Chapter 4 Existing Competency Standards and the Qualification System in the Electric Power Sector

4.1. Legal Structure and Organizations Related to Electric Power Competency Standard and Qualification System

4.1.1. Laws or Decrees on Competency Standards in Electric Power Sector and related Organizations

Since Electricity Law No. 30/2009 came into effect in 2009, the Electricity Law No. 15/1985 has become invalid at the same time. However, related Governmental Regulations and Ministerial Decrees, which were established under Law No.15/1985, have still been valid because new Governmental Regulations and Ministerial Decrees relating to Law No.30/2009 are now under development. Accordingly, analysis on the current situation of Competency Standards for Electrical Power Sector has been described according to Law No.15/1985.

Section 2 of Article 18 in the Electricity Law No.15/1985 strives to achieve the standardization of Work Safety, Public Safety and Business Development in the Electric Power Sector in order to realize that the government can train and supervise the Electric Power Sector.

A detailed Order of the Electricity Law is the Governmental Regulation on Electricity Supply and Utilization No.10, 1989. Article 33 prescribes that the Minister who supervises the Electric Power Sector manages to nurture the Electric Power Supply business. Article 34 of this Order stipulates that the minister establishes the implementation guidelines which cover Work Safety, Public Safety, Electricity Supply, Services and Business Development. Further, Article 35 of this Order stipulates the supervision of the Electric Power Supply business.

Based on these two regulations, the Ministerial Decree of Energy and Mineral Resources on Competency Standardization for Electrical Workers, No.2052, 2001 has been laid down in order to realize the Competency Standardization for Electrical Workers.

The Establishment and maintenance of Competency Standards in the Electric Power Sector have been originally derived from the Electricity Law No.15/1985. Figure 4.1-1shows the correlation among the Governmental Order, Ministerial Decree and organizations that stipulate and revise Competency Standards within the Electric Power Sector.

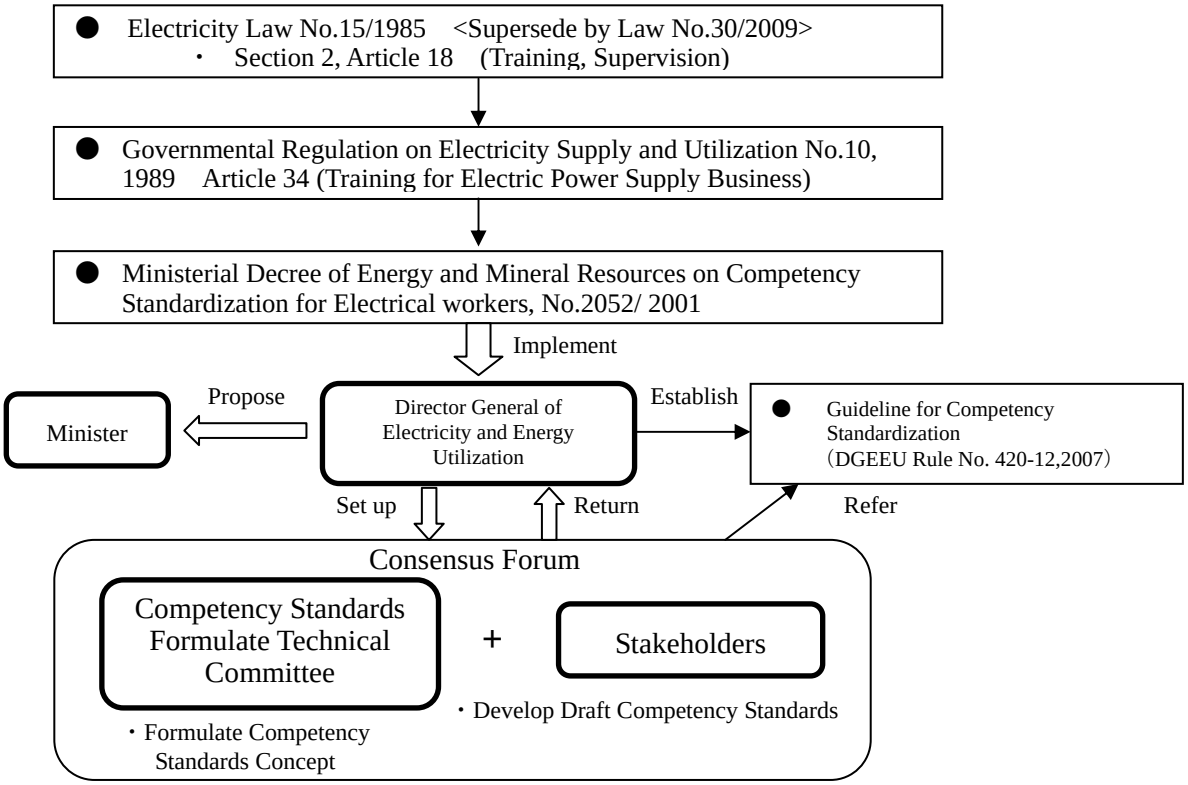

Figure 4.1-2 Laws or Decrees on Competency Standards in Electric Power Sector and related Organizations

According to the Ministerial Decree of Energy and Mineral Resources on Competency Standardization for Electrical workers, No.2052, 2001, the purposes of the Competency Standardization are as follows.

- Realization of a reliable, safe and environmentally-friendly Electricity Supply through the support of the Electric Power Sector
- Realization of advancement of the technical workers' Competency
- Realization of well-organized methods of work in the Electric Power Sector

Based on these purposes, a fundamental framework is set up to govern the establishment of "Competency Standards", training for technical workers, supervision of certification bodies of Competency Standards.
Competency Standards must be established according to the following documents.

- Complete and accountable data
- Qualifications and classification regarding Electric Power technology

- International Standards, other nations' standards or other adequate reference documents

When establishing Competency Standards, as shown in Figure 4.1-3, DGEEU first forms a "Competency Standards Formulate Technical Committee", and its committee formulates a basic concept for Competency Standards.

The "Consensus Forum", which comprises stakeholders, and "Competency Standards Formulate Technical Committee" will jointly draft the Competency Standards according to the basic concept for Competency Standards.

Article 14 of Ministerial Decree of Energy and Mineral Resources on Competency Standardization for Electrical workers, No.2052, 2001 orders DGEEU to establish "Guideline for Competency Standardization" (DGEEU rule on Competency Standards Formulating Guideline No.420-12, 2007). "Competency Standards Formulate Technical Committee" and "Consensus Forum" will establish Competency Standards referring to this Guideline.

As a result of discussion in Consensus Forum, a final draft of Competency Standards will be submitted by DGEEU to the minister of Energy and Mineral Resources. After the minister has accepted the final draft, Competency Standards will come into effect as the compulsory standards.

Competency Standards must be revised at least once every 5 years. Proposals for revision will be prepared by the Competency Standards Formulate Technical Committee or other organizations that have an interest. The procedures of revision will be also followed according to the procedures described in Figure 4.1-4.

The aforementioned procedure regarding the establishment of Competency Standards is only limited to internal processes within the DGEEU. On the other hand, the BNSP has been formed as a coordinating Agency that controls the overall Competency Standards of all sectors. Hence, the function of the BNSP is mentioned in the following.

The role of BNSP is, basically, to implement a "Formality Examination" on draft Competency Standards which the sector government office has established. The Ministry of Labor and Transmigration has established a "Ministerial Decree on the procedures of establishing Indonesian National Vocational Competency Standards, No. 21/MEM/X/2007" as a reference

for a sector government office to establish Competency Standards. Its Article 10 stipulates that the BNSP verifies draft Competency Standards which a sector government office has established. In addition, Article 14 stipulates that the Minister of Labor and Transmigration "enacts" Competency Standards which sector government office has submitted. On the other hand, a sector government office would put Competency Standards into practice. Therefore, it can be said that the scope between the BNSP and the sector government office is clearly separated.

In fact, according to an interview with a BNSP member, its organization has only 21 staff. Accordingly, they don't have enough expertise or manpower to go into the detailed contents regarding the Competency Standards of all sectors. So all they can do is implement a Formality Examination.

In other words, the role of the BNSP is only to conduct a Formality Examination. This means that the BNSP doesn't have any responsibility for supervising those sectors that the sector government offices must take on. Therefore, it would appear that the communications and consensus on role allotment in the procedures of establishing draft Competency Standards are not well coordinated between the two bodies. It is essential to facilitate coordination between governmental offices in order to streamline these procedures in terms of administrative operations.

4.1.2. Laws and Decrees on Certification Bodies for Competency Standards, and those related organizations

Actual certifications of Electrical workers are being implemented according to Competency Standards. Figure 4.1-5 shows the correlations among laws and decrees and related organizations regarding the constitutions of Certification Bodies and supervision.

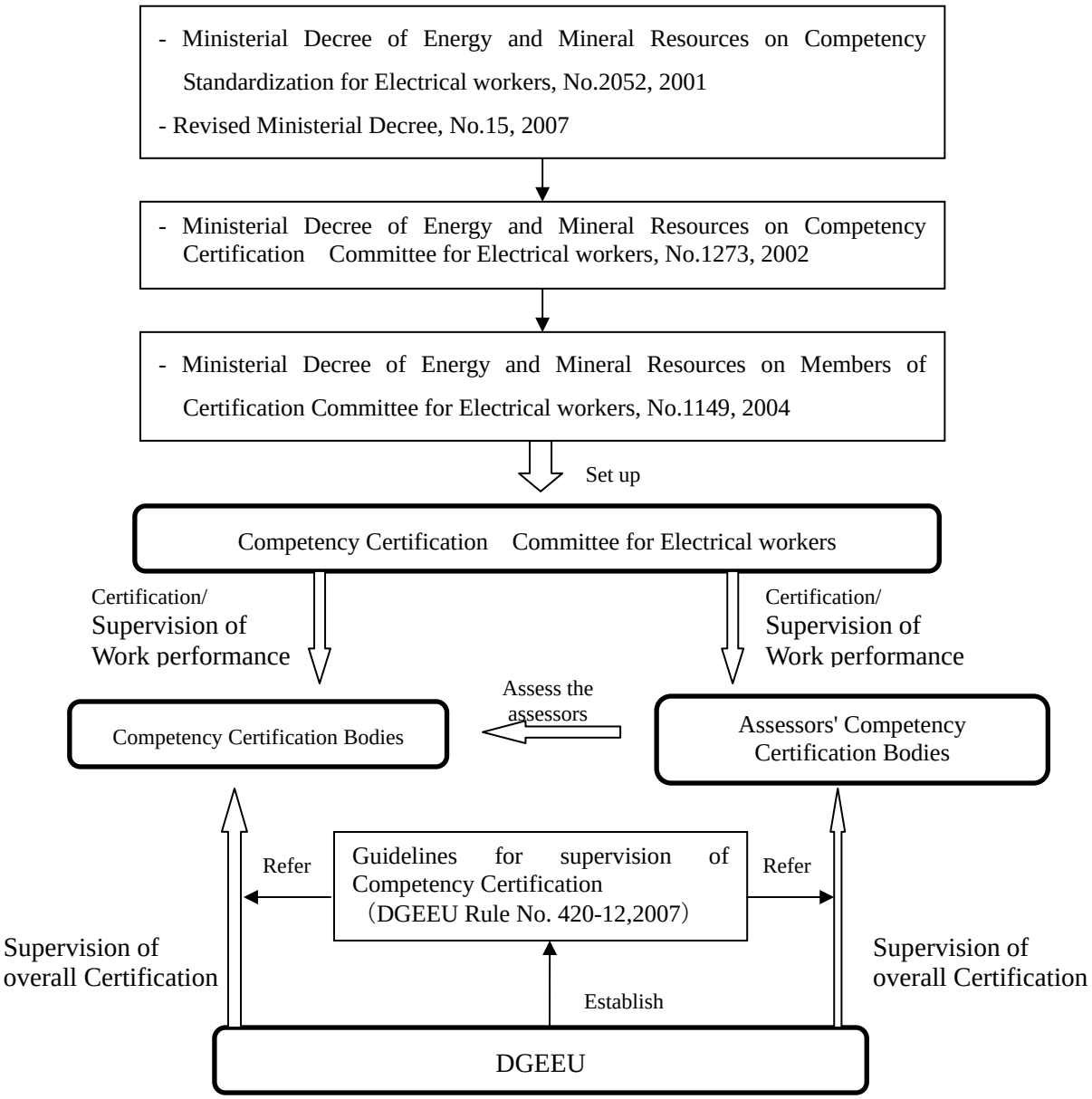

Figure 4.1-5 Laws and Decrees on Certification Bodies for Competency Standards, and those related organizations

In the "Ministerial Decree of Energy and Mineral Resources on Competency Standardization for Electrical workers, No.2052, 2001", Section 1 of Article 11 stipulates that an eligible organization that is able to certify a Competency Certification Body is "Competency Certification Committee". The concrete requirements for the setup and functions of this Competency Certification Committee have ruled in the Ministerial Decree of Energy and Mineral Resources on the Competency Certification Committee for Electrical workers, No.1273, 2002.

The minister of Energy and Mineral Resources appoints members of the Competency Certification Committee based on proposals from DGEEU. The term of office is 3 years, and those members can be reappointed only for the next following term. Furthermore, the member composition of Competency Certification Committee is issued by "Ministerial Decree of Energy and Mineral Resources on Members of Competency Certification Committee, No.1149, 2004";

Table 4.1-1 Composition of Competency Certification Committee（established in June 2008）

No.	Organization	Title in Committee
1	Director General of Electricity and Energy Utilization	Chair/Member
2	Indonesian Electric Power Community (MKI) Chairman	Vice Chair/Member
3	PLN Human Resource & Organization Bureau Manager	Chief Secretariat/Member
4	Manager of Electric Power Bureau, DGEEU	Member
5	Manager of Standardization & Certification Bureau, Ministry of Manpower and Transmigration	Member
6	Manager of Vocational Middle Grade Education, Ministry of National Education	Member
7	Chair of the Electricity Department, Bandon Institute of Technology	Member
8	Chair of the Electricity Department, Indonesia University	Member
9	Chair of the Indonesian Institute of Electric Power Technology Expert	Member
10	Chair of The Institute of Generation Expert	Member
11	Head of Education and Training Centre for Electricity and Renewable Energy, MEMR	Member
12	Manager of Human Resource Bureau, Piton Energy	Member
13	Deputy Technical Director, DGEEU	Member

As shown in Figure 4.1-5, the Competency Certification Committee certifies the Competency Certification Bodies, and supervises the work performances of the Certification Bodies' judge and certification to the technicians.

The Assessors' Competency Certification Bodies have functions to assess the assessors in Competency Certification Bodies. The Competency Certification Committee also has the responsibility to certify Assessors' Competency Certification Bodies and supervise the work

performances.

On the other hand, the DGEEU is also responsible for supervising the overall works on Certification. The DGEEU stipulates “Guideline for supervision of Competency Certification （DGEEU Rule No. 421-12,2007）”, in order for Certification Bodies to comply with the conditions and maintain well-organized work procedures.

As mentioned above, the licensing of Certification Bodies is substantially under the authority of the DGEEU. Nonetheless, it is necessary to refer to the role of BNSP minus the licensing of Certification Bodies.

Article 4 of “Governmental Regulations on BNSP, No. 23, 2004” stipulates that the BNSP is able to license Certification Bodies which satisfy the specified requirements for conducting certifications of Vocational Competency.

On the other hand, Article 12 of the “MEMR Decree, No. 15/2007, on the amendment of the MEMR Decree on Electrical Technicians’ Competency Standards, No. 2052/K/40/MEM/2001” stipulates that Competency Certification Bodies are able to apply for license/certification to regulatory agencies or organizations designated by such laws. This means that Certification Bodies that are authorized by the Minister of Energy and Mineral Resources can receive another license from BNSP as Certification Bodies. In fact, IATKI, which is one of Certification Bodies which certifies Competency Standards for Electrical Technicians, has already had both licenses from the MEMR and BNSP.

Although such “double licenses” are acceptable, Certification Bodies have to implement certification operations under the control of their sector government office. Therefore, it is difficult for them to find out what the positive significance is in obtaining a license from BNSP. Actually, other Certification Bodies like GEMA PDKB, HATEKDIS and HAKIT, which certify Competency Standards for Electrical Technicians, operate their certification business with only a license from MEMR.

Regarding the aforementioned issue, it is essential to facilitate coordination between the governmental offices in order to streamline these procedures in terms of administrative operations.

4.2. National Qualification Framework (NQF)

Article 11 of the Labor Law of the Republic of Indonesia (No.13/2003) states that "All the workers are entitled to acquire, improve, and develop vocational competency through vocational training, according to their talent, interest, and ability", affirming the workers' right to have opportunities to develop vocational capacity. Article 18-(1) of the same law follows this and stipulates that "Workers are entitled to have certification of vocational competency after participating in the vocational training programs offered by the Governmental training institutes, private training institutes, and business entity's in-house training centers", obliging the Government to install training institutes that provides workers with an opportunity for capacity development.

In accordance with this, Government Regulations on the National Vocational Training system (No.31/2006) stipulates that "Vocational trainings and competency certification shall conform to the National Vocational Competency Standards of Indonesia (Standar Kompetensi Kerja Nasional Indonesia : SKKNI, Indonesian Standard for National Competency Standardization: NCS) as well as the qualification system for the industrial sector" where the development of competency standards is clearly defined as national policy target.

Indonesia National Qualification Framework is the description of the Competency, which is common all over Indonesia. Further, it describes the necessary minimum knowledge, technology and work attitudes that a person should have in order to hold specific office.

If workers acquire Indonesian National Vocational Competency Standards, they will be qualified for the following duties:

- Task skills
- Task managements skill
- Contigency management skill
- Job/role environment skill

The full equipment of the Indonesian National Vocational Competency Standards provides the following organizations respective merits;

”Education and Training Organization”

- Provision of Information for the development of the Program/Curriculum
- References for Evaluation Training and Certification Implementation

”Business World/Industries, Laborer, User”

- Support of recruitment
- Support of work performance evaluation
- Utilization of post explanation/establishment
- Development of a specific Training Program based on the Business World/Industry’s needs

”Test/Certification Bodies”

- Reference for the formulate of Certification Package according to the Qualification/Level
- Reference for Evaluation Training/Certification

The competency requirements that are developed are based on SKKNI and then systematically organized by referring to a National Qualification Framework (NQF). NQF is the common guideline for each industrial sector to define necessary competencies at each level of organizational positions. The BNSP has prepared the Indonesian National Qualification Framework as follows.

(1) Workers Qualifications based on the technical competencies are classified into 6 levels, from I to VI (The larger the number is, the higher the levels become).

(2) Characteristics and Indices of each Qualification are as follows.

Table 4.2-1 Indonesian National Qualification Framework

Qualification	Indeces		
	Activity	Knowledge	Responsibility
I	Implement following activities: • Activity in a limited range • Activity with repetition, common practice • Activity in a limited context	• Restate • Use limited knowledge • No need to use new ideas	• Responsibility on directed activity • Under direct supervision • No responsibility to others' work
II	Implement following activities: • Activity in a little bit broad area • Activity with a maturity, common practices • Activity with limited discretions to routine work	• Use fundamental knowledge of operation • Use secured information • Adopt standardized problem solving • Necessary to use new ideas a little bit more	• Responsibility on directed activity • Under indirect supervision/quality management • Responsibility with less quality and quantity • Possible to give responsibility in instructing others
III	Implement following activities: • Activity necessary to use standardized technics in a broad area • Activity with several options in procedures • Activity In a routine context	• Use appropriate logical knowledge • Interpret secured information • Use calculation and discretion • Adopt standardized problem solving	• Responsibility on directed activity with limited autonomy • Under indirect supervision/quality management • Full responsibility on work performances regarding quality and quantity • Possible to give responsibility in others' work performances
IV	Implement following activities: • Activity necessary to use logical technics in a broad area • Activity with many options in procedures • Activity with common practices or with a context without common practices	• Associate logical contexs and use broad knowledge • Analyze and interpret secured data • Decision-making based on present rules • Adopt innovative solutions to problems, which are concrete and sometimes not common	• Responsibility to their own planned activities • Responsibility under training and broad evaluations • Perfect responsibility against quantity and quality of work performances • Possible to give responsibility in others' work performances

			regarding quality and quantity
V	Implement following activities: • Activity necessary to use special (specified) technics in a broad area • Activity with broad options in both standardized procedures and non-standardized ones • Activity with many options regarding Standardized and non-standardized procedures • Activity with routine context or non-routine context	• Adopt broad knowledge with well experiences in multiple areas • Analyze and interpret secured data in a broad area • Decide optimal procedures and measures to solve concrete problems with logical elements	Implement followings: • Responsibility on self-directed activity and sometimes on instructions to others • Responsibility to use broad and general guidelines and functions • Perfect responsibility on activity regarding characteristics, quantity and quality of work performances • Possible to give responsibility in achieving work performances
VI	Implement following activities: • Activity necessary to use special (specified) technics in a very broad area • Activity with very broad options in procedures including both standardized and non-standardized and those combinations • Activity in contexts with varied routines and other types of contexts	• Use deep and special knowledge in some areas • Analyze, reset and evaluate information in broad area • Formulate proper steps for solving concrete and abstract problems	Implement followings: • Responsibility on activity and its process management • Responsibility on using broad indices for specified activity • Responsibility on accountable activity for deciding achievement of personal and group work performances • Possible to give responsibility in achieving organizational work performances
VII	Cover technics, knowledge and responsibility to enable the followings: • Explain systematically the main principle in some area • Indicate indepedence in intelligent, analytic and communicative aspects by implementing researches, verificaion and intelligent activity independently in some area		
VIII	Cover technics, knowledge and responsibility to enable the followings: • Indicate maturity in some area • Plan and implement intelligent activity and researches uniquely as per the standards acknowledged internationally		
IX	Cover technics, knowledge and responsibility to enable the followings: ● Contribute with unique knowledge through intelligent activity and researches evaluated by indepedent experts as per international standards		

4.3. National Competency Standard for Electric Power Sector

Indonesian electric power sector presents four items such as “Safety for Workers”,” Public Safety”,” Safety for Environments” and “Safety for Power Facilities”. There are important indexes concerning personnel competency standards in each item and they play a key role in maintaining safety measures for the power sector. Establishing competency standards in each index enables the power sector to maintain safety in their own power facilities.

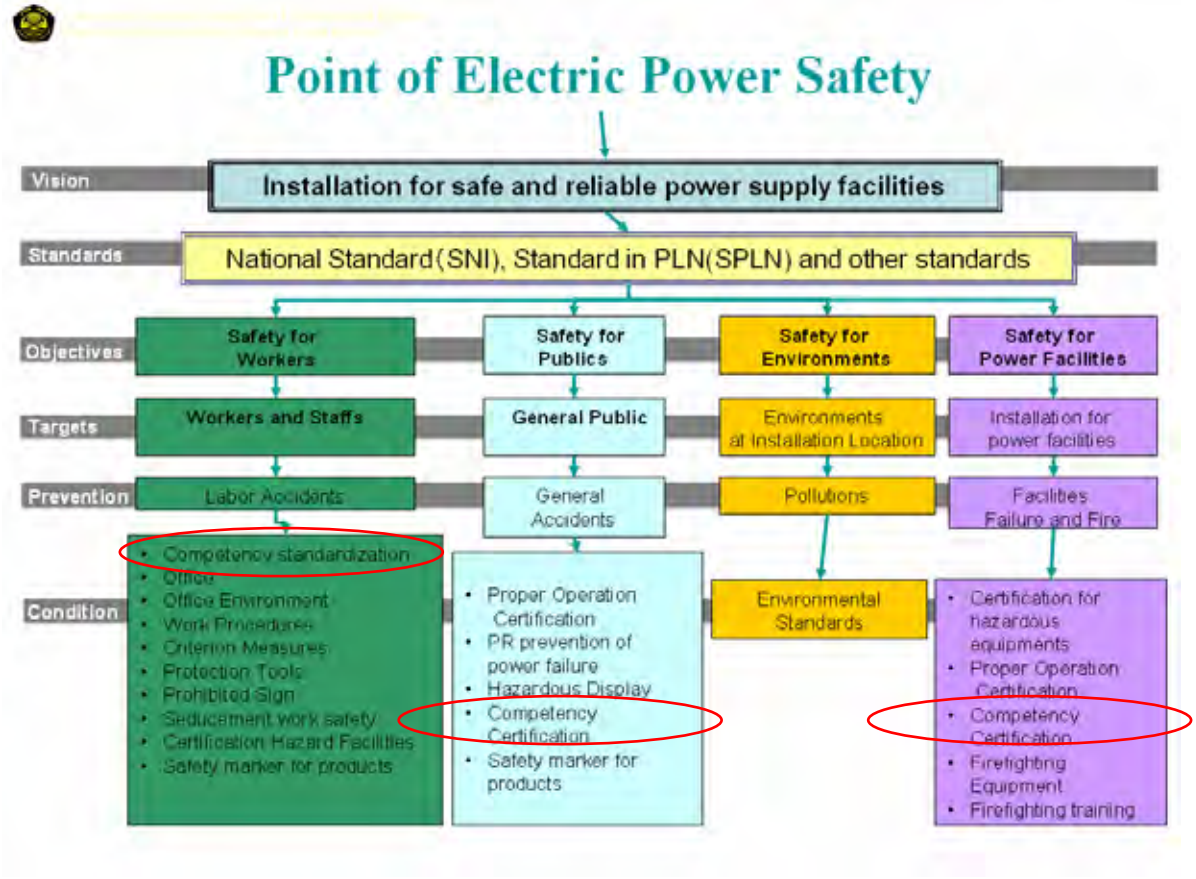

Figure 4.3-1 Point of Electric Power Safety

To approve the operation of electric power sector in Indonesia, according to Governmental Order on Electricity Supply and Utilization No.10, 1989 Article 34, the operators are imposed on five responsibilities as follows, And the fourth competency qualification is explained in detail in this section.

- ✓ Electric power operators should follow the safety regulations
- ✓ Electric power facilities should pass its commissioning and periodic inspections and should have a license of its own from the certification bodies prior to operations
- ✓ Electric appliances should obtain certifications and tags for the safety label
- ✓ All the engineers working in electric power sectors should have a license in accordance

with their competency standards.

✓ Electric power operators should follow the regulations regarding its environmental protections

National competency standards for engineers and assessors (Hereinafter competency standards) are defined as “knowledge and technical competencies based on the attitudes and applications in the particular field of work processes”. The five components of competency standards set up by MEMR-DGEEU are listed below.

① Task skills
② Task management skills
③ Contingency management skills
④ Job / role environmental skills
⑤ Transfer skills

Regarding the engineers in the electric power industry, electric power competency standards are regulated and according to this competency standard they need to have their own certifications after graduation from school.

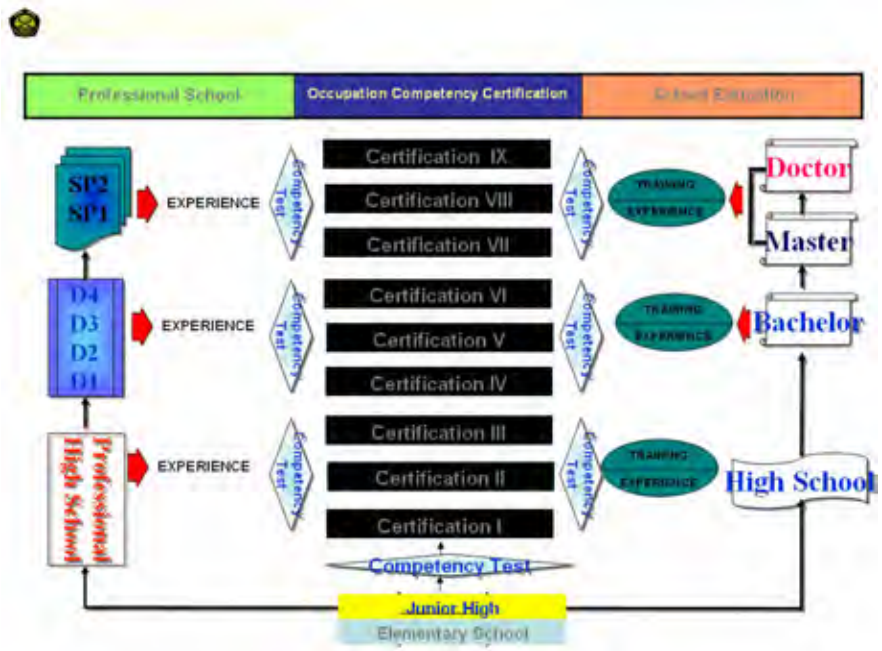

Figure 4.3-2 School education and certification system after graduation

There are 2,200 competency units for electrical engineers and 250 competency standard units for electrical assessors related to the electric power industry and electronic products regulated

by the DGEEU.

These competency standard units are being drafted and DGEEU is developing new competency standard units when they understand new units need to be created.

When new competency units are created, the needs for their development or amendments are voiced through the Consensus Forum. These new competency units become the official competency standard units after they have been authorized by MEMR.

Table 4.3-1 Competency Standard Units

	Fields	Number of unit
Engineer	Generating facilities	1,235
	Transmission and Substation	318
	Distribution	197
	Electric equipments	149
	Electric equipments industry	79
	Electric appliances	91
	New Renewable Energy	150
	Training Facilities	48
	Competency units for Engineers	**2,267**
Assessor	Generating Assessors	239
	Transmission and Substation Assessors	15
	Competency units for assessors	**254**
	Total Number	**2,521**

Electric power engineers are given competency certifications in every 2,000 or more units listed above. These units are useful for not only the electric power industry, but also for similar competencies in other industries as nationally authorized.
These units more than 2,000 are classified into five fields and in each unit description along with the required elements, evaluations and technical level needed in order to be certified.

① Planning
② Construction
③ Inspections

④ Operation

⑤ Maintenance

4.3.1. Standard Format of National Competency Standard

"Guideline for Supervision of Competency Certification（DGEEU Rule No. 420-12,2007）" stipulates that the minister has supervisory functions over the implementation of competency standard for the electric power sector and establishes its qualification through certification bodies. Competency standard are implemented appropriately based on this guideline.

Each competency standard is ordered by unit and is defined by seven components according to the Regional Model Competency Standard (RMCS).

1. Unit Cords
2. Unit Title
3. Description of Unit
4. Competency Element
5. Performance Criteria
6. Parameter of Competency
7. Evaluation Guidance

Table 4.3-2 Definition of Competency and its Format

<table>
<tr><td colspan="2">1) Unit Cord （*1）
It is consist of both alphabets and numbers with the approval between the propounders and the stakeholders</td></tr>
<tr><td colspan="2">2) Unit Title
Definition of relevant skill or knowledge for unit competency. Title should be described by the active sentence.</td></tr>
<tr><td colspan="2">3) Description of Unit
Brief description of related unit</td></tr>
<tr><td>4) Competency Element （*2）
Unit element for achieving relevant competency unit
Usually these are described by 3 -12 elements</td><td>5) Performance Criteria
Performance results and output by competency elements (See left column).
It should be measurable index with active sentence include knowledge, skill and attitude.</td></tr>
<tr><td colspan="2">6) Parameter of Unit Competency
Description of working circumstance as follows,
Confirming rules / Procedures / Policy / Information relevant facilities</td></tr>
</table>

7） Evaluation Guidance（Clarification of Competency Level）

- Evaluation of assigned procedures
- Required initial condition for participants
- Information of knowledge, skill and attitude related to this competency
- Considerable profile related to this competency achievements
- Seven Key items[A-G]（Each item is classified by Level 1-3）（*3）

(*1) Unit Cord

Competency unit codes are numbered by industry, type of job, and competency level. Here are the rules to number unit codes. For example, the Unit code of “Competency for maintenance of Hydro power pumps“KTL.PH.20.106.02”” is as follows.

Electric power industry＜KTL＞
Generating＜P＞
maintenance＜H＞
Core technology＜2＞
Hydro power＜0＞
Level＜1＞
Serial Number<06>
Version<02>

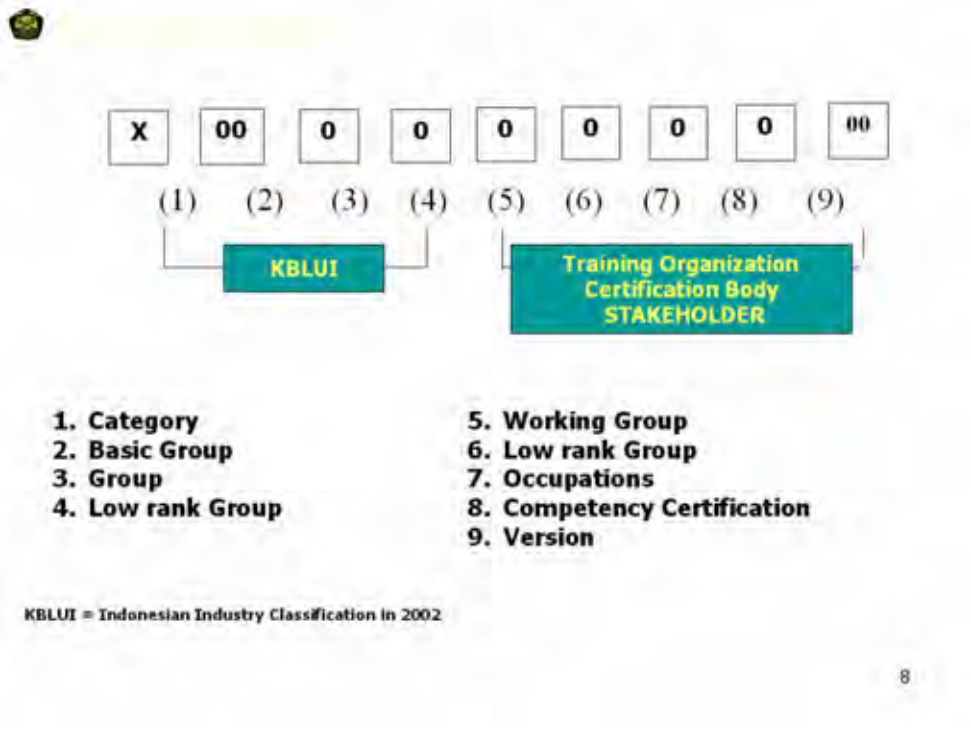

Figure 4.3-3 Competency Units Numbering

Table 4.3-3shows the list of competency units for the Electric power industry.

Table 4.3-3 List of competency units for Electric power industry（KTL）

Basic Group	Group	Field
P. Generation	1.General Competency 2. Core Competency 3. Optional competency	O. Operation H. Maintenance I. Inspection
T. Transmission & Substation	1. General Competency 2. Core Competency 3. Optional competency	R. Planning K. Construction I. Inspection H. O & M
D. Distribution	1. General Competency 2. Core Competency 3. Optional competency	R. Operation I. Inspection O. Operation H. Maintenance
I. Installation(Interior Wiring)	1. General Competency 2. Core Competency 3. Optional competency	R. Operation K. Construction I. Inspection O. Operation H. Maintenance

Each Competency Unit has its own format issued by DGEEU. In each competency unit's format, the explanation of the units, competency elements, work descriptions, work processes and duties, and materials are described.

(*2) Competency element

Competency element is the smallest unit describing the skills needing to be evaluated by competency standard units. Each unit has a specific unit number and is described by its performance results and output in the format.

There are three kinds of element as listed below. General competency and Core competency are obligatory subjects that are compulsory for all candidates. One optional competency is an elective subject that complements core competencies and from which candidates can chose.

○Obligatory subjects

- ✓ General competency（Precondition complement to core competency）
- ✓ Core competency（Performance for specific work skill）

○Elective subject

- ✓ Optional competency（Abilities complement to core competency）

(*3)Key Items

Additionally, competency levels are stipulated in all of the seven key items from level 1-3 to know the prospective work level as an index to measure knowledge and technical elements.

<Seven key items>

A: Data collection, analysis, management

B: Competency of idea and data communication

C: Competency of time management and monitoring

D: Team works

E: Mathematical idea and approach

F: Problem solving ability

G: Technical abilities for equipment operation

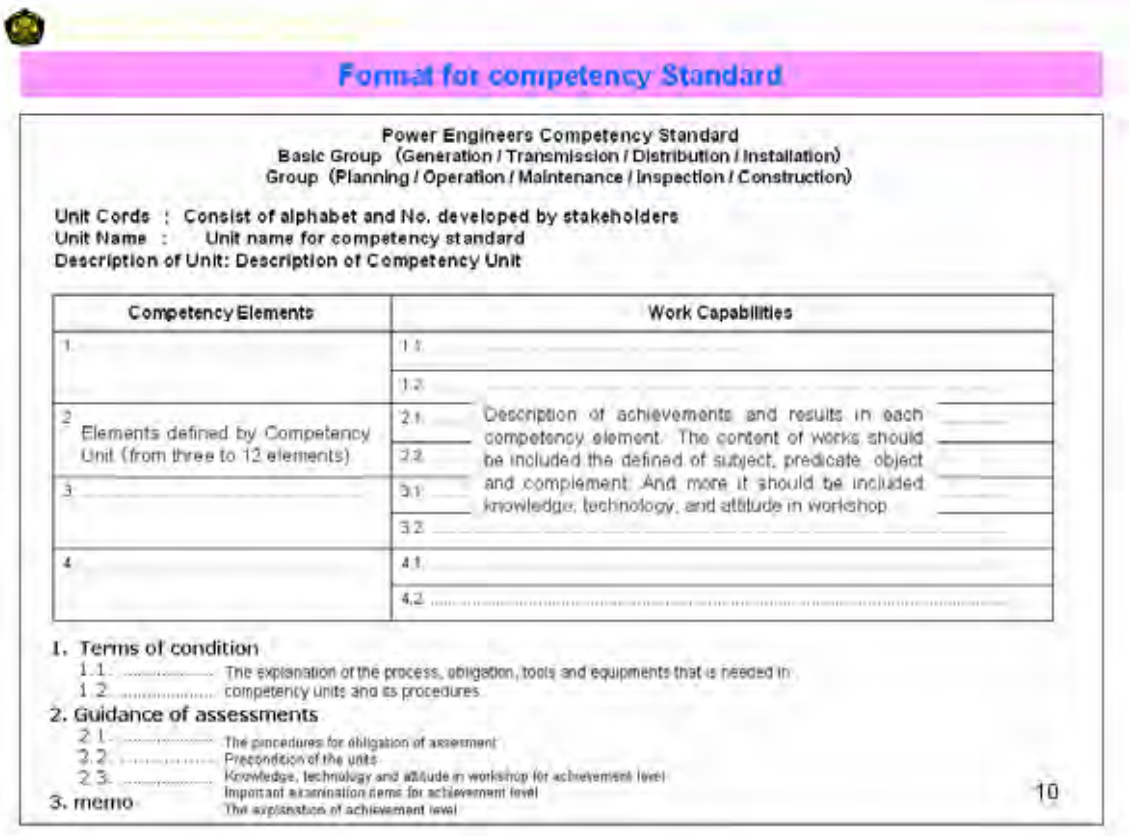

Figure 4.3-4 Competency Standard Format

Figure 4.3-3 shows the definitions for level 1 to 3.

Table 4.3-4 Definition from level 1 to 3

Level 1	Competency for doing routine work under the supervision of supervisors
Level 2	Competency for doing routine works independently as follows ➢ Various types of procedures ➢ Problems solution ➢ Suggest his own ideas to supervisors
Level 3	Competency for doing routine works independently as follows ➢ Problems analysis ➢ Problems solution ➢ Suggest his own ideas to supervisors ➢ Control and adjust multiple works

4.4. In-house Competency Standards in PLN

PLN has developed the “Competency Directory” to define the competencies of all the staffs, which PLN requires, for carrying out corporate missions and realizing the corporate vision in 2004. This document is a modern and fair approach in light of abolishing unofficial and obsolete evaluation criteria and establishing the official documents available throughout the corporation.

With this Competency Directory, it is possible to figure out each employee’s competency level and have this data recorded, then to clarify the necessary knowledge and competencies for each post. Accordingly, it is possible to match the competencies, which are required in certain posts, and individual competencies. In addition, it is possible to use the Competency Directory as the indices for formulating a necessary capacity building program in order for the PLN to become sustainable. That is, it is possible to evaluate, train and promote systematically and efficiently based on the “Competency Directory”.

There are 720 posts in the PLN according to the “PLN Kebutuhan Kompetensi Jabatan Edisi Ⅱ November 2006”. The following table shows the number of posts, classified by department.

Table 4.4-1 The Number of Positions Classified by Departments in PLN

	Department	No. of positions		Department	No. of positions
1	Management	10	9	Customer Area /Electric Power Network (APJ)	141
2	Planning Department	28	10	Service Area	68
3	Distribution Department	44	11	Electric Power Network Area	84
4	Sales Department	34	12	Distribution Operation Area	53
5	Finance Department	25	13	Middle/High Voltage Area	40
6	Human Resource/Organization	22	14	Service/Electric Power Network Unit	60
7	Communication / Legal Affairs / Clerical Work Department	33	15	Service Unit	30
8	Internal Audit Department	4	16	Electric Power Network Unit	44

Necessary competencies are defined to all the posts in PLN. PLN's competencies are classified into three major groups, such as "Core Competency", "Leadership Competency" and "Technical Competency".

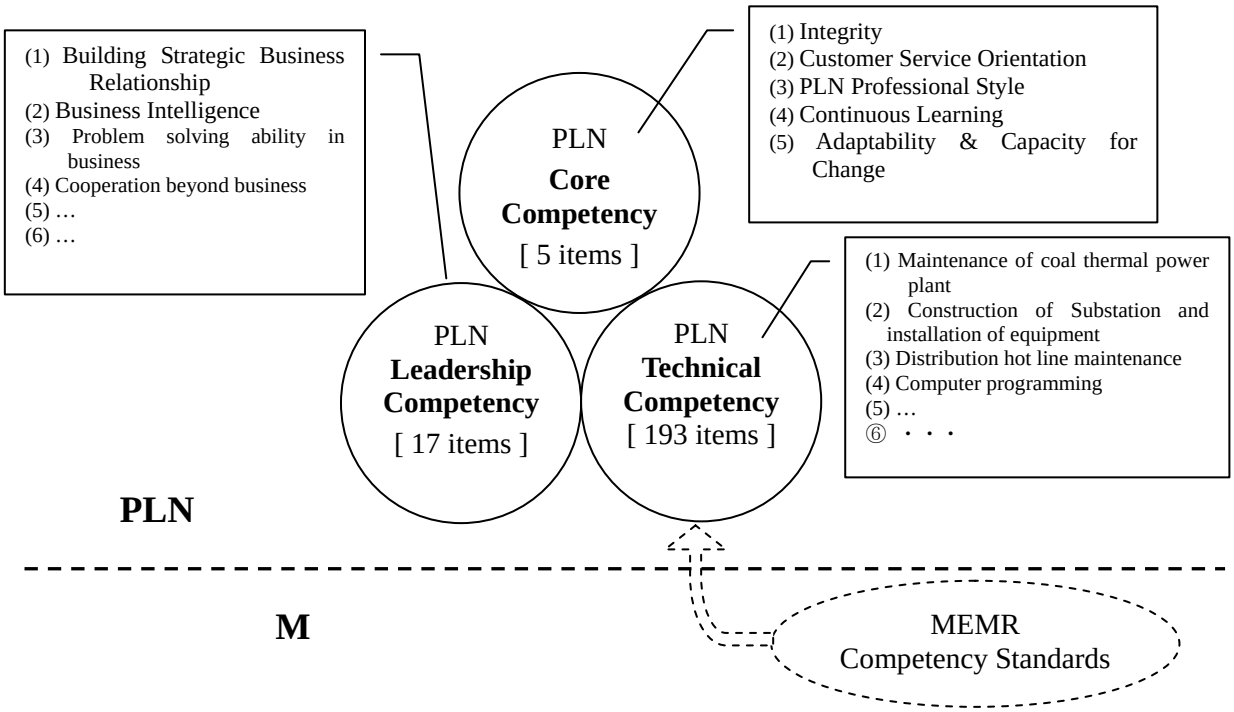

Figure 4.4-1 Employees' Competencies in PLN

"Core Competency" consists of 5 elements, which all the PLN staffs should have as general competencies.

Leadership Competency" consists of 17 elements, which designated employees should have as general competencies common among management, experts, and technical/operations.

"Technical Competency" is professional competency, which is required of staffs to solve these problems. These are defined not only for the O&M of Electrical Facilities but also for various fields, such as finances, audits, human resource development and organizational management. "Technical Competency" consists of 193 items. National competency standards, which MEMR has developed, are incorporated into the PLN Competency Directory.

Elements for Competency evaluation include such items as motivation, initiative or self-control, which are difficult to quantify in terms of evaluation.

The following are levels for each competency element. As for the Core Competency and Leadership Competency, there are 6 levels from "level –2" to "level 4". As for Technical Competency, employees are evaluated with 6 levels from "level 1" to "level 6".

Table 4.4-2 Evaluation levels for Core Competency and Leadership Competency

Core Competency Leadership Competency	
Level 4	Capable to enlighten his organization and improve his organization's reputation
Level 3	Capable to enlighten his business unit and improve his business unit's reputation
Level 2	Capable to enlighten his group and improve his group's reputation
Level 1	Capable to enlighten himself and carry out tasks
Level –1	Partly qualified with criteria, but necessary to be trained and improved in an important part
Level –2	Not qualified even with minimum criteria, necessary to be trained

Table 4.4-3 Evaluation levels for Technical Competency

Technical Competency	
Level 6	Instruct. Capable to develop the systems and procedures for related corporations in its field, merge its area and those other areas for improving corporations' procedures
Level 5	Matured. With a full of work experiences, capable to act voluntarily within a corporate approved area and solve the unprecedented and complicated circumstances.
Level 4	Advanced. With many experiences, capable to solve problems without other companies' supports on both ordinary and extraordinary cases and instruct other employees.

Level 3	Work. Capable to proceed works as per the routine and solve the problems on a daily work basis. But necessary to be helped when particular problems happen.
Level 2	Applied concept. Understand how to apply related concept on a broad scale.
Level 1	Concept. Know the basic concept regarding knowledge and technology.

At most 15 items are selected for the one post of PT PLN. Particular includes 5 items for Core Competency, 2 to 7 items for Leadership Competency and 3 to 5 items for Technical Competency.

The following are two examples of the competency standards and those levels defined for "General Manager in Headquarters" and "Matured operator of Distribution Department".

Table 4.4-4 Competencies required for General Manager in Headquarters

Title: **General Manager**	
Organization: Headquarters	
Core Competency	Required level
1 Integrity (ING)	4
2 Customer Service Orientation (CSO)	4
3 PLN Professional Style (PPS)	4
4 Continuous Learning (CLE)	4
5 Adaptability & Capacity for Change (ACC)	4
Leadership Competency	Required level
1 Building Strategic Business Relationship (BSB)	3
2 Business Intelligence (BIN)	4
3 Conflict Resolution with External Sensitivity (CRE)	4
4 Leader Persuasiveness Ability (LPA)	4
5 Management Control & Decision Making (MCD)	4
6 Planning & Direction Setting (PDS)	4
7 Visionary Leadership (VLS)	2
Technical Competency	Required level
1 Performance Management (PMG)	5
2 Risk Management (RMG)	6
3 Strategic Planning (SPL)	5

Table 4.4-5 Competencies required for matured operator of Distribution Department

Title: Matured operator of Distribution Department		
Organization: Distribution Department		
Core Competency		Required level
1	Integrity (ING)	1
2	Customer Service Orientation (CSO)	1
3	PLN Professional Style (PPS)	1
4	Continuous Learning (CLE)	1
5	Adaptability & Capacity for Change (ACC)	1
Leadership Competency		Required level
	N/A	-
Technical Competency		Required level
1	Customer Service (CUS)	3
2	Distribution Network Operation (DNO)	3
3	Distribution Network Planning (DNP)	3
4	Metering & Power Limiter (MPL)	3
5	Foreign Language (FLG)	2

All the items defined as Core Competencies are applied to all of the staff in PLN.

Regarding Leadership Competency and Technical Competency, the number of items applied to these categories change according to each rank.

The higher the ranks of the posts go up, the more the applied number of items in Leadership Competency increases.

As for specialists, the applicable number of Technical Competencies is comparatively more than other posts. The level of Technical Competency for more matured skilled posts is set higher than other posts. On the other hand, the numbers of Technical Competency for such posts like management become less as those levels go up.

4.5. Qualification System and Its Operation

4.5.1. Operation regarding certification of competency standards

Figure 4.5-1 is the flowchart that depicts the process of acquiring competency certifications for technicians.

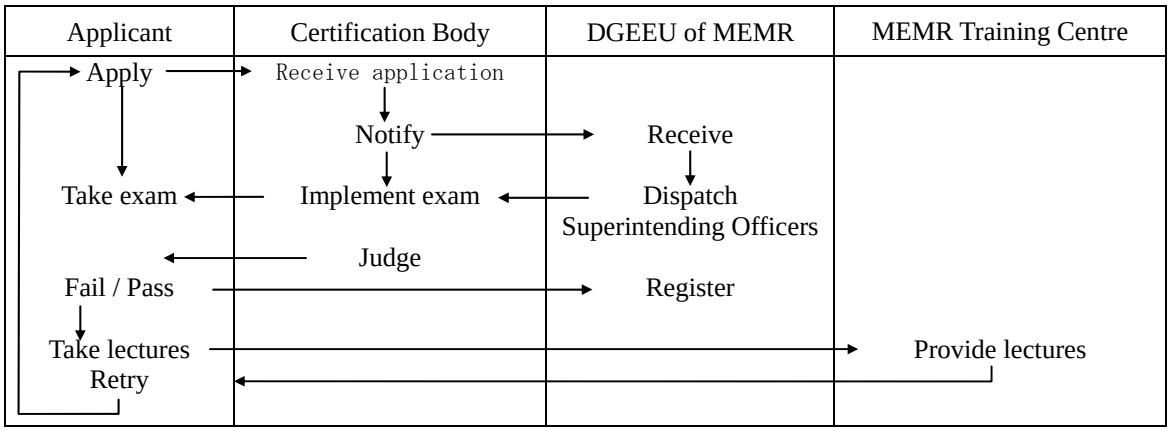

Figure 4.5-1 Competency Certification Acquiring Process

Certification Bodies that receive applications from applicants notify the DGEEU and the Competency Certification Committee.

DGEEU and the Competency Certification Committee dispatch the superintending officers to the exam venue, and they implement supervisory tasks as per the Guidelines for supervision of Competency Certification. In addition, Article 5 of the "Ministerial Decree of Energy and Mineral Resources on Competency Certification Committee for Electrical workers, No.1273, 2002" stipulates the following concrete items as the functions of Competency Certification Committee.

a. Instruction to Certification Bodies
b. Collection of Certification Activity data
c. Survey of the Certification Report from Certification Bodies
d. Sanctions to Certification Bodies because of certification rules violations

Certification Bodies evaluate the applicants' knowledge and practical competencies based on Competency Standards.

Actual tests conducted by the Certification Body are illustrated in the following with the example of one of the Certification Bodies, IATKI.

About 20 applicants and 5 assessors participate in one session of the tests, which continues for 5 days. The tests are carried out NOT DURING PREDETERMINED fixed periods but on an applied basis. Applicants take desk tests, interviews and skill tests after the qualification screening, and then the assessors evaluate them. Skill tests are implemented at the venues of the applicants' companies, and assessors check applicants' operating skills etc. With the results of the tests, decisions to pass or fail are made by the assessors. If passed, applicants are registered as certified persons of Competency Standards and certifications are issued.

Since the valid period of Competency Standards is three years, certified persons must update the certification on a necessary basis if deemed necessary. Certification can be renewed by judges via documentation and interviews.

Applicants who fail the exam can take extra lectures at the MEMR Training Center, and then retake the exams. This MEMR Training Center is the only official education center for the Electric Power Sector, so this organization plays an important role in developing workers' competencies under the National Qualification Framework.

On the other hand, assessors of Competency Standards must take their certification test to be assessors. Like workers' tests, certification units for assessors are classified according to the units of Competency Standards, and certifications are offered to assessors by unit. In assessors' tests, Master Assessors give lectures to the candidates for assessors. The contents include the methodology of evaluation. If they pass the subsequent tests, they are certified as the assessors.

The assessors who commit the certification operation at existing Certification Bodies are appointed from all over Indonesia. They originally belong to PLN (IP, PJB, etc) or IPP, while conducting the certification operation. Those candidate assessors are mainly recommended from the organizations that are asked to recommend appropriate persons by Certification Bodies. Candidate assessors such as experienced persons or academic experts then take the assessors tests.

4.5.2. Existing Certification Bodies

Currently, there are four Certification Bodies for the Electric Power Sector. The following table shows the covered areas, while each Certification Body implements certification operations.

Area	Concrete Operation	IATKI	HAKIT	GEMA PDKB	HATEKDIS
Generation	Planning				
	Construction				
	Operation				
	Maintenance				
	Inspection				
Transmission	Planning				
	Construction				
	Operation				
	Maintenance				
	Inspection				
Distribution	Planning				
	Construction				
	Operation				
	Maintenance				
	Inspection				
Installation	Planning				
	Construction				
	Operation				
	Maintenance				
	Inspection				

* Colored cells mean the coverage by Certification Bodies

Figure 4.5-2 Covered Areas for certification operation by Existing Certification Bodies

The followings is the exhaustive information gathered from the interviews for each Certification Body.

“IATKI”

IATKI is one of the biggest organizations among the 4 certifying bodies for the power sector and the only entity authorized by BNSP. The other 3 organizations (HAKIT, HATEKDIS, GEMA PDKB) are authorized by MEMR and are able to certify only competency certifications related to MEMR matters. On the other hand, IATKI is able to certify for any kind of business. Currently, IATKI issues three levels (Level 1-3) of certification for un-skilled workers in the

power sector. Level 4 (Supervising), Level 5 (Managing), Level 6 (Directing) are yet to be established due to the absence of competency standards for those levels.

IATKI does certifying works for the generation and distribution fields, and both fields focus on "operations", "maintenance" and "inspection". IATKI intends to expand its works to the transmission field and currently apply to BNSP.

Assessors working in IATKI are the staff belonging to PLN (including IP, PJB), IPPs and they are working for IATKI in addition to their usual works. IATKI has 14 local offices and assessors are selected from across the nation.

IATKI holds meetings, if necessary, for discussion among the assessors regarding the issues/problems raised in the competency standards, and submit issues/problems that need to be improved to MEMR.

Examinees mostly belong to the staff of PLN, IPP, etc. There is an agreement between IATKI and PLN, IPP, etc. regarding the funds of the business operation on certifying works at IATKI. IATKI operates its business only with those funds. There are no subsidies from governmental bodies. Examinee who belongs to the aforementioned entities can take the exam free of charge, however, if examinees do not belong to any entities mentioned above, they have to pay a large fee in order to take the exam. In this situation, a person who does not belong to any of the entities mentioned above cannot take exam. Persons belonging to the off-grid electrification cooperative cannot take the exam due to a lack of funds. Since this situation does not satisfy the governmental requirement that all electricians working for electric utilities have to obtain certification, IATKI requests that the government give out subsidies.

"HAKIT"

HAKIT stands for the "Indonesian Society of Power Generation Professionals" and comes from the initial character of Indonesian name.

HAKIT certifies the competency skill for thermal power generation and hydro power generation at the head office and nine branch offices. HAKIT provides educational training and consultancy services as well.

HAKIT classifies the examinees into three categories, "Workers newly employed in the power sector", "experienced workers in the power sector", and "Other industrial engineers". The

examinations are based on the competency standard in Indonesia. For the experienced workers, HAKIT adopts various methods to for certification. Experienced workers may be certified via a record detailing their work experience up until now and interviews.

Examinees must pay the fee for the examination. Normally, companies pay for the exams for their employees. Since the certification expires after three years, the work records which are required for certification may be submitted through the internet or by e-mail via the renewal process.

Currently, HAKIT certifies 161 competencies on generation work skill based on the NQF from level 1 to level 3. There are 51 certifications for operations and 110 for maintenance.

"GEMA PDKB"

GEMA PDKB stands for "Live Line works and Live line community movement" and comes from the initial character of the Indonesian name.

GEMA PDKB certifies the competency skills for transmission and distribution lines at the head office and nine branch offices.
Over the past 5 years since 2004, 5,683 people have obtained the certification among 6,693 examinees.

Most applications are submitted from the Human Resource department of PLN. Three assessors related to the fields of certification are selected from among people in nine controlled areas.

The examination is conducted for 3 or 4 days after the 2-day lectures.

The most remarkable feature of the GEMA PDKB is a certifying hot-line of jobs for transmission and distribution lines. Certifying hot-line jobs are classified into two categories, voltage classes and work methods. There are three types of methods; the distance method, direct operation using gloves, and the potential method used for 500 kV lines.

The GEMA PDKB is trying to integrate some units of competency standards and create a package of qualifications.

Specifically, one package menu provides compulsory units and selective units, and examinees can flexibly select subjects from selective units. This flexibility will enable the certification

system to be simpler and more effective.

“HATEKDIS”

HATEKDIS stands for the “Association of Indonesian Technical Distribution Engineers” and comes from the initial character of Indonesian name.

HATEKDIS certifies the competency skill for house wiring regarding low- and medium-voltage and electrical facilities for private use, whereas the facilities of the electric power company are out of scope. Moreover, the scope of specific jobs covers operation, maintenance and inspection while construction and design are out of scope.

An official organization, KONSUIL, (Komite Nasional Utk Kesecaoratan Installasi, National Committee for Safety Installation) which was established a few years ago, carries out inspections of house wiring at the time of new construction and issues certifications regarding safety levels of facilities, whereas HATEKDIS assesses the competency of engineers and also issues certifications.

The funds of HATEKDIS are offered by KONSUIL.

Most assessors consist of engineers or retired employees from PLN, and other evaluators are selected from the staffs of Universities and the training centers for engineers.

Retired employees of PLN get posts in KONSUIL as well as in HATEKDIS.

HATEKDIS has certified competency skills only for low-voltage lines, and is now ready for certifying for medium-voltage. In the future, services are supposed to extend to 20 kV.

HATEKDIS has just started services in Java Island. Assessors need to go on a business trip to the venue in Java Island for the examination because there are no other offices other than in Jakarta.

Last year, the number of certifications was 6 with one session consisting of 3-day lectures, writing tests, and tests of practical skills. Instructors who are not related to HATEKDIS provide lectures to ensure fairness.

Many retired employees of PLN belong to HATEKDIS. MEMR requests that HATEKDIS

expand its activities because HATEKDIS has many experienced employees who have plenty of experience and sound knowledge.

Chapter 5 Basic Policy of Developing Technical and Competency Standards

5.1. Institutional Designing for Strengthening the Safety Management of Electrical Facilities

5.1.1. Proposing 3 Systems for Improving Electrical Safety

Since around 1990 the structure of the electric power sector in Indonesia has been in a transition shifting from PLN's monopoly to a diversified structure with various business entities such as a new entry of IPPs in the sector and the functional separation of PLN into power generation, transmission, and distribution business units.

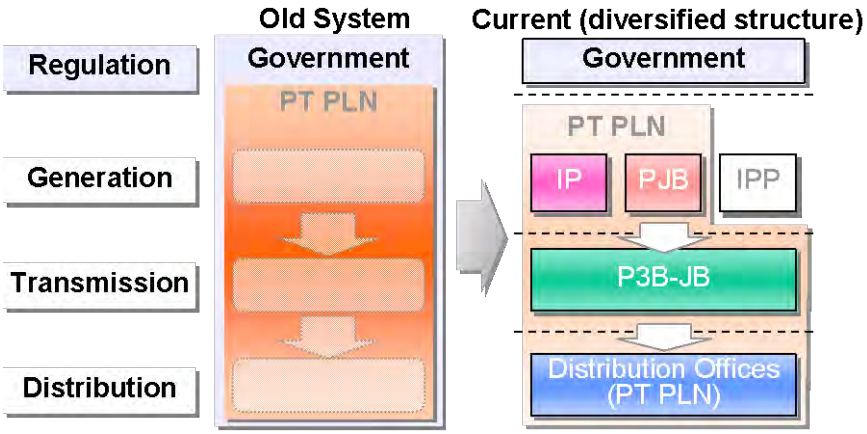

Figure 5.1-1 Structural Changes in the Power Sector in Indonesia (Java-Bali Area's Case)

The enactment of the old Electricity Law (No.15/1985) in 1985 became the trigger of this structural transition, but whereas the legal framework under this law encourages these structural changes, which also inevitably lead to the diversification of responsibilities for electricity supply, not enough of the managerial system has been prepared to deal with this new situation.

During the transitional period of the electricity sector with diversified business entities, the institutional framework has not clearly defined what the Government is obliged to do as regulator responsible for the supervising the safety of electrical facilities and what the utilities are obliged to do as the operator of such facilities. In other words, the institutional framework concerning the safety of electrical facilities has not changed since the era of PLN's monopoly when the roles of the Government and those of the power utility were not clearly separated.

For example, as also discussed in Section 3.7, the Article No.21 of the Governmental Regulation for Power Supply and Utilization (No.10/1989, No.3/2005) provides stipulations that that electrical facilities need to conform to rules on electrical safety. Furthermore, the more specific descriptions to follow them are expected to be provided in the Ministerial Decree of Energy and Mineral Resources on Electrical Facilities (No.45/2005, No.46/2006) which is subordinate to Governmental Regulation.

However, what is actually provided in this Ministerial Decree is mainly the electrical facility inspection procedures to be carried out by the Inspector entrusted by the Government, which may infer that there is a basic institutional concept that the safety of facilities can be managed via a Government's inspection carried out on a point in a time series. It is incumbent on all the facilities to pass the inspection as the gatekeeper prior to periodic checking of the condition of the facilities (10-15 years). However, the implementation of a safety management system in the continuity of a time series, i.e. regulating how the utilities should operate and maintain the facilities in the daily routine works and how the Government should supervise and direct these activities also needs to be taken into account. Under the diversified sector structure where various utilities are active in the sector and the functional separation between the Government and utilities inevitably exists, an institutional framework should be provided to clarify what kinds of Government intervention are appropriate when applied to the routine of utilities and what kinds of intervention are not. However, in this context, the current institutional framework, is not sufficiently prepared to provide such clarification..

In addition, the Article No.22 of the aforementioned Governmental Regulation stipulates that every electrical facility needs to conform to SNI. However, the actual situation is that the SNI for power supply facilities is still underdeveloped and, in order to compensate for this deficiency,, each power utility has inadvertently adopted other technical standards at its own discretion. PLN mainly uses SPLN, which was developed long ago as its own private standard, whereas IPPs have adopted international technical standards such as IEC, IEE, and so on (also refer to Figure 3.7-2 of Chapter 3). In other words, there's a considerably wide area of deficiency in the existing institutional framework, which is left up to much arbitrary decision making amongst the utilities.

Further, even if the Government allows the utilities to decide on the standards and rules that they conform to, the Government finds it difficult to judge appropriately whether the numerical specifications provided in these standards and rules are sufficient to fulfill the requirements for sustaining the safety of electrical facilities without basic common criteria that give grounding to

these specifications.

The new Electricity Law (No.30/2009) to replace the old Electricity Law (No.15/1985) was enacted in September 2009 and then MEMR is slated to develop the subordinate new Governmental Regulations and Ministerial Decrees within one year. The general characteristics of Indonesia's legal structure is that only conceptual stipulations are provided in the supreme law and specific descriptions that affect the actual practices are provided in the subordinate Regulations and Decrees (also refer to Section 10.3). Article No.28 of the new Electricity Law provides "Observance to regulations on electrical safety" as one of the obligations of electricity supply utilities, but it is not until the establishment of new Governmental Regulations and Ministerial Decrees that the specific stipulations that are to correspond are provided. At the moment, the Regulations and Decrees that were established under the old Electricity Law are still effective and no substantial changes in the safety management of the electrical facilities have taken place.

Following this observation on the problems, the JICA Study Team has presented to the counterpart agency MEMR the following three new systems for improving the safety of electrical facilities and has proposed to institutionalize them in the process of establishing new Governmental Regulations and Ministerial Decrees:

- *National Safety Requirements* (NSR)
- *Safety Rules* (SR)
- *Engineering Manager* (EM) system

These three systems proposed are based on the so-called "three main pillars" for electrical safety as stipulated in Japan's Electric Utility Industry Law (No.170/1964) respectively the "Obligation of electrical facilities' conformity to Technical Standards" (Articles No.39-No.41), "Development of Safety Rules" (Article No.42), and the "Nomination of Chief Engineers" (Articles No.43-No.45), while taking into consideration the situation in Indonesia.

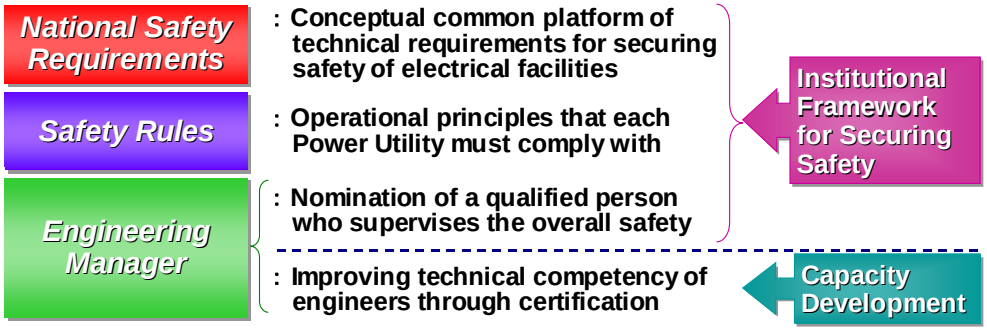

Figure 5.1-2 Proposed Three New System for Improving Electrical Safety

These three systems can be categorized into two groups: while *National Safety Requirements* fall into the institutional framework on facility conditions, *Safety Rules* and *Engineering Manager System* belong to the institutional framework on business operations for achieving and maintaining the facility conditions as stipulated in *National Safety Requirements*. These three systems are further described in the following Sections 5.1.2, 5.1.3, and 5.1.4, and then are further discussed in Chapter 6, Chapter 7, and Chapter 8 respectively.

5.1.2. National Safety Requirements

(1) Development of National Safety Requirements

The current status of the electric power sector in Indonesia that SNI, which is formally defined as the national standard that every electrical facility needs to conform to, has not been sufficiently developed and each power utility adopts technical standards at its own discretion. Hence no common basis of technical specifications has been formed so far. Following this observation, the JICA Study Team came to the conclusion that, continuous efforts to complete SNI that covers comprehensively all kinds of electrical facilities needs to be tackled as the mid or long-term challenge, but that more priority should be given to institutionalizing the basic philosophy of securing the safety of facilities at a more conceptual level. Based on this conclusion, the JICA Study Team has proposed developing and institutionalizing the *National Safety Requirements*, which is the common platform of the technical specifications of electrical facilities.

Figure 5.1-3 Outline of the Proposed National Safety Requirements

Introducing *National Safety Requirements* in Indonesia's electric power sector does not necessarily mean that power utilities are immediately obliged to drastically amend the current situation in adopting different technical standards. Basically no changes will take place concerning the situation that utilities are adopting standards at their own discretion, but *National Safety Requirements* will play a role, as the super-ordinate ordinance for the technical standards that power utilities are adopting, to provide a foundation for assessing whether applying these standards are appropriate for securing the safety of electrical facilities. In case the Government judges that a part of some technical standards adopted by the power utility is not sufficient for fulfilling these conditions, the power utility is requested to apply appropriate amendments such as applying other technical standards to make up for that part.

Besides that, the SNI on power supply facilities has been underdeveloped for a long time and MEMR has an ambition to complete this as its mid- and long-term challenge. *National Safety Requirements* is also expected to help developing SNI systematically as the super-ordinate conceptual platform to indicate the total to-be framework of SNI.

There were the following comments from the officers of Indonesian counterpart MEMR-DGEEU on the JICA Study Team's proposal, showing their willingness to accept the JICA Study Team's proposal.

- MEMR has also recognized the problem pointed out by the JICA Study Team that the current legal framework only provides ambiguous descriptions of safety management on electricity supply.
- In practice there was an argument within the MEMR-DGEEU around 2007 for establishing a regulation that stipulates more specifically how to secure the safety of electricity supply, but so far this idea has not gone beyond the internal discussion to be materialized as

legislation.

The *National Safety Requirements* proposed by the JICA Study Team has been developed based on Japan's "Ministerial Ordinance to Stipulate Technical Standard on Electrical Facilities", "Ministerial Ordinance to Stipulate Technical Standard on Hydropower Facilities", and "Ministerial Ordinance to Stipulate Technical Standard on Thermal Power Facilities", taking into account the current situation of the Indonesian power sector and the counterparts' comments. Originally the JICA Study Team had planned to propose this in the name of "Technical Standards", but there was a comment from on the Indonesian side that the name of "Technical Standard" reminds us of the technical specifications with numerical criteria like SNI and SPLN. Hence the JICA Study Team's proposal, which is a more conceptual framework to be positioned above these "standards", was tentatively named "Safety Requirements" in order to avoid confusion. The name of "*National Safety Requirements*" can be changed depending on the idea of Indonesian counterparts.

(2) *National Safety Requirements* and Facility Inspection System

Introduction of the *National Safety Requirements* as the super-ordinate regulation on electrical safety is also expected to strengthen the existing scheme of inspection on electrical facilities.

The current "Ministerial Decree on Electrical Facilities" that was established under the old Electricity Law and is still effective as of February 2010, stipulates the inspections on electrical facilities carried out by inspection bodies designated by the Government and the list of items to be inspected is also provided in the appendix of this ministerial decree. However, due to the lack of criteria for each inspection item, no common rules have been established between the facility inspectors and owner/user of facilities that are to be applied universally. In practice, inspectors are making a judgment on each occasion by looking at the facility's conformity to technical standards that the owner/user refers to or its conformity to technical specifications provided by the manufacturer.

The institutionalization of *National Safety Requirements*, which will be positioned above individual technical standards/specifications, is expected to provide common judgment criteria between the inspectors and facility owners/users. The appropriateness of technical standards that each facility owner/user refers to, as well as that of the technical specifications provided by facility manufactures, can also be assessed from the viewpoint of compatibility with *National Safety Requirements*. That is, the *National Safety Requirements* provides a universal rule that

every electrical facility all over the country needs to conform to.

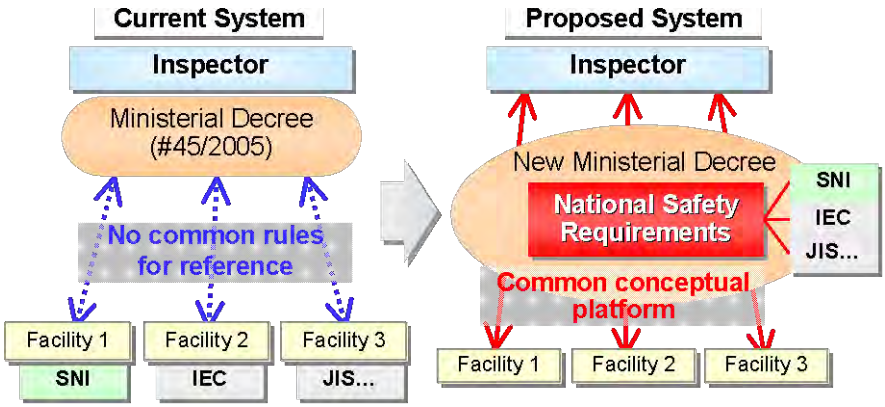

Figure 5.1-4 *National Safety Requirements* and Facility Inspection System

Detailed institutional design of *National Safety Requirements* will be discussed in Chapter 6

5.1.3. Safety Management Based on *Safety Rules* System

As stated in the previous section, there already exist regulations on the specification of electrical facilities, although their imperfection is also argued. However, no regulations have been established regarding power utilities' daily business operations to stipulate how these utilities, which are the owner (user) of electrical facilities, should be operated. In other words, no regulations have been stipulated regarding how the Government should supervise and direct the power utilities' business operations, and on what should be reported by the power utilities to the Government. This led to the JICA Study Team's observation that the roles of the Government and those of power utilities have not been clearly defined in assuring the safe operation of electrical facilities.

For example, MEMR says that PLN has been reporting to the Government on facility conditions and on accidents, but admits that the PLN only follows historical convention and in fact no regulation exists governing the specifics of how PLN is obliged to report to the Government.

These unwritten rules may have worked fairly well in the era when the roles of the Government and those of utilities were not separated, but, as also discussed in Section 5.1.1, this situation may lead to the possibility that the Government will not be able to collect the necessary information in a timely manner for its tasks as a regulator in a period when the Indonesian

Government has been pushing forward with basic policy to realize an efficient electric power sector through structural diversification. In other words, the existing legal framework has failed to provide the necessary institutional tools to work this new sector structure effectively.

Clearly defining the roles of the Government (regulator) and power utilities (operator) regarding safety management on facilities is also important from the viewpoint of maintaining the status of facilities as specified in the *National Safety Requirements* in daily business operations. Based on this idea, the JICA Study Team proposed a system, in which power utilities are obliged to compile their basic policy of facility operation as *Safety Rules* and submit the *Safety Rules* to the Government, in order to assure that power utilities' business operations are well organized to maintain the technical specifications as stipulated in the *National Safety Requirements*. The Government assesses the *Safety Rules* submitted by the power utilities and, when the Government finds that the operational policy described in the *Safety Rules* is not sufficient enough to maintain the facility conditions as stipulated in the *National Safety Requirements*, it can order the power utilities to amend the *Safety Rules*. The Government also regularly monitors the business operations of power utilities to ensure that they are in compliance with *Safety Rules* and have the authority to order the power utilities to improve their business practices when their activities are not in compliance.

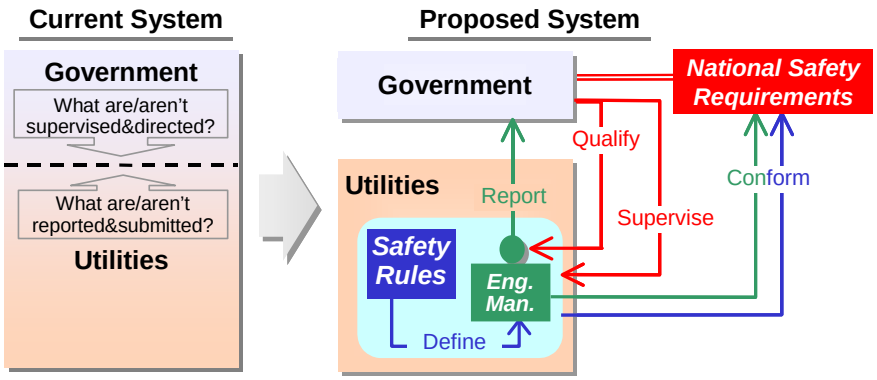

Figure 5.1-5 Introduction of *Safety Rules* and Separation of Responsibilities between the Government and Power Utilities

Safety Rules consists of the following two components:

- Organizational structure and assignment of duties for securing the safety of facilities;
- Basic policy of business operations for the safety of facilities

With regards to the first point, each power utility is obliged to nominate a necessary number of

Engineering Managers, who pivotal personnel in the organizational and operational setup for assuring the safety of facilities. The details of the *Engineering Manager* system will be explained in the following Section 5.1.4.

The description of the *Safety Rules* does not go beyond the basic operational policy of electrical facilities and power utilities would have already had practice in preparing more detailed private documents such as operational manuals to define their business operations more specifically. The *Safety Rules* are positioned as the super-ordinate regulation above these operational manuals, and these operational manuals need to be developed in conformity to the operational policy as stipulated in the *Safety Rules*.

There were the following comments from MEMR-DGEEU officers on *Safety Rules* and *Engineering Manager* Systems, showing their willingness to accept these systems.

- In the Indonesian power sector, there are statutory facility inspections carried out by inspection bodies entrusted by the Government as a scheme to assure the safety of electrical facilities
- However, as pointed out by the JICA Study Team, there are no institutional frameworks for the Government to verify whether the power utilities' daily routine is operated appropriately during ordinary times other than inspections. Obliging power utilities to develop and submit Safety Rules as the basic policy of business operation will help make their daily routine transparent to the Government
- Further, sometimes the person on the side of the owner/user who should be the counterpart of the Inspector of the facility is not clearly identified r. The legal nomination of this person as an *Engineering Manager* makes sense.

Likewise with the *National Safety Requirements*, the names of the *Safety Rules* and *Engineering Manager* are tentatively provided by the JICA Study Team and their final naming may be changed depending on the Indonesian counterpart's idea.

Detailed institutional design of the *Safety Rules* will be discussed in Chapter 7

5.1.4. Establishment of *Engineering Manager* System

Each power utility is obliged to nominate the necessary number of *Engineering Managers*, who

are the key personnel in an organizational structure responsible for supervising the safety of electrical facilities. As discussed in Section 5.1.3, one of the main objectives of the JICA Study Team's proposal is to clearly defining the responsibilities of the Government and power utilities while nominating a person with certain competencies to the position of *Engineering Manager* and assigning considerable discretion on facility safety will help in clarifying the structure of responsibility within a power utility regarding safety management.

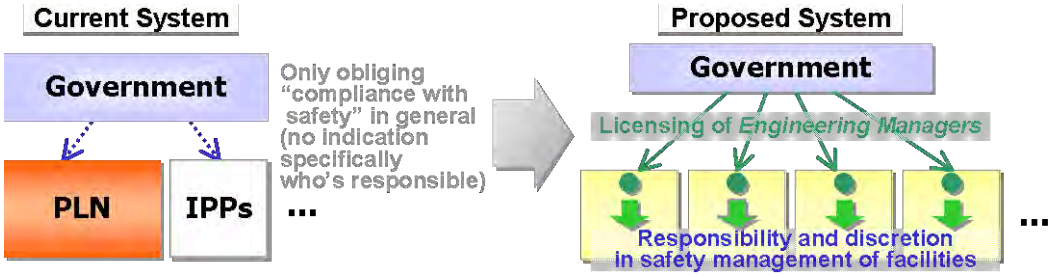

Figure 5.1-6 Proposal of Engineering Manager System

The *Engineering Manager* assumes responsibility for the overall supervision of the construction, operations and maintenance activities of the facilities under his/her jurisdiction, and for overseeing the technical reporting to the Government (and the entrusted inspector). It goes without saying that the final responsibility for the business operations, including the responsibility for facility safety, belongs to the General Manager, but in general it is realistically difficult to extend the General Manager's responsibilities so that he is obliged to oversee the status of facilities in the fields specifically from the technical aspect and to conduct necessary reporting to top management and the Government. In order to compensate for all of this, the *Engineering Manager* provides the necessary information to the General Manager as his technical advisor and assumes accountability to top management and to the Government on behalf of the General Manager when the necessary reporting exclusively deals with technical matters.

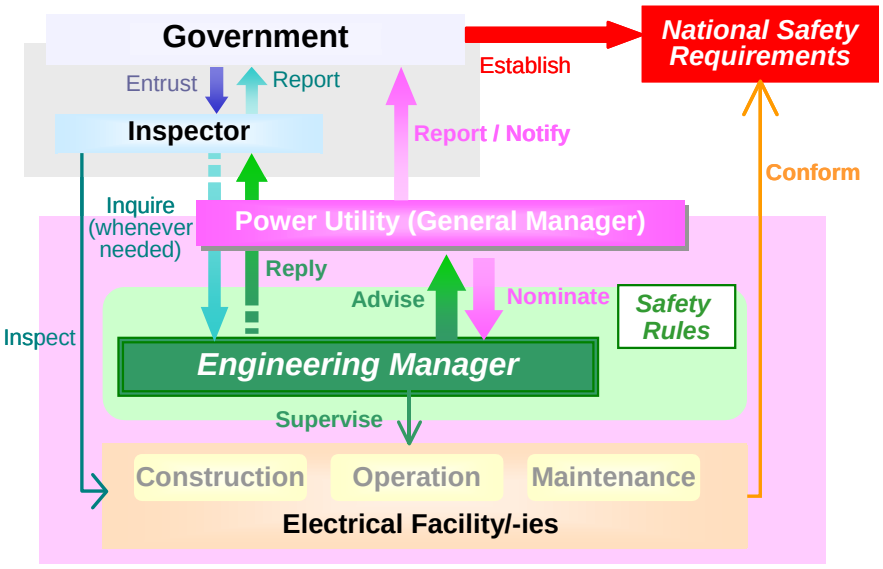

Figure 5.1-7 Safety Management Based on *Engineering Manager* System

In preparing the *Safety Rules*, each power utility is required to describe explicitly how to position the *Engineering Managers* in its organization as a part of the overall safety management structure, though the number of *Engineering Managers* and positioning in the organizational hierarchy can be primarily decided based on the power utility's initiative. However, the Government can order the power utility to revise the *Safety Rules* when it finds that the number of assigned *Engineering Managers* does not appear to be sufficient.

As previously mentioned, no prior regulations regarding the positioning of the *Engineering Manager*, but some very basic patterns of positioning can be shown as follows for reference. As for a vertically integrated power utility with generation, transmission and distribution such as PLN, each power station, each regional chapter of the transmission division, each regional chapter of the distribution division and so on, can be defined as a *Regional Business Unit*, where *Engineering Managers* needs to be nominated. When two or more power stations of the same type are located closely within a given region, they can be grouped into one *Regional Business Unit* under the jurisdiction of one *Engineering Manager*. Likewise, IPPs also nominate one *Engineering Manager* for each individual power station or for a group of power stations in a designated area.

As for the power distribution cooperatives in rural areas and power suppliers with isolated grids in remote islands, at least one *Engineering Manager* needs to be nominated for each cooperative / supplier. When the size of these cooperatives / suppliers is too small with too many limited human resources for nominating one *Engineering Manager* from their staff, they can entrust the

position of *Engineering Manager* to an external person if this individual possesses the proper qualifications. The external *Engineering Manager* does not need to be permanently stationed and can assume the position of *Engineering Manager* from two or more utilities, though it depends on his/her workload.

The person to be nominated as an *Engineering Manager* is required to obtain the necessary qualifications stipulated in the ordinances. The competency standards for *Engineering Manager*, which needs to be provided as the basis of qualification, will be explained in the following Section 5.2

Detailed institutional design of *Engineering Manager System* will be discussed in Chapter 8.

5.2. Development of Competency Standard for *Engineering Managers*

5.2.1. Institutional Design for Strengthening Electrical Safety Management and Development of Competency Standard

This JICA Study originated from a request brought forth from the Indonesian Government to the Japanese Government to assist in developing competency standards and a qualification system for Indonesian electric power sector based on the National Qualification Framework (NQF), focusing on the management-level personnel (NQF level 4 and above). Based on this request, a preliminary Study to define the Scope of Works of this JICA Study was carried out in July and August 2008. After a series of discussions, both parties reached an agreement following the Indonesian side's acceptance of the Japanese side's proposal that the Japanese consultants will assist developing competency standards and a qualification system for the electric power sector in Indonesia based on the Japanese Chief Engineer's system (e.g. Electrical Chief Engineer).

After that, the Japanese side also made a proposal that based on the observation of the laws and regulations regarding electricity safety, as an equivalent of Japan's "Ministerial Ordinance to Stipulate Technical Standards on Electrical Facilities", they have not been sufficiently developed, the JICA Study will provide assistance in institutional designing in this regard as well. This proposal was also accepted by the Indonesian side.

This JICA Study began in January 2009, and after a series of discussions in the field between the JICA Study Team and the Indonesian counterpart as well as related stakeholders, the JICA

Study Team confirmed the observation that the institutional framework for managing the safety of electrical facilities has not been sufficiently established. Then the JICA Study Team proposed the *National Safety Requirements* based on Japan's "Ministerial Ordinance to Stipulate Technical Standards on Electrical Facilities", "Ministerial Ordinance to Stipulate Technical Standards on Hydropower Facilities", and the "Ministerial Ordinance to Stipulate Technical Standards on Thermal Power Facilities". Then the JICA Study Team also proposed *Safety Rules* and *Engineering Manager Systems* to assure the effectiveness of the *National Safety Requirements* from the aspect of business operations.

As with Japan's Chief Engineer system, the *Engineering Manager* system proposed by the JICA Study Team also requires personnel possessing a high-level technical knowledge. Therefore, the JICA Study Team proposes that the person who will be nominated as *Engineering Manager* needs to acquire the necessary qualifications, and started listing the technical competencies needed to-be an *Engineering Manager* as the first step in establishing a qualification system. Following the agreement with the Indonesian side on the list of technical competencies, the JICA Study Team started developing competency standards. Because the proposed *Engineering Manager* will be responsible for assuring and sustaining the safety of facilities to meet the stipulations in the *National Safety Requirements*, the applicant's capability in constructing, operating, and maintaining facilities to conform to the *National Safety Requirements* forms the fundamentals of the competency standards for the *Engineering Manager*.

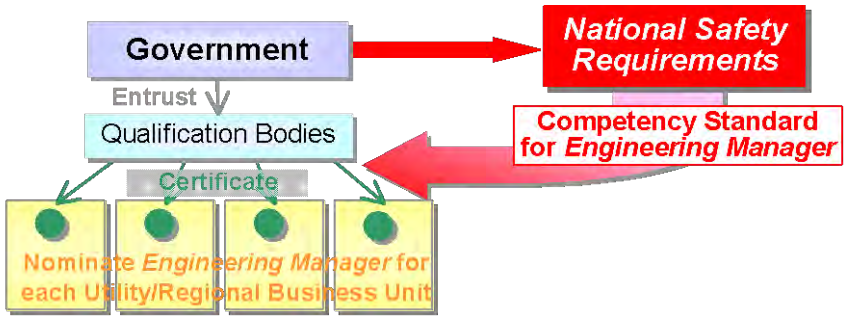

Figure 5.2-1 Relation between *Engineering Manager System* and *National Safety Requirements*

5.2.2. Consistency with National Qualification Framework (NQF)

In developing competency standards for the *Engineering Manager*, its consistency with the original request from the Indonesian side, i.e. the development of competency standards and a

qualification system for management-level personnel (NOF level 4 and above), also needs to be noted. Unlike the original request from the Indonesian side which aims at developing competency standards for all kinds of managers in the power sector, the JICA Study Team proposed to confine the targets to the competency standards exclusively for the *Engineering Manager*. It also needs to be noted that, whereas the main objective of the Indonesian NQF is to improve and standardize the capacity of engineers in the electric power sector, Japan's Chief Engineer system, which provides the foundation of the proposed *Engineering Manager* system, has been developed as a part of a safety management system on electrical facilities, and due to the differences in characteristics, the transplantation of one to another cannot be made mechanically. The difference between both systems is summarized in Table 5.2-1.

Table 5.2-1 Differences between Indonesian NQF and Japanese Chief Engineer System

	Indonesian NQF	Japan's Chief Engineer System
Overview of the system	- Listing all the jobs (=competency units) necessary for an industrial sector and describing the necessary job capabilities (competencies), as well as their extent, for each position engaged in the sector.	- Identifying the person responsible for securing safety of an electrical facility and the obligation to acquire license to certify the qualification of that nominated person
Main purpose	- Vocational capacity development for all of those engaged in the sector	- Securing safety of electrical facility
Target	- All the positions engaged in the sector	- Those who are nominated as the Chief Engineer of an electrical facility
Licensing	- Licensing each of the competency units required for the position	- A single license regardless of the position (no division of generation / transmission / distribution)
Layers of licensing	- Nine layers from Level 1 (lowest) to Level 9 (highest) - Layers are designed so that the person at higher level directs the person at lower level (in relation to the organizational structure of a business entity)	- 3 categories, 7 types of Chief Engineer: Chief Electrical Engineer (1st, 2nd, and 3rd Grades), Chief Engineer of Dams and Waterways (1st and 2nd Grades), and Chief Engineer of Boilers and Turbines (1st and 2nd Grades). - No superordinate/subordinate relations among Classes 1, 2 & 3 (which license to acquire depends on the voltage that the applicant deals with)
Relation with job	- Closely related to job description and promotion in the organization of	- No close relation with job description and promotion

description	business entity	

In Japan, there is also a vocational qualification system, which may be more similar to Indonesia's NQF in nature. Its biggest difference from the Indonesian NQF, however, is that Japan's vocational qualification system has historically been developed by each individual business entity and in Japan there are no national vocational qualification systems such as the Indonesian NQF that defines technical competencies for each industrial sector and vocational levels countrywide. The vocational qualification system developed by each company is has been designed in close affinity with the company's unique personnel policy and structure thus is not easily transformed into a national qualification system. In short, it is not easy to find an existing system in Japan that can be a good reference for developing NQF.

In Japan's electric power sector as well, each power utility has developed its own unique vocational qualification systems, and they have been designed exclusively to harmonize with the utility's own organizational structure, job descriptions, and remuneration and promotion systems, hence they can hardly be applied to as a prototype of the national vocational qualification system. Moreover, the typical human capacity development program of Japan's power utilities has been designed so that the technical skills should be brushed up in the status of field technicians (that are considered equivalent to NQF level 3 and lower) and the required competency of management-level personnel mostly focuses on developing the capacity from the non-technical soft aspects as an administrator of the organization, rather than enhancing the capability of supervising and directing technical matters specifically. This may not necessarily be fit for the vocational system in Indonesia, where high-level personnel are still required to enhance the capability of supervising and directing technical matters, and there was a request from the Indonesian side to the JICA Study Team requesting to develop competency standards taking into account this situation.

That kind of technical competency for high-level officers cannot be found in the vocational qualification system of Japan's electric power utilities. In Japan, qualified Chief Engineers are expected to play the role of high-level officers responsible for supervising and directing technical matters. A person who will assume the position of Chief Engineer is requested to acquire qualifications as stipulated in Japan's Electric Utility Industry Law and a similarity with Indonesian NQF can be found from this aspect.

5.2.3. Basic Policy of Developing Competency Standard in this Study

Following the observations in the previous section, the JICA Study Team came to the conclusion that developing competency standards for the *Engineering Manager* by referring to Japan's Chief Engineer system would be the best solution in this Study. This Study has proposed three systems for improving the safety of electrical facilities, i.e. *National Safety Requirements*, *Safety Rules*, and *Engineering Manager System*, and the development of competency standards exclusively for the *Engineering Manager* for the integrity of the Study has been considered to yield the most effective output.

Also from these perspectives, these three systems for improving the safety of electrical facilities have been proposed in this Study, i.e. *National Safety Requirements*, *Safety Rules*, and *Engineering Manager System*, prioritizing the development of competency standards for the *Engineering Manager* in a unity of the entire Study is considered to yield the most effective output.

The JICA Study Team evaluated an alternative to develop competency standards targeting overall management-level personnel in the power sector trying to meet the original request from the Indonesian side. However, this option needs to deal with much more content volume than focusing on the *Engineering Manager* and developing a national competency standard for management-level personnel that cannot find any relevant references in Japan within the limited project period of this Study would not reach a high degree of perfection. And developing competency standard to cover all kinds of management-level personnel would diminish the synergy with the JICA Study Team's proposal of institutionalizing *National Safety Requirements*, *Safety Rules*, and *Engineering Manager System* for improving the safety of electrical facility. For these reasons, this option would be rejected.

The JICA Study Team conducted a series of discussions with the Indonesian counterparts and relevant stakeholders during the 3rd and 4th Field Studies in Indonesia to explain the aforementioned concept and gain consensus.

There was a comment from the Indonesian side in this regard as follows:

- MEMR is obliged to develop competency standards in conformity to the NQF format, as stipulated in the Ministerial Decree of Energy and Mineral Resources on Competency Standardization for Electrical workers (No.2052/2001), and that competency standard for

field technicians (NQF level 1, 2, and 3) has already been developed in this format. Hence the newly developed competency standard at least formally needs to maintain continuity with the existing competency standard

Following this comment, the JICA Study Team has set a basic policy of the Study to first develop the systematical structure of the required competency for *Engineering Manager* based on Japan's Chief Engineer system, to gain consensus of the Indonesian site step by step, and then to work together in transplanting this into a format that complies with the Indonesian side's request.

Japan's Chief Engineer system provides three different categories, i.e. Chief Electrical Engineer, Chief Engineer of Dams and Waterways, and the Chief Engineer of Boilers and Turbines, depending on the type of facilities, but the only single qualification is provided for the Chief Electrical Engineer minus caring about the functional differences among power generation, transmission, and distribution. This is mainly due to the fact that the exam of the Chief Electrical Engineer focuses on the understanding of electrical theories, and hence no major differences exist in the required knowledge regardless of the differences in functions in the electrical system.

There were comments and requests from the Indonesian side in this regards as follows:

- The required competency should differ among power generation, transmission, and distribution. Hence the qualification of *Engineering Manager* should be provided separately among these functions
- The competency standards for *Engineering Manager* should be developed with more emphasis on the understanding of practical skills, so that the consistency with the existing competency standard can be maintained and the applicant's capability of carrying out the tasks he/she would be responsible for can be assessed straightforward

It is not strange to prepare competency standards separately for generation, transmission, and distribution, if the listing up of the required technical competencies for Engineering Manager emphasizes understanding of the practical skills. Therefore this Study proposes providing different qualifications for the *Engineering Manager* among the different functions such as power generation, transmission and distribution, and developing different competency standards to meet this.

As far as the exam of Japan's Chief Electrical Engineer, which emphasizes the understanding of theoretical matters, it is used as the primary reference for the competency standards of the *Engineering Manager*, functional separation among power generation, transmission and distribution is hardly possible. The JICA Study Team therefore decided to first define the tasks and responsibilities of the *Engineering Manager* by referring to the Japanese power utility's private manual for their own Chief Engineers as the first step, to share understanding with the Indonesian counterpart and related stakeholders, and then to compose a set of required competencies for the *Engineering Manager* based on these tasks and responsibilities.

According to MEMR, the tasks for completing the competency standards for the *Engineering Manager* will be taken over by the Indonesian side after completion of the JICA Study because it will still take a considerable amount of time (a year or more) to consult with the stakeholders to gain consensus on its details. Further, there are also other miscellaneous tasks that would be left for MEMR staff after the completion of this Study, such as the numbering of the listed items and establishing linkage with the existing competency standards. Therefore, a considerable volume of tasks needs to be conducted by the Indonesian side after the hand-over from the JICA Study Team. Careful consideration is needed to determine how to transfer the JICA Study Team's output to the Indonesian counterpart so that the workload of the Indonesian side can be mitigated.

Details of the competency standards for the *Engineering Manager* will be discussed in Chapter 9.

Chapter 6 Development of National Safety Requirements

6.1. Basic Concept of National Safety Requirements

6.1.1. Significance of National Safety Requirements

"MEMR Ministerial Decree on Electrical Facilities (Ministerial Decree)"(No.45/2005, No.46/2006), which is referred to as the "Ordinance on electrical safety" in the "Government Regulation on Power Supply & Utilization (Government Regulation)" (No.10/1989, No.3/2005), stipulates inspection procedures and touches little on how electrical facilities can maintain safety. Beside the detailed specifications for facilities installation that have been established such as SNI or IEC etc., however, SNI etc. does not stipulate the conceptual background regarding how the facilities should be installed and maintained.

Therefore the JICA Study Team established *National Safety Requirements* as the super ordinate concept for the preconditions to stipulate quantitative specifications such as SNI.
By clarifying how the facilities should be installed and maintained to be safe in the *National Safety Requirements* specifically, the criteria of inspections, which mentioned only items in the above "Ministerial Decree", will be indicated. Further, for the area that has not developed SNI, a principle that all electrical facilities should follow will be indicated by providing *National Safety Requirements* ahead of the SNI establishment.

Moreover, under the present situation, enterprises have various kinds of technical standards respectively, but after "*National Safety Requirements*" implementation, when seeing from a viewpoint of security reservation of power facilities and judging whether it is appropriate, they need to follow same technical standards.
And "*National Safety Requirements*" is also expected to help developing SNI systematically as the super-ordinate conceptual platform to indicate the total to-be framework of SNI.
Therefore it required the deepening and disseminating systematically to stakeholders especially private sector.

In addition, in order to adjust easily to technology improvements and to quote other standards such as international standard or neutral private agency standards, *National Safety Requirements* do not describe the definite specification of electrical facilities and do not describe the performance of facilities to stipulate the basic concept for securing a facility's safety. Therefore,

National Safety Requirements are consistent with existing technical standards such as SNI.

6.1.2. Scope of National Safety Requirements

Having Japan's ministerial ordinance, which possesses extensive experience in facility safety, stipulate the technical standards for electrical facilities was primarily referred to in developing the *National Safety Requirements*. However, this ministerial ordinance literally targets "electrical facilities" and it excludes power supply facilities that are not defined as electrical facilities while it includes electrical facilities that have little to do with electric power supply.

Power supply facilities related to power transmission, substations and distribution are mostly defined as "electrical facilities", but some facilities related to power generation, such as dams and channels for hydropower generation and boilers and turbines for thermal power generation have been excluded from the definition of "electrical facilities", and they are instead dealt with in an ministerial ordinance to stipulate technical standards for hydropower generation facilities and ministerial ordinances to stipulate technical standards for thermal power generation facilities respectively. Facilities related to electric railways are an example of electrical facilities that have little to do with electric power supply.

Because the objective of this Study is to support MEMR as the counterpart agency in Indonesia, in developing technical standards for electric power supply, and also considering that MEMR agreed that the target of *National Safety Requirements* should cover power supply facilities regulated by MEMR, the National Safety Requirements is undergoing development with reference to the aforementioned Japan's ministerial ordinances. Power supply facilities that are not defined as electrical facilities deal in National Safety Requirements as follows.

[Hydropower Facilities]

- Large dams are under the supervision of the Ministry of Public Works (MPW) and the facility authentication in setting-up is conducted following the assessment of the Dam Safety Committee that is founded under the MPW. Hence large dams that are under supervision of MPW, as well as their related facilities, shall not be covered by *National Safety Requirements*.
- However, regarding medium-sized and small dams that are out of the scope of MPW's authentication and need to be supervised by MEMR in assuring safety, their materials, strength and structure shall be regulated by *National Safety Requirements*.

(Note) Dams that are subject to the assessment of the Dam Safety Committee:

- Bank height: 15m or higher, and reservoir capacity: 100,000m^3 or more

  or
- Bank height: lower than 15m, and reservoir capacity: 500,000m^3 or more

  or
- Others that are designated by the Dam Safety Committee taking into account their effects on downstream areas.

[Thermal power facilities]

- Among mechanical facilities that are thermal power-related, boilers, steam turbines that include geothermal power, gas turbines, internal combustion engines, liquefied gas facilities, gasifier facilities and storage facilities for refuse-derived solid fuels are covered by the *National Safety Requirements*.
- However, in Indonesia, the Ministry of Manpower and Transmigration stipulate safety for welding. Therefore, to prevent duplication of the regulation, welding is not covered by the *National Safety Requirements*.
- Boilers and gasifier facilities have been supervised by both MEMR and the Ministry of Manpower, however, MEMR requested to cover them by *National Safety Requirements*. Therefore, the JICA Study Team decided to cover them in *National Safety Requirements*.

[Renewable power facilities]

- Renewable power facilities such as wind power, solar power, and fuel cell facilities are not covered in *National Safety Requirements* so far. Because each facility has different technical specifications and standard regulations that all facilities comply with on a minimal basis..
- However, general electrical provisions for generation facilities are covered by *National Safety Requirements*. Geothermal power facilities should comply with the regulation of thermal power because the facilities are almost identical excepting the steam well.

[Nuclear power facilities]

- Nuclear Power facilities need special and high level technical requirements compared with other generation facilities. Technical requirements for Nuclear power are established independently from other facilities in Japan

- Nuclear power facilities for commercial use do not exist in Indonesia so far. Further, the development of technology and law for Nuclear power are implemented by BATAN and BAPETEN, not MEMR. So these facilities are not covered by *National Safety Requirements*.

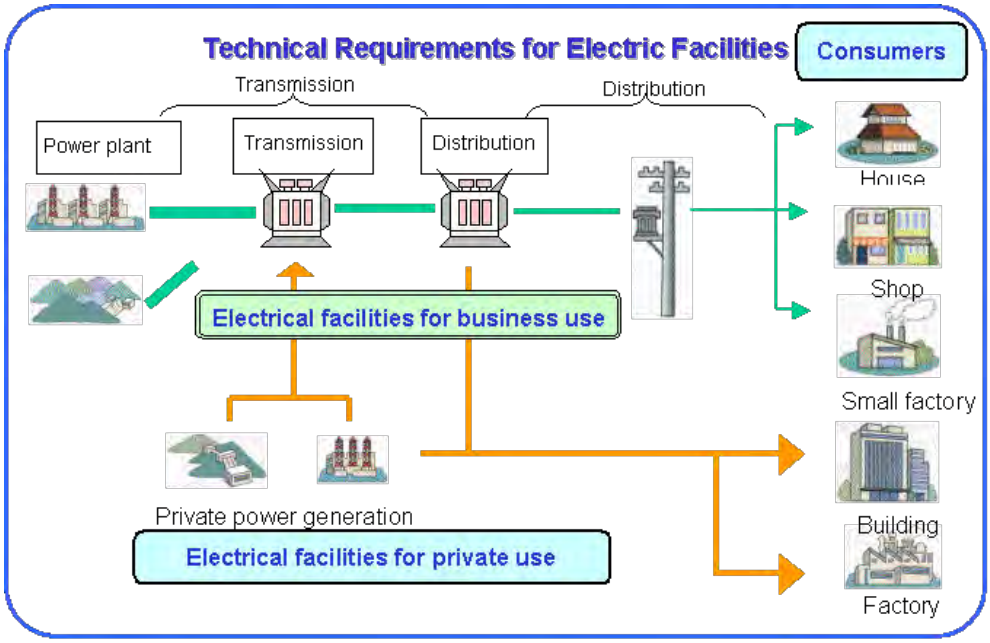

Figure 6.1-1 Scope of National Safety Requirements

6.2. Outline of National Safety Requirements

6.2.1. System of National Safety Requirements

Japan's technical standard for electrical facilities, herein the reference of *National Safety Requirements*, stipulate the following four safety principles as the foundation undergirding safe electricity facilities.

"Safety Principle for Electrical Facilities"

- Prevention of electric shock or fire
  Stipulate measures such as grounding in order to prevent electric shocks or fires.
- Prevention of abnormality and Protective Measures
  Stipulate the fundamental policy for the prevention of abnormalities and protective measures for electrical facilities
- Prevention of electric or magnetic interference with electrical facilities
  Stipulate the prevention of electric or magnetic interference with other objects
- Prevention of power supply obstacles
  Stipulate preventive measures of obstacles in power supply caused by damage of electric facilities.

The technical standards for electrical facilities in Japan stipulate the articles for electrical facilities development based on the above safety principles. The *National Safety Requirements* also apply correspondingly to the contents, including safety principles, stipulated in the technical standard for electrical facilities in Japan. Surroundings or conditions of the electrical facilities, however, are not exactly the same between Indonesia and Japan. The JICA Study Team developed *National Safety Requirements* in consideration of the surroundings and conditions of Indonesia.

For example, as mentioned in 6.1.2, the technical standards for electrical facilities, hydropower facilities and thermal power facilities have been established as individual technical standards. The JICA Study Team considers the *National Safety Requirements* easy to adopt if that system collaborates with each electric power supply business in Indonesia. So under the safety principles, the *National Safety Requirements* stipulate the requirements for installation of the electric network system and the requirements for generation facilities (general provision). Then the specific requirements for hydropower and thermal power facilities are stipulated under the requirements for generation facilities as showing in figure 6.2-1.

All stipulated items were also developed reflecting the comments and opinions at the workshop for *National Safety* Requirements held on the 4th survey and all seminars and meetings at each survey. The comments from the Indonesian side and the revised status will be described in 6.2.2.

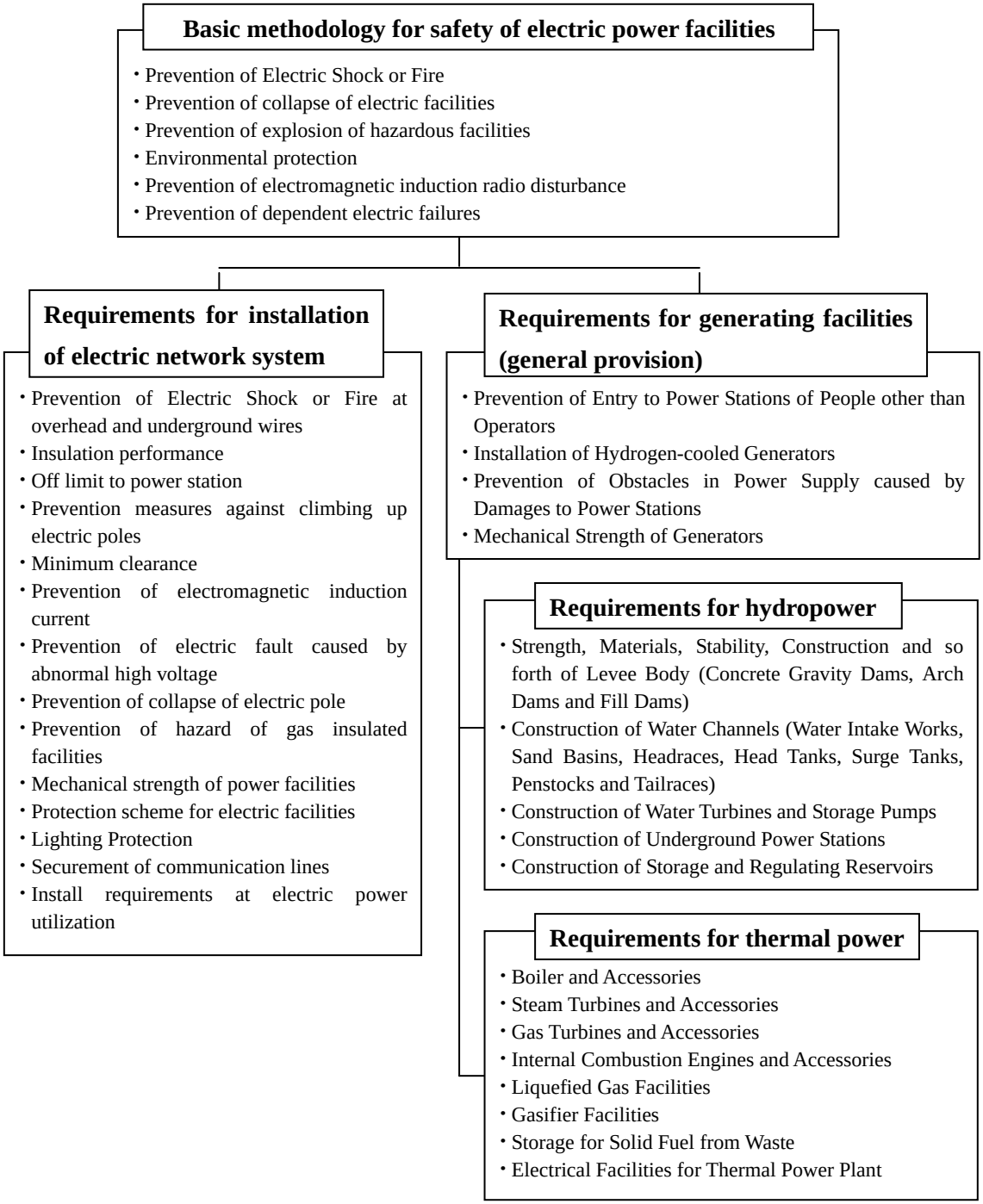

Figure 6.2-1 Structure of *National Safety Requirements*

6.2.2. Structure of National Safety Requirements

The *National Safety Requirements* proposed by the JICA Study Team consist of two parts with 153 articles. Part 1 describes the purpose and safety principles etc. and Part 2 describes the technical requirements for the power network facilities, generating facilities, hydropower facilities and thermal power facilities. The scope of application for each facility is defined based on the result of discussions with MEMR in considering the scope of inspection under MEMR. The outline of each chapter and comments from the Indonesian side are as follows.

[Part 1 General Rules : Article 1 to 18]

Table 6.2-1 Part 1 General Rules

Article 1	Purposes	Article 11	Grounding of Electrical Equipment
Article 2	Coverage	Article 12	Grounding Method for Electrical Equipment
Article 3	Terminology		
Article 4	Classification of Voltage	Article 13	Prevention of Transformer Fires at Medium-, High- and Extra High- Voltage Power Circuits
Article 5	Prevention of Electric Shock or Fire at Electric Facilities		
Article 6	Insulation of Electric Power Circuit	Article 14	Protective measures against Over-Current faults
Article 7	Prevention of Electric Conductor Breakage		
Article 8	Electric Conductor Connections	Article 15	Protective measures against Ground fault
Article 9	Thermal Strength of Electric Equipment	Article 16	Prevention of Electric or Magnetic Interference in Electric Facilities
Article 10	Prevention of Danger in Medium-, High-, or Extra-High Voltage Electrical Equipment	Article 17	Prevention of Failures in Power Supply caused by Electric facilities
		Article 18	Prevention of Pollutions

The articles of the general rules section stipulate Purposes, Coverage, Definitions and fundamental regulations in terms of public safety and stable power supply for electric power utilities. The JICA Study Team has created these articles through careful discussion with the staff of DGEEU to adapt these to Indonesian standards. For example, as much as possible, ,a numerical number should not be used in the article but a standard value should be stipulated by describing to comply with SNI or IEC etc.

[Part 2 Installation of Electric Power facilities for Power Supply]

[Chapter 1 Power Network Facilities : Article 19 to 48]

1-1 Electric Network Facilities for Power supply

Table 6.2-2 Electric Network Facilities for Power supply

Article 19	Prevention of Electric Shock or Fire at Power Network	Article 30	Prevention of Collapse of Supports (Towers/Poles)
Article 20	Prevention of Electric Shock Caused by Overhead Electric Wires and Underground Electric Wires	Article 31	Prevention of Danger Caused by Gas Insulated Facilities
		Article 32	Installation Restrictions of Oil-immersed Switches
Article 21	Restricting Substation Entry to Operators		
Article 22	Prevention of Overhead Electric Power Line Pole/Tower Climbing	Article 33	Prohibition of Electric Power Line Installation on Cliffs
Article 23	Height of Overhead Electric Wires	Article 34	Preventing Communication Facility Interference
Article 24	Protect workers from electrocution caused by overhead conductors connected to wires installed by others	Article 35	Prevention of Obstacles in Power Supply Caused by Damage to Substation Facilities
Article 25	Prevention of Electric Shock by Electrostatic or Electromagnetic Induction from Overhead Electric Power Lines	Article 36	Mechanical Strength of Transformers
		Article 37	Installation of Substations minus All-Time Monitoring
Article 26	Prevention of abnormal contact of Electric Wires	Article 38	Protection of Underground Electric Power Lines
Article 27	Prevention of Danger to Other Structures Caused by Electric Wires	Article 39	Prevention of Obstacles in Power Supply from Extra-high-voltage Overhead Electric Power Lines
Article 28	Prevention of Danger to Other Electric Wires and Structures Caused by Arc Discharge in the event of Underground Electric Wire Failure	Article 40	Installation of Lightening Arrester for Medium-voltage, High-voltage and Extra-high-voltage Electric Power Circuits
Article 29	Danger Prevention at Overhead Electric Wires Due to Abnormal Voltage	Article 41	Installation of Communication Tools for security purpose
		Article 42	Securing Communication Tools in the event of Disasters

The articles of the Electric Network Facilities for the Power supply section stipulate the necessary regulations for the installation, mechanical and electrical strength of the Electric Network Facilities for Power supply in terms of public safety and stable power supply for electric power utilities.

1-2 Electrical Facilities/Equipment for Electric Power Utilization

Table 6.2-3 Electrical Facilities/Equipment for Electric Power Utilization

Article 43	Prevention of Electric Shock or Fire caused by Wiring at Locations of Electric Power Utilization	Article 46	Prevention of Danger caused by Wiring to other wirings and facilities
Article 44	Electric Wires used at Location of Electric Power Utilization Prevention	Article 47	Protection of Wiring at Locations of Electric Power Utilization from Over-currents
Article 45	Prevention of Electric Shock or Fires caused by Electrical Equipment/Appliances installed at the Locations of Electric Power Utilization	Article 48	Protective measures against Ground faults at Locations of Electric Power Utilization

The articles of Electrical Facilities/Equipment for the Electric Power Utilization section stipulate the necessary regulations for the installation of Electric Facilities for Electric Power Utilization in terms of the user's safety and prevention of electric shock and fire at place of usage.

[Chapter 2 Generating Facilities (General Provision) : Article 49 to 56]

Table 6.2-4 Generating Facilities (General Provision)

Article 49	Unauthorized Entry Restrictions	Article 53	Installation of Power Stations minus All-Time Monitoring
Article 50	Installation of Hydrogen-cooled Generators		
Article 51	Prevention of Obstacles in Power Supply caused by Damages to Power Stations	Article 54	Installation of Communication Tools for security purposes
Article 52	Mechanical Strength of Generators	Article 55	Securing Communication Tools in the event of Disasters
		Article 56	Protection of Motors from Overload

The articles of Generation Facilities (General Provision) stipulate the necessary regulations of installation, mechanical and electrical strength of the Generating Facilities in terms of public safety and stable power supply for electric power utilities.

[Chapter 3 Hydropower Facilities : Article 57 to 84]

3-1 General Provisions

Table 6.2-5 General Provisions

Article 57	Scope of Application	Article 59	Protection Facilities
Article 58	Definition		

The articles for Hydropower Facilities consist of 28 provisions and cover such facilities as dams, waterways, turbines, underground power stations, storages and regulating reservoirs.

3-2 Dam

Table 6.2-6 Dam

3-2-1	General Rules	3-2-2	Concrete Gravity Dam
Article 60	Dam	Article 67	Strength of Dam Body
Article 61	Position of the Top of the Non-Overflow Section	Article 68	Stability of Dam Body
		Article 69	Construction of Dam Body
Article 62	Foundation Ground	3-2-3	Fill dams
Article 63	Concrete Materials for Dams	Article 70	Dam Body Materials
Article 64	Prevention of Water Leakage	Article 71	Stability of Dam Body
Article 65	Spillways of Dams	Article 72	Installation of Dam Body
Article 66	Water Outlet Works Other Than Spillways	Article 73	Construction Limitations of Water Outlet Works

Based on the comment in the second seminar, the articles of the Dam cover all the dam facilities except those under the jurisdiction of Public Works and stipulate the conditions of the foundation ground or dam body. In the workshop for *National Safety Requirements*, there was the comment that the provision pertaining to earthquake resistance in the dam should be stipulated. However, Article 60 has already stipulated the installation of safety structures in the event of an earthquake as well as other numerical criteria established by other technical standards.

3-3 Waterways

Table 6.2-7 Waterways

Article 74	General	Article 78	Head Tanks
Article 75	Water Intake facilities	Article 79	Surge Tanks
Article 76	Settling basins	Article 80	Penstocks
Article 77	Headraces	Article 81	Tailraces

The articles of the Waterways stipulate the necessary regulations of installation in the main and cover the facilities from the intake until the tailrace.

3-4 Turbines and Underground Power Stations

Table 6.2-8 Turbines and Underground Power Stations

Article 82	Turbines and Pumps	Article 83	Construction of Underground Power Stations

The articles of the Turbines and the Underground Power Stations stipulate the necessary regulations of Turbine installation (especially the high pressure and rotating parts) and Underground Power Stations.

3-5 Storage and Regulating Reservoirs

Table 6.2-9 Storage and Regulating Reservoirs

Article 84	Storage and Regulating Reservoirs

The articles of Storage and Regulating Reservoirs stipulate the necessary regulations to prevent dam installation or sand sedimentation from causing harmful influences to the surroundings.

[Chapter 4 Thermal Power Facilities: Article 85 to 153]

4-1 General Provision

Table 6.2-10 General Provision

Article 85	Scope of Application

The articles of Thermal power Facilities consist of 69 provisions and cover facilities such as Boilers, Steam Turbines, Gas Turbines, Internal Combustion Engines, Liquefied Gas Facilities, Gasifier Facilities, Storage Facilities for Solid Fuel from Wastes, Electrical Facilities for Thermal Power Plants and Special Facilities.

4-2 Boilers and Accessories

Table 6.2-11 Boilers and Accessories

Article 86	Boiler Materials	Article 90	Shutting Off Steam or Feed Water
Article 87	Structure of Boilers	Article 91	Blow Down Systems
Article 88	Safety Valves	Article 92	Instrumentation
Article 89	Feed Water Supply Systems		

The articles of Boilers stipulate the necessary regulations on materials, structures and boiler installations , independent superheaters, steam accumulators and their accessories.

During the initial phase of the discussion, the MEMR staff requested to cover the electrical and mechanical facilities of the turbines and its downstream facilities because the MEMR inspection area excluded pressure vessels such as boilers and welding. However, in term of Boilers, the operation has been supervised by MEMR as electrical facilities and MEMR requested to cover them by the *National Safety Requirements*. Therefore, the JICA Study Team decided to cover them in *National Safety Requirements.*

4-3 Steam Turbines and Accessories

Table 6.2-12 Steam Turbines and Accessories

Article 93	Steam Turbine Accessory Materials	Article 96	Alarm and Emergency Shutdown Devices
Article 94	Structure of Steam Turbines	Article 97	Pressure Relief Devices
Article 95	Governors	Article 98	Instrumentation

The articles of Steam turbines and Accessories stipulate the necessary regulations on safety devices such as governors, emergency shutdown devices in addition to materials and structures. In the workshop for *National Safety Requirements*, there was the comment that the provision regarding earthquake resistance was not mentioned directly but it stipulates the emergency devices necessary to stop the facilities as a safety mechanism when abnormal vibration occurs as a consequence of an earthquake.

4-4 Gas Turbines and Accessories

Table 6.2-13 Gas Turbines and Accessories

Article 99	Materials of Gas Turbine Accessories	Article 102	Emergency Shutdown Devices
Article 100	Structure of Gas Turbines	Article 103	Pressure Relief Devices
Article 101	Governors	Article 104	Instrumentation

The articles of Gas turbines and Accessories stipulate in proportion the articles of Steam turbines because the configuration of facilities and safety measures are basically the same.

4-5 Internal Combustion Engines and Accessories

Table 6.2-14 Internal Combustion Engines and Accessories

Article 105	Materials of Internal Combustion Engine Accessories	Article 108	Emergency Shutdown Devices
		Article 109	Pressure Relief Devices
Article 106	Structure of Internal Combustion Engines	Article 110	Instrumentation
Article 107	Governors		

The articles of the Internal Combustion Engines stipulate and Accessories stipulate in proportion as the articles of Steam turbines as well as the articles of Gas turbines.

4-6 Liquefied Gas Facilities

Table 6.2-15 Liquefied Gas Facilities

Article 111	Definitions	Article 121	Instrumentation
Article 112	Isolation Distance	Article 122	Alarm & Emergency Shutdown Devices
Article 113	Safety Zones	Article 123	Shut Off Devices
Article 114	Installation Location of Facilities	Article 124	Gas Replacement
Article 115	Materials of Liquefied Gas Facilities	Article 125	Signs
Article 116	Structure of Liquefied Gas Facilities	Article 126	Thermal Insulation
Article 117	Safety Valves	Article 127	Protection
Article 118	Gas Leakage Prevention	Article 128	Heating Section of Carburetors
Article 119	Electrostatic Removal	Article 129	Odorization
Article 120	Fire Prevention & Extinguishing Systems		

The articles of Liquefied Gas facilities stipulate the necessary regulations on isolation distance, gas leakage prevention etc. not just the materials and structures due to extensive damage to the public if troubled. During the initial phases of the discussion, the *National Safety Requirements* did not cover the Liquefied Gas facilities because the liquefied gas receiving facilities was not installed in Indonesia. However, some such as the ammonia storage tank correspond to Liquefied Gas facilities. Therefore, the JICA Study Team decided to cover them in the *National Safety Requirements*.

4-7 Gasifier Facilities

Table 6.2-16 Gasifier Facilities

Article 130	Isolation Distance	Article 137	Blow Down Systems
Article 131	Safety Zones	Article 138	Gas Leakage Prevention
Article 132	Materials of Gasifier Facilities	Article 139	Electrostatic Removal
Article 133	Structure of Gasifier Facilities	Article 140	Fire Prevention and Extinguishing Systems
Article 134	Safety Valves	Article 141	Instrumentation
Article 135	Feed Water Supply Systems	Article 142	Alarm and Emergency Shutdown Devices
Article 136	Shutting Off Steam or Feed Water	Article 143	Gas Replacement

The articles of the Gasifier facilities stipulates the necessary regulations on the isolation distance, fire prevention and extinguishing systems due to the extensive public damage that will ensue if troubled as well as the liquefied gas facilities. Indonesia has a plan to install Gasifier facilities in future, the JICA Study Team decided to cover them in *National Safety Requirements*.

4-8 Storage Facilities for Solid Fuel from Wastes

Table 6.2-17 Storage Facilities for Solid Fuel from Wastes

Article 144	Humidity Measuring Devices	Article 147	Ignition Prevention Device
Article 145	Temperature Measuring Devices	Article 148	Fire Extinguishing Systems
Article 146	Gas Concentration Measuring Devices		

The articles of Storage Facilities for Solid Fuel from Waste stipulate the necessary regulations of the measuring devices because the management of fuel storage conditions is important for safety, and another reason is that the facilities have already been installed at IPP in Indonesia.

4-9 Electrical Facilities for Thermal Power Plant

Table 6.2-18 Electrical Facilities for Thermal Power Plant

Article 149	Installation at Site with Danger of Explosion by Combustible Gas	Article 151	Installation of Electric Anticorrosion Facilities
Article 150	Installing Extra-high-voltage Electric Dust Collection Application Devices	Article 152	Prohibition of Installation of Electric Heating Equipment for Pipelines

Japan's Ministerial ordinance is to stipulate the technical standards on thermal power generation facilities that stipulate only regulations on the installation of mechanical facilities. However, *National Safety Requirements* cover electrical and mechanical facilities that reflect MEMR requests. So the article of Electrical Facilities for Thermal Power Plants stipulate the necessary regulation of the electrical facilities in the thermal power plant such as electric dust collection devices, electric anticorrosion facilities etc.

4-10 Miscellaneous Provision

Table 6.2-19 Miscellaneous Provisions

Article 153	Safety of Special Facilities

The *National Safety Requirements* stipulate the safety against potential chemical and physical impact on the thermal power facilities that are not mentioned above in chapter 4 of the *National Safety Requirements*.

[Reference]

" Ministerial ordinance to stipulate technical standard on electrical facilities"
(28th March 2007, Ordinance of the Ministry of Economy, Trade and Industry No.21)

" Ministerial ordinance to stipulate technical standard on hydropower generation facilities"
(29th March 2005, Ordinance of the Ministry of Economy, Trade and Industry No.33)

" Ministerial ordinance to stipulate technical standard on thermal power generation facilities"
(3rd September 2007, Ordinance of the Ministry of Economy, Trade and Industry No.59)

Chapter 7 Safety Management Based on *Safety Rules* System

7.1. Basic Concept of *Safety Rules* System

(1) Need for *Safety Rules* System

Japan's Electric Utility Industry Law requires that power utilities comply with the following three basic requirements for ensuring the safety of electrical facilities.

(1) Obligation of conformance to the Ministerial Ordinance for Determining Technical Standards for Electrical Facilities
(2) Nomination of Chief Qualified Engineer
(3) Establishment, notification to the regulatory agency, and compliance of *Safety Rules*

The aforementioned (1) and (2) correspond to the *National Safety Requirements* and the *Engineering Manager System* respectively, which the JICA Study Team proposed to the Indonesian side during this Study.

The "*Safety Rules*" as mentioned in (3) are the basic policies governing business operations for ensuring safety, which should be developed and notified to the government by each power utility.

The relations among these three requirements are recognized as follows:
The *Ministerial Ordinance for Determining Technical Standards* is conceptual provisions for securing the safety of Electrical Facilities, while the *Safety Rules* are the power utility's internal rules regarding its operational tasks to ensure safety, and the *Chief Qualified Engineers System, which* is a scheme to ensure a power utility's human capacity to implement its operations in accordance with these two system to secure safety.

It is generally accepted that a combination of these three pillars greatly contributes to the achievement of high-security and high-reliability of electric power supplies in Japan.

In Indonesia, PLN and IPPs have already established internal regulations and/or guidelines/manuals concerning construction, operation and maintenance for their electric power facilities, while the government has not developed such laws and regulations governing

organizational structures and operational procedures of the power utilities to secure the facilities' safety.

As mentioned above, the JICA Study Team has proposed the *National Safety Requirements* and *Engineering Manager System* to the Indonesian side for securing the safety of Electrical Facilities. From the facilities' aspect, the *National Safety Requirements* are to stipulate basic Technical Standards for the electrical facilities. From the perspective of conducting practical business, the *Engineering Manager System* is to stipulate that a power utility be obliged to nominate the *Engineering Manager* as an overall supervisor for ensuring the safety of its electrical facilities in conformance to *National Safety Requirements*. Here, in addition, also in Indonesia, from the perspect of ensuring the safety of electric power facilities, it is important for the Government to develop its own regulations stipulating that a utility should develop its own basic rules or *Safety Rules* that it should follow to secure the safety of its power facilities in line with these rules, aimed at ensuring appropriate construction, operations and maintenance of its power faculties in conformance to *National Safety Requirements.*

In Indonesia, PLN used to maintain its monopoly in the electric power sector for a long time. However, for improving the efficiency of the power sector, deregulation has been introduced step by step. Starting by allowing IPPs via private capital to participate in the power generation market, PLN has made its power generation sector in the Java-Bali region separated and its two subsidiaries. Furthermore, even PLN, which covers the whole country at present, could be unbundled regionally in the future. It is expected that the number of players in the electric power sector could increase and that the power sector structure would move from a simple and close relationship between PLN and the government to complicated relationships between many electric power players and the government. The government which is responsible for supervising the utilities' safety procedures could be confronted with great difficulties. It is, therefore, expected that in addition to the *Engineering Manager System,* the introduction of a new governmental regulation, *Safety Rules* which stipulates that each utility is obliged to prepare its own operational principles as the utility's pledge to carry out operations in this manner, would contribute to the optimization and the rationalization of the governmental responsibilities for supervising the utilities' many safety procedures.

In the case of introducing the *Engineering Manager System* that was mentioned in Chapter 8, each utility needs to notify the government where and how the *Engineering Manager(s)* would be posted in the utility's organization. Since the *Safety Rules* also play a role in clearly defining a utility's safety management system and stipulating the assignments and tasks of the

Engineering Manager, the *Safety Rules* are closely related to the *National Safety Requirements* and *Engineering Manager System*, and expected to work as one of the important pillars for supporting the safety management system for both the government and the utilities as shown in Figure 5.1-5.

(2) Outline of *Safety Rules* System

Outline of *Safety Rules* System proposed by the JICA Study Team is shown in Figure 7.1-1.

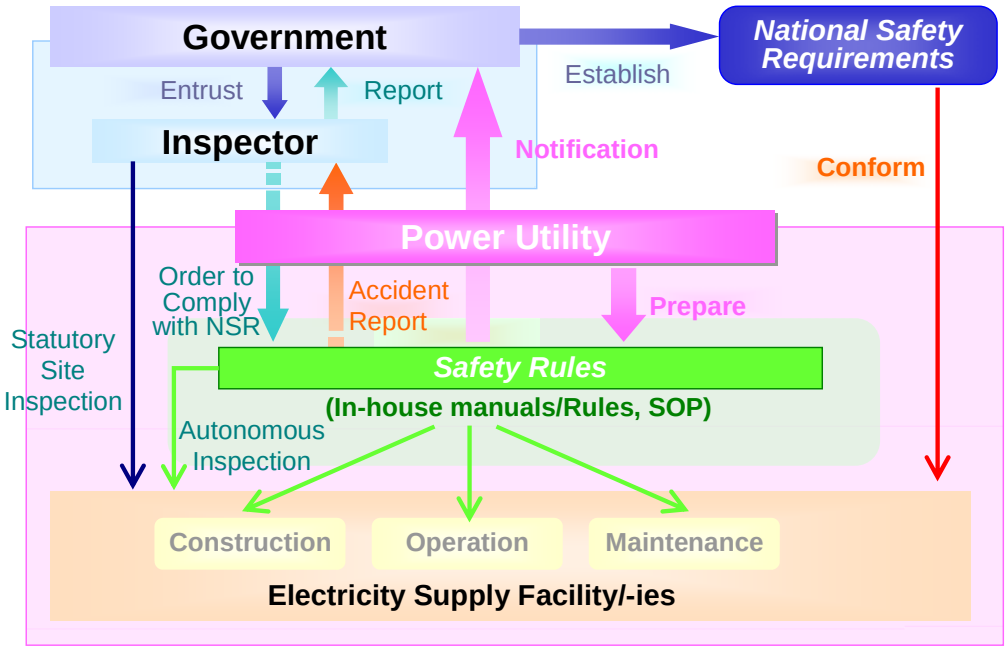

Figure 7.1-1 Outline of *Safety Rules* System

[Objectives of *Safety Rules System*]

Objectives of *Safety Rules* System are to maintain and improve the safety of electrical facilities secured by the utilities.

Safety Rules are the basic rules governing construction, operations and maintenance procedures for securing the safety of electrical facilities in conformance to the *National Safety Requirements*. *Safety Rules* consist of the following two main rules: 1) Organizational structures to secure the safety of electrical facilities, including the positioning of Engineering Managers and assignment of duties, 2) basic rules of operational procedures for securing the safety of electrical facilities. Each utility is obliged to submit *Safety Rules* to the government.

[Preparation of *Safety Rules*]

The JICA Study Team is proposing that *Safety Rules* be prepared by each power utility, in principle. The reason is as follows.

Because the *Safety Rules* are the basic rules of construction, operations and maintenance procedure for each utility to secure the safety of electrical facilities, *Safety Rules* should be prepared based on the specific facilities and operational rules. Therefore, it is more rational that the *Safety Rules* be prepared and submitted to the government by each power utility owning different electrical facilities than the *Safety Rules* provided by the government as an across the board regulation.

1) PLN and large-scale IPP have already established detailed private manuals concerning their electrical facilities' operation. Therefore, they can refer to their own private manuals when preparing *Safety Rules*.
2) Organizational structures to secure the safety and basic rules of the operational procedures of the *Safety Rules* consist of the two main rules that should be arranged appropriately based on technical innovations and changes in the business environment. Therefore, it is more suitable that *Safety Rules* be prepared by each utility rather than by the government.

[Positioning of *Safety Rules*]

It has been considered that the stipulations of the *Safety Rules* prepared by each power utility refer to the legal obligation of submitting the *Safety Rules* to the government. This ensures that the government will supervise safety. For instance, the government can order the utility who fails to meet designated safety standards to improve business based on *Safety Rules* as legal grounds.

Safety Rules is positioned as the superordinate rules of the operational procedure in each utility and details will be provided in the subordinates such as in-house manuals or SOP, based on the concept of *Safety Rules*. The relationship between *Safety Rules* and in-house manuals is shown in Figure 7.1-2.

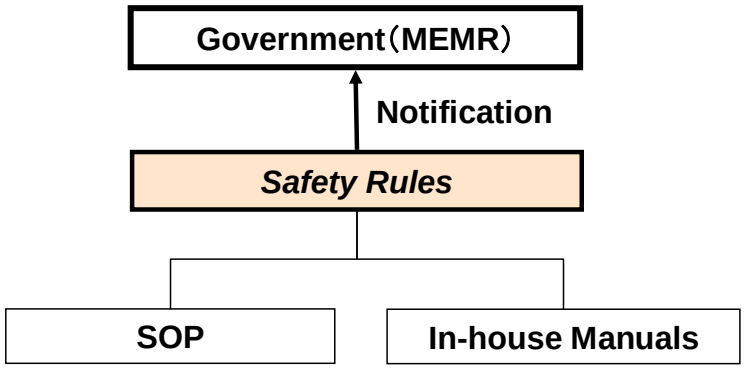

Figure 7.1-2 Relationship between *Safety Rules* and In-house Manuals

[Separation of Responsibility between Government and Utilities by *Safety Rules*]

Safety Rules define the separation of the role and the responsibility between the government and power utilities as follows.

The government establishes *National Safety Requirements* in order to prevent the electrical facilities from creating any danger or obstacles to public safety and obligate the utilities to secure the safety of their electrical facilities in conformance to *National Safety Requirements*.

Furthermore, the government obliges the utilities to report accidents and supervise the facilities to conform to *National Safety* Requirements through statutory site inspections.

The government can order the utility that doesn't meet designated safety standards to improve their business conduct and operations. Further, the government can order the utility to amend the *Safety Rules* in case the descriptions are insufficient for ensuring safety.

It has been considered that the introduction of the proposed system is subject to further discussion among all the people who are stakeholders in Indonesia. Especially, critical matters, such as the separation of the role between statutory inspections and autonomy inspections and the detailed definition of the contents reported to the government, should be decided with careful consideration to Indonesia's current situation.

7.2. Structure of *Safety Rules*

The Study Team requests that the following items be included in the *Safety Rules*.

Ⅰ.	Organizational structure to secure safety
	Ⅰ.1. Organizational structures
	Ⅰ.2. Scope of work of the *Engineering Manager*, his/her position in the organization
	Ⅰ.3. Job description of staff engaged in securing safety
	Ⅰ.4. Safety education for employees
Ⅱ.	Basic policy of operations to secure safety
	Ⅱ.1. Construction, operations and maintenance for the safety of electrical facilities
	Ⅱ.2. Inspection of the safety of electrical facilities
	Ⅱ.3. Records on the safety of electrical facilities
	Ⅱ.4. Accident and periodical reports on the safety of electrical facilities

Safety Rules consist of two main items. One is organizational matters and the other are operational matters. The outline of each item is as follows.

[I.1. Organizational structures]

This item requires that the utility must build organizational structures to conform to the relevant regulations and *Safety* Rules for securing the safety of construction, operations and maintenance. In this item, each utility must indicate the management responsibility of securing safety with an organizational chart and provide the scale of organization, positioning and chain of command appropriately for each organization to execute their roles and responsibilities appropriately under the plan framed by the president. Japan's sample of the organizational structure and assignment of duties is shown in Figure 7.2-1.

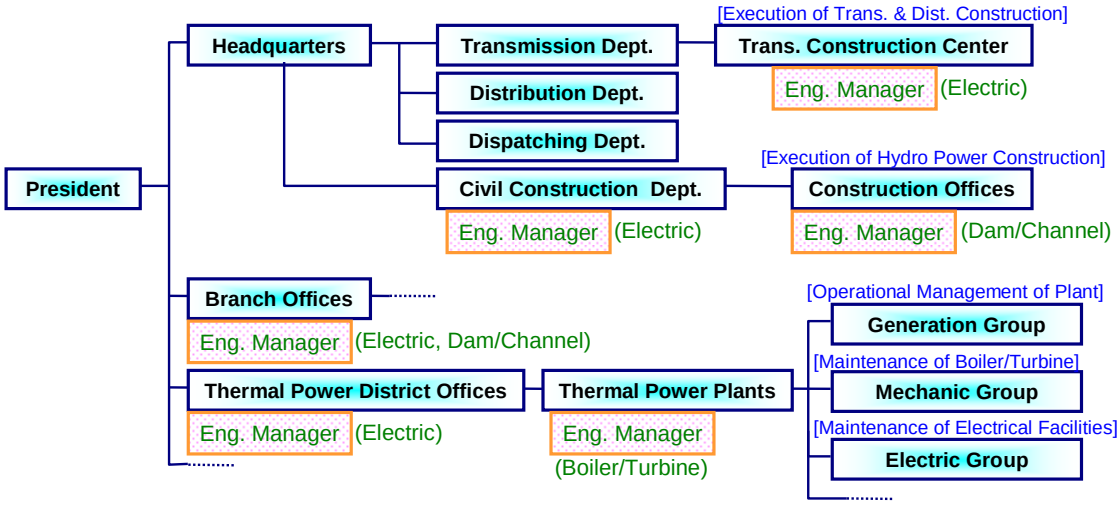

Figure 7.2-1 Japan's sample of Organizational Structure and Assignment of Duties

[I.2. Scope of work of *Engineering Manager*, his/her position in the organization]

This section stipulates that each facility be obliged to nominate the appropriate number of *Engineering Managers* according to the range of his business. The *Engineering Manager*, who is obliged to supervise so that each organization implements their roles and responsibilities appropriately to secure the safety of electrical facilities, must instruct the employee about security operations generally. The details of the JICA Study Team proposal for the *Engineering Manager* will be explained on the next chapter.

[I.3. Job description of staff engaged in securing safety]

This section stipulates that the manager of each organization is obliged to instruct subordinates and low-ranking organizations and communicate to the relevant organizations, and the general staff is obliged to obey a high-ranking person's instruction for clarifying the job responsibility of each staff engaged in securing safety definitely.

[I.4. Safety education for employees]

This section stipulates that a utility is obliged to educate employees on the following matters for securing safety.

- Compliance with relevant laws and regulations, and *safety rules*
- Skill and knowledge pertaining to facilities' safety
- Measures against accidents and training

[II.1. Construction, operation and maintenance for safety of electrical facilities]

Safety Rules are placed as the superordinate rule over the in-house manuals of each power utility and the items that are requested to be included in the *Safety Rules* are restricted to general descriptions. In other words, the notification of detailed down-to-earth descriptions to the Government is not required, whereas in-house manuals of a power utility are expected to provide practical and ordinary descriptions. Power utilities are allowed to develop their own practical rules on safety-related works at their discretion.

The items requested to be included in *Safety Rules* are as follows.

- Measures to confirm the conformity level of facilities to *National Safety Requirements* after and during the facilities' construction
- Measures to secure the facilities' safety during operation
- Intervals and items for patrol and inspection to maintain the conformance of facilities to *National Safety Requirements* and prevent accidents
- Measures against the facilities' accidents
- In-house manuals for the facilities' construction, operations and maintenance

[II.2. Inspection for safety of electrical facilities]

As mentioned in chapter 3, the current status of Indonesia, K registered by the Government or a state government witnesses each and every inspection during the commissioning of the construction or reconstruction. On the other hand, in Indonesia as with Japan, deregulation has been introduced in the power sector and this situation requires the minimization of government participation in securing safety. Based on this requirement, the JICA Study Team proposes the introduction of *Safety Rules* as the main pillar of the accountability for safety, and the JICA Study Team also proposes that the accountability be introduced in the inspection system and each utility should confirm the conformance of the facilities to *National Safety Requirements* on their own.

In Japan, the inspection system requires that each utility confirms the conformance of the facilities to Technical Standards on their own and is obliged to record the result. On the other

hand, the role of the government is just to verify how the utility's inspection is being conducted. The full adoption of the Japanese inspection system to Indonesia is too sudden. Therefore the JICA Study Team proposes that an autonomous inspection system be gradually introduced step by step.

In the case of the first introduction of the autonomous system, the targeted facilities or utilities should be determined. In consideration of the entry of the foreign-affiliated company into the generation sector, the target for the first-step should be decided by the competency of the utility not by the sort of facilities. The flow for the proposed introduction proposed is shown in Figure 7.2-2.

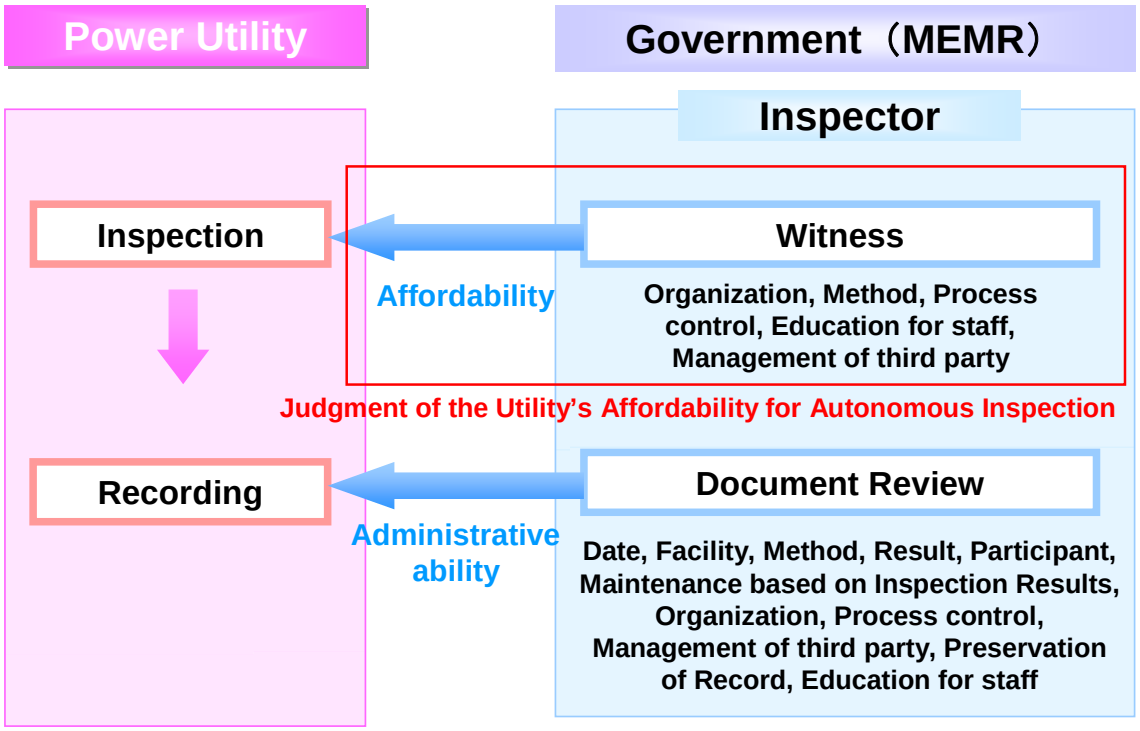

Figure 7.2-2 Flow for the Introduction of Autonomous Inspection

Firstly, the government witnesses the autonomous inspection conducted by the utility and judges the utility's affordability for the autonomous inspection. The items used to judge the affordability of the organization are the methods, processes, controls, education for staff and third party management. As a result of the inspection being witnessed, if the government approves of the utility's affordability, from the next time, the government needs only to judge the utility's administrative ability via a document review. The items used to judged administrative ability are the date, facility, method, result, participants, maintenance based on inspection results, organization, process control, third party management, preservation of records and education for the staff.

Through the introduction of this autonomous inspection, it is anticipated that the utility will be able to reach the high level of facilities' ability while decreasing government involvement.

The JICA Study Team proposes to have the following items concerning the above contents are included in the *Safety Rules*.

- Procedure and documentation of inspections
- Organization the inspections and the *Engineering Manager* duties
- Preservation of records
- Education for the staff and third party management

[II.3. Records on safety of electrical facilities]

In order for the third party to judge the utilities' safety procedures, the JICA Study Team proposes that the following items pertaining to the records be included in the *Safety Rules*.

- Construction and inspection
- Patrol and inspection
- Operation
- Accident
- Education for the staff
- Procedures concerned with recording and preservation of the above items

[II.4. Accident report and periodical report on safety of electrical facilities]

The reporting is divided into two categories, accidental reports and periodical reports. In the current status of Indonesia, there are no laws and regulations concerning the accident reports. However, accident reports require the government's supervision of the utility's work in securing safety and the government can achieve the improvement of the electrical facilities' safety and the prevention of the similar accidents through the analysis of the accident report. The JICA Study Team proposes that the following items concerning the accident report are requested to be included in *Safety Rules*.

- Died or injured from an electrical shock
- Fire caused by electrical problems
- Damage of the main electrical facilities
- Serious accidents causing a wide area of a power failure

In order for the utilities to report the above accident to the government immediately and sufficiently, the JICA Study Team also proposes that the items concerning documentation and the management of records concerning the above accidents and reporting procedures be included in the *Safety Rules*.

On the other hand, periodical reports in Japan, includes four items: (i) management for the electric supply business, (ii) construction, operation and maintenance of electrical facilities, (iii) financial affairs, and (iv) management of the investigation business. The JICA Study Team proposes that the only item concerning construction and the operation and maintenance of electrical facilities be included in the *Safety Rules*. This item is to put the accident records in order with a certain period. The accident reports contribute to the qualitative analysis, and the periodical reports contribute to the statistical analysis.

Chapter 8 Establishment of *Engineering Manager* System

8.1. Basic Concept of *Engineering Manager* System

8.1.1. JICA Study Team's Proposal on Engineering Manager System

Development of competency standards for engineers on the management level (NQF level 4 or higher) was one of the main objectives of technical assistance that the Indonesian government had initially requested to the Japanese Government. In discussing the scope of work agreed to between the Japan International Cooperation Agency (JICA) and the Indonesian Government in October 2008, the Japanese side will come up with the request to develop the competency standards by referring to the qualification system of Japan's Chief Electrical Engineer system (1^{st} – 3^{rd} Grade) which is one of the main backbones for securing the safety of the electrical facilities in Japan's electric power sector.

The power sector of Indonesia has been shifting from the monopoly of PT PLN to the diversity of the power utilities with functional segmentation of PT PLN and IPP's. Following this observation, the JICA Study Team came to the conclusion that it is beneficial for the power sector in Indonesia to clearly and legally identify the responsibility of the safety management of each electrical facility as shown in Figure 8.1-1. The JICA Study Team proposed to the Indonesian counterpart, i.e. MEMR, the conceptual outline of *Engineering Manager* System based on the Chief Electrical Engineer system in Japan. And this proposal was accepted by the Indonesian side.

However, as discussed in Chapter 5, it was made clear by the JICA Study Team's 2^{nd} Field Study that proposing the *Engineering Manager* system based on Japan's Chief Electrical Engineer system, though the idea itself is beneficial for Indonesia, has little in common with developing competency standards in accordance with NQF, which mainly aims at vocational capacity development. It also turned out to be very difficult to develop both the *Engineering Manager* System and the competency standards for the NQF levels 4-6 at once in the Study. Therefore, the JICA Study Team concluded that the original idea of the Study to develop competency standards for NQF levels 4-6 based on the chief engineer system in Japan cannot be maintained and that the Study should be directed towards either the introduction of the *Engineering Manager* system or the development of NQF levels4-6.

The JICA Study Team discussedthe direction of the Studywith the Indonesian counterparts for discussion in the 3rd Field Study in Indonesia, and agreed that the 1st option would be adopted, in which the introduction of the *Engineering Manager* System would be prioritized and competency development would be focused only on the technical aspects conducible to the *Engineering Manager* System. Furthermore, the development of NQF levels 4-6 would be conducted done by the Indonesian side afterwards by referring to the Study results. This agreement was approved by the Steering Committee dated 3rd August 2009. On 5th August, the JICA Study Team convened the 2nd Seminar inviting relevant persons in the power sector in Indonesia, and presented the conceptual outline of the *Engineering Manager System*, which was positively accepted by the participants.

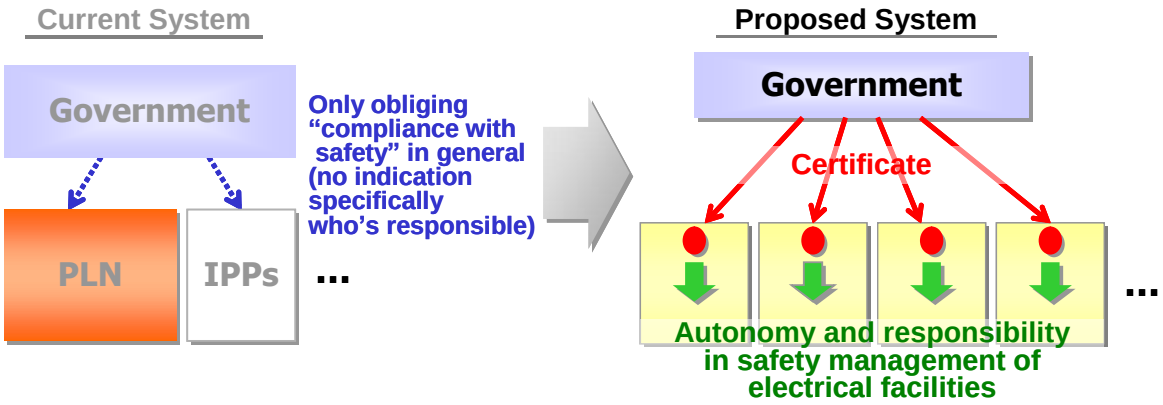

Figure 8.1-1 Image of proposed *Engineering Manager* System

8.1.2. Outline of Engineering Manager System

The proposed outline of *Engineering Manager* System is shown already in Figure 5.1-7. The details regarding the *Engineering Manager* System are described in the following.

[Objectives of *Engineering Manager* System]

To nominate responsible persons for supervising and comprehensively managing the safety in the construction, operations and maintenance of the electrical facilities and to clearly identify his/her legal status, responsibility, and discretion in an organization for securing the safety of electrical facilities.

[Safety Management of Electrical Facilities]

The *Engineering Manager* shall hold comprehensive responsibility for the safety management

of facilities. Compliance with *National* Safety *Requirements* needs to be noted in carrying out tasks for safety management.

[Confirmation of the Compliance Activity in accordance with *Safety Rules*]

The *Engineering Manager* shall assure whether the persons engaged in construction, operations and maintenance are carrying out their tasks in compliance with the *Safety Rules*. How the *Safety Rules* have been given its legal status is explained in Chapter 7.

[Report to the Government (Authority)]

The *Engineering Manager* shall represent the power utility as the counterpart for the Inspector entrusted by the Ministry, and have accountability for the status of the electrical facilities in his/her jurisdiction. The *Engineering Manager* shall report to the Ministry in case that accidents such as electric shock, fire, or blackout in relation to the facilities occurs.

[Notification of *Engineering Managers*]

When the *Engineering Manager* is nominated, replaced or dismissed, the power utility shall immediately notify this to the Ministry.

[Qualification of *Engineering Manager*]

The *Engineering Manager* shall hold the necessary qualifications before he/she is nominated by the power utility.

8.1.3. Allocation and Positioning of Engineering Manager System

Since the Electricity Law No.30/2009 was enacted in September 2009, the legal position of the *Engineering Manager* will be legislated in detail in the Governmental Regulations or Ministerial Decree, which will be stipulated around 2010, based on the proposal from the JICA Study Team.

Even if the authority and responsibility of the *Engineering Manager* are legally defined, the allocation of the *Engineering Manager* in the organizational structure of a corporate entity is at the discretion of the Power Utilities. The typical indication is that one *Engineering Manager* is appointed in one Business Unit, such as the one Power Plant, one Regional Transmission Office or the one Regional Distribution Office, in accordance with the current situation of the existing Power Utilities.

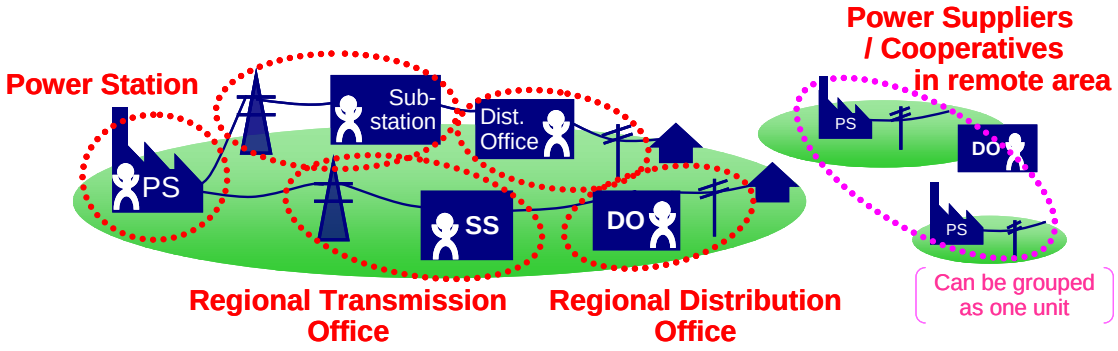

Figure 8.1-2 Allocation of *Engineering Manager*

Even if the authority and responsibility of *Engineering Manager* is legally defined, the positioning of the *Engineering Manager* in the organizational structure of a corporate entity is also at the discretion of the Power Utilities.

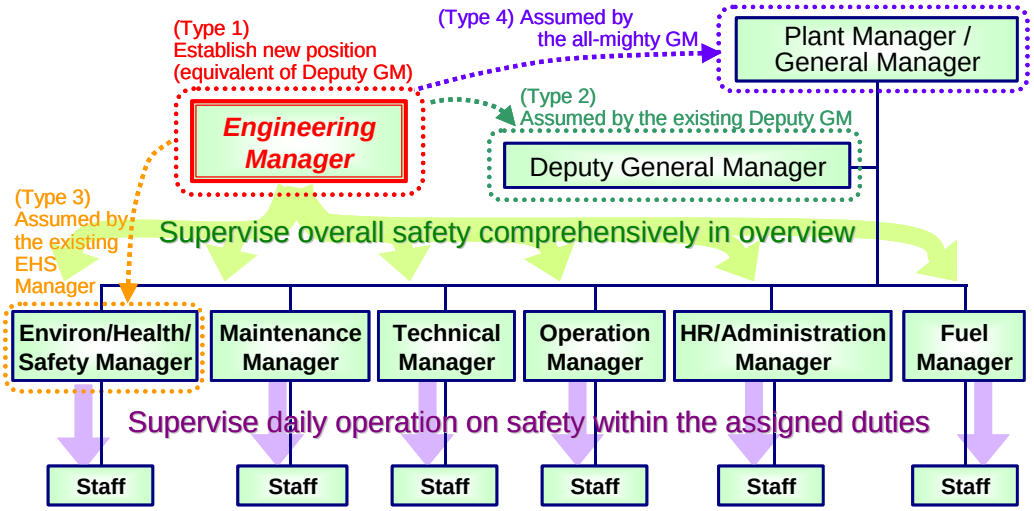

Figure 8.1-3 Positioning of *Engineering Manager*

Figure 8.1-3 describes the organizational structure of the Thermal Power Plant. As far as the interviews to the Transmission and Distribution offices in Indonesia are concerned, the basic structure is almost the same even in the Transmission and Distribution offices except for the Fuel unit. So, in this sentence, examples for the Transmission and Distribution offices have been omitted.

There was a question from the Indonesian counterparts whether the nomination of the *Engineering Manger* is needed even in the event that there already exists a person in the

organization responsible for safety management. Clarification from the JICA Study Team is as follows.

- The underlying objectives of this scheme is to supervise from the perspective of an "internal" third party by nominating an *Engineering Manager*, who is positioned apart from the hierarchy of routine operations and maintenance management.
- If the person who assumes similar responsibilities for overall safety already exists in power utilities, such as the deputy general manager who is positioned apart from routine operations and maintenance, this person can be nominated as an *Engineering Manager*. However, since the authority and responsibility of the *Engineering Manager* will be clearly defined in a legal manner, such a safety manager is requested to acquire the aforementioned qualification.
- The *Engineering Manager* is legally obliged to make a report or explanation to the Ministry, in addition to his/her in-house tasks to carry out comprehensive management and supervision on safety. The *Engineering Manager* is expected to not only to act as an advisor who passively carries out tasks on safety management, but also to behave actively with a high degree of motivation as a person with legally stipulated responsibilities.
- If there isn't an appropriate candidate within the business entity, such power utilities can nominate a qualified person externally as the *Engineering Manager*. Such nominated persons do not necessarily need to reside within the facility sites.

- In the Indonesian power sector, especially pertaining to power generation, the improvement of efficiency is expected via enhancing the competitive market and the diversification of business types. During situations where each power utility will behave with more autonomy, clearly defining the responsibilities and authority of the Engineering *Manager* in an organization is expected to contribute to the establishment of the safety management structure of the electrical facilities. Establishing and sustaining an autonomous safety management structure through the *Engineering Manager* System is expected to strengthen and supplement the current scheme of safety management that lays emphasis on the Government's supervision.

8.2. Tasks and Responsibilities of *Engineering Managers*

During the 3rd Field Study in the Indonesia, the JICA Study Team and the Indonesian counterpart discussed the overview of the proposed Engineering Manager system and agreed on the development of this system. Then the Study moved on to the next step to discuss the details of the tasks and responsibilities that the *Engineering Managers* should assume.

Discussion on the implementation of the Engineering *Manager* System needs to be made from the following two viewpoints:

- Legal status of the *Engineering Manager* (legal provisions concerning the responsibilities of *Engineering Manager*); and
- Jobs and practices to be assigned to the *Engineering Manager* in the power utility;

Taking into account that this *Engineering Manager* system is a new concept for the Indonesian power sector and appears to require considerable efforts for gaining a full understanding of its significance, the JICA Study Team has decided to take an approach to start with intensive discussions on the job and practices of the *Engineering Manager* and then to define the legal status of the *Engineering Manager*.

Currently the diversification of the business types of power utilities is going on in Indonesia with the functional separation of PT PLN by generation, transmission and distribution as well as the new entry of private entities in the sector such as IPPs. Based on this transition, the definition of legal status of the *Engineering Manager* needs to be provided so that it can be generally applied to all kinds of power utility business structures in the country. Therefore, it is a reasonable approach to first discuss the details of the expected roles of the *Engineering Manager* with every stakeholder to consider customized patterns for every kind of business type and then to determine what should be stipulating legal provisions by extracting common factors.

As the first step for starting the discussion of this system, the JICA Study Team prepared some English-written materials to specifically describe the tasks that the Engineering manager should assume, based on the Japanese power utility's in-house manual for their Chief Electrical Engineers that was also generalized and modified in consideration of the situation in Indonesia. The materials refrained from naming the specific Divisions or positions within the organization responsible for the related tasks and instead used general terms such as the "Division responsible for the task" or "responsible person". The Indonesian stakeholders that are provided with these materials are expected to submit counterproposals to specific Divisions and positions in correspondence.

Though the materials initially prepared by the JICA Study Team only provides descriptions that can be generally applied to any of the functions of the power supply such as generation, transmission, and distribution, it is possible to include some provisions that are exclusively applied to either generation, transmission or distribution, if necessary.

The following is an outline of the tasks and responsibilities of the *Engineering Manager*, which was prepared by the JICA Study Team for discussion with Indonesian counterparts and stakeholders.

I. Nomination of Engineering Manager
- I-1. Obligation to nominate Engineering Manager
- I-2. Certification of Engineering Manager

II. Tasks and Responsibilities of Engineering Manager
- II-1. General Tasks on Safety Management
  - II-1.1 Development of Annual Activity Plan on Safety Management
  - II-1.2 Supervision on Submitting Documents of Application and/or Notification to the Authority
  - II-1.3 Supervision and Assessment of *Safety Rules* and Manuals
  - II-1.4 Planning and implementation of Safety Education, and Supervision of Educational Programs on Safety Management
  - II-1.5 Attendance to Meetings Related to Safety Management
- II-2. Tasks Concerning Construction of Facilities
  - II-2.1 Supervision of Facility Construction Plan
  - II-2.2 Assessing the Conformity of Construction Designing to *National Safety Requirements*
  - II-2.3 Site Investigation During Construction Works
  - II-2.4 Inspection Before Commissioning
- II-3. Tasks Concerning Operation and Maintenance of Facilities
  - II-3.1 Assessment of the Condition of Facilities in Operation (Site Investigate)
  - II-3.2 Assessment of Safety Management
  - II-3.3 Supervision of the Revision of Site Patrol
  - II-3.4 Measures against abnormalities and/or accidents/troubles
  - II-3.5 Attendance at Mandatory Onsite Inspection Carried Out by the Inspector

III. Penalties
- III-1. Penalties Imposed to Engineering Manager in Case of Violating Laws and Regulations
- III-2. Penalties Imposed to Power Utility/Power Generation Entity

The description of each section is summarized as follows:

[I-1. Obligation to nominate *Engineering Manager*]

This section stipulates that, each of the power stations or each set of power supply facilities managed by a regional branch office of power transmission and distribution utilities is defined as one "unit" of power supply operation (hereinafter "operational unit") and each operational unit is obliged to nominate the Engineering *Manager*. This stipulation, however, does not necessarily require the nomination of "one unique *Engineering Manager* for one operational unit". Variation to the coverage area for an *Engineering Manager* is possible depending on the tasks actually assigned to the *Engineering Manager*, the volume of tasks and facilities, and the actual conditions of the operational unit".

For example, a thermal power plant, which consists of two or more turbine units, can assign one *Engineering Manager* to a part of these units and another *Engineering Manager* to the remainder.

In the meanwhile, in Indonesia, there are more than ten thousand islands and there exist many islets where power is supplied from a small diesel generator and nominating a unique *Engineering Manager* respectively may not be realistic. In this case, it is also acceptable to recognize a group of islets in a certain area as one operational unit and to nominate one Engineering Manager for this.

[I-2. Certification of *Engineering Manager*]

In order to guarantee the capability of the Engineering Manager, the person who is nominated as an Engineering Manager by a power utility is obliged to acquire appropriate certification (or license) endowed by the Government. The certification or license system is, besides guaranteeing the capability of Engineering *Manager*, expected to enhance the social status and social recognition of the Engineering Manager by its legislation, and hence to contribute to improving the quality of electrical safety.

Assessing the applicants and endowing certification (or license) is supposed to be primarily the responsibility of the Directorate General of Electricity and Energy Utilization (DGEEU), Ministry of Energy and Mineral Resources (MEMR). It needs to be noted, however, that there already exist four certification bodies responsible for assessing the competency concerning NQF levels 1-3 for the Power Sector and they've already employed assessors who have good job

experience in this sector or academic background. Taking this into account, it is more reasonable and appropriate to make use of these certification bodies during actual implementation rather than letting DGEEU itself be the executing body or establishing a new organization for this purpose.

[II-1.2 Supervision on Submitting Documents of Application and/or Notification to the Authority]

The *Engineering Manager* is required to hold responsibility for assessing the documents that need to be submitted to the Authority (= Government), confirming that there's no flaw and submitting the documents by the due date. This section stipulates the responsibilities and accountability of *Engineering Manager* as the contact person for the Authority.

[II-1.3 Supervision and Assessment of *Safety Rules* and Manuals]

The *Engineering Manager* is requested to supervise the process of developing and revising the *Safety Rules*, and is also required to provide the necessary supervision and advices on the development and revision of operation manuals, which are in-house documents for power utilities to be subordinated to the *Safety Rules* stipulating the specific procedures of actual operation.

[II-1.4 Planning and implementation of Safety Education, and Supervision of Educational Programs on Safety Management]

This section stipulates that the *Engineering Manager* holds responsibility for supervising the preparation and implementation of the educational programs related to safety education that every staff engaged in safety issues in the field has to take. More specifically, the *Engineering Manager* is responsible for supervising the programs in terms of the conformity to laws and regulations as well as *Safety Rules*, engineering issues for securing safety, scheduled implementation and revision of educational programs and so on.

[II-1.5 Attendance to Meetings Related to Safety Management]

The Engineering Manager is required to be present at the meetings within the power utility regarding safety and to report on the annual plan of safety-related works and their actual status, the assessment of the conformity to *National Safety Requirements* and the plans of safety education programs and their status. Sharing information on the plans and the status of safety-related activities to those within the utility concerned with the safety issues making use of the opportunity of such meetings is expected to contribute to the edification

[II-2 Tasks Concerning Construction of Facilities]

The *Engineering Manager* is required to evaluate and assess the newly constructed facilities in terms of securing safety and conformity to National Safety Requirements from the perspective of construction planning and designing. The *Engineering Manager* is also requested to carry out an onsite investigation of the facility under construction, to record the investigation results, and to inform the division(s) concerned, aiming at enhancing the quality of safety management.

In addition, the *Engineering* Manager is requested to carry out inspections of the completed facility before usage under his/her responsibility, which precedes the official inspection carried out by the Inspector who is entrusted by the Government to assess the facility in terms of conformity to *National Safety Requirements* and so on. The *Engineering Manager* is obliged to keep records of the inspection results and to submit them to the Inspector when needed.

[II-3 Tasks Concerning Maintenance and Operation of Facilities]

The Engineering Manager is required to carry out an onsite investigation of the facility during operations regularly to confirm its operation is conducted in conformity to *National Safety Requirements*, to record the investigation results, to share the results with the division(s) concerned, and, when he/she finds that a repairing work is necessary, to request its implementation to the division(s).

When a trouble or accident occurs, the *Engineering Manager* is requested to provide advice and guidance so that the division(s) concerned can take appropriate actions, and to supervise the submission of the report of the accident to the Authorities.

[III. Penalties]

The *Engineering Manager* holds the responsibility to carry out his/her obligations sincerely. He/she is subject to penalties, along with the power utility that employs him/her, when a serious accident or power interruption in a wide area and/or for a long duration takes place that considerably affects society, and when it turns out that this accident derives from his/her negligence or fault.

In this case, the payment of penalty fines is imposed on the *Engineering Manager* in general, and the amount of penalty fines and the payment terms are decided based on the discretion of DGEEU, taking into account the general legal practices in Indonesia and referring to similar past cases. When it turns out that the negligence or fault of *Engineering Manager* is too problematic, he/she may have his *Engineering Manager* license revoked.

Chapter 9 Development of Competency Standard for *Engineering Managers* and Qualification System

9.1. Required Competency for Engineering Manager

Regarding the aforementioned Engineering Manager System, effective measurements to classify required competencies for engineering managers of each type of facility and also establishing one's own qualifications for appropriate engineers is vital for significant introduction. Further, it is also very important for the system to maintain sustainability of the power facilities' safety and define the responsibilities of the Engineering Manager. Moreover, setting up the requirements for capability for the qualified technician and institutionalizing make concrete skill standards clearly. This is one of the effective ways for improvement of electric power engineer's capability.

With this objective in mind, the JICA Team members conducted consultations such as seminars, steering committees and workshops with the relevant counterparts and gave the Indonesian side proper assistants for developing the Engineering Manager System. To be specific, the JICA Team takes out the appropriately required competencies for Engineering Managers based on the Japanese Electric Chief Engineering System and the JICA Team developed the suggestions of the competency standard format such as the competency unit title and its description for the Indonesian power sector during the fifth site survey.
In the sixth site survey, the JICA Team revised and restructured their proposed competency standards as a result of the additional Indonesian requests and providing support to develop the competency element that is developed to define the qualification contents.

The Indonesian side will evaluate the detailed terms of the performance and level of competency using the the JICA Team's suggestion as a reference and finally the Indonesian counterpart will complete the Competency Standard of the Engineering Manager at the end of 2010.

9.1.1. Basic Structure and Evaluation Index for Competency Standard

The Engineering Manager in Indonesia should be classified into five categories from the perspective of organizational management and types of power facilities as described in Fig9.1-1. Additionally, hydro power facilities are separated into two categories, both Civil and Mechanic/Electric based on their roles. The transmission and substation facilities are dealing

with the same organization and these two facilities should be one category.

The qualifications should be provided to each category after introducing this system. The JICA Team has proposed a two step screening processes. The first step is the “Basic Competency” required technical background and basic knowledge and the 2nd step are the skills related to specific facilities. These are divided into “Construction”, “Operations” and”Maintenance”.

The most appropriate organizations for assessing these competencies are the existing certification bodies that already have the know how to evaluate the competencies and to issue the licenses.
For example, the certification bodies assess their competencies of the candidate via writing exams, verbal interviews, relevant experiences and academic background.

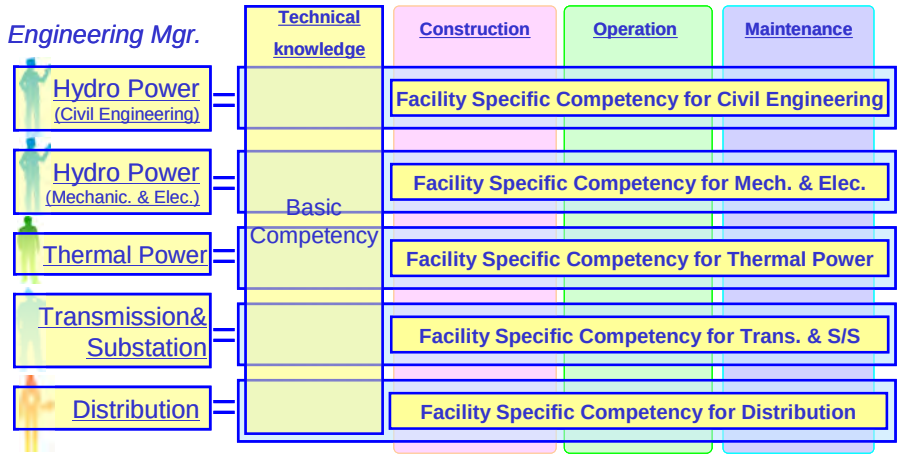

Figure 9.1-1 Competency Index for evaluation of Engineering Manager System

(1) Basic Competency

Basic competency is the common competency regardless that applies to all five types of facilities such as generation, transmission, substations and distribution. It requires the basic working knowledge of the facilities. Then candidates need to take an examination, in particular, the academic knowledge of electricity, reporting to authorities, staff training, planning of construction O&M and compliance with safety rules.

Figure 9.1-2 Five Elements for Basic Competency

The JICA Team has been discussing with DGEEU and other Indonesian relevant counterparts and has proposed competency standards for the basic competency and competency elements for having its qualification and the Indonesian side basically accepted this JICA proposal

For the next step, the Indonesian side DGEEU, power utilities, certification bodies and other stakeholders established a technical team in February 2010 to validate this draft proposal and a consensus forum has been held to hear the opinions from the stakeholders.

(2) Facility Specific Competency

The next step to becoming an Engineering Manager is to obtain the technical requirements for Engineering Manager as the capabilities for specific facilities. These capabilities are classified into three groups, “Construction” “Operations” and “Maintenance” in each of the five facilities, a total of 15 fields in total. As a result of the discussion with DGEEU, the JICA Team revised and restructured these fields to be more specific and detailed. The revised fields in these three groups are as follows.

- Construction：「Planning・Design」「Construction Works」
- Operations：「Power Supply」「Restoration of Facilities」「Operating Management」
- Maintenance：「Field Inspection・Patrol」「Maintenance Works」

These competencies in the different five facilities are almost the same contents, because theses

safety methods are evaluated from the same point of view. The competency index called the "Competency Element" that is defined as a measurable expression such as the prospective effects or outputs from each competency element and specific descriptions are mentioned as performance criteria.

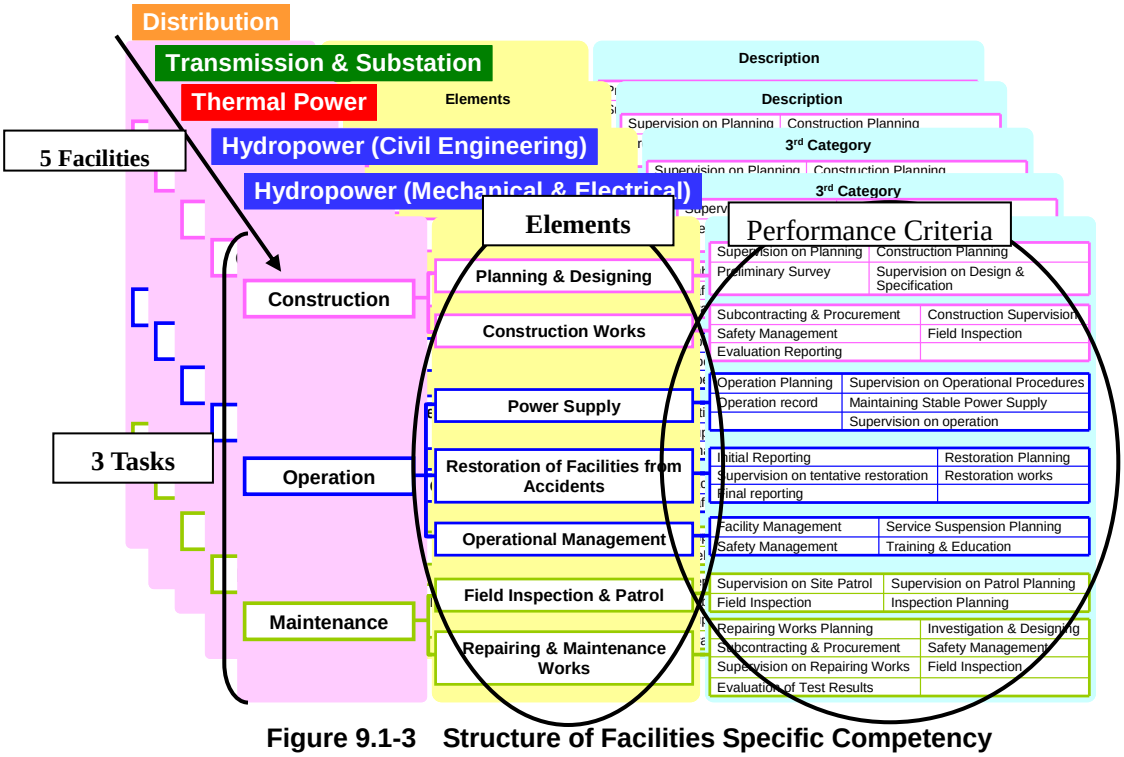

Figure 9.1-3 Structure of Facilities Specific Competency

9.1.2. Development of Competency Unit format

Describing the previous clause" the basic structure and evaluation index of the required competencies that the JICA team proposed" are JICA's suggestions for the Indonesian power sector reference from the Japanese experience. It is necessary for the JICA Team to classify the items and revise the expression on the Indonesian format according to additional requests. The Indonesian side needs to have a discussion with stakeholders to have it smoothly introduced and to validate the legislation of the proposed system under the Indonesian legal system.

The JICA Team discussed the legislation process during the sixth visit after obtaining basic acceptance of the proposed system. Further, the JICA Team accepted additional requests from DGEEU and agreed to revise the proposed system into the Indonesian format.

The competency standard unit that is the basic unit for qualification consists of three items and to have these qualifications the candidate needs to obtain the entire competency such as

"General Competencies", "Core Competencies", and "Optional Competencies" under the Indonesian competency format. General competencies and Core competencies are obligatory subjects that are compulsory for all examination candidates. Optional competencies are elective subjects that are complementary to core competencies and candidates can chose some of them.

Competency elements are defined as the smallest unit describing its skills. Each unit has a specific unit number and is described by its performance results and output in the format.

The JICA Team conducted a consultation with DGEEU and revised their proposed competency requirements for the Engineering Manager to the Indonesian specific format in compliance with the Indonesian method.

As a result of the aforementioned JICA's assistance, the Indonesian side DGEEU will review JICA's proposed format in the technical team established in February and will hold a consensus forum to introduce to stakeholders. The Indonesian side DGEEU will add other components such as parameters of unit competency and evaluation guidance to establish all the contents of the competency standard. Further, it will be legislated as official competency standard after approving Minister of MEMR.

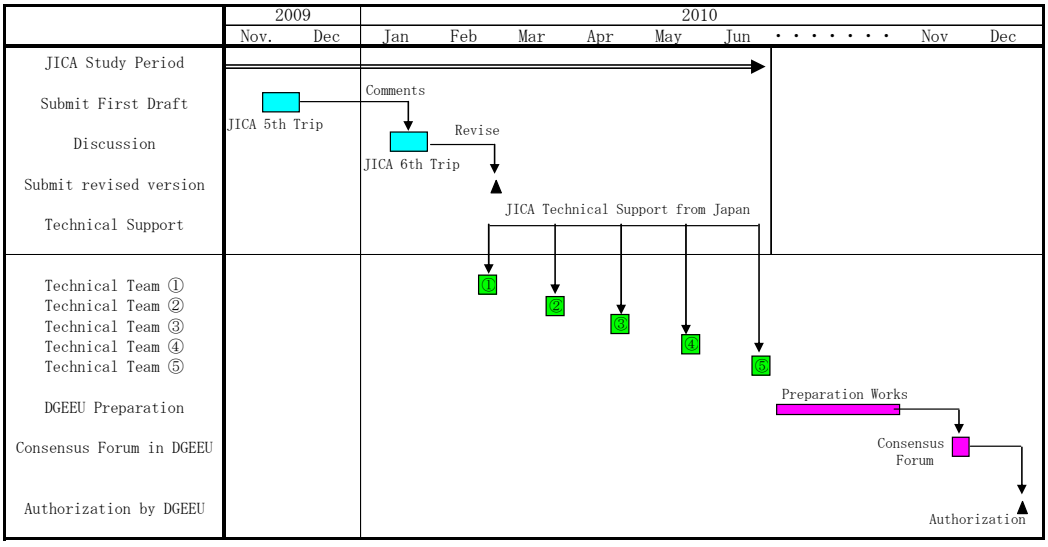

Figure 9.1-4 Developing Schedule for Competency Standard of Engineering Manager

KUALIFIKASI STANDAR KOMPETENSI

TENAGA TEKNIK KETENAGALISTRIKAN

BIDANG PEMBANGKITAN TENAGA LISTRIK

Unit Cord、Unit title、Description

Kode Kualifikasi	KTL.xxx.xx.xxx.xx
Sertifikat Kualifikasi	V
Judul Kualifikasi	Engineering Manager for construction of thermal power plant
Uraian Kualifikasi	Engineering Manager (Thermal power) shall supervise the safety construction and its works of thermal power facilities based on relevant laws, regulations and safety rules as the responsible manager, and shall provide necessary instruction to person concerned.

General Competency

Unit Kompetensi Umum (must have)	
Kode Unit	**Judul Unit**
xxx.xx.xxx.xx	Knowledge of electricity
	Compliance with Safety Rules
	Planning of Construction and O&M
	Training of Staff
	Reporting to Authorities

Core Competency

Kompetensi Inti (must have)	
Kode Unit	**Judul Unit**
xxx.xx.xxx.xx	Construction Planning & Designing (Thermal power)
	Construction works (Thermal power)

Optional Competency

Unit Kompetensi Pilihan (minimal x dari xx)	
Kode Unit	**Judul Unit**
xxx.xx.xxx.xx	xxx.xx.xxx.xx

Figure 9.1-5 Competency Standard Format（Example: Thermal Power[Construction]）

Power Engineers Competency Standard

Basic Group: Basic Competency

Group: **Basic Competency**

Unit Code : xxxxxxxxxxxx

Unit Title : **Basic understanding of electric power system**

Description : **Basic understanding of electric power system and safety on electric facilities**

Competency Elements	Performance Criteria
1. Understanding the knowledge of systematic power flow from generations to customers	1.1. Understanding type, function and supply of generating fuel 1.2. Understanding transmission system voltage 1.3. Understanding distribution system voltage 1.4. understanding function of meter and service wire
2. Understanding the power balances between supply and demand.	Version 1: 2.1. Understanding load control of interconnection of transmission system 2.2. Understanding load control of interconnection of distribution system
	Version 2: 2.1. Understanding system balance between supply and demand 2.2. Understanding availabilities of supply for peak demand
3. Understanding the causes and its appropriate measures against demand and supply unbalance	3.1. Understanding the relationship of supply capacity and peak demand 3.2. Understanding peak load increase and generating capacity 3.3. Understanding maintenance schedule of each facilities 3.4. Understanding real time operation of each facilities
4. Understanding the causes of power outage	4.1. Understanding the power supply during abnormal condition 4.2. Understanding the phenomena and causes of outage 4.3. Understanding power shortage because of generating collapse

Figure 9.1-6 Competency Element Format (Example: Basic Competency)

9.2. Qualification and Licensing

As mentioned in the above section, the Indonesian side will complete the “Competency Standards for Engineering Manager” based on “Competency Elements” and “Performance Criteria” proposed by the JICA Team. Further, the qualification will be implemented based on these “Competency Standards”.

Then, in consideration of what kind of organization is the most adequate entity, it is the most reasonable to utilize the existing resources at a maximum, i.e, four existing Certification Bodies, IATKI, GEMA PDKB, HAKIT or HATEKDIS.

The reasons are as follows;

- Basically it is ideal for DGEEU to directly conduct certification operations, but the DGEEU should pursue the reasonableness by entrusting certification operations to other organizations and then exercise its overall supervision by monitoring or directing certification bodies to improve the quality of certification operations.
- Existing Certification Bodies have so far conducted certification operations on NQF levels 1 to 3 for Electrical Technicians and have compiled enough experiences and knowledge in this area.
- Four Certification Bodies have adopted a flexible operational style so as to fit the necessary system by hiring experienced persons from the electrical sector and scholastic persons, whenever they needed, as temporary assessors, without hiring them on a regular basis. Therefore, they will be able to expand their business scope even to include the Engineering Managers qualification flexibly.
- When Certification Bodies hire assessors, those bodies evaluate the candidates for assessors and then hire them. This means that existing Certification Bodies have enough competencies to judge and evaluate experienced persons full of much work history and experiences, whose levels correspond to management levels.

Taking into account the aforementioned items, it is preferable to utilize the existing four Certification Bodies for qualifying the *Engineering Managers*’ Competency.

As for the actual qualification operation, it is considered that there might be no confusion or trouble if the performance criteria of *Competency* Standards for *Engineering Managers* are properly applied on the basis of the current methodology for evaluating assessors.

Since the Engineering Manager System itself is completely unprecedented in Indonesia, it is very important that the effect and availability of this system as well as the roles and responsibilities of the *Engineering Managers* be *understood* among the many stakeholders in advance. Achieving an understanding among the many stakeholders will facilitate the smooth introduction of qualification operations. Under this provision, it is recommended that the enlightenment material that the JICA Team has prepared should be utilized.

For the better improvement of the qualification system after starting the qualification operation, it is important for DGEEU to monitor regularly whether there might be problems or troubles in the qualification operation of Certification *Bodies*. If they can foresee presumed issues beforehand and take provisions for them, there is no better way than this. But this kind of ideal handling is not realistic. Therefore, for handling unexpected problems, it is a realistic and effective methodology to find out problems during ordinary qualification operations, devise provisions for improvement, and standardize those provisions to other Certification Bodies. By realizing such a system, sustainable system for qualification operations will be established and an effective spiral-up for better improvement will be expected.

In the next place, the licensing system is referred to. In the former clause, a story proceeded on the basis that those who passed the qualification test done by Certification Bodies can obtain the licenses of *Engineering Managers*. But, in terms of ensuring the number of *Engineering Managers* on some level, an other system to obtain a license of *Engineering Manager* should be prepared.

Consequently, licenses of *Engineering Managers* corresponding to one of the following conditions should be issued from the *Minister* of Energy and Mineral Resources.

(a) Those that have passed the qualification tests conducted by Certification Bodies. Any person is eligible for admission to tests
(b) Those who possess academic expertise or licenses, and work experiences, designated in Ministerial Decree
(c) Those who are accredited by the Minister of Energy and Mineral Resource as persons who have corresponding or superior knowledge and competences to (a) or (b)

With regards to (a), as mentioned in the above clause, those who passed the test done by Certification Bodies and qualified as *Engineering Managers* can be issued with licenses from

the Minister of Energy and Mineral Resource. Regarding eligibility for admission to an examination, restrictions such as one's academic history, age, gender, experiences and so on should NOT be established. This is because any person possessing sufficient motivation should of his or her initiative be given opportunities to obtain licenses.

Although there may be some objections to the possibility that even the persons who don't possess any work experiences can pass the qualification test, it is clear that the qualification tests for *Engineering Managers* is very difficult to pass without a sufficient amount of experience taking into account of the contents of Competency Standards for *Engineering Managers*. In other words, if applicants who have no work experiences have passed the qualification tests, these successful applicants had already possess enough competencies for *Engineering Managers* substantially.

With regards to (b), those who have passed through the required subjects designated by the Ministerial Decree at the University or other kind of educational institutes and then gained work experiences more than stipulated years, should be regarded as an *Engineering Managers*.

In concrete terms, specific requirements should be set up as "academic history or licenses, and work experiences, designated in Ministerial Decree" according to the classification of *Engineering Managers* proposed in Chapter 9.1. As an example, a requirement for "Hydro Power Facilities (Civil Engineering)" has been described in the following. The following table, however, is just an example, therefore appropriate requirements and specific work experiences, etc., must be well considered when this scheme is applied for during the actual operation. In addition, licenses other than the "Hydro Power Facilities (Civil Engineering)" should also be considered taking into account the following table for better application to Indonesia's situation.

Table 9.2-1 Academic history or licenses, and work experiences, designated in Ministerial Decree

Type of licenses	Academic history or licenses	Work Experience	
		Contents of Works	Experienced Years

Hydro Power Facilities (Civil Engineering) [Construction]	(1) Those who have taken Civil Engineering courses, designated by the Minister of Energy & Mineral Resources, in Universities or Educational Institutions, which are equivalent or superior to Universities	Hydro Power Facilities (Except for Electrical Facilities) or other Generating Facilities corresponding to Hydro Power Facilities	More than 10 years after graduation
	(2) Those who have taken Civil Engineering courses, designated by the Minister of Energy & Mineral Resources, in Junior College or High Schools, which are equivalent or superior to Junior College	Hydro Power Facilities (Except for Electrical Facilities) or other Generating Facilities corresponding to Hydro Power Facilities	More than 15 years after graduation
	(3) Those who are other than (1) or (2) and have licenses of "Hydro Power Facilities (Civil Engineering) [Operation]" or "Hydro Power Facilities (Civil Engineering) [Maintenance]"	Hydro Power Facilities (Except for Electrical Facilities) or other Generating Facilities corresponding to Hydro Power Facilities	More than 5 years after issued with licenses of "Hydro Power Facilities (Civil Engineering) [Operation]" or "Hydro Power Facilities (Civil Engineering) [Maintenance]"

Why the licenses of *Engineering Managers* should be authorized as the National Qualification is for the purpose of enhancing the recognizability of *Engineering Managers* by placing them as responsible persons not only in the Electric Power Sector but also for society and the general public. If their positions in society are to be upgraded, their sense of commitment and

responsibility for the safety of electricity will be all the more enhanced. This will also contribute to the improvement of the level of electrical techniques.

Since (a) and (b) could be the "two wheels of one cart" for conducting the qualification of *Engineering Managers*, the accomplishment of a complementary relationship between (a) and (b) would facilitate effective operations of the qualification system in line with needs from the applicants. To be more precise, as for the qualification of (b), those who do not satisfy the specified subjects in the educational institutes can be regarded as taking all the specified subjects if they passed successfully the partial test of subjects corresponding to the subjects which they had not taken in the educational institutions. Specific operations should be designed according to Indonesia's situation.

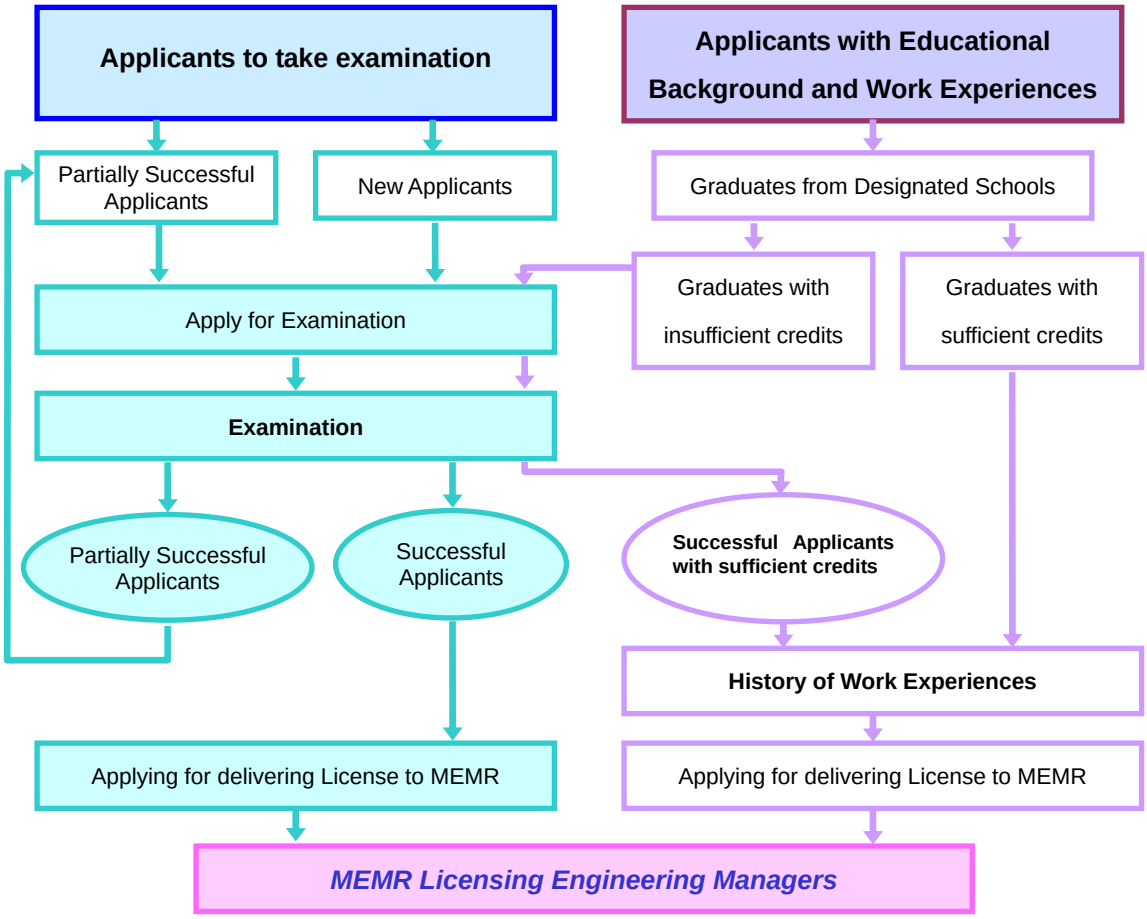

Figure 9.2-1 Flow of obtaining licenses of *Engineering Managers*

To meet the transient period for the adoption of the *Engineering Manager* System, it is

necessary to use the “Deemed Qualification” provisionally. Licensing by (c) is a supplementary rule to enable them to go through such a transitional situation. Details are described in the next clause.

9.3. Preparation for the adoption of the System (Future Direction)

It is the most ideal way to complete the nomination and installation of the *Engineering Managers* at all the sites in Indonesia until the date of enforcement of the *Engineering Manager* System. However, taking into account of the state of the affairs in Indonesia where there are more than 10,000 islands, it is almost impossible to enforce the new system all together in a normal manner. Therefore, it is more ideal to introduce the new system gradually in Power Utilities all through Indonesia by setting up a transitional period after the enforcement of the new system.

In addition, in order to ensure the specified level of competency, all of the *Engineering Managers* should be nominated from those who have acquired the licenses via qualification conditions (a) or (b); these conditions are proposed in the former clause. However, in order to minimize the confusion and burden with the introduction of the new system, “Deemed Qualification” according to qualification condition (c) should be utilized for the transition period by nominating *Engineering Managers* from existing workers who are engaged at each Utility’s site. In this regard, after finishing the transitional period, the “Deemed Qualification” should not be used in principle and the supply of *Engineering Managers* should be based on the applications of conditions (a) and (b).

Besides, the duration of the transitional period will be considered and decided in order to minimize the confusion and burden with the introduction of the new system, taking into account Inodonesia’s current situation, such as the number of Utilities and those scales.

It is recommended that the qualification condition (c) should be kept even after the end of the transitional period, but much attention should be paid in order that this condition not be abused. If the qualification condition (c) is abused even after *Engineering Manager* System has taken a firm hold within the Indonesian Power Sector, this misuse would increase the number of incompetent *Engineering Managers*. This improper situation, in the long run, would lead to a crisis of the *Engineering Manager* System. Hence, application of the qualification condition (c) after finishing the transitional period must be limited in principle to exceptional cases.

9.4. Human Resource Development for cultivation of *Engineering Manager*

The qualification test of *Engineering Managers*, mentioned in the clause 9.2, would be a formidable barrier for the applicants who have had no work experiences. Regardless, this difficulty should be firmly maintained, because the *Engineering Managers* must take great responsibilities on ensuring the overall safety of the Electrical Facilities. Accordingly, it is very difficult for the *Engineering Managers* to exert their competency without a substantial amount of work experience under one's belt. So, the hurdle should be set considerably high as a way to be recognized by both within the power sector and the general public that this qualification represents a position of considerable responsibility.

Taking the aforementioned efforts into consideration for human resource development, it can be said that capacity building along with work experiences are the most effective measures. On the other hand, there are no limitations regarding eligibility for admission to an examination, i.e., this means that the qualification test is open to anyone who wants to apply for the test. In Japan, many applicants aiming for the licenses of *Qualified Chief Engineers* are workers in the Power Sectors who have compiled work experiences there. In addition, the exam questions will be publicly disclosed after the tests. Actually, many successful applicants pass the tests through continuing self-education, also taking into account of the purpose of self-development. Such spontaneous trends of human resource development based on the applicants' self-motivation, as a consequence, enhance the level of Electrical Techniques and the safety of Electrical Facilities. In Indonesia, such a style for human resource development would be sufficient.

As it has in Japan, if such planted seeds fermented throughout the Indonesian Power Sector, a greater awareness for ensuring safety in throughout the Electrical Power Facilities will stretch out among all the various parties concerned in the Power Sector. After all, the utilization of the MEMR Training Centre is rightly essential. The MEMR Training Center provides supplementary lectures for applicants or failed applicants to aim for obtaining the qualification of NQF level 1- 3. Such a hospitable backup system by the Government has yet to be seen in Japan. Therefore, utilizing the function of the MEMR Training Center for providing lectures and preps for examination to applicants is the most effective measure to cultivating the candidates of the *Engineering Manager.* The MEMR Training Center will construct a program for the human resource development of the *Engineering Managers*, incorporating the policy of the existing NQF Level 1 to 3, based on the Competency Standards of the *Engineering Managers* which the

JICA Team has proposed.

9.5. Provision for maintaining Competency after obtaining licenses

It is incumbent on the *Engineering Managers* to conduct their duties in good faith. Therefore, the Minister of Energy and Mineral Resource possesses the right to revoke the licences of *Engineering Managers* deemed to be in violation of their duitrwho violate duty of good faith, they must hand back their licenses.

On the other hand, as long as the *Engineering Managers* do not commit a
A violation, in other words, does not automatically correspond to disqualification causes, their licenses should be maintained as permanent certification. It is almost improbable that qualified persons for *Engineering Managers* could easily lose their management abilities, which have accumulated through their work experiences. The nature of the *Engineering Managers*' qualification and competencies tested cover mainly managerial capability rather than technical skills. Hence, it may be not be feasible for licenses for the *Engineering Managers* to be updated once every three years and likewise with licenses for NQF Levels 1 to 3.

Nonetheless, it is not easy for those persons, who have spent a dozen years or more as *Engineering Managers*, to adopt brand-new techniques or change their feelings as they have just obtained licenses. In this term, the DGEEU should hold meetings periodically to give information concerning recent accident cases, preventive measures or brand-new techniques and exchange opinions among *Engineering Managers*, as provisions for maintaining the capabilities or motivations of *Engineering Managers*.

In Japan, the association for Electrical Engineers was formed for providing information or support services for the enlightenment of *Qualified Chief Engineers*. To be more specific, its association provides information about Electrical techniques or revision of Laws and Ordinances necessary for *Qualified Chief Engineers*. Furthermore, it also provides consulting services by specialists regarding Electrical Engineering. Cooperation services with the Ministry of Economy, Trade and Industry are also operated to provide lecture meetings, training sessions or excursions. Through these activities, provisions for maintaining or enhancing abilities, awareness-building or encouragement of senses of responsibility as *Engineering Managers* are implemented.

Chapter 10 Discussion for Institutionalization

10.1. Status of Legislating New Electricity Law and Related Regulations

"Electricity law No.30/ 2009" based on the structural reform of the electric power sector was legislated in September 2009 and mentioned in Chapter 3.1.1.
"Electricity law No.30/ 2009" conceptually provides certain principles, Governmental Regulations and Ministerial Decrees that are subordinated to Electricity Law provides more in detail in near future.

The new governmental Regulation is being drafted by DGEEU based on the legislation of the "Electricity law No.30/ 2009" and it follows Indonesian regulations regarding legislation procedures.

In addition, although there are 15 related governmental regulations based on the "Electricity law No. 15/1985", the new governmental regulations are expected to be arranged and unified at the three regulations that cover the following contents as shown in Figure. 10.1-1.

① Regarding international cooperation
② Regarding building constructors and consultancy firms
③ Regarding safety

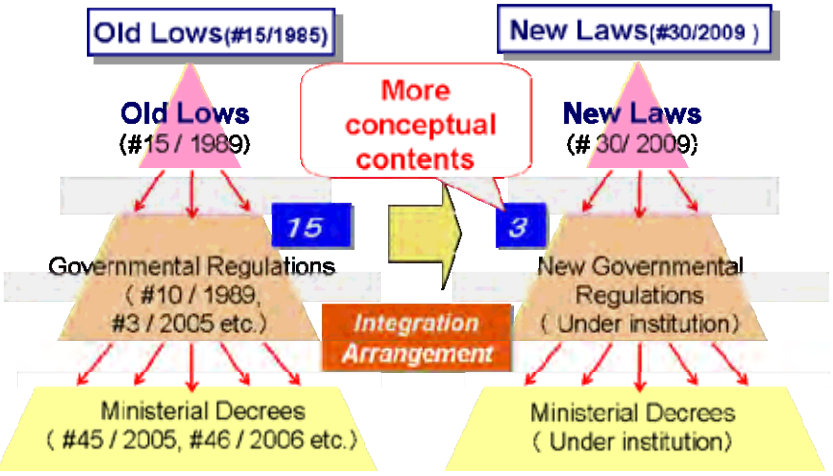

Figure 10.1-1 The comparison of the old and new legal structure

The draft of the new governmental regulations has not been disclosed though, according to MEMR, it seems that the "National Safety Requirements", "Safety Rules System" and "Engineering Manager System" proposed by the JICA Study Team is going to be legislated as new governmental regulation concerning (3) safety. The flow chart for the institutionalization of the new governmental regulations are shown in Fig. 10.1-2.

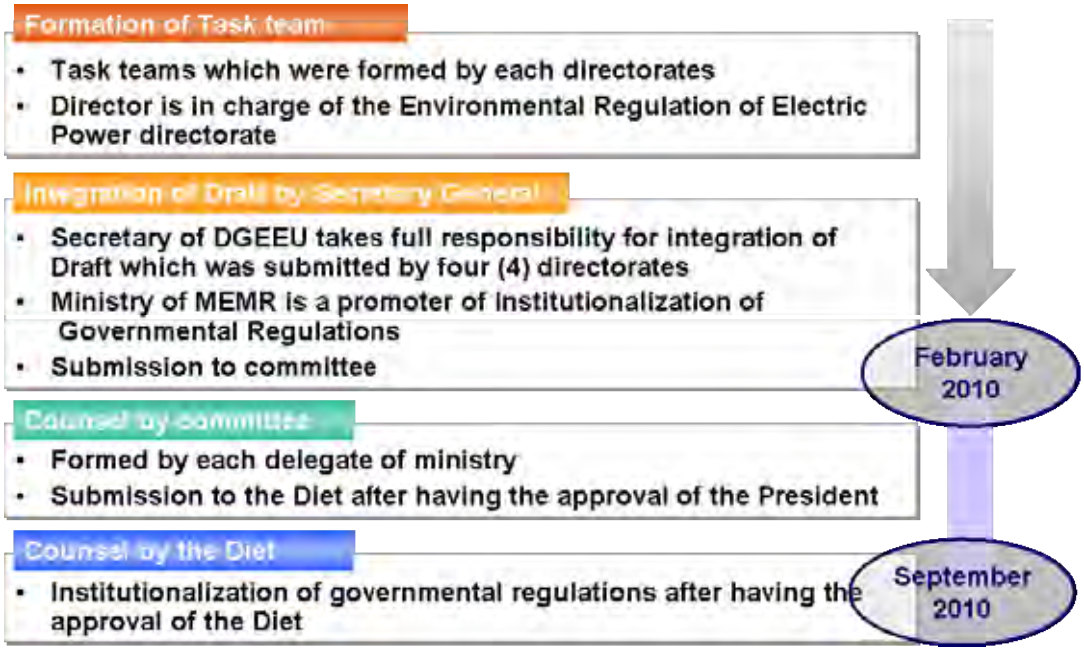

Figure 10.1-2 Flow chart for institutionalization of governmental regulations

Moreover, the new ministerial decrees are expected to be drafted by DGEEU. The main tasks are the modification and addition of existing ministerial decrees. In addition, it seems that JICA Study Team's proposal is going to be referred to and reflected in the new ministerial decrees.

10.2. Adoption of the JICA Study Team's Proposal in the New Governmental Regulation

At present (February 1, 2010), new governmental Regulation is being discussed in detail by DGEEU and has not yet been released officially. Therefore, although the details are unknown according to the contents of the action plan on which it has agreed upon by the Minutes of Meetings (February 1, 2010), the adoption of the JICA Study Team's Proposal in the new governmental Regulations have been described as follows.

10.2.1. National Safety Requirements

According to the action plan, it seems that the “Safety Principles for Electrical Facilities”, which are the contents of thje “National Safety Requirements” proposed by the JICA Study Team mentioned in Chapter 6, is going to be legislated as new governmental regulation which is presently being drafted by DGEEU in order to stipulate more specifically how to secure a safef electricity supply.

Moreover, it seems that the JICA Study Team’s proposal is going to be referred to and reflected in the new ministerial decrees in detail which shall be developed next step.

10.2.2. Safety Rules System

According to the action plan, it seems that the idea of the “Safety Rules System”, proposed by the JICA Study Team mentioned in Chapter 7 is going to be legislated under new governmental regulations being drafted by the DGEEU in order to clearly define the roles of Government and power utilities regarding the safety management of facilities and assure safe facility management.

Moreover, it seems that JICA Study Team’s proposal is going to be referred to and to reflected in the new ministerial decrees in detail which shall be the develop ed next step.

10.2.3. Engineering Manager System

According to the action plan, it seems that the idea of the “Engineering Manager System”, proposed by the JICA Study Team mentioned in Chapter 8, is going to be legislated under new governmental regulations which are being drafted by DGEEU in order to clearly define personnel responsibilities for supervising the organizational structure in order to secure the safety of electrical facilities.

Moreover, it seems that JICA Study Team’s proposal is going to be referred to and reflected in the new ministerial decrees in detail which shall be the developed next step.

10.3. Further Legislation (Next Steps)

Even if the new "Governmental Regulation on Electricity Supply Business" that has been prepared by MEMR is approved without major changes from the current draft and the new systems proposed by the JICA Study Team are reflected in the new Governmental Regulation as discussed in the previous section, these stipulations in the new Governmental Regulation will be simply general description with 1- or 2-line sentences each, thus they cannot serve as a detailed definition of the new systems.

This is partially due to the difference in the legal system between Indonesia and Japan, that is, whereas Japan's Electric Utility Industry Law consists of 170 articles in total, Indonesian laws and regulations are formulated with simpler stipulations, with 56 articles in the Electricity law (No.30/2009) and 52 articles in the current draft of the new Governmental Regulation. Therefore it can be assumed that some stipulations that would be included in Japan's Electric Utility Industry Law might be regarded as too specific and they might not be provided in either the Electricity Law (No.30/2009) or the subordinate Governmental Regulations but in the subordinate Ministerial Decrees.

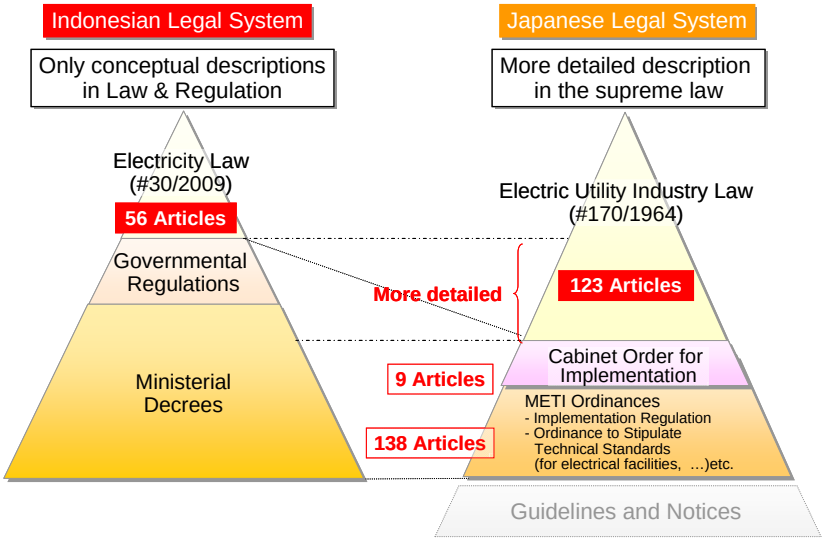

Figure 10.3-1 Difference in Legal Structure Related to Electric Power between Indonesia and Japan

Therefore, it is necessary to wait at least until the development of the new Ministerial Decrees that will follow after the completion of the new Governmental Regulation for evaluating whether the new systems proposed by the JICA Study Team are reflected in the new legal structure as effectively functioning systems. According to MEMR, the development of new Ministerial Decrees will be completed after the completion of the new Governmental

Regulations. Therefore, the completion of the new Ministerial Decrees will be made after the end of this Study.

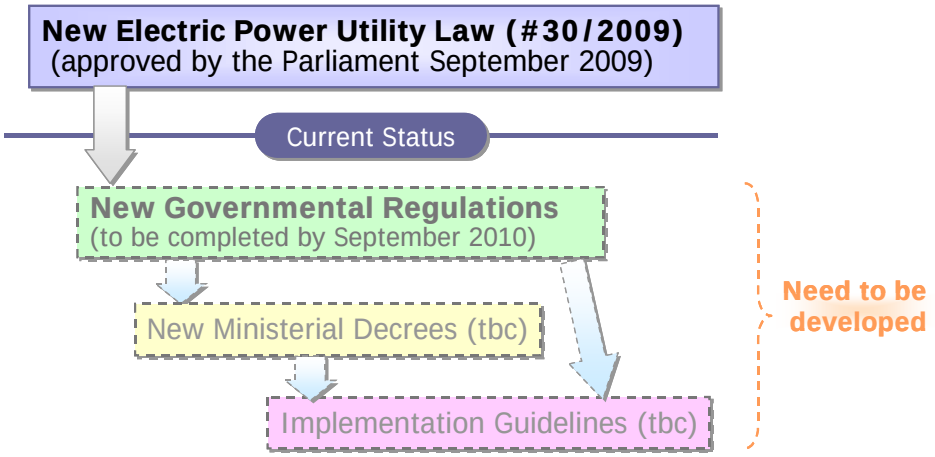

Figure 10.3-2 Legislation of New Electricity Law and the Plan of Developing Related Ordinances

In order to assure that the institutional design will be made to reflect JICA Study Team's proposal in the process of developing new Governmental Regulations and new Ministerial Decrees after the completion of this Study, the JICA Study Team and DGEEU has agreed on the "Action Plan" by Minutes of Meetings (February 1, 2010)

Chapter 11 The Way Forward

11.1. "Action Plan" to Be Done by MEMR after the Completion of the Study

This JICA Study first investigated into the current status of the safety management of electrical facilities and the competency standards in electric power sector in Indonesia, taking into account the status quo of the sector, and then based on the problems observed by the JICA Study Team, three new systems for improving the safety of electrical facilities, namely *National Safety Requirements*, *Safety Rules*, and *Engineering Manager* system were proposed. Further, then assuming that each power utility would be obliged to nominate person(s) with designated qualifications as the officer responsible for electrical safety with the adoption of the proposed *Engineering Manager* system, the Study also prepared a systematical and comprehensive structure of technical competency for people who would assume the position of Engineering Manager and then developed a draft of competency standards for the *Engineering Manager*.

During the Study, the new Electricity Law (No.30/2009) was enacted by Parliament, and then the works to develop the new Governmental Regulations and Ministerial Decrees were set out by MEMR. Taking advantage of this opportunity, the JICA Study Team created a series of discussions with the MEMR-DGEEU officers so that the aforementioned newly proposed systems would be reflected into the "Governmental Regulation for Electricity Supply Business" and the new Ministerial Decrees that would follow the Governmental Regulation. The proposed *National Safety Requirements*, *Safety Rules*, and *Engineering Manager System* are expected to be reflected in the new Governmental Regulation and new Ministerial Decrees.

However, even if these new systems are reflected in the aforementioned Governmental Regulation and Ministerial Decrees, further steps will need to be made by the Indonesian side for materializing these systems in practice, such as the development of related Implementation Guidelines that will provide more detailed institutional designing. Because the development of these Ministerial Decrees and Implementation Guidelines will start after the completion of the Study, the JICA Study Team expects the Indonesian counterparts of the Study, i.e. MEMR, will continue working on the institutional designing taking into account the JICA Study Team's proposal. In order to mitigate the friction normally accompanies the introduction of a new system, programs of publication and edification activities for related stakeholders and the gradual adoption of the new system with a certain transitional period also needs to be taken into account.

Regarding the competency standards for the *Engineering Manager*, the JICA Study Team has systematically formulated the technical requirements for applicants, developed specific evaluation criteria for each competency element, presented them to the Indonesian counterparts and stakeholders in a format consistent with the existing competency standard in Indonesia, and has held a series of meetings to exchange views. It appears possible that the Indonesian side will continue discussing on its own initiative the draft of competency standards presented by the JICA Study Team and give it a final brush up.. However, it is expected that it will still take a considerable amount of time to meticulously review all the contents of the proposed draft through regular meetings with related stakeholders, and even after that, there will still remain tasks to be completed by the Indonesian side, such as establishing a linkage between the newly proposed competency standards and the existing competency standards, providing unique codes to each competency unit and proceeding with the necessary approval within the Indonesian Government.

Furthermore, in order to institutionalize these proposals smoothly and certainly, it is necessary for MEMR to determine the roadmap that outlines the time and the scope of application and show to the stakeholders.
For example, these proposals will be implemented to the large scale on a trial basis in order to find out the problems. After solving these problems, they will be implemented to fully enterprises.

The tasks that the Indonesian side needs to do after the completion of Study are summarized in the “Action Plan” as seen in Table 11.1-1. Specific descriptions of each individual action are discussed in the following Sections 11.2 and after.

The draft of this “Action Plan” was presented by the JICA Study Team to the Indonesian counterparts during the 5th Field Study in the Indonesia and was discussed intensively during the 6th, i.e. the final, Field Study in Indonesia. After creating amendments taking into account the opinions of the Indonesian side, the Team Leader of the JICA Study Team and the Director of Technical and Environmental Regulation of Electric Power of DGEEU, MEMR signed this Action Plan as a part of the Meeting Minutes of the final Field Study.

Table 11.1-1 "Action Plan" to Be Done by MEMR after the Completion of the Study

Subject Group	Subject	Recommended Action	Responsible Division	Period (by when)	Assistance to be made by the JICA Study Team	MEMR's Comments
National Safety Requirements	Legislation of *NSR*	Completion of the Governmental Regulation	SDEE, SDEIS & SDES	Sep. 2010	Provide relevant provisions in Japanese laws and regulations for reference	JICA Study Team's proposal will be utilized in developing the new Regulation/Decree, though further discussion within MEMR is needed to determine how it will be adopted
		Development of the new Ministerial Decree	SDEE, SDEIS & SDES	Sep. 2010		
		Hosting a forum / seminar / workshop for related stakeholders to share understanding	SDEE, SDEIS & SDES	Sep. 2010	N.A.	MEMR is ready to coordinate the meetings and distribute the brochure, as far as the budget allows
		Distribution of edification brochure (based on the draft prepared by the JICA Study Team)	SDEE, SDEIS & SDES	Sep. 2010	Provide the draft of edification brochure	
	Developing implementation guidelines to supplement *NSR*	Development of Implementation Guidelines of *NSR* with more specific criteria	SDEE, SDEIS & SDES	Dec. 2011	Provide Japan's example (e.g. translation of "Kaishaku") for reference	MEMR will develop the implementation guideline by referring to Japan's example
		Completion of SNI/PUIL to cover the entire facilities related to electrical power supply	SDEE, SDEIS & SDES	Dec. 2011	N.A.	MEMR will try accelerating the process of completing SNI/PUIL, though it may be less prioritized than developing *National Safety Requirements*
Safety Rules	Legislation of Safety Rules	Completion of the Governmental Regulation	SDEE &SDEIS	Sep. 2010	Provide relevant provisions in Japanese laws and regulations for reference	JICA Study Team's proposal will be utilized in developing the new Regulation/Decree, though further discussion within MEMR is needed to determine how it will be adopted
		Development of the new Ministerial Decree	SDEE &SDEIS	Sep. 2010		
		Hosting a forum / seminar / workshop for related stakeholders to share understanding	SDEE &SDEIS	Sep. 2010	N.A.	MEMR is ready to coordinate the meetings and distribute the brochure, as far as the budget allows
		Distribution of edification brochure (its draft is prepared by the JICA Study Team)	SDEE &SDEIS	Sep. 2010	Provide the draft of edification brochure	
	Developing guidelines to specify *Safety Rules*	Determining the roles of the Government and utilities in developing *Safety Rules*	SDEE &SDEIS	Sep. 2010	Discuss with MEMR staff based on the JICA Study Team's proposal (to be provided Jan 2010)	To be stipulated in the new Ministerial Decree in consultation with stakeholders
		Developing a detailed guidelines to define the specification of *Safety Rules* system (as well as providing a template of *Safety Rules*)	SDEE &SDEIS	Dec. 2011	Discuss with MEMR staff based on the JICA Study Team's proposal (to be provided Jan 2010)	
	Roadmap for full adoption of *Safety Rules* system	Determine the period and targeted facilities for implementation	SDEE &SDEIS	Sep. 2010	Discuss with MEMR staff to give advices	This item items will be stipulated in the new Ministerial Decree in consultation with stakeholders MEMR expects JICA Study Team to provide example of gradual implementation
	Further expanding the target of *Safety Rules* as next steps in the future	Discussion for applying *Safety Rules* system to power users' facilities and captive power	SDEE &SDEIS	After 2011	Provide advices (when needed)	MEMR will study the feasibility of implementing *Safety Rules* system to power utilization facilities after confirming the effectiveness of this system for power supply facilities MEMR expects JICA Study Team to provide example of applying *Safety Rules* to power utilization facilities

Subject Group	Subject	Recommended Action	Responsible Division	Period (by when)	Assistance to be made by the JICA Study Team	MEMR's Comments
***Engineering Manager* System**	Legislation of *Engineering Manager* system	Completion of the Governmental Regulation	SDEE	Sep. 2010	Provide relevant provisions in Japanese laws and regulations for reference	JICA Study Team's proposal will be utilized in developing the new Regulation/Decree, though further discussion within MEMR is needed to determine how it will be adopted
		Development of the new Ministerial Decree	SDEE	Sep. 2010		
		Hosting a forum / seminar / workshop for related stakeholders to share understanding	SDEE	Sep. 2010	N.A.	MEMR is ready to coordinate the meetings and distribute the brochure, as far as the budget allows
		Distribution of edification brochure (its draft is prepared by the JICA Study Team)	SDEE	Sep. 2010	Provide the draft of edification brochure	
	Developing guidelines to specify *Engineering Manager* system	Developing a guidelines (templates) to define the roles and responsibilities of *Engineering Manager*	SDEE	Dec. 2011	Discuss with MEMR staff by referring to Japan's sample	To be stipulated in the new Ministerial Decree in consultation with stakeholders
	Roadmap for full adoption of *Engineering Manager* system	Determining the period and targeted facilities for implementation	SDEE	Sep. 2010	Discuss with MEMR staff to give advices	To be stipulated in the new Ministerial Decree in consultation with stakeholders MEMR expects JICA Study Team to provide example of gradual implementation
	Further expanding the target of *Engineering Manager* system as next steps in the future	Discussion for applying *Engineering Manager* system to power users' facilities and captive power	SDEE	After 2011	Provide advices (when needed)	MEMR will study the feasibility of implementing *Engineering Manager* system after confirming the effectiveness of this system for power supply facilities. MEMR expects JICA Study Team to provide example of applying *Engineering Manager* system to power utilization facilities
Technical Competency for *Engineering Manager*	Completion of the list of Competency Units	Completion of the entire list of Competency Units following the receipt of the 1st draft provided by the JICA Study Team	SDEE	Dec. 2010	Provide the 1st draft of the list of Competency Units (from Japan)	MEMR expects the JICA Study Team to provide the draft of entire list of Competency Units
	Taking necessary procedures for authorization	Gaining approval within MEMR	SDEE	Jun. 2011	N.A.	Notification to BNSP is not needed once the competency standard is authorized by the Ministry of Energy and Mineral Resources
	Developing the institutional scheme of certifying *Engineering Manager*	Determining the entities to undertake certification	SDEE	Dec. 2011	Discuss with the existing certification bodies (when needed)	To be stipulated in the new Ministerial Decree in consultation with stakeholders
		Assisting the aforementioned entities in developing certification system	SDEE	Dec. 2011		
		Concluding an agreement with the aforementioned entities to entrust the certification	SDEE	Dec. 2011	N.A.	
		Establish a section within MEMR to license *Engineering Manager*	SDEE	Dec. 2011	N.A.	
	Roadmap for applying the certification of *Engineering Manager*	Estimating the workload for certifying all potential applicants	SDEE	Sep. 2010	Provide advices (when needed)	To be stipulated in the new Ministerial Decree in consultation with stakeholders
		Determining the transitional period before full adoption	SDEE	Sep. 2010	Provide advices (when needed)	
		Hosting a forum / seminar / workshop & developing edification brochure (when needed)	SDEE	Sep. 2010	N.A.	

(Note) SDEE: Sub-Directorate of Electricity Engineers (Mr. Arief Indarto)
SDEIS: Sub-Directorate of Electricity Installation and Safety (Mr. Pahala Lingga)
SDES: Sub-Directorate of Electricity Standardization (Mr. Alihudin Sitompul)

11.2. National Safety Requirements

11.2.1. Legislation of *NSR* and Promotion for Full Adoption

"Government Regulation on Electric Power Supply" under consideration shall be legislated based via the new Electricity Utility Law. The draft of regulations has not yet been disclosed, according to MEMR, there is a description such that "the purpose of regulation regarding the safety of electric power facilities is to achieve the following condition" in the (2) of Article 46 and the condition seems to include firstly the "reliability of the facilities and safety". Based on this Article, it seems that "National Safety Requirements" proposed by the JICA Study Team is going to be legislated at the Ministerial Decree which shall be the next step of development..

The JICA Study Team is expecting that the draft of "Government Regulation" to be completed without major modifications. The JICA Study Team is also expecting the detailed design of National Safety Requirements to be completed with the works of the related Ministerial Decree development right after Government Regulations are approved. During the study period, the Team provides reference information regarding the related laws/regulations in Japan.

At the same time of the processing of Government Regulations and the Ministerial Decree, MEMR is kindly asked to proceed with promotion activities among business entities related to the power sector in order to introduce National Safety Requirements easily. For example, it is recommended that "Forums, Seminars & Workshops" could be held by inviting related parties, and it is also believed that a brochure could be provided or distributed so that the new scheme could be understood easily. The draft of the Brochure with the Indonesian language is going to be provided during the 6th study visit. Based on the draft of Brochure, it shall be continuously reviewed or revised, and distributed to related parties even after this Study is completed.

Moreover, at the workshop for promotion of the JICA Study Team's proposals under the auspices of the MEMR, the stakeholders requested of MEMR that the implementation on National Safety Requirement must be legitimated on level of Government Regulation or Minister Decree in order to enforce to the private sector to ensure observance of laws and rules.
The JICA Study Team investigated into the current status of the safety management of electrical facilities and the competency standards in electric power sector in Indonesia, taking into account the status quo of the sector, and then based on the problems observed by the JICA Study Team, three new systems for improving the safety of electrical facilities, namely "National Safety

Requirements", "Safety Rules", and "Engineering Manager system" were proposed and finally these proposals need to be institutionalized.
Therefore the basic contents of the "National Safety Requirements" should be legislated as new Governmental Regulation, the detail contents of the "National Safety Requirements" should be legislated as new Ministerial Decrees, and the technical specifications with numerical criteria should be legislated as the guidelines.

11.2.2. Developing Implementation Guidelines to Supplement *NSR*

Based on the New Electricity Utility Law that is coming into effect in September 2009, the establishment of "Government Regulation on Electric Power Supply" is presently under consideration. It is expected to have articles in the new regulation so that electric power facilities shall maintain their reliability and safety in the long run as mentioned in 11.2.1. In order for electric power facilities to comply with new regulations, the establishment of technical requirements via the Ministerial Decree or other forms of legislation is necessary. The proposed National Safety Requirements prepared by the JICA Study Team are the fundamental technical requirements based on the basic law / regulation regarding electric utilities in Indonesia.

In Indonesia, the liberalization of electric utility industry is proceeding and new business entrants such as IPPs have been entering into the electric utility industry. Even though the circumstances where many business entrants are entering, electric power facilities shall be installed and maintained in accordance with the regulation/appropriate requirements. As mentioned before, the proposed "National Safety Requirements" have been prepared as conceptual requirements of which any utility or IPPs shall comply for electric power facility installations. In other words, the "National Safety Requirements" are the common platform for installation and maintenance of electric power facilities in a safe manner.

Since the proposed National Safety Requirements are the conceptual requirements, it only stipulates that the electric power facilities should exist for safety. In this view, the JICA Study Team recommends that more detailed guidelines for electric facility installation and maintenance be established that comply with the National Safety Requirements.

Based on the idea that National Safety Requirements are the conceptual requirements, in order to apply the requirements efficiently, the JICA Study Team recommends to develop a detailed guideline for the implementation of electric power facility development in accordance with National Safety Requirements. The guideline shall indicate the specific requirements including

numerical indications.

The development of such a guideline is expected because it becomes a policy for the fare and appropriate facility developments for all entities and it is also expected that the guidelines allow for appropriate judgment regarding whether or not electric facilities are installed in accordance with the National Safety Requirements.

11.2.3. Completion of SNI/PUIL

As mentioned in Chapter 3, SNI shall be developed based on the Government Regulation of National Standardization. So far, among electric facilities, generation, transmission, and distribution, and in-house facilities, the field of distribution and in house facilities have been standardized as SNI.

In addition to the fields of distribution, other fields including generation, transmission, and transformation are expected to develop SNI as soon as possible in accordance with the National Safety Requirements the JICA Study Team has proposed.

When completing SNI from now on, it is necessary to follow the "national safe requirements" which is conceptual platform to indicate the total to-be framework of SNI. When considering that a part of existing technical standard has not satisfied enough the specification for on "national safe requirements" temporarily, it is necessary to conduct suitable reinforcement for reexamination about an applicable part.

11.3. Safety Rules

11.3.1. Legislation of *Safety Rules* and Promotion for Full Adoption

Legislation of *Safety Rules* System will be moved forward at the MEMR's initiative in the upcoming Governmental Regulations or Ministerial Decrees, based on the proposal that the JICA Study Team has submitted. During this study period, the Team provides reference information regarding the related laws/regulations in Japan.

At the same time of processing Governmental Regulations and Ministerial Decrees, MEMR is to promote activities to introduce the *Safety Rules* System among business entities related to the Power Sector. For example, "Forum, Seminar or Workshop" organized by MEMR will be held

by inviting the related parties, and also an enlightenment brochure will be utilized in order for the new scheme to be understood easily among them. At the 5th Seminar of this Study in January 2010, a large amount of the enlightenment brochures in the Indonesian language prepared by the JICA Study Team was provided to participants in the Seminar. Even after this study was completed, MEMR will continuously review or revise the enlightenment brochure and distribute them to stakeholders in the Power Sector.

Moreover, at the workshop for promotion of the JICA Study Team's proposals under the auspices of the MEMR, the stakeholders requested of MEMR that the implementation on Safety Rules must be legitimated on level of Government Regulation or Minister Decree in order to enforce to the private sector to ensure observance of laws and rules.
The JICA Study Team investigated into the current status of the safety management of electrical facilities and the competency standards in electric power sector in Indonesia, taking into account the status quo of the sector, and then based on the problems observed by the JICA Study Team, three new systems for improving the safety of electrical facilities, namely "National Safety Requirements", "Safety Rules", and "Engineering Manager system" were proposed and finally these proposals need to be institutionalized.
Therefore the basic contents of the "Safety Rules" should be legislated as new Governmental Regulation, the detail contents of the "Safety Rules" should be legislated as new Ministerial Decrees and the guidelines.

11.3.2. Developing Guidelines to Specify *Safety Rules*

In the power sector of Indonesia, deregulation is being introduced step by step for the efficiency of the power sector. From this situation, it is effective for promoting the efficiency and the improvement of safety so that the securing of safety is up to each power utility's discretion as much as possible. Therefore, the JICA Study Team proposed the introduction of the *Safety Rules System* in order to clearly define the responsibility of the government and utilities and maintain the electrical facilities in compliance with *National Safety Requirements* autonomously, and that the proposal is accepted widely by the persons concerned.

For the full adoption of the Safety Rules System, defining the roles and the responsibility of the government and utilities clearly, MEMR Will develop guidelines to assist the power utilities in preparing *Safety Rules* on their own in consideration of the ability and the situation of the government and utilities.

Moreover, for various reason, when the creation of Safety Rules is difficult by enterprises their selves, relaxation of regulations is necessary like the creation of Safety Rules by similar enterprise associations jointly.

11.3.3. Roadmap for Full Adoption of *Safety Rules* System

In order to introduce the Safety Rules System smoothly and surely, MEMR needs to decide on the roadmap for the full adoption of the Safety Rules and present the roadmap to the persons concerned. The gradual adoption of Safety Rules System by prioritizing large-scale power stations which are important in terms of impact on safety and solving problems at each stage may be considered. In order to promote smooth adoption, MEMR will also hold seminars to discuss how to install the *Safety Rules* System and schedule with relevant organizations.

11.3.4. Further Expanding the target of *Safety Rules* as Next Steps in the Future

The scope of the *Safety Rules* System in this Study covers electric supply facilities such as generation, transmission, and distribution. The discussion on applying the *Safety Rules* System to power user's facilities and captive power needs to be considered as the next step after the completion of this study.

11.4. Engineering Manager System

11.4.1. Legislation of *Engineering Manager* System and Promotion for Full Adoption

The legislation of the *Engineering Manager System* will be moved forward at the MEMR's initiative in the upcoming Governmental Regulation or Ministerial Decree, based on the proposal that the JICA Study Team has submitted. During this study period, the Team provides reference information regarding the related laws/regulations in Japan.

At the same time of processing Governmental Regulation and Ministerial Decrees, the MEMR

is to promote activities to introduce the *Engineering Manger System* among business entities related to the Power Sector. For example, “Forums, Seminars or Workshops” organized by MEMR will be held by inviting related parties, and also the enlightenment brochure will be utilized in order for the new scheme to be understood easily among them. At the 5th Seminar of this Study in January 2010, a large amount of the enlightenment brochure in Indonesian language prepared by JICA Study Team was provided to participants in the Seminar. Even after this study has completed, MEMR will continuously review or revise the enlightenment brochure and distribute them to stakeholders in the Power Sector.

Moreover, at the workshop for promotion of the JICA Study Team’s proposals under the auspices of the MEMR, the stakeholders requested of MEMR that the implementation on Engineering Manager System must be legitimated on level of Government Regulation or Minister Decree in order to enforce to the private sector to ensure observance of laws and rules as *Safety Rules*.

The JICA Study Team investigated into the current status of the safety management of electrical facilities and the competency standards in electric power sector in Indonesia, taking into account the status quo of the sector, and then based on the problems observed by the JICA Study Team, three new systems for improving the safety of electrical facilities, namely “National Safety Requirements”, “Safety Rules”, and “Engineering Manager system” were proposed and finally these proposals need to be institutionalized.

Therefore the basic contents of the “Engineering Manager” should be legislated as new Governmental Regulation, the detail contents of the “Engineering Manager” should be legislated as new Ministerial Decrees and the guidelines.

11.4.2. Developing Guidelines to Specify *Engineering Manager* System

Liberalization is processing in Indonesia to make power sectors more efficient in Indonesia, and the power sector in Indonesia has been shifting from the monopoly of PT PLN to the diversity of power utilities with the functional segmentation of new entries such as the IPP in the generation market. Considering the diversification of players, it is important for the power sector in Indonesia to clearly identify the responsibilities of safety management of each electrical facility in legislation.

The concept of the *Engineering Manager*, however, is new to power sectors in Indonesia. The MEMR will prepare the detailed guidelines to clarify the roles and responsibilities, for example,

based on the following actions.

- Positioning of *Engineering Manager* in an organization will be illustrated in the guidelines. For example, appointing an *Engineering Manager* at each regional business unit, or policy regarding the positioning of *Engineering Manager* will be described taking account of its own organizational structure and staff capacity, etc.

or

- Stipulating penalties when *Engineering Manager*'s activities fail to comply with *National Safety requirements*.

11.4.3. Roadmap for Full Adoption of *Engineering Manager* System

Action plans for the *Engineering Manager* is similar to those for the *Safety Rules*, because both systems are closely related with each other. The gradual adoption of the *Engineering Manager* System by prioritizing large-scale power stations and solving problems at each stage will be considered. In order to promote smooth adoption, MEMR will also hold seminars to discuss how to install the *Engineering System* and schedule with relevant organizations.

11.4.4. Further Expanding the Target of *Engineering Manager* System as Next Steps in the Future

The scope of *Engineering Manager* System in this Study covers the electric supply facilities such as generation, transmission, and distribution. The discussion on applying *Engineering Manager* System to power user's facilities and captive power needs to be considered as the next step after the completion of this study.

The following figure shows an example of the step by step adoption of the *Engineering Manager* System and *Safety Rules*. This figure has also been developed taking into account stakeholders' comments saying that the values of asset and risks in case of accidents should be emphasized.

In addition, about the expansion of adoption sector, it is necessary to conduct the hearing of opinion from the stakeholders and to carry out transition measures, such as preparing a suitable renewal period by mandating. Moreover, about the generating facilities for own use, if sufficient safety is

secured, relaxation of regulations is necessary like Engineering Manager System positions can be held by the manager of Safety Work as current system that runs now.

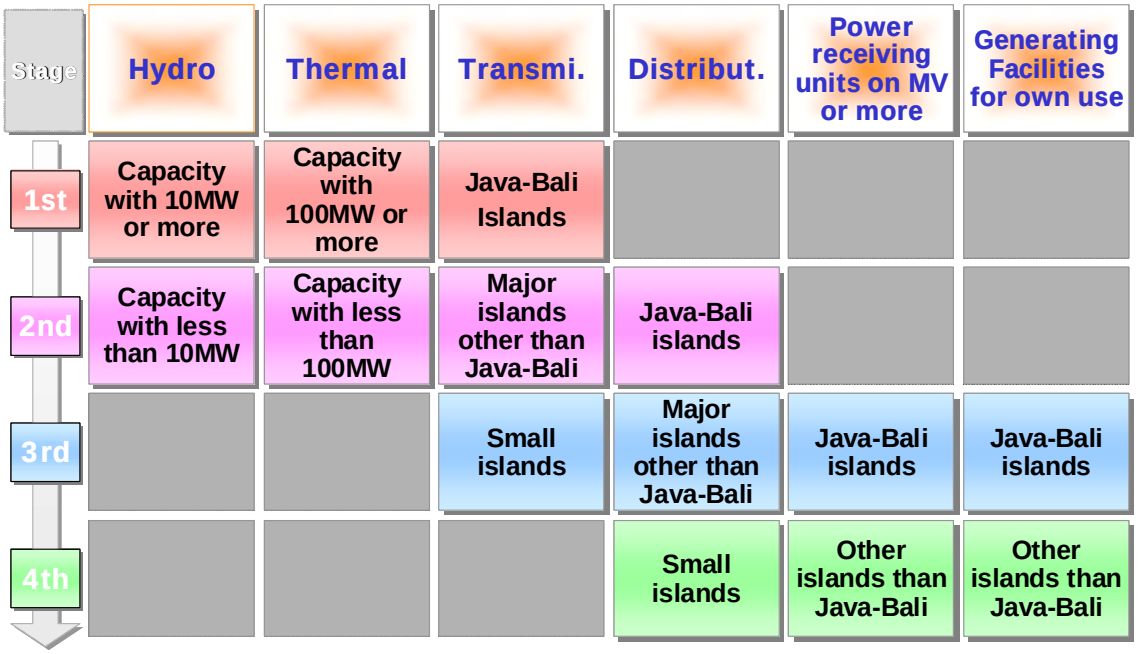

Figure 11.4-1 Image of step by step adoption of *Engineering Manager* System and *Safety Rules*

11.5. Technical Competency for *Engineering Manager*

11.5.1. Preparation of Competency Units of *Engineering Manager*

Regarding the aforementioned Engineering Manager System, in order to achieve a smooth introduction and steady implementation of this system, it will be necessary to clarify the required competencies for the Engineering Manager and to establish their qualifications. Indonesia already has the relevant regulations, the “Ministerial Decree of Energy and Mineral Resources on Competency Standardization for Electrical Workers, No.2052, 2001” in order to realize the Competency Standardization for Electrical Workers. Further, based on these purposes, a fundamental framework has been set up regarding the establishment of “Competency Standards”, training for technical workers and the supervision of certification bodies of Competency Standards.

Under these circumstances, the JICA Team promoted consultation with the DGEEU staffs regarding the introduction of the Engineering Manager System. Further, the JICA Team also

proposed the requirements for the Engineering Manager to achieve smooth implementation of the system.

The proposed requirements of the Engineering Manager are described in Apendix-4. They are divided by both one “Basic Competency” and 15 “Facilities Specific Competency”. The later Facilities Specific Competencies have three categories such as Construction, Operations and Maintenance in each of the five power facilities.

These competency standards have specific formats, show a sample in Figure 9.1 4, that has been authorized by DGEEU as a Competency Standard. This format has a competency unit name and cord together with the descriptions of its competency and the required knowledge and skill to obtain the qualifications collectively known as the “competency element”. These competency elements are the smallest units of the competency and have been divided into General Competency, Core Competency and Optional Competency.

The JICA Team developed the drafts of the competency standard formats and submitted these drafts to DGEEU during their fifth visit. The JICA Team also had additional requests from DGEEU to revise and restructure these competency standards and agreed to revise the format according to the requests during the sixth visit and submitted them again to DGEEU.

11.5.2. Developing Competency Element for Engineering Manager

The smallest units to evaluate each competency standard are called “competency elements” and all the candidates need to learn them in order to meet the qualifications of the competency standard. As shown in Figure 9.1.5, the competency standard format consists of a list of elements, usually 3 -12 elements, and performance criteria that describes the performance results and output of the competency elements.

The JICA Team developed each competency element and its performance criteria as the required competency for the Engineering Manager after having a discussion with DGEEU. The Team suggested draft formats of competency standards for each category; for example, construction, Operations and Maintenance and develops the competency element in more detail with categories such as Planning, Designing, Construction, Restoration of accident, Operation Management, Inspection, Patrol and Maintenance Works.

As a result of the aforementioned JICA's assistance, the DGEEU on the Indonesian side will review JICA's proposed format in the technical team established in February and will hold a consensus forum to introduce to stakeholders. The DGEEU on the Indonesian side will add other components such as the parameters of unit competency and evaluation guidance to establish all the contents of competency standard. Further, it will be legislated as official competency standards after approving the Minister of MEMR by the end of 2010.

11.5.3. Establishment of Institutional Framework for Qualifying *Engineering Managers*

In establishing the qualification system for *Engineering Managers*, it is necessary at an early date to decide who will be responsible for the qualification business, and how provisions for supporting those bodies to set up new businesses would be constructed. Although it is realistic to set up a the transitional period for introducing *Engineering Manager* System, at the end of the transitional period, the Qualification System must be smoothly operated in an ordinary manner.

To complete the institutional framework, the Competency Standards for the *Engineering Managers* needs to be prepared in the early stage. Additionally, the framework for the Qualification System, proposed by the JICA Team in Chapter 9, must be customized in line with the circumstances in Indonesia. In proceeding with these works, MEMR will build a consensus for optimal and prompt institutional design by holding workshops or seminars, and interchanging various opinions involving a broad-range of stakeholders.

11.5.4. Roadmap for implementing Qualification System of *Engineering Managers*

Regarding the amount of qualification works needing to be inputted after the end of the Engineers Managers System transitional period, an estimate of the amount of new resources that must be injected is necessary if the existing Certification Bodies are to take on new qualification works. MEMR will estimate the quantity of work, the necessary number of Engineering Managers all over Indonesia as a whole, and the necessary number of newly qualified persons every year to meet the natural reductions and so on. In addition, the work amount or density for establishing the new system will change according to the duration of the transitional period. Unless enough duration is given to the transitional period, the work density for paving the way

for the new system will become high. In order to not increase the burdens imposed on Certification Bodies, MEMR and relevant stakeholders will hold meetings to deliberate regarding the setting of the duration of the transitional period for the resources necessary for operations on a normal basis after the end of the transitional period, which should not largely differ from the ones necessary for establishing the new system.

11.6. Edification Brochure

Since the systems proposed by the JICA Study Team are new systems to the stakeholders in the electric power sector in Indonesia, receiving their understanding of the systems is required for legislation of the systems and promotion for introduction of the systems. The JICA Study Team, has, therefore, prepared a “Handbook”, that consists of the outlines of the three systems with answers to frequently asked questions (FAQs) about the JICA Study Team’s proposal and was distributed to the participants of the final seminar which was held in January 2010. This handbook is shown in Appedix-5.

This handbook is expected to enhance the stakeholders’ understanding of the proposed systems because it includes questions which were actually asked by Indonesian stakeholders with their answers.