

Codes, Practices, and Regulations for Major Power Line Construction and Operation in the Republic of Korea, with a Focus on Environmental Protection

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Preface:

The purpose of this paper is to provide a data and knowledge base of laws and practices related to power line construction in the Republic of Korea (ROK). Along with its companion papers by participants from other countries, this paper is designed to help Grid Workshop participants compare the technical and environmental requirements that apply to construction of power transmission facilities in different countries, and thus to help to determine a set of power line configurations that would meet the needs of each of the countries that would share a grid interconnection. As in many countries, it is very difficult and time-consuming job to construct electric facilities in the Republic of Korea. This paper mainly summarizes the procedure that must be followed to obtain approval to construct transmission lines in the ROK. The paper also touches upon other codes and regulations related to the construction and operation of transmission lines, including key environmental regulations.

Key Words:

Transmission line, Environment, Code/Act/Law, Regulation, Permission

1. Introduction

Environmental policy in the Republic of Korea (ROK) is geared toward providing qualitative improvement in environmental quality for ROK citizens, as well as the establishment of a pleasant environment nationwide through the use of good environmental conservation practices. "The Framework Act on Environmental Policy", legislated in August 1990 and updated in December 2002, which sets the direction of environmental policy in the Republic of Korea, is based upon the following basic concepts:

- The maintenance of a balance between humans and the environment, which is a prerequisite to maintaining the health of the people, enabling enjoyment of a sound cultural life, and conservation of the nation's land, in turn allowing the sustainable development of the country
- The establishment and conservation of a sound environment, and the design of environmental

policies geared toward environmental consideration.

- Environmental consideration takes priority over any other national policy.

Based on these concepts, the environmental policies of the Republic of Korea aim to provide a system of laws and regulations that allow all those who currently living in the ROK to use and enjoy environmental benefits, but at the same time, fulfilling the obligation of the current generation to hand over a clean environment to the next generation. In this regard, the government of the Republic of Korea has the responsibility to set up an Environmental Standard on which to base the regulation of the environmental performance of many types of activities. The Standard itself is based on the principles of environmental maintenance and conservation described above. As such, the Environmental Standard is the object and indicator of national administrative activities, although it does not have direct regulatory implications itself.

The Environmental Standard is set by the ROK government based on an examination of the unique nature of the Korean peninsula, but recommendations based on global environmental standards are generally referred to. Presently, in the Republic of Korea, the stronger enforcement of the Environmental Standard is considered to be required because environmental regulations currently enforced are too loosely to conserve the environment effectively.

According to the laws and codes in force in the ROK, the overall Environmental Standard is to be enacted by presidential decree. Although it is desirable that the Environmental Standard be set in this manner, as it places the authority of the office of the President behind the Standard, practical implementation of the Standard is aided if the Standard is based on solid scientific principles.

2. Codes Concerning the Construction of Transmission Lines

Transmission lines (T/L), due to their unique nature, are usually constructed over a long geographical distance. Transmission line right-of-ways are therefore likely to pass through various land types, including forests, river areas, farm fields, pastures, parks, and other types of areas, and often pass through a number of different governmental jurisdictions as well. Thus, in order to construct transmission lines, T/L builders must obtain permission from every relevant authority along the right-of-way according to the provisions of the individual acts and/or codes concerned with T/L construction and related activities (such as the building of access roads) in each jurisdiction.

Laws under which transmission line builders may need to (and in some cases, must) obtain permits or other authorization during the transmission line planning and/or construction process are as follows:

- Permission for changes of land classification and related changes under the provisions of Article 4 of the *Urban Planning Act*, the designation of the which agency will execute the urban planning program related to the area near the proposed right-of-way under the provisions of Article 23 of the same Act, and authorization of the execution plan under the provisions of Article 25 of the *Urban Planning Act*.
- Permission for the initiation of road construction work related to transmission line construction and/or maintenance under the provisions of Article 34 of *the Road Act*, permission to occupy newly constructed roads under the provisions of Article 40 of the same

Act, and permission for construction activities related to or affecting the use of roads under the provisions of Article 50 and 51 of the same Act.

- Permission for the establishment of private roads under the provisions of Article 4 of the ***Private Road Act***
- Permission for the initiation of the construction work near or over rivers under the provisions of Article 23 of the ***River Act***, and the permission of occupation of structures near or over rivers under the provisions of Article 25 of the same Act.
- Permission for the occupation and use of areas of public waters under the provisions of Article 5 of the ***Public Waters Management Act***, authorization to execute a plan for the use of public waters, and responsibilities for reporting on the use of public waters.
- Authorization of a implementation plan for changes in land ownership under the provisions of the ***Land Expropriation Act***
- Licensing for the reclamation of public waters under provisions of Article 9 of **the *Public Waters Reclamation Act***, authorization of the T/L project's plan for executing water reclamation under provisions of Article 15 of the same Act, and requirements for consultation and obtaining approval for waters reclamation under provisions of Article 38 of the same Act;
- Authorization for the installation of exclusive waterworks or exclusive waterworks for manufacturing use under the provisions of Articles 36 and 38 of the ***Water Supply and Waterworks Installation Act***;
- Permission for occupation and use of parks and other natural protected areas under the provisions of Articles 23 and 25 of the ***Natural Parks Act***;
- Requirements for obtaining approval or conducting consultation related to the establishment of public facilities under the provisions of Article 20 of the ***Act on the Utilization and Management of the National Territory***;
- Permission for changes in classification of farmland under the provisions of Article 36 of the ***Farmland Act***;
- Permission for the diversion of land preserved for forestry under the provisions of Article 18 of **the *Forestry Act***, permission to clear trees and other vegetation in forests under the provisions of Articles 62 and 90 of the same Act, and permission to lease or use national forest lands under the provisions of Article 75 of the same Act;
- Permission to clear forests and make other changes in land cover under the provisions of Article 14 of the ***Work Against Land Erosion or Collapse Act***, and permission to change the designation of erosion control areas under the provisions of Article 20 of the same Act;
- Requirements for consultations and other approvals related to the use of government installations under the provisions of Article 10 of the ***Protection of Military Installations Act***, Article 6 of the ***Naval Bases Act***, and Article 16 of **the *Military Air Bases Act***;
- Permission for changes in land classifications and related changes under the provisions of Article 8 of the ***Grassland Act***, and permission for diversion of grassland under the provisions of Article 23 of the same Act;

- Permission to prepare plans for port construction work under the provisions of Article 9 (2) of the *Harbor Act*, and obtaining approval of plans for execution of port construction work under the provisions of Article 10 (2) of the same Act;
- Permission for burial of transmission cables and other T/L components under the provisions of Article 16 (2) of the *Burial and Graveyard Act*;
- Identification of non-permitted measures related to transmission line construction under the provisions of Article 29 of the *Mining Industry Act*, and measures required for revocation of mining rights or measures for reduction of areas for which mining rights are allowed under the provisions of Article 39 of the same Act; and
- Approval of land use under the provisions of Article 11 (3) of the *Atomic Energy Act*.

3. Act on Special Cases Concerning Electric Source Development

3.1 Purpose of the "Act on Special Cases Concerning Electric Source Development"

The purpose of the Act on Special Cases concerning Electric Source Development (referred to as ASCESD hereafter) is to effectively move forward and give priority to the program of development of electricity supply infrastructure in order to secure the stability of electricity supply, and thus to contribute to the development of the Korean economy.

During the past several decades, the Korean economy has grown very rapidly. Along with strong economic growth, electricity demand has also skyrocketed. Generation capacity increased from 282 MW in 1953, just after the Korean War, to 52,649 MW in 2002. Further, it is estimated that maximum electricity demand will reach 67,700 MW by 2015, at which time power demand will (studies suggest) be saturated, growing very little thereafter (see reference [4]).

As a consequence, in order to supply electricity reliably to the Korean economy as it grows, an estimated 41,150 MW of additional generation capacity (taking into account capacity that will need to be retired), 103,688 MVA (mega-volt-ampere) of new transformer capacity and 8,053 c-km (circuit-kilometers) of new transmission lines are scheduled to be constructed by 2015.

Electricity supply development projects, however, are usually large in scale, and therefore capital intensive, as well as being time-consuming to complete. To make matters worse, civil petitions against construction of electric facilities are increasingly frequent because electric facilities are often deemed as “disgust facilities” (undesirable neighbors), drawing a “NIMBY” (“Not In My Back Yard”) response from those who live or work in areas near proposed electricity infrastructure sites. In addition, builders of transmission lines have to check whether electricity infrastructure development projects will be affected by (or will affect) other national projects (for example, transport infrastructure, resource use/protection, new urban development, environmental protection activities, or other national initiatives).

In addition to addressing citizen concerns, transmission line planners and builders must consult and get permission, sanction, or authorization from concerned authorities in order to determine what transmission routes will be used and to allow the implementation of construction

activities. Various codes and laws related to the establishment and use of right-of-ways in which the transmission lines will be constructed, regulate these approval processes.

Procedures for obtaining approval for transmission line construction in the ROK are very complicated and are extremely time consuming. If T/L builders are required to go through every individual Code and/or Act of regulation that may apply, transmission line construction might not in some cases be completed in time to meet growing electricity demand. This delay in providing necessary power may bring tremendous damage to the national economy and cause inconvenience in the everyday life of the people.

In order to streamline the process of obtaining approval for transmission line construction, the Korean government created through legislating the "Act on Special Cases Concerning Electric Source Development", or ASCESD. The ASCESD is sort of a one-stop process designed to facilitate the planning and construction of electricity supply facilities. Under the provisions of this Act, transmission line builders do not have to consult with or obtain permission, sanction, or authorization required in other individual Codes or Acts of regulation. Of course, it is still an indispensable part of the approval process for the electricity supply facility developer to discuss the issues of each individual Codes/Acts with the relevant authority. In order to obtain approval to construct a transmission line, T/L builders are obligated to discuss various issues and seek opinions or conditions of agreements from the authorities concerned, but builders only need to meet the criteria prescribed by the ASCESD.

Article 6 (Relation with Other Acts) of the ASCESD reads:

In a case where an electric resource developer has obtained authorization of the execution plan or authorization, it shall be regarded as having obtained the permission, authorization, license, decision, designation, approval, discharge, consultation, or measures, etc. in subparagraph below and, therefore, if public notice is being made under the provisions of the same Article, authorization and permission in subparagraph below shall be regarded as being publicly notices.

The purpose of the ASCESD is to promote electric facility construction by synthesizing and abridging the required legal process for the construction of electrical facilities, and, therefore, to promote construction of electric facilities, which will contribute to the development of the national economy. In cases where there are difficulties in securing right-of-way for transmission lines, the ASCESD process can also be the prerequisite for expropriation of the land in question.

3.2 What Types of Projects can be Processed under the ASCESD?

Projects in the following categories may be processed under the ASCESD:

- Electric resource development projects that involve the construction of power plant, transmission, substation, and incidental facilities in accordance with the "Long-range Power Supply Plan" issued by the Korean government.
- Electric resource development projects that are not specified by the provisions of the Enforcement Decree of the ASCESD

3.3 Process for Obtaining Permission for Construction of Electricity Facilities through the ASCESD

A. Pre-survey for the selection of the T/L route

The pre-survey includes investigation of general aspects of proposed power line routings, including the possibility of civil petitions, environmental impacts, other plans for use of the subject area, construction costs, and anticipated difficulties in purchasing or recompensing owners for the use of the land to be included in the T/L routes.

B. Determination of transmission line route

Under the ASCESD, prospective T/L builders typically submit multiple proposals for the transmission line routes. These proposals are then screened using the following process:

- Opinions on the proposed project are gathered from provincial administration bodies and local residents. These opinions should be considered in forming in the execution plan.
- Evaluation of the impact of the proposed routings on the environment.
- Estimation of construction costs for the project using the proposed routes.
- Evaluation of the feasibility of securing right-of-ways for the proposed routes.

Once the preferred transmission line route has been selected, builders are to apply for permission to assemble an execution plan to develop the electric resource

C. Documents required when seeking permission for T/L projects through the ASCESD

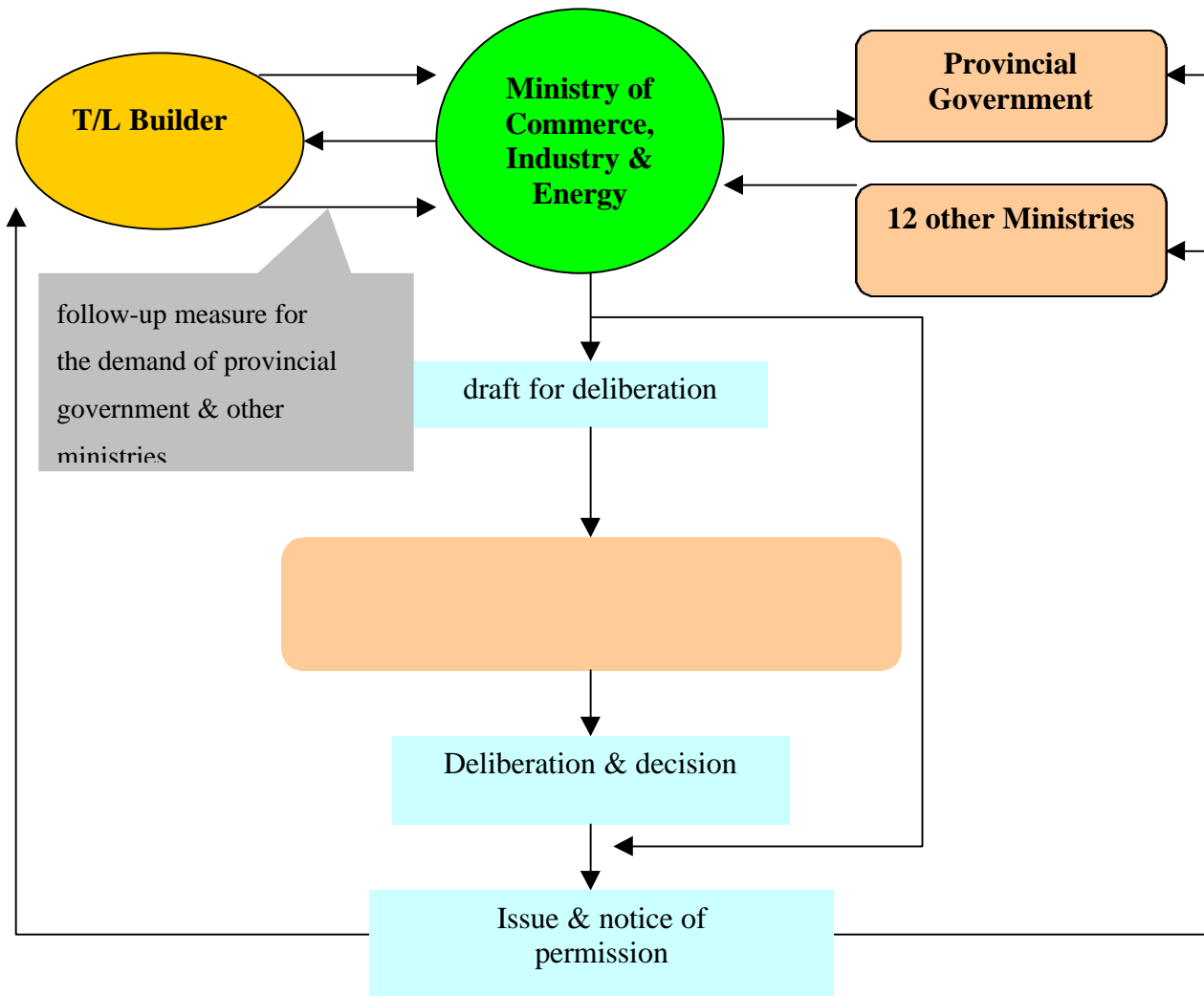
Execution plans for construction of T/Ls submitted under ASCESD shall include the following:

- A summary of the electricity supply facilities included in the plan.
- The location and area, in square kilometers, of the electricity supply facility area.
- The expected period over which the electricity supply facility will be constructed.
- The total costs of the project and the projected sources of project funding.
- A description of matters related to installation of public facilities as a part of the project and potential sharing of project cost by authorities developing those public facilities.
- A discussion of matters concerning national natural environmental preservation, (more details on this issue will be dealt with later in this paper).
- Other matters defined by presidential decree concerning the electric resource development business.

D. Procedure for obtaining permission to build electric facilities through the ASCESD

1) Procedure for obtaining permission for T/L construction through the ASCESD

The following diagram summarizes the procedure to be followed to obtain permission to construct T/L facilities under the ASCESD. The elements presented in the diagram are discussed in the text that follows.



- Based on the requirements of the ASCESD, T/L builders are to submit an execution plan for transmission line construction to the Ministry of Commerce, Industry and Energy (MOCIE) after first discussing the plan with local administration bodies.
- MOCIE circulates the execution plan to provincial governments and other ministries, and requests opinions or conditions for agreement.
- Provincial governments and other ministries reply to MOCIE with "conditions or opinions", if any, for agreements on the T/L project. If there is no infringement of law in the execution plan, provincial governments and other ministries are unlikely to disagree with the plan.
- MOCIE informs the prospective T/L builders of any "conditions or opinions" that must be taken into account in T/L line design and construction.
- T/L builders then prepare follow-up measures designed to meet the "conditions or opinions" expressed by other agencies, and informs MOCIE about the measures it intends to take to revise the execution plan.

- MOCIE analyzes the plan, conditions, opinions, and measures, then forms a draft for deliberation, and MOCIE issues permission if the execution plan is classified as "not serious case" by the provisions of presidential Decree of reinforcement of the ASCESD
- MOCIE submits the cases not classified as "not serious" (meaning that there are no serious disagreements between parties) to the Electric Source Development Promotion Committee.

The committee is to be composed of 14 members, with the vice minister of MOCIE as the chairperson, a director level officer of MOCIE as the secretary, and director general level officers from 12 Ministries.

- The Electric Source Development Promotion Committee deliberates over the draft plan and decides whether the execution plan can proceed, must be modified, or should be canceled (rejected).
- MOCIE then notifies every concerned stakeholder of the committee's decision, including the prospective T/L builder, the provincial government, and others.

The execution plan is considered authorized from the minute the decision of the Committee is published in the official gazette of government proceedings.

Local administrative bodies are required to inform landowners and/or interested parties of the Committee's decision.

2) Pre-submission discussions with local parties to obtain agreement on execution plan

T/L builders usually meet with local administration officials, including provincial, municipal, state, county, ward, and, if needed, subsidiary offices of various ministries to discuss the execution plan for transmission line construction before the plan is officially submitted. The purpose behind these "pre-discussions" is to explain the execution plan for T/L construction. It is important to the process of winning approval from stakeholders that stakeholders receive the information needed to review the execution plan prior to official submission of the plan. Doing so enables T/L builders to save time and to minimize trials and errors in obtaining stakeholder approval when the execution plan is circulated for agreement by MOCIE. The issues covered in these pre-discussions typically include the following items:

- Potential conflicts with other urban development projects.
- Potential conflicts with existing plans for road, industrial complexes, housing areas, cultural asset preservation areas, or other public or private developments.
- Issues related to the fundamental plan of reclamation of public waters.
- Conflicts that may arise with future plan for farmland use.
- Potential conflicts with forestry conservation efforts.
- Inquires as to the use the of river areas.
- Deliberations on the use of national or public lands.
- Potential conflicts with projects governed by other laws.
- Opinions or agreements conditionally imposed by provincial governments

During this pre-discussion process, if the execution plan is found to infringe on other

codes/acts, builders must re-examine the proposed site and execution plan and then return to the discussion table to go over any modifications with stakeholders.

3) Discussions with other Ministries

Based on the provisions of the ASCESD, MOCIE takes the proposed execution plan, as submitted by the proposed electric facility builder, and begins discussions with twelve other Ministries. These ministries must then submit opinions on the plan, if any, within 30 days. The main issues examined by each ministry are described in the table that follows.

Ministry	Issues to be discussed
Ministry of Finance & Economy	<ul style="list-style-type: none"> • Items concerning national economic development plans • Items related to cost, financing and national properties
Ministry of National Defense	<ul style="list-style-type: none"> • Issues regarding existing or future military facilities • Issues concerning military operations • Issues of national security
Ministry of Government Administration & Home Affairs	<ul style="list-style-type: none"> • Items concerning local development plans and the balance between areas • Issues related to ironing out the different views of provincial governments and compensation for hosting T/L facilities • Issues regarding installation or replacement of public facilities
Ministry of Science & Technology	<ul style="list-style-type: none"> • Issues concerning construction of nuclear power plants • Issues concerning development of electrical technologies
Ministry of Agriculture & Forestry	<ul style="list-style-type: none"> • Issues concerning agricultural policy (use of farmland, reclamation, etc) • Issues concerning diversion of farmland and charges for farmland conversion, including costs of establishing substitute farmlands • Diversion of grasslands
Ministry of Information & Communication	<ul style="list-style-type: none"> • Induced interference from T/L on telecommunication facilities and countermeasures to reduce interference • Establishment of exclusive communication facilities for the electric power sector
Ministry of Construction & Transportation	<ul style="list-style-type: none"> • Issues on rational use and balanced development of land • Issues on occupying and crossing the road areas • Issues regarding urban plan, new city projects, development of industrial, complexes, and related issues.

Ministry	Issues to be discussed
Ministry of Maritime Affairs & Fisheries	<ul style="list-style-type: none"> • Issues concerning marine policy and conservation of marine resources • Compensation of fishery rights and protection of fishing people • Issues concerning harbor policy • Issues regarding use and designation of harbors
Korea Forest Service	<ul style="list-style-type: none"> • Issues concerning policies of forest conservation • Issues concerning woodcutting and the use of national forests
Korea Railroad Service	<ul style="list-style-type: none"> • Issues concerning railroad policy • Issues concerning railroad crossings and countermeasures against induced interference in railroad communications equipment

E. Requirements for adhering to conditions placed on agreements

T/L builders are required to carry out or adhere to any agreement conditions imposed by the "Electric Power Source Development Promotion Committee" during the deliberations on the execution plan, or instituted by provincial governments, or other ministries, during pre-discussion or during opinion gathering on the draft of the execution plan. T/L builders are required to report on the status of the agreement conditions annually to all interested parties. The party who brought up the condition is required to check on the performance of the T/L builder in following the agreement condition, and to urge the project builders to push forward to meet the terms of the condition. If the party finds that the builders seriously neglected the agreement condition, those parties can require a stoppage in construction until the condition is met.

The brief case study that follows illustrates the operation of the process of identifying, reaching agreement on, and implementing conditions of interest to local stakeholders in an ROK T/L siting process.

Case Study: Agreement on Conservation of "Naemorhedus Goral Raddeanus" Habitat

When Korea Electric Power Corp (KEPCO) submitted the draft of its execution plan to construct a 765 kV transmission line between Taebaek and Gapyoung, a distance of 150 km, it encountered a wildlife problem. According to the draft execution plan, the T/L route was to go through the Wonju County. During the pre-discussion and opinion gathering session involving residents and provincial government representatives, the environmental office of Wonju County pointed out that the transmission line was going to cross the habitat of the "Naemorhedus Goral Raddeanus", a wild goat, which is on the verge of becoming extinct. The Wonju County environmental office demanded that measures to conserve the wild goat population be incorporated in the T/L project.

KEPCO issued an order to form a team of environmental specialists to conduct research on the topic, and asked for suggestions from other parties as to how to resolve the wild goat habitat issue. The report resulting from the commissioned research did indeed show the existence of the endangered wild goat in the area, and that the proposed transmission line route really did cross the goat's habitat. Based on these findings, KEPCO decided to re-route the transmission

line to detour around that site, which increased the length of transmission line and number of towers required. Of course these changes contributed to an increase in the cost of the project!

F. Environmental Impact Assessment and Environmental Investigation report

When prospective T/L builders submit their execution plans to obtain permission to proceed with a project, documents that deal with environmental issues related to the project must be attached. The following types of electric generation or transmission facilities construction projects must go through Environmental Impact Assessment (EIA).

- Power plants whose total generation capacity is equal to or greater than 10 MW. In the case of hydro power plants, the minimum size for which an EIA is required is 3 MW.
- Transmission lines with ratings of 345 kV and above, and with lengths of 10 km or more.
- Outdoor-type 765 kV substations.

An "Environmental Investigation" report, rather than an EIA, is required for electricity infrastructure projects not included in the categories above.

The difference between an "Environmental Impact Assessment" and an "Environmental Investigation" is that the Ministry of the Environment stringently examines the former, while the latter goes through a comparatively less rigorous examination. Both the EIA and the Environmental Investigation reports, however, must cover all of the issues and include the data specified below:

1) Impact on Natural Environment sector

a. Climate

- meteorological observation data covering the subject area for more than the preceding 10 years.
- estimated changes in local and/or regional weather patterns due to the construction of the electrical facility.
- evaluation of the possibility of adverse impacts, such as air pollution, noxious smells, and other impacts, on the area neighboring the facility to be built, and proposal for follow-up measures to mitigate any such impacts.

b. Topographical and geological features

Investigation and compilation of quantitative and qualitative data on the topographical and geological features of the proposed project area, and consideration as whether some features that will be affected by the project are scientifically or culturally valuable to conserve.

c. Ecological features

Investigation of the present ecological status of the site, analysis of what the impacts of project construction and operation might be on the site, and presentation and analysis of follow-up measures designed to conserve the ecological features of the project area.

d. Marine ecological features

In the event the project takes place near a marine area, an investigation of the present status and an estimate on the environmental impact of the project on marine areas is required.

e. Hydrographical features

- Investigation of the status of water resources and irrigation use in the project area.
- Measures to prevent the project from damaging the hydrographical environment.

f. Consideration in tower siting.

- In principle, constructing towers in green belt conservation areas or on land with slopes of 20-30 degrees or more is restricted.
- Tree cutting should be restricted to within the tower site, excluding areas possible avalanche or landslide danger exists.
- Access roads to the tower area that are used to transport construction materials should be built with only a minimum of tree cutting, utilizing monorail, cable car, or helicopter logging methods when possible to reduce damage to the site.
- measures to minimize topographical or geological change during construction.

2) Impact on Residential Environment sector

a. Land use

- Investigate the current state of land use at the targeted area and check for any future development plans related to other projects that might conflict with the T/L project.
- Estimate any impact to the land in question that may result from the construction of T/Ls, and evaluate and prepare any follow-up measures necessary to mitigate transmission line land use impacts.

b. Air quality, noise and odors

- Examine the present situation with respect to air quality, noise pollution, and odor in the subject area, especially relative to local or national environmental standards, noting the existence of noise and odor sources.
- Estimate any impacts on the local situation, such as the amount of air pollutants emitted, level of noise, and other related impacts from the construction and operation of transmission lines.
- Assess measures to mitigate the impact of the project on air quality, noise and odors in the project area, including designating buffer zones and other measures.

c. Water quality

- Investigate the current situation, including a review of the impact of any future plans for development of the subject area, analysis of whether the proposed project area has been designated as a conservation area or a source of water supply, whether current water quality in the area is adequate, and other aspects of local water quality.
- Estimate any impacts on water quality that may result from the construction of the proposed T/Ls, and prepare follow-up measures to reduce or eliminate the water quality impacts of the project.

d. Soil

- Evaluate the present condition of the soil environment in the proposed project area, including

the existence of any pollutants in the soil or any toxic material storage facilities in the area.

- Estimate the impacts of construction of the T/L project on soil quality, and prepare and evaluate follow-up measures to address or avoid those impacts.

e. Wastes

- Investigate the present situation, including production of solid wastes in the local area, the availability of disposal facilities, and other aspects of waste projection and treatment in the project area.

- Estimate the impact on solid waste production and disposal that may result from the construction of T/Ls, and prepare follow-up measures to address those potential impacts.

f. Interference with “right to light” and landscape

- Everyone has the right to enjoy an unobstructed view and to live clear of the shadows cast by huge utility structures; this is referred to as the “right to light”. T/L builders must assess the current status of view and shading in the proposed T/L area.

- As part of the EIA or Environmental Investigation process, prospective T/L builders must provide an estimate of any impacts, that may arise from the construction of T/Ls, and then prepare follow-up measures to minimize those potential impacts.

3) Social and Economic Environment sector

a. Population, residential, industrial, public facilities and education

- Perform an in-depth analysis of the present status of the local population, residential, industrial, and public facilities, and local education facilities (schools and similar buildings) in the proposed project area.

- Estimate any impact that the construction and operation of T/Ls may have on these sectors of the local economy, and identify measures to correct any possible damage to each sector.

- Analyze the current spatial and age composition of the population, and evaluate how the proposed project will affect the population concentration.

- Analyze what if any influence the T/L project will have on local residences, and prepare measures to mitigate any negative impacts, including consideration of the option to move occupants of residences in the T/L path, if needed.

- Estimate any change that may result to the structure of local industries or to local incomes. Estimate potential impacts on farming fisheries, or other productive activities in the project area, and prepare compensatory measures for those affected, if needed.

b. Impact on Traffic

- Investigate the present status of traffic conditions in the project area.

- Estimate the potential for the project to result in an increase to traffic, determine whether the existing road capacity is sufficient to handle the increased traffic, and prepare measures to control any traffic overflow resulting from the project.

c. Impact on Cultural Properties

- Perform a careful inspection of the area in question for the presence of relics, vestiges of

structures, and other artifacts of cultural or historical significance.

- Prepare measures to conserve any culturally important sites or artifacts, or designate the area for cultural properties conservation.

4. Technical Standards for Transmission Lines in the ROK (as defined by Presidential Decree)

In the Republic of Korea, almost all of electric facilities are designed, constructed, tested, and operated under the regulation of the "*Presidential Decree on Technical Standard of the Electric Facilities*" (referred to as PDTSEF hereafter). Transmission lines, therefore, are fall under the regulations specified in the PDTSEF. Facilities that do not satisfy the guidelines would not be permitted to operate, or for that matter, would never be allowed to be built. Electric facilities must go through extensive testing after the completion of construction and before they begin service. Facilities are also subject to periodic checks by authorities, as specified by law.

The following are the major technical standards related to the construction of transmission lines.

1. Safety Factor for Construction of Tower Foundation

The safety factor for the construction of transmission tower foundations should be greater than 2, that is, every tower should be designed and constructed to have the strength of twice the severest stress anticipated.

2. Interference by Induced Current

The induced current of power transmission lines to the neighboring communication lines should be below 3 micro-Amps.

3. Minimum Distance between power lines and other objects

Other object	Minimum clearance
Building	3 m + 15cm for every 10 kV over 35 kV
Other EHV transmission line	2 m + 12 cm for every 10 kV over 60 kV
Plants	2 m + 12 cm for every 10 kV over 60 kV

4. Minimum depth of underground cable

Underground transmission cables must be constructed as follows:

Locations	Minimum depth
Locations where cables may be affected by cars or other heavy objects	1.2 m
Other locations	0.6 m

5. Minimum height of power lines

Transmission lines should have the following minimum height above the ground:

T/L of above 35 kV and below 160 kV	- 6 m in urban areas - 6.5 m where lines cross railroads - 5 m in other areas
T/L of above 160 kV	6 m + 12 cm for every 10 kV over 160 kV

6. Interference by electric waves

In cases where power transmission lines emit electric waves that interfere with radio-communication facilities constantly and severely, transmission companies are obligated to devise measures to mitigate such problems. The intensity of the electric waves from the transmission line should not induce current in neighboring communication lines.

5. Other Regulations

So far, this paper has touched mostly upon the Codes/Acts that are concerned with the construction of major transmission lines. Below, we briefly review the ROK regulations concerning the operation of transmission lines.

Most of the regulations related to the operation of transmission lines are based on the codes recommended by the PDTSEF. However, almost all transmission lines in the Republic of Korea are constructed and operated by KEPCO, a solely-owned government transmission utility, which has more strict standards and design criteria than those called for in the PDTSEF guidelines. The following is a short list of the regulations or recommendations included in various codes concerned with the operation of transmission lines and substations.

Item	Target	Based on
Radio Interference	SNR*: greater than 24	Recommendation by concerned commission
TV Interference	SNR: greater than 50	Recommendation by concerned commission
Corona noise	Residential areas: 50 dB Semi-residential areas: 55 dB Other areas : 60 dB	Framework Act on Environmental Policy
Audible Noise	50sdB	Noise and Vibration Control Act
Electric field intensity	Residential areas: 3.5sV/m Other areas: 7 V/m	Presidential Decree on Technical Standard of the Electric Facilities
Magnetic field Intensity	Lower than 833 mG (milliGauss)	Recommendation (Not legislated yet)

*SNR: Signal to Noise Ratio

6. Conclusion

Builders seeking to construct transmission lines in the Republic of Korea must obtain permission from national and local authorities, dictated in part by the land classifications in the "right-of-way" to be used by the transmission lines. In cases where the construction project belongs to a designated category, the approval process for the project can be processed under the "Act on Special Cases of Electric Source Development" through which the T/L builder needs only to meet the criteria of the Act in order to get permission to implement construction.

As for the technical and safety issues related to transmission lines in the ROK, all electric facilities are designed, constructed, tested, operated, and maintained under the regulation of the Presidential Decree on Technical Standard of the Electric Facilities. There are other regulations governing the operation of transmission lines, including regulations on noise, magnetic fields, and other operational aspects, but these are far too many to cover in detail in this paper.

In summary, it is clear that it still remains a difficult task to secure construction rights for major projects like transmission lines. Strict government guidelines ensure the electric utilities in the ROK will continue to construct facilities meeting high standards of reliability, safety, and environmental performance. At the same time, the ROK government has helped to make all of the regulations and laws that apply to electric facility construction a little more "user friendly". The end result is a better standard of living for all concerned.

7. References

[1] Acts of the Republic of Korea (For further information on these Acts, refer to the web address <http://www.moleg.go.kr>, which is the homepage of the Ministry of Legislation of the ROK. Please note, however, that English versions may not available for every Act.)

- *Framework Act on Environmental Policy*
- *Urban Planning Act*
- *Road Act*
- *Private Road Act*
- *River Act*
- *Public Waters Management*
- *Land Expropriation Act*
- *Public Waters Reclamation*
- *Water Supply and Waterworks Installation Act;*
- *Natural Parks Act;*
- *Act on the Utilization and Management of the National Territory*
- *Farmland Act;*
- *Forestry Act*
- *Work against Land Erosion or Collapse Act*
- *Military Air Bases Act;*
- *Grassland Act*
- *Harbor Act*
- *Burial and Graveyard, Act;*
- *Mining Industry Act*
- *Atomic Energy Act.*
- *Act on Special Cases concerning Electric Source Development*
- *Presidential Decree on Technical Standard of the Electric Facilities*
- *Act on Assessment of Impacts of Works on Environment, Traffic, Disasters,*
- *Noise and Vibration Control Act*

[2] *Design Criteria of Transmission lines and Substations* - Korea Electric Power Corporation (established in January 1962 and last updated in January, 2003). This document can be found (in Korean only) at http://100.1.26.23:8005/owa_xf/owa/xfqmenu2.main.

[3] Work Procedure for Permission of Execution Plan of Transmission lines & Substations by the "Act on Special Cases concerning Electric Source Development" - Korea Electric Power Corporation, 2001. 4.

[4] *Long-range Grid Expansion Plan – 2002. 12* - Korea Electric Power Corporation.