COMPARATIVE ANALYSIS OF ENERGY USE IN THE EU

### A. Nuclear Energy

In the world energy market, the development of nuclear power does not keep pace with total electricity production : its market share comes down to 10% in 2030 meanwhile renewables cover 4% of the production from 2% in 2000, mainly because of a rapid progression in electricity production in wind.

Currently, market share of nuclear energy is about 35% and France, Finland and the UK are the nations that propel nuclear energy plans officially meanwhile it does not seem to have promising market share in the future except Finland.

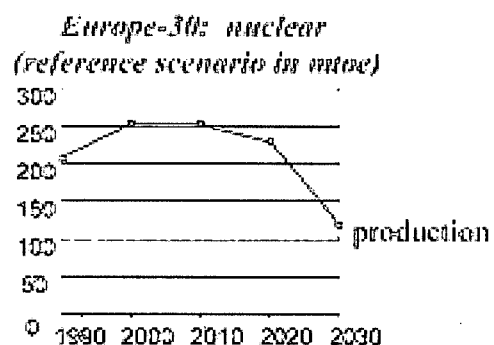


Fig. 2 Nuclear Power Production in the EU [9]

The main reason that nuclear power market has faced with difficult situation is the privatization of electric

Manuscript received June 08, 2005.

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companies since long term investment in nuclear energy is accompanied with high risks unless there would be the government support.

Although, there is a restriction on the establishment of new atomic reactor, the EU operates related R&D programs to get technical competitiveness in nuclear power and related areas which are currently led by the U.S.. Therefore, it is expected that there will not be decrease in terms of power production in the short term meanwhile it will be slowly come down after 2010 [fig. 2].

This phenomenon will be caused by the fact that commercialization of renewable energy will replace the nuclear power market to some extent.

### B. Non-Nuclear Energy

Firstly, coal production of the world market is expected to double between 2000 and 2030, with most of the growth taking place in Asia and in Africa, where more than half the coal would be extracted in 2030. Definitely, coal is attractive energy source from an economic and energy supply viewpoint. However, coal has been phased out from homes, especially in electricity generation where gas is the preferred choice.

*Europe-30: solid fuels  
(reference scenario in mtoe)*

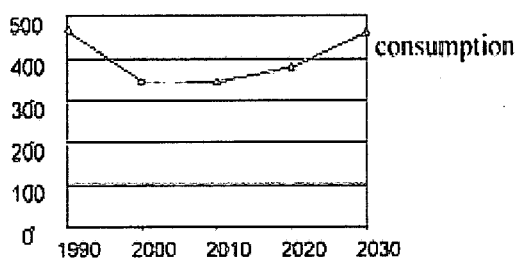


Fig. 3 Coal Consumption in the EU [4]

Furthermore, considering that some EU member nations plan to abolish nuclear power plants by stage, coal use in the EU will not seem to be increased in the future but the current market share would be maintained.

Based on the above trends [fig. 3], technology development and production of coal will be progressed in the direction of minimizing the environmental effects<sup>1</sup>.

Secondly, oil has a larger share of the energy market than any other fuel types, although this proportion is falling. Because of growing demand of oil in the transport sector, oil consumption seems to continuously increase in the near future except of electricity generation area where gas market share shows upward trends. It is expected that dependence on imports continues to fluctuate around 60%-70% and this rate is likely to increase up to 90% in

<sup>1</sup> It is said that there is a relation between greenhouse gas emissions and climate change. In this point of view energy use and production by far the most important source of total greenhouse gas emissions, representing around 80% of 1990 the EU emissions. Among various energy sources, the most important gas is CO<sub>2</sub> coming from fossil fuel production and use.

2020 [fig. 4]. Based on this background, the EU is underway of supporting R&D sector for minimizing the dependence on transportation sector.

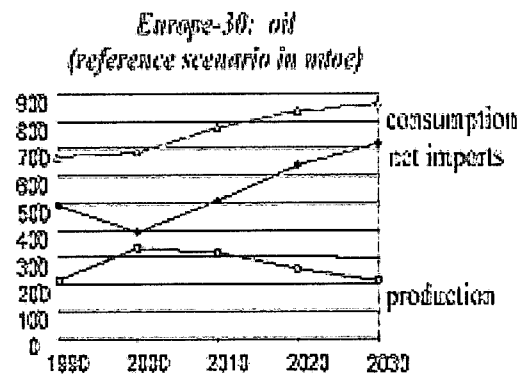


Fig. 4 Oil Consumption in the EU [4]

Thirdly, the share of gas in power generation increases steadily in the three major gas producing regions (CIS, Middle East and Latin America) meanwhile the share of coal decreases in all regions. The EU gas market is rapidly expanding and growth is expected to continue in the next two decades, driven by the gas for power generation. Nevertheless, the EU contribution to world gas consumption is expected to decrease steadily due to production risks.

*EU 30: external dependence per energy product*

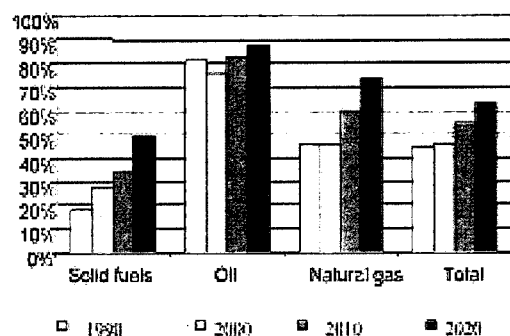


Fig. 5 Natural Gas Consumption in the EU [10]

World gas reserves are abundant but concentrated in CIS and the Middle East. However, the European gas resources are limited and will be declined beyond 2010, resulting in increasing dependence on external gas suppliers. Therefore, it seems that the EU would put emphasis on the use of renewables to avoid supply risks and minimizing dependence on external gas suppliers [fig. 5].

Finally, the major Renewable Energy Sources (herewith RES) sector is wind, photovoltaic, solar thermal, hydro, biomass and geothermal. In the long run, those energy sources could help significantly to combine secure energy supplies with a healthy environmental and economic performance. Although their potential is significant, renewable sources of energy make a small contribution of around 6% of electricity production at the moment. In this connection, the challenge for the RES sector is to increase this proportion: the European Commission has set a target of

12% by 2010 [fig.6], and this will be helpful for environmental targets since RES are CO<sup>2</sup> neutral.

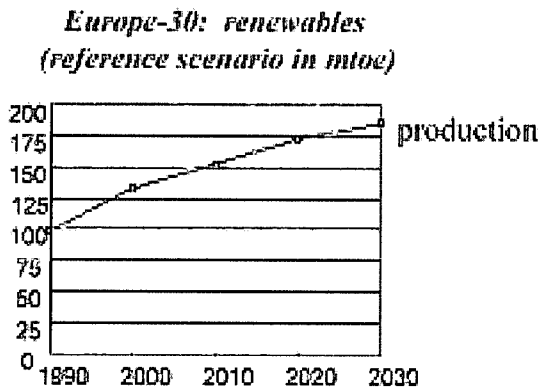


Fig. 6 Renewables Production in the EU [10]

There will be a high level of investment in renewable energy almost 30% increases between 1987 and 2010. If this is coupled with funding in research, technology development and demonstration for related technologies, the renewable production over the coming years will be highly promising.

It is anticipated that the EU keeps its favorable position as a manufacturer, developer and user of RES technologies and further to play an important role in spreading fast-growing markets in the world [fig 7].

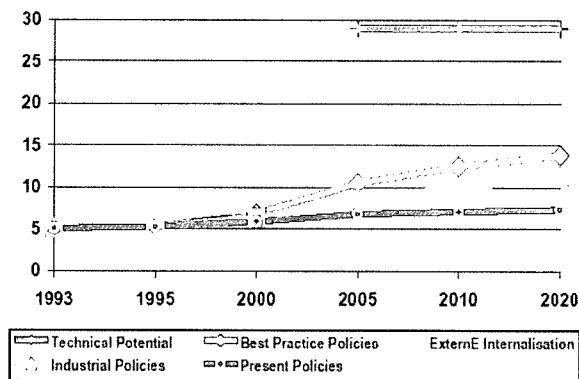


Fig. 7 RES Contribution to Primary Energy Consumption: actual, best available and Potential [6]

Among various renewable energy sources, wind energy is expected to grow dramatically and a quadrupling of market potential is expected by 2020 based on long-term investment and tax favor.

In the long run, wind energy will have potential to contribute up to 30% of the current electricity demand (15% of the overall primary energy in the EU) as new technologies for offshore installations, lighter structures and variable speed generators come on stream.

The EU faces with many issues in a long term energy supply and in particular, full development of renewable energy sources could play a large part in reducing greenhouse gas emissions from electricity production. However, early introduction of targeted measures, economic incentives and vigorous marketing would be required in advance.

## IV. IMPLICATIONS

Nuclear Energy in the EU has been facilitated by international treaties (e.g. Euratom) and specific agencies. The EU is currently dependent on nuclear generation for a significant part of its electricity supply: approximately 23% of installed electricity generation capacity and 35% of electricity production. This trend is likely to remain at least in the short term but uncertain in the mid term.

On the one hand, nuclear power has the advantage since it produces very few greenhouse gases and on the other hand several member states have introduced nuclear moratoria. As the EU policy shows, it is required for Korea to maintain long-term research, partly to find a solution to the problems and partly to hand down nuclear expertise to future generation looking beyond 2010. In the long term, the EU plans to produce renewable energy for electricity production up to 22% in 2010 considering that RES market share increases dramatically through continuous investment and market enlargement.

Energy market trends and RES market growth in the EU give some implications. Apart from political and economic situation, energy policies and market trends of the EU which has a similar condition to Korea in terms of natural resources and geographical conditions could give us solutions for domestic energy issues.

In the first place, it is recommended to emphasize environmental improvement, minimizing greenhouse effect and employment creation when setting up long term plan in Korea, and further it is suggested financial incentives to promote renewables should be considered. RES do not compete on an equal basis with conventional fuels and technical advancement could help cost reduction in some sectors such as wind. It suggests appropriate investment in R&D activities and promotion of renewable technologies for short, medium and long term commercialization should be made.

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