Republic of the Philippines
National Electrification Administration (NEA)

Republic of the Philippines
Data Collection Survey on the Incentive Mechanism for Improving Disaster Resiliency of Electric Power Distribution Network
Final Report

October 2015

Japan International Cooperation Agency (JICA)

Shikoku Electric Power Co., Inc. (YONDEN)
The Japan Economic Research Institute (JERI)

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Abbreviation

ADFIAP	Association of Development Financing Institutions in Asia and the Pacific
BATELEC 2	Batangas 2 Electric Cooperative
BCM	business continuity management
BPI	Bank of the Philippine Islands
CAPEX	capital expenditures
CRED	Center for Research on the Epidemiology of Disasters
DBJ	Development Bank of Japan
DBP	Development Bank of the Philippines
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
DOF	Department of Finance
DRF	Disaster Risk Finance
EC	electric cooperative
ECPCG	electric cooperative partial credit guarantee
ERC	Energy Regulatory Commission
IC	Insurance Commission
IFC	International Finance Corporation
JICA	Japan International Cooperation Agency
KPS	Key Performance Standards
LBP	Land Bank of the Philippines
LGUGC	Local Government Unit Guarantee Corporation
NDRRMC	National Disaster Risk Reduction and Management Council
NDRRMP	National Disaster Risk Reduction and Management Plan
NEA	National Electrification Administration
OPARR	Office of the Presidential Assistant for Rehabilitation and Recovery
PIRA	Philippine Insurers and Reinsurers Association
RAY	Reconstruction Assistance on Yolanda
REFC	Rural Electrification Financing Corporation
SEC	Securities and Exchange Commission
UNISDR	United Nations International Strategy for Disaster Reduction

Chapter 1 Situation of the Energy Sector

1.1 Economic Conditions in the Philippines

1.1.1 Overview of the Macroeconomy in the Philippines

Despite some fluctuations right after the Lehman shock in 2009 and the rise in crude oil prices in 2011, the Philippine economy has been recording steady growth, achieving real GDP growth of 6.8% in 2012 and 7.2% in 2013.

Although the growth slowed down to 6.1% in 2014, the Philippines continues to maintain a relatively high economic growth rate compared to other ASEAN countries, with its per capita GDP reaching close to USD 3,000. However, the trade deficit has been remaining at high level. The unemployment rate of the Philippines continues to be the highest among the ASEAN countries; thus, job creation through industrial development is an important issue.

Table 1 Selected macroeconomic indicators

	2009	2010	2011	2012	2013
Real GDP growth rate (%)	1.1	7.6	3.9	6.8	7.2
Nominal GDP (in million US$)	168,335	199,591	224,095	250,240	272,067
GDP per capita (in US$)	1,851	2,155	2,379	2,612	2,790
CPI (%)	4.1	3.9	4.6	3.2	3.0
Unemployment rate (%)	7.5	7.4	7.0	7.0	7.1
Current Account (Balance of Payments, in million US$)	8,448	7,179	5,643	6,949	10,393
Trade Balance (Balance of Payments, in million US$)	-13,860	-16,859	-20,428	-18,926	-17,702
Foreign Reserve (in million US$)	38,783	55,363	67,290	73,478	75,689

(source) JETRO, NSCB, IMF, BSP

A major growth driver is private consumption, supported by the Philippine advantages in (1) demography (population of about 100 million with an average age of 23, implying a demographic dividend for at least the next 30 years), (2) remittances from Overseas Filipino Workers (about 10 million OFWs, with total remittance of USD 23 billion) and (3) IT/business process outsourcing industry (English speaking population who could engage in software development, etc.).

With continuing population growth, the importance of stable electric power supply is further increasing in order to support people's daily lives and industrial development in the Philippines.

1.1.2 Overview of the Philippine Banking System

There are four main categories in the Philippine banking system: (1) universal banks (ordinary commercial banking operations with authorization to engage in investment banking), (2) commercial banks, (3) thrift banks and (4) rural and cooperative banks. The universal banking

system (comprising 21 banks) accounts for 83% of the total assets of the Philippine banking system as a whole (as of the end of March 2012).

There are three categories (private banks, government banks and branches of foreign banks) in the universal banking system. Private banks account for about 70% of the total assets of the universal banking system. BDO Unibank, Metropolitan Bank & Trust Company and the Bank of the Philippine Islands are the three leading banks among 12 private banks, accounting for about 40% of total assets of the universal banking system. There are three government banks: the Land Bank of the Philippines, the Development Bank of the Philippines and Al-Amanah Islamic Investment Bank of the Philippines. The combined total assets of these government banks accounts for 16% of the total assets of the universal banking system.

Table 2 Philippine banking system classifications

Major Categories	Sub-categories	Features	No. of Banks
Universal banks	Private banks	Ordinary commercial banking operation authorized to engage in securities underwriting, stock trading and investment banking outside the financial sector.	12
	Government banks	Individually established for policy-based lending and other tasks.	3
	Foreign bank branches	Have many international business transactions. Active in investment banking, syndicated loans, currency exchange and financial derivatives.	6
			21
Commercial banks	Private banks	Have rights to same operations as universal banks, other than investment.	5
	Foreign bank subsidiaries	Have many international business transactions and lend at low interest rates.	2
	Foreign bank branches	Have many international business transactions and lend at low interest rates.	8
			15
Thrift banks		Accept small savings with retail savings products for individuals and offer low-interest retail loans for individuals and SMEs. Classified into savings and mortgage banks, security savings and loan associations, private development banks and microfinance savings banks.	69
Rural banks		Small and mid-sized banks which support agricultural development.	515
Cooperative banks		Banks managed by union members in shared workplaces in rural areas.	30

(Sources: Prepared based on Bangko Sentral ng Pilipinas website, etc.)

1.1.3 Overview of the Philippine Insurance Sector

There are currently 72 private non-life insurance firms, including one reinsurance firm, all of which are Philippine Insurers and Reinsurers Association (PIRA) members. As 70% of these are SMEs, the market scale is small at JPY 200 billion in local currency despite the high number of firms. Regarding the insurance products, fire and automotive insurance account for nearly 70% of all insurance. Products such as disaster insurance and personal accident insurance are not widespread or diversified due to the expensive premiums. Thus, Prudential Guarantee and Assurance Inc., Malayan and maybe one other major private non-life insurance firm might be the only ones that can handle sales of new disaster insurance products.

Given the lack of progress in new insurance product sales due to the prevalence of financially weak smaller insurance firms, the Insurance Commission (IC), which regulates and oversees the insurance sector under the Department of Finance (DOF), took steps to restructure the non-life insurance sector by increasing the minimum net assets of member companies to PHP 250 million (USD 5.5 million) in 2014. This has decreased PIRA membership from its peak at 80 companies, but the sector remains competitive to the point of excess. The IC plans to incrementally increase the minimum net assets up until 2022.

1.2 Current Situation of the Energy Sector in the Philippines

There are 16 private, investor-owned distribution utilities, such as Manila Electric Company (MERALCO), as well as 119 small-scale public power cooperatives referred to as electric cooperatives (ECs). Also, there are eight local government unit-owned utilities (LGUOUs) in remote areas. A summary of the ECs can be found in Table 3.

Table 3 EC general description

Outline	In 2013	In 2014
The number of ECs	119	119
Total number of customers in all ECs	9,923,725	10,636,110
Total sales in all ECs (GWh)	6,887	15,055
Total peak demand in all ECs (MW)	3,057	3,390
Total number of workers in all ECs	21,562	22,630
Average power loss (%)	Approx. 13 (In 2011)	11.61

(Source: NEA material)

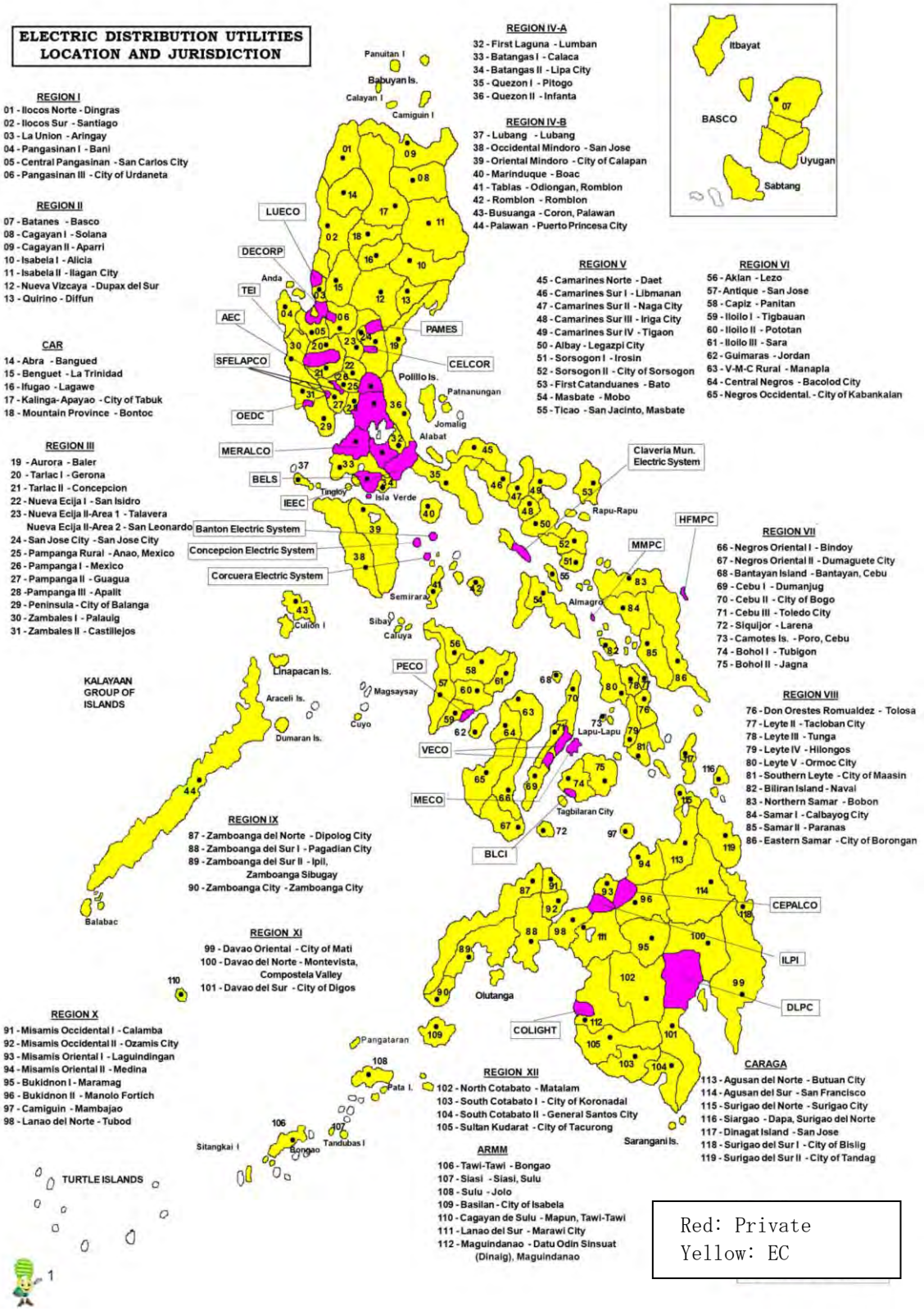

Figure 1 EC map

(Source: NEA material)

There are profitable power distribution utilities operating in urban areas that are owned by the public sector. Other areas are supplied by ECs under the management of the National Electrification Administration. ECs supply 90% of the country and 90% of their customers are residential. Distribution system losses were about 11.61% in 2014.

National Electrification Administration

The National Electrification Administration (NEA) was established in 1969 as a unit of the Department of Energy (DOE). Their goal is to increase electrification and their vision is to "energize the entire country by 2020". Additionally, NEA is responsible for supporting the ECs financially, institutionally and technically. They look to encourage competition for rural electrification and improve service quality.

1.3 Natural Disaster in the Philippines – Type and Impact

1.3.1 Type of Natural Disaster

The Philippines comprises 7,109 islands and is located on the Pacific Ring of Fire, along with Japan[1]. The country suffers from many natural disasters, including earthquakes, volcanic eruptions, and typhoons and accompanying flooding. The mountainous topography is vulnerable to flash floods and landslides, the detriment of which is exacerbated by a dense population. As a result, economic growth suffers. The "World Risk Index 2013", published by the World Bank, ranked the Philippines as the third most vulnerable to natural disasters among 173 countries worldwide.

According to the United Nations International Strategy for Disaster Reduction (UNISDR), from 1980 to 2010, disasters in the Philippines were most often caused by (1) storms followed by floods, (2) volcanic activity and (3) earthquakes. A total of 363 natural disasters occurred during this period, causing the loss of 32,956 lives and affecting 110 million people. There was also considerable damage to infrastructure (see Figure 2).

[1] Ministry of Foreign Affairs of Japan - http://www.mofa.go.jp/mofaj/area/philippines/

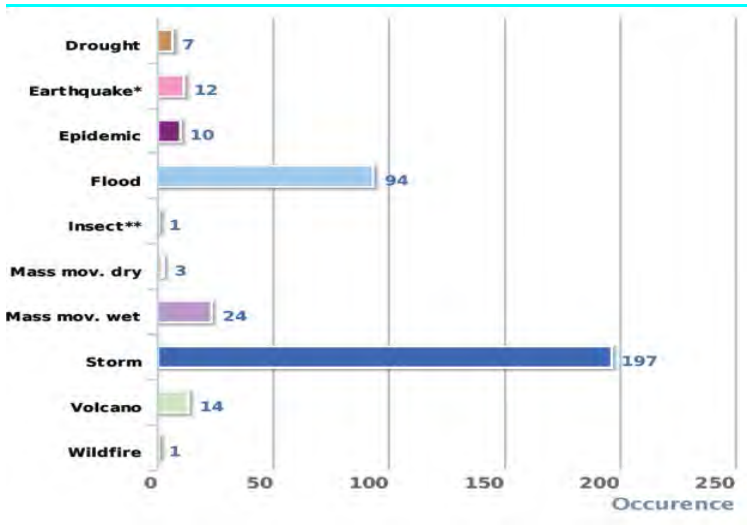

Figure 2 Occurrence of natural disasters in the Philippines 1980-2010

(Source: UNIDSR)

In the Philippines, strong typhoons cause damage over a wider area than floods, volcanic activity or earthquakes and occur much more often than earthquakes. Therefore, the following section will focus on tropical storms and typhoons (together hereinafter referred to as "typhoons").

Figure 3 shows the occurrence of typhoons in the Philippines from 1990 to 2014 and the number of people affected. It is based on data from the Center for Research on the Epidemiology of Disasters (CRED). While the occurrence of typhoons seems to have increased in recent years, the drastic increase in the number of people affected by typhoons may indicate an increase in intensity[2].

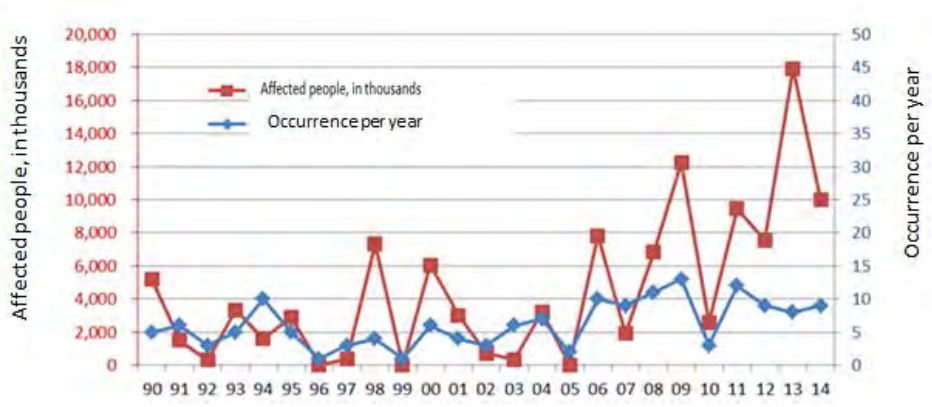

Figure 3 Typhoon prevalence and people affected per year (1990-2014)

(Source: EMDATA-CRED)

[2] Damage to the electric distribution network from typhoons should be categorized by the number of people affected rather than by the loss of life.

One disaster mitigation effort, the Philippine Disaster Risk Reduction and Management Act of 2010 (RA10121), enacted by the Philippine Government, creates an institutional framework for disaster risk management. The Act established the National Disaster Risk Reduction & Management Council (NDRRMC) and a National Disaster Risk Reduction and Management Plan (NDRRMP) – both of which serve as long-term measures to cope with disasters. The NDRRMP has four sections: (1) Disaster Prevention and Mitigation, (2) Disaster Preparedness, (3) Disaster Response and (4) Disaster Rehabilitation and Recovery. The plan has a comprehensive approach to reduce disaster risks and mitigate the impact of climate change. RA10121 is a noteworthy change to the disaster management policy of the Philippine Government, as they previously tended to focus on disaster response[3].

1.3.2 Damage to the Distribution Network after Typhoon Yolanda

In November 2013, Super Typhoon Yolanda (international name: Haiyan) hit the central Philippines and caused unprecedented damage to 14 regions and cities in the Visayan Islands. The result was a loss of more than 6,000 people, with 16 million people affected overall. This disaster also revealed the need to review the NDRRMP. The recovery effort included a government-developed framework called the Reconstruction Assistance on Yolanda (RAY). The government also created the Office of the Presidential Assistant for Rehabilitation and Recovery (OPARR) to assume an administrative role that reports directly to the president. To increase efficiency, the corresponding agencies at the local government level were re-organized to match that of OPARR. The function of OPARR has been transferred to the National Economic and Development Authority (NEDA).

Electrical distribution facilities are a critical part of the infrastructure, making it essential to have it restored early in any recovery process. According to a report from NEDA, damage to the electricity sector by Typhoon Yolanda was estimated at PHP 6,830 million, with that to the distribution system estimated at PHP 5,200 million[4]. This shows the great vulnerability of electrical distribution facilities to strong typhoons in the Philippines. A World Bank report issued in March 2014 suggested that priority should be placed on distribution networks to speed post-storm recovery.

The Philippine president's "Build Back Better" concept aims to reduce the vulnerability of the distribution system and create resilient communities[5]. The study team's discussion with NEA counterparts during its first visit confirmed that Build Back Better has been well received by NEA. Bearing this in mind, the study team will proceed with its distribution system research to bring this concept to reality.

[3] https://www.senate.gov.ph/publications/AAG%202013-04%20-%20Natural%20Disasters_final.pdf.
[4] http://www.gov.ph/2013/12/18/document-reconstruction-assistance-on-yolanda/.
[5] Typhoon Yolanda Ongoing Recovery – Recovery Framework Case Study, August 2014, Global Facility for Disaster Reduction and Recoveryetc.

Chapter 2 Current Condition of the Power Network in the Philippines

2.1 Response Organization at Disaster

2.1.1 DOE・NDRRMC-NEA-EC (Distribution Sector)

Figure 4 is a response organization structure of the distribution sector which shows the obligation and role of each organization at the time of a disaster.

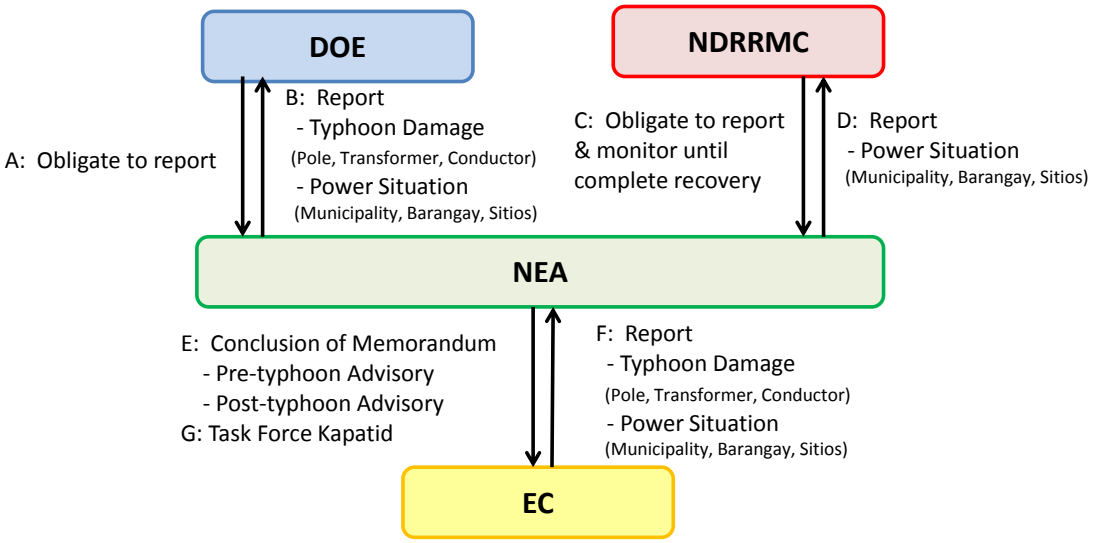

Figure 4 Disaster response organization

(Source: Created by the study team based on NEA material.)

A: DOE⇒NEA

- The DOE requires NEA to report on the situation.

B: NEA⇒DOE

- NEA is required to report the following:

  - Damage caused by a typhoon to distribution equipment, including poles, transformers and distribution lines (refer to Table 4)

  - The power production situation in the municipality / barangay / sitio (including data on how recovery is progressing in the municipality / barangay / sitio [refer to Table 5])

C: NDRRMC⇒NEA

- The NDRRMC requires NEA to follow the recovery and make regular reports until restoration is completed.

D: NEA⇒NDRRMC

- The content of NEA's power situation report to the NDRRMC is the same as the content

previously described for its reporting to the DOE, including the power situation in the municipality / barangay / sitio (Progress Data for the Number of Recovery Customers at Municipality / Barangay / Sitio).

E: NEA⇒EC

- ECs respond to average typhoons by conducting basic maintenance. However, they do not have a standard response to above-average typhoons. Instead, EC protocol is outlined in a memorandum between NEA and the ECs.
- An advisory is issued by NEA to the EC based on data of the weather bureau outlining needed preparation (e.g., inspection of the entire distribution system, organization of a Quick Response Team, maintenance of back-up generators etc.). The advisory also covers recovery (e.g., impact assessment, restoration of power in areas which were not affected by the typhoon etc.) (refer to Figure 5, Figure 6).

F: EC⇒NEA

- The content of the EC report to NEA includes overall damage and power status.
- The content covers distribution equipment (i.e., poles, transformers and distribution lines).
- The content of the EC power situation reports to NEA is the same as that described for the reporting on the power situation in the municipality / barangay / sitio (Progress Data for the Number of Recovery Customers at Municipality / Barangay / Sitio).

Table 4 Damage situation of poles in 3 main distribution facilities hit by Typhoon Yolanda (November 2013)

Poles, Transformers, and Conductors
Damaged by Super Typhoon Yolanda

			Poles															Total
			30 ft			35 ft			40 ft			45 ft			50 ft		55 ft	
			W	S	C	W	S	C	W	S	C	W	S	C	W	S	S	W,S,C
Reg.4B	1	BISELCO	108	40		83	97		80	75		30	9		12	30		564
	2	OMECO		55			110			30			4			2		201
	3	ORMECO		2			7						4			59	85	157
	4	TIELCO		37			19			2			4					62
	5	MARELCO	124			23			6									153
Reg.5	6	TISELCO		10														10
	7	MASELCO		196			256						8					460
Reg.6	8	AKELCO		795			3,367			623			112					4,897
	9	ANTECO		429			360			86			42					917
	10	CAPELCO		9,312			2,706			210			141					12,369
	11	ILECO I		90			73											163
	12	ILECO II					1,330			75								1,405
	13	ILECO III		1,787			604			105			58			8		2,562
	14	VRESCO		245			260			37			37					579
	15	CENECO			47		37			13							5	102
Reg.7	16	BANELCO																1,048
	17	CEBECO I		74			40			30			25			8		177
	18	CEBECO II																8,961
	19	PROSIELCO																
	20	CELCO																648
	21	BOHECO I																15
	22	BOHECO II					18			3								21
Reg.8	23	DORELCO																10,854
	24	LEYECO II			1,070		56	1,347			816			2,693				5,982
	25	LEYECO III		1,023			2,390		839									4,252
	26	LEYECO IV																724
	27	LEYECO V																11,143
	28	SOLECO		139			142			45								326
	29	BILECO																766
	30	NORSAMELCO		14			216			110			6					346
	31	SAMELCO I																1,872
	32	SAMELCO II																2,559
	33	ESAMELCO																3,433
TOTAL A (with estimates)			505	31,017	2,432	231	26,315	2,932	2,014	3,144	1,776	65	980	5,863	26	233	196	77,728
TOTAL B (used to make estimates)			232	14,248	1,117	106	12,088	1,347	925	1,444	816	30	450	2,693	12	107	90	35,705
percentage			0.65%	39.90%	3.13%	0.30%	33.86%	3.77%	2.59%	4.04%	2.29%	0.08%	1.26%	7.54%	0.03%	0.30%	0.25%	

(Source: NEA material)

Table 5 Power situation in municipality/barangay/sitio (Ruby: December 2014)

Province/Region	% Energized	EC	Towns/Cities			Barangays			Household Connections		
			Actual	W/ Power	Percent	Actual	W/ Power	Percent	Actual	W/ Power	Percent
Region IV-A	**100%**										
Batangas	100%	BATELEC I	12	12	100%	366	366	100%	156,280	156,280	100%
		BATELEC II	17	17	100%	482	482	100%	176,006	176,006	100%
Laguna	100%	FLECO	11	11	100%	164	164	100%	49,997	49,997	100%
Quezon	100%	QUEZELCO I	24	24	100%	817	817	100%	118,564	118,564	100%
		QUEZELCO II	8	8	100%	129	129	100%	18,353	18,353	100%
		SUB-TOTAL	**72**	**72**	**100%**	**1,958**	**1,958**	**100%**	**519,200**	**519,200**	**100%**
Region IV-B	**100%**										
Marinduque	100%	MARELCO	6	6	100%	218	218	100%	43,165	43,165	100%
Occidental Mindoro	100%	OMECO	9	9	100%	137	137	100%	59,956	59,956	100%
		LUBELCO	2	2	100%	25	25	100%	5,615	5,615	100%
Oriental Mindoro	100%	ORMECO	15	15	100%	426	426	100%	140,700	140,700	100%
Romblon	100%	ROMELCO	4	4	100%	66	66	100%	13,879	13,879	100%
		TIELCO	10	10	100%	112	112	100%	32,156	32,156	100%
Palawan	100%	BISELCO	4	4	100%	61	61	100%	10,662	10,662	100%
		PALECO	19	19	100%	370	370	100%	83,719	83,719	100%
		SUB-TOTAL	**69**	**69**	**100%**	**1,415**	**1,415**	**100%**	**389,852**	**389,852**	**100%**
Region V	**96%**										
Albay	94%	ALECO	18	17	94%	720	705	98%	223,891	219,839	98%
Camarines Norte	100%	CANORECO	12	12	100%	282	282	100%	83,587	83,587	100%
Camarines Sur	100%	CASURECO I	12	12	100%	309	309	100%	63,812	63,812	100%
		CASURECO II	10	10	100%	259	259	100%	88,813	88,813	100%
		CASURECO III	7	7	100%	229	229	100%	64,680	64,680	100%
		CASURECO IV	9	9	100%	258	258	100%	44,371	44,371	100%
Catanduanes	100%	FICELCO	11	11	100%	315	315	100%	44,094	44,094	100%
Masbate	79%	MASELCO	15	11	73%	435	316	73%	55,000	41,825	76%
		TISELCO	4	4	100%	72	72	100%	6,773	6,773	100%
Sorsogon	100%	SORECO I	8	8	100%	253	253	100%	50,402	50,402	100%
		SORECO II	7	7	100%	288	288	100%	70,715	70,715	100%
		SUB-TOTAL	**113**	**108**	**96%**	**3,420**	**3,286**	**96%**	**796,138**	**778,911**	**98%**

(Source: NEA material)

NATIONAL ELECTRIFICATION ADMINISTRATION
Republic of the Philippines
NEA Road, Diliman, Quezon City
Telefax No. (02) 926-13-17

FAX – Page 1 of 2

DATE / TIME : 03-31-2015 EO# 38-2015

FROM : NEA ADMINISTRATOR

TO : ALL LUZON ELECTRIC COOPERATIVES

ATTN : GENERAL MANAGERS

In connection with the expected coming of typhoon Chedeng which is forecasted to landfall in Luzon Island, you are hereby strongly advised to take the necessary contingency measures in order to avert any damage to the distribution facilities of ECs in franchise area. You are required to undertake the following:

A. Pre-Typhoon Advisory:

1. Prepare and implement contingency measures for the distribution system in order to ensure readiness;
2. Immediately conduct a thorough inspection of the entire distribution system and perform the necessary preventive maintenance, right-of way clearing and temporarily collapse power substation infrastructure which may be destroyed;
3. Determine inventory of materials and to pre-position them in strategic areas for immediate access;
4. Organize a skeletal force/personnel on a 24-hour basis as Quick Response Team for any line or equipment breakdown;
5. Assign a stationary lineman in every strategic area to render immediate response even to minor electrical troubles;
6. Maintain a back-up generator and adequate inventory of critical materials in strategic areas;
7. Report/coordinate all significant outages to NEA through the Monitoring Team; and
8. Coordinate with local officials and NGCP representatives for the harmonization and synchronization of contingency efforts;

Prepared by:
FERDINAND P. VILLAREAL
Acting Director for Engineering

Approved by:
EDGARDO R. PIAMONTE
Deputy Administrator for EDUS

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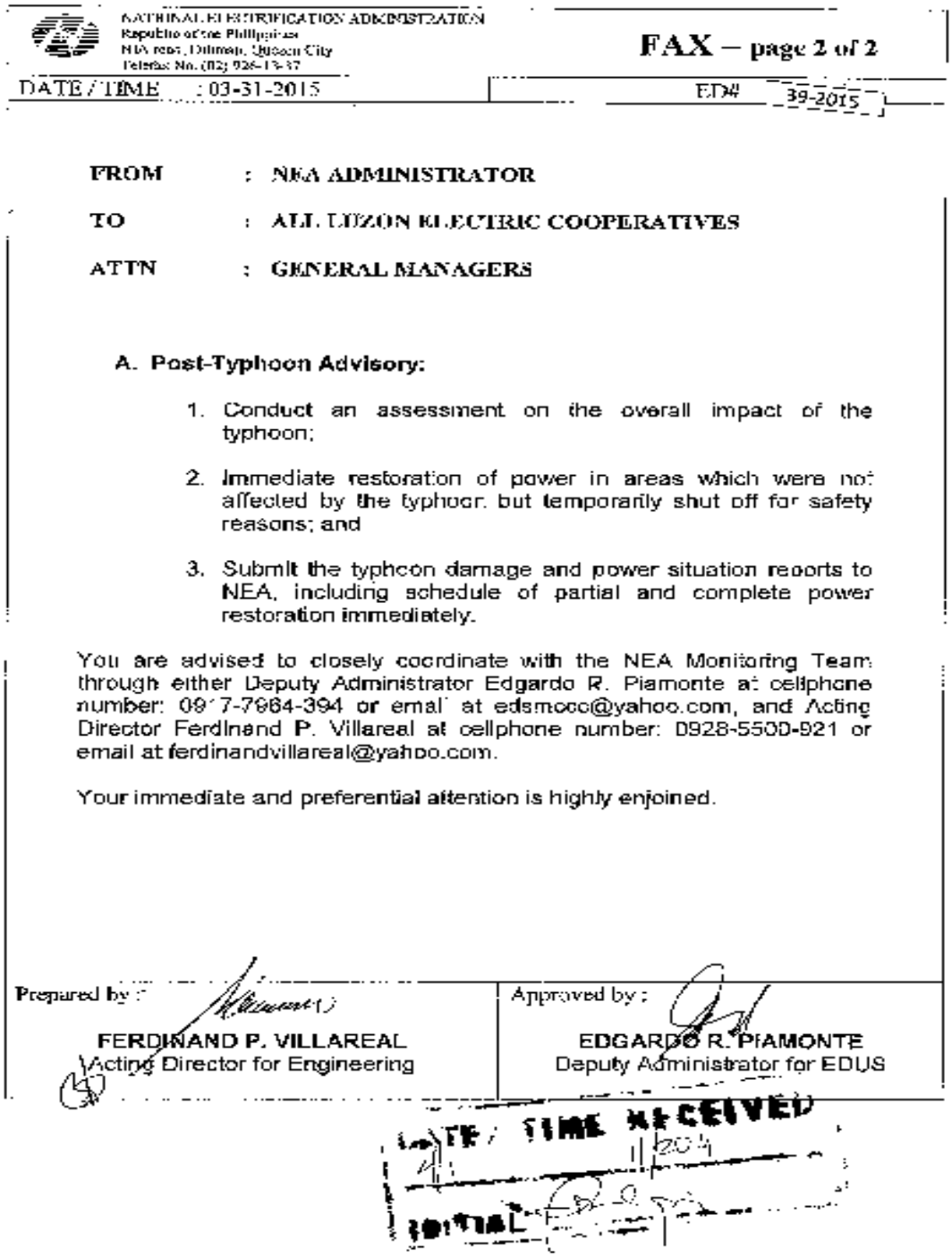
Figure 5 Pre-typhoon advisory

(Source: NEA material)



NATIONAL ELECTRIFICATION ADMINISTRATION
Republic of the Philippines
NIA road, Diliman, Quezon City
Telefax No. (02) 926-13-37

FAX – page 2 of 2

DATE / TIME : 03-31-2015

EDM 39-2015

FROM : NEA ADMINISTRATOR

TO : ALL LUZON ELECTRIC COOPERATIVES

ATTN : GENERAL MANAGERS

A. Post-Typhoon Advisory:

1. Conduct an assessment on the overall impact of the typhoon;
2. Immediate restoration of power in areas which were not affected by the typhoon but temporarily shut off for safety reasons; and
3. Submit the typhoon damage and power situation reports to NEA, including schedule of partial and complete power restoration immediately.

You are advised to closely coordinate with the NEA Monitoring Team through either Deputy Administrator Edgardo R. Piamonte at cellphone number: 0917-7664-394 or email at edsmoco@yahoo.com, and Acting Director Ferdinand P. Villareal at cellphone number: 0928-5500-921 or email at ferdinandvillareal@yahoo.com.

Your immediate and preferential attention is highly enjoined.

Prepared by :

FERDINAND P. VILLAREAL
Acting Director for Engineering

Approved by :

EDGARDO R. PIAMONTE
Deputy Administrator for EDUS

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Figure 6 Post-typhoon advisory

(Source: NEA material)

2.1.2 NEA-EC (Task Force Kapatid [TFK])

As "G" in Figure 4 describes, "Task Force Kapatid (TFK)" is the cooperative structure for restoration work between NEA and ECs. TFK is a temporary entity that supports EC restoration work and is based on NEA direction. It is dissolved after its work has been completed.

TFK is established at the head office of NEA based on weather reports and damage forecasts. NEA does not have a specific standard for establishment of TFK. NEA staffs are dispatched to ECs when TFKs are formed. As "C" in Figure 4 describes, the role of NEA includes providing restoration progress reports to NDRRMC up until restoration is complete. NEA staffs strive to clearly understand the situation they are facing.

TFK is operated efficiently, according to NEA's accumulated experience. However, there are some issues to overcome. For example, EC equipment costs are covered by NEA after the completion of restoration work. However, EC staffs' dispatch costs (e.g., travel and labor costs) to neighboring ECs are not covered by NEA. This could be an area for TFK improvement of TFK.

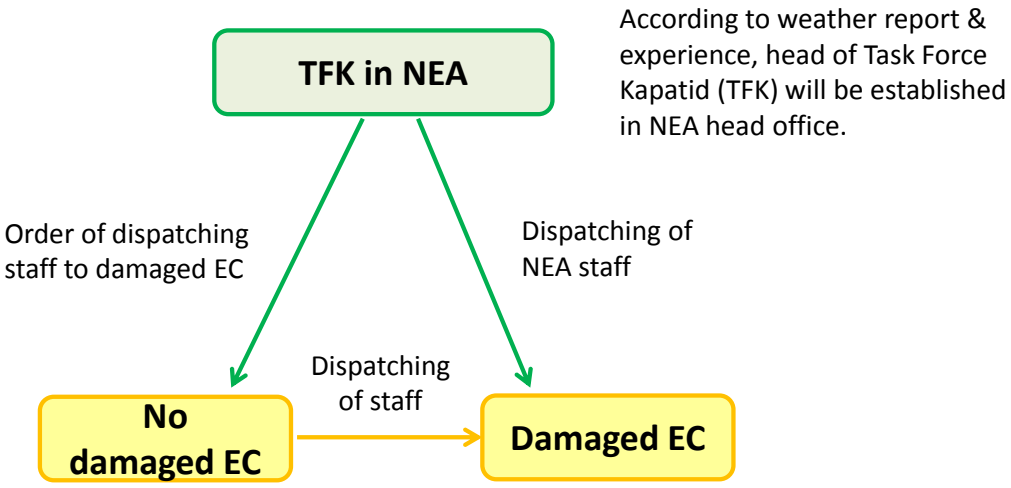


Figure 7 Outline of TFK

(Source: created by the study team based on NEA material.)

2.2 EC Damage and Response Status Information Gathering

2.2.1 Damage Situation

In addition to natural disasters attributable to seismic and volcanic activity, the Philippines frequently suffers from severe storms and surges. Table 6 shows ECs sustaining considerable damage following the Bohol Earthquake in October 2013 and Typhoon Yolanda in November 2013. Typhoon Yolanda prompted the first systematic study of EC damage. Of course, ECs had submitted damage reports to NEA before Typhoon Yolanda; however, the information had never gone past NEA. Study of the damage situation was conducted for Typhoon Ruby in December

2014 after Typhoon Yolanda.

Table 7 shows a summary of pole, transformer and distribution line damage in ECs after Typhoon Yolanda. This table was created by NEA based on the ECs' status reports, which are required by NEA. Though each distribution facility has several segments, each segment's damage is described in detail, making the situation easily understood. NEA reports the damage summary to the DOE.

Table 6 ECs extensively damaged by Bohol Earthquake and Typhoon Yolanda

Heavily damaged ECs	Region 6 Panay	Region 7 Cebu/ Bohol	Region 8 Samar	Region 8 Leyte
Typhoon Yolanda	ILECO3, AKELCO, CAPELCO	CEBECO123, BANELCO	VRESCO, CELCO, BILEOC, ESAMELCO, NORSAMELCO, SAMELCO2	BISELCO, DORELCO, LEYCO2345
Earthquake in Bohol	NORECO2, ILECO1, ILECO2, ANTECO, CAPELCO	BOHECO1, BOLECO2	ESAMELCO, NORSAMELCO, SAMELCO2, SAMELCO1	LEYCO2345, SOLECO

(Source: NEA material)

Table 7 Summary table of damage situation in 3 main distribution facilities (poles, transformers, distribution lines) in EC damaged by Typhoon Yolanda

Cost Estimate for Poles, Transformers, & Conductors
Damaged by Super Typhoon Yolanda

DESCRIPTION	UNIT COST	QTY.	EXTENDED COST
Conductor, Bare, ACSR #1, AWG 6/1 (Meters)	35.00	10,650	372,750.00
Conductor, Bare, ACSR #2, AWG 6/1 (Meters)	21.32	1,962,360	41,837,515.20
Conductor, Bare, ACSR #1/0, AWG 6/1 (Meters)	30.14	452,220	13,629,910.80
Conductor, Bare, ACSR #2/0, AWG 6/1 (Meters)	38.68	196,590	7,604,101.20
Conductor, Bare, ACSR #3/0, AWG 6/1 (Meters)	41.83	283,000	11,837,890.00
Conductor, Bare, ACSR #4/0, AWG 6/1 (Meters)	61.65	720,000	44,388,000.00
Conductor, Insulated, ACSR #1, AWG 6/1 (Meters)	45.00	5,061,290	227,758,050.00
Conductor, Insulated, ACSR #1/0, AWG 6/1 (Meters)	49.10	149,650	7,347,815.00
Conductor, Duplex, #2, AWG 6/1 (Meters)	41.58	294,990	12,265,684.20
Conductor, Duplex, #4 AWG (Meters)	56.00	270	15,120.00
Conductor, Duplex, #6 AWG (Meters)	20.77	4,526,550	94,016,443.50
Transformer, Pole Type, Conventional, 5 KVA	31,000.00	6	186,000.00
Transformer, Pole Type, Conventional, 10 KVA	48,430.00	1,174	56,856,820.00
Transformer, Pole Type, Conventional, 15 KVA	59,638.33	1,789	106,692,972.37
Transformer, Pole Type, Conventional, 25 KVA	77,380.00	3,212	248,544,560.00
Transformer, Pole Type, Conventional, 37.5 KVA	94,467.00	914	86,342,838.00
Transformer, Pole Type, Conventional, 50 KVA	110,435.00	962	106,238,470.00
Transformer, Pole Type, Conventional, 75 KVA	139,726.19	360	50,301,428.40
Transformer, Pole Type, Conventional, 100 KVA	156,236.34	223	34,840,703.82
Transformer, Pole Type, Conventional, 167KVA	215,200.00	24	5,164,800.00
Pole, Concrete, 30'	10,288.00	2,342	24,094,496.00
Pole, Steel, 30', Standard	10,204.05	31,017	316,499,018.85
Pole, Wood, 30', Standard	11,341.94	505	5,727,679.70
Pole, Concrete, 35'	12,303.89	2,932	36,075,005.48
Pole, Steel, 35', Standard	12,716.92	26,315	334,645,749.80
Pole, Wood, 35', Standard	12,792.84	231	2,955,146.04
Pole, Concrete, 40'	19,622.00	1,776	34,848,672.00
Pole, Steel, 40', Standard	17,395.25	3,144	54,690,666.00
Pole, Wood, 40', Standard	17,491.41	2,014	35,227,699.74
Pole, Concrete, 45'	20,420.75	5,863	119,726,857.25
Pole, Steel, 45', Standard	22,272.23	980	21,826,780.50
Pole, Wood, 45', Standard	18,387.20	65	1,195,168.00
Pole, Steel, 50', Standard	27,149.20	233	6,325,763.60
Pole, Wood, 50', Standard	26,843.44	26	697,929.44
Pole, Steel, 55', Standard	45,798.50	196	8,976,506.00
	TOTAL		1,496,835,387.34

Prepared by:	Noted by:	Noted by:
REXON M. ARGANA Engineer A	ANTONIO D. CORTES Principal Engineer A	FERDINAND P. VILLAREAL Acting Director, Engineering Department

(Source: NEA material)

2.2.2 EC Response Protocol

Most ECs do not have natural disaster contingency plans. They respond to natural disasters with basic countermeasures, including restoration work. In some cases restoration work is temporary or otherwise insufficient, leading to further problems. These problems can arise from a shortage of funds as well as a lack of technical information. Accordingly, it could be useful to support the creation of documentation for such work.

On the other hand, ECs that were heavily affected by Typhoon Yolanda are developing contingency plans and focusing on pre- and post-disaster countermeasures. For example, Table 8 shows the contingency plan of Cebu II Electric Cooperative, Inc. (CEBECO2). However, this plan describes superficial tasks, such as prior confirmation of tool and vehicle inventory checks as well as post-typhoon confirmation of damage and the accessibility of roads, and may not provide enough information on proactive steps to produce the benefits that CEBECO2 intends it to engender. Additionally, for a contingency plan to be effective, details on matters such as spare equipment placement, food stores and accommodation for EC restoration workers need to be determined in advance. Repeated training for staff to manage a wide variety of circumstances would also be useful.

Regarding mutual support among the ECs, no agreements exist and no storm-afflicted EC has ever requested support from another EC. This is because TFK is seen as the mechanism to manage such support.

Table 8 Contingency plan of CEBECO2

CEBU II ELECTRIC COOPERATIVE, INC.
Malingin, Bogo, Cebu
Tel./FAX: (032)251-2154
Islaphone No.: (032)434-8555

TYPHOON CONTINGENCY MEASURES

GENERAL GUIDELINES

A. PREPARATORY STEPS:
1. Conduct Inventory of Tools, Equipment, Vehicle, Materials, and Manpower Resources.
2. Procure necessary Tools, Materials, and Equipment.
3. Secure Bank Credit Lines.
4. Conduct Check-up and Conditioning of all Usable Vehicles.
5. Conduct Check-up and Conditioning of Power Generating Units.
6. Orientation of Family Members, Employees, Community Electricians, and Members of the Board.
7. Scout for possible areas to serve as Relay Station Site.
8. Prepare Updated System Maps of each Municipality [Three (3) Blue Print copies each].
9. Prepare Power Transfer Scheme.
10. Conduct a Refresher Course for Lineman assigned as Meter Readers or Service Linemen.

B. DIRECT HIT EXPECTED IN 48 HOURS. Exercise the following Preparatory Measures 24 to 48 hours before the typhoon is expected to strike:
1. Prepare Needs of Family Members.
2. Withdraw Buffer Funds.
3. Stock Food, Medicines, Fuel, and other necessities.
4. Recall all employees on Vacation Leave.
5. Conduct Final Briefing of Contingency Plan.
6. Prepare Documents necessary for Release of Tools and Equipment.
7. Distribute Damage Survey Sheets to assigned personnel.
8. Know your Specific Assignments.
9. Double Manpower in Action Centers and assign personnel to man offices round the clock.
10. Monitor Typhoon Path and Strength.

C. DURING TYPHOON.
1. Stay at Home and Secure Safety of Family Members.
2. If on Duty, monitor instructions from Main Office and secure your own safety.
3. Let the Typhoon pass.

D. POST TYPHOON ACTIVITIES.
1. Report for Duty at respective offices immediately after typhoon has cleared.
2. Conduct Survey of Line Damages and Road Accessibility.
   a. Refer to Personnel Assignment on Routes and Vehicles.
   b. Submit Partial Reports for Substation Status and Backbone Line Damages within 3 hours after mobilization
   c. Content of Line Damage Report:
      i. Location and Brief Description of Damage (indicate landmarks)

ii. Pole Height and Class
iii. Type of Structure
iv. Transformer Rating

d. Indicate the following in the Road Accessibility Report:
   i. Location and Status of Bridges
   ii. Location of Obstacles such as Fallen Trees, Pole and Cables lying on roadways

3. For Substation Tenders, isolate substation from 69 KV line by opening the Disconnect or Air Break Switch.
4. Submit Complete Survey Report to Main Office within 8 hours.

E. REHABILITATION

1. The Chief Engineer shall be Chief of Operations.
2. Engineering Supervisors shall supervise, support, monitor, and coordinate all activities in their assigned areas.
3. Hire Contract Workers for additional Manpower (to act as ground-man, Hole Digger, Logistics Support).
4. Organized the barangay electrician to work on the service drops and for the house inspection to be ready to receive power
5. Refer to Crew Assignment and give assignments to newly-hired personnel.
6. Clearing of Roadways shall be done in coordination with DPWH and DENR personnel of local government units. This is to ease access to affected areas.
7. Order of Priority for Restoration of Power:
   a. Backbone Lines and Substations
   b. Communication Facilities (Repeaters and Relay Stations)
   c. Evacuation Centers (possibly Schools and Hospitals)
   d. Water Systems
   e. Offices and Action Centers
   f. Municipal Buildings
   g. Radio Installations (Bantay Radio, DYCM, etc.)
   h. Major Industrial Loads
   i. Municipal Poblacions
   j. Barangays along Backbone Routes
   k. Other Commercial and Industrial Loads
   l. Interior Barangays
   m. Other Laterals
8. Repair must conform to Safety and Clearance Standards.

F. RESTORATION OF COMMUNICATION NETWORK

1. The following Repeater and Base Stations must be operational within 24 hours:
   a. Binabag Repeater Bogo
   b. Tominjao Repeater, Tuburan
   c. Manghilao Repeater, Danao City
   d. Danao Sub-Office Base Station
   e. Bogo Main Office Base Station
   f. Tuburan Sub-Office Base Station
2. Alternative Repeater sites are Bontilao, Sogod and Poblacion, Tabuelan.
3. Bring the following logistics that would last for about three (3) days:
   a. Power Supply: Battery Back-up, 12V, 21 Plates
   b. Spare Antenna
   c. Flashlight
   d. Fully charged Handheld Radio with spare Battery Pack
   e. Food and Clothing

4. Reinforcements shall be provided whenever required until Repeater Station is fully rehabilitated and Electric Power Supply is restored.
5. IMPORTANT: When Battery Power is still in use, it is imperative that transmissions must be Concise and Precise to avoid draining the power supply.
6. See separate sheet for Personnel assignments.

G. POLE DELIVERY.
1. Manpower for delivery of poles shall be on contract basis. The number shall depend on how many teams will be organized. One team shall comprise: 1 vehicle, 1 team leader, 1 driver, and 15 laborers.

H. REPORTING.
1. Report all accomplishments to Bogo Main Office daily so that progress of rehabilitation shall be monitored.
2. Area Engineers must follow one format for the rehabilitation monitoring and reporting
3. Area Engineers must update daily their accomplishment and submit to the over-all coordinators.

Prepared by:

BRYAN G. RAZA
NSD Manager

(Source: CEBECO2 material)

2.3 ECs' Capital Investment Plans

ECs have to prepare their respective CAPEX plans and submit them to the Energy Regulatory Commission (ERC) for approval prior to their implementation. The CAPEX plan is reviewed by the ERC according to the following five criteria, listed in order of priority: (1) capacity, (2) safety, (3) power quality, (4) system loss reduction and (5) reliability[6].

The following table shows the aggregate data of ECs' CAPEX plans for 2015-2019, compiled by NEA[7]. According to this table, the total estimated annual investment amount is decreasing year by year, but this may be because the investment plans for the immediate future are firm, whereas those for later years have not been well examined yet. The total amount of investment for 2015 is about PHP 29.6 billion, but it is necessary to note that this amount includes the plans that have not been approved by the ERC yet. While preparing CAPEX plans, the ECs need to consider well how to finance their implementation.

Table 9 ECs' CAPEX plans (2015-2019)

(Unit: PHP 1,000)

CAPITAL PROJECTS FUNDING REQUIREMENTS (P'000)	GRAND TOTAL (NATIONAL)				
	2015	2016	2017	2018	2019
A. NETWORK ASSET					
RURAL ELECTRIFICATION					
Subsidy Expansion Network 13.2 kV	**6,943,950**	**5,354,552**	**209,714**	**38,211**	
Sitio	6,123,349	4,548,401	101,614	38,211	
Line Enhancement	820,601	806,151	108,100		
Non Subsidy Expansion Network 13.2 kV	**232,558**	**317,084**	**109,944**	**10,500**	
Distribution Line Extension (based on energized brgys/sitios)	40,915				
Dedicated Circuit (for Large Load or any)	35,929	14,420	9,944	10,500	
Submarine Cable	145,215	242,974	100,000		
Underground Circuit	10,500	59,691			
Land Rights					
Off Grid System (Renewable Projects)	**442,670**	**488,540**	**1,044,667**	**764,667**	**64,667**
Solar System	20,000	1,000			
Gen Set		200,000			
Micro/Mini Hydro Plant	105,670	288,540	1,044,667	764,667	64,667
Wind Power					
Bio Mass	317,000				
Ocean Power					
Consumer Connection					
New Connection (Subsidy)	**563,161**	**486,556**	**9,889**	**2,227**	
Metering Equipment	398,744	321,272	9,121	1,392	
Service Drop	164,417	165,285	768	835	
Add Ons Consumer (Non Subsidy - Other CAPEX Requirements)	**1,720,959**	**1,523,745**	**1,193,992**	**1,078,479**	**991,106**
Metering Equipment	601,744	584,584	496,466	427,401	400,407
Service Drop	261,479	199,470	143,816	143,904	138,501
Distribution Transformer	536,979	483,584	367,890	362,381	320,240
Primary and Secondary Line Expansion	320,757	256,106	185,820	144,793	131,959

[6] Interview with ERC (in July 2015).

[7] However, it is necessary to note that the amount includes the plans that have not been approved by the ERC yet, as it takes a long time to receive the ERC's approval. Currently JICA is providing technical assistance for the ERC to streamline its approval process.

CAPITAL PROJECTS FUNDING REQUIREMENTS (P'000)	GRAND TOTAL (NATIONAL)				
	2015	2016	2017	2018	2019
SUBTRANSMISSION DEVELOPMENT	**3,713,622**	**2,523,376**	**911,777**	**884,838**	**109,158**
69kV Sub-Transmission Line	1,953,808	1,276,989	600,737	593,977	100,646
Rehab 69kV Sub-Transmission Line	111,089	87,326	52,571	11,540	8,512
Acquisition of 69kV from NGCP	575,972	609,611	20,621	44,800	
Looping of 69 kV	1,072,753	549,450	237,849	234,521	
Installation of Sub Trans with more than 69 kV					
SUBSTATION PROJECTS	**2,474,597**	**1,477,429**	**719,169**	**260,591**	**147,015**
Substation	1,991,612	1,317,088	630,092	247,091	124,848
Rehab / Upgrading of S/S	482,985	160,341	89,077	13,500	22,166
Power Transformer rated @ more than 69/13.2 kV					
DISTRIBUTION PROJECTS	**1,145,652**	**619,452**	**401,036**	**134,376**	**87,575**
System Configuration / Rehab / Revamp	254,437	205,127	128,363	61,862	40,441
Looping of Distribution Line 13.2 kV	195,220	125,159	56,153	14,293	5,118
Capacity Projects (e.g. Overloaded DTs)	580,228	193,665	168,130	29,627	11,828
Uprating/Conversion of Voltage Level in Distribution System	115,767	95,501	48,390	28,594	30,188
System Reliability	**1,399,053**	**828,010**	**344,244**	**187,035**	**366,539**
System Loss Reduction	**1,726,804**	**1,238,761**	**624,287**	**296,690**	**225,194**
Power Quality	**915,801**	**841,504**	**433,803**	**263,397**	**133,436**
Safety and Consumer Protection	**992,288**	**635,786**	**333,606**	**130,109**	**60,646**
CONTINGENCY PROJECT (Calamity Affected Asset System)	**2,199,566**	**1,300,111**	**668,184**	**656,870**	**603,008**
B.NON - NETWORK ASSET					
Property	**1,428,802**	**671,099**	**206,046**	**34,224**	**56,178**
Land and Land Rights	247,969	126,870	21,318	10,500	17,825
Building and Improvement	1,180,832	544,229	184,729	23,724	38,353
Equipment	**3,630,618**	**1,903,550**	**890,341**	**519,894**	**339,768**
Office Furniture and Equipment	231,785	117,012	39,958	50,747	45,154
Transportation Equipment	1,186,183	611,242	300,522	188,698	116,722
Store Equipment	212,831	156,982	87,443	96,387	62,795
Power Operated Equipment	82,150	17,433	39,547	35	3,609
Logistical I.T. Equipment	1,107,274	531,474	262,125	106,549	59,317
Tools Shop, Safety Gadgets and Garage	446,913	262,791	78,510	52,071	34,381
Laboratory Equipment	363,482	206,617	82,235	25,407	17,791
OTHER NETWORK ASSET	**30,543**	**9,615**	**8,482**	**3,080**	**1,041**
WESM Requirement	30,543	9,615	8,482	3,080	1,041
Logistical I.T. Equipment					
GRAND - TOTAL	**29,560,643**	**20,220,172**	**8,109,179**	**5,265,187**	**3,185,330**

Source: NEA

2.4 Financing of ECs

2.4.1 NEA Lending Program

NEA has been providing not only technical assistance but also financial assistance to ECs—for example, loans for facility expansion. NEA's financial assistance includes loan programs for rural electrification, acquisition of 69kV lines from the National Transmission Corporation (TransCo)/the National Grid Corporation of the Philippines (NGCP), procurement of facilities or rehabilitation/upgrade projects, achievement of single-digit system loss, settlement of accounts with power generation companies (GenCos) and the Wholesale Electricity Spot Market (WESM) and so forth. The objective, overview and current status of NEA's lending program are as follows.

(Objective of NEA's lending program)

The objective of NEA's lending program, according to its "Loan Policies: Selected Policies from the Loan Policy Handbook", is as follows.

1. To attain financial stability for NEA by applying the appropriate pricing mechanisms
2. To assure a readily available source of funding to meet the financial requirements of qualified ECs
3. To manage a loan portfolio that will address NEA's investment planning thrust of (1) rehabilitation/upgrading projects, (2) add-on projects, and (3) systems expansions
4. To ensure the continued financial viability of the Rural Electrification Program through timely infusion of emergency and other loans to ECs and other borrowers when deemed appropriate, while simultaneously exercising rigorous supervision over delinquent and failing ECs

(Overview of NEA's lending operations)

The following tables show types and conditions of NEA loans. If revision of the lending interest rates is needed, the Financial Services Department (FSD) and Accounts Management & Guarantee Department (AMGD) prepare a draft revision for approval by the Board. Considerations when preparing draft revisions include (1) operating expense of NEA, (2) allowance for doubtful debts and (3) cost of funds based on collection rates from ECs, and trends of the lending rates of commercial banks.

Table 10 Types of NEA loans

	Maturity period	Grace period
Long-term loans	More than 5 years	1 year
Medium-term loans	2 years and a day up to 5 years	1 year
Short-term loans	2 years	none

(Source: NEA)

Table 11 NEA lending program interest rates

Classification of loans	Maturity period or funding source	Interest rate per annum
Regular loans	2 years and below	6%
	3-15 years	6.5%
Concessional loans	Subsidy-funded	1.5%
	NEA Internally Generated Fund	3.5%
Calamity loans	Subsidy-funded	3%
	NEA Internally Generated Fund	Lower by 50% the prevailing NEA lending rate

(Source: NEA)

NEA's major lending programs are summarized in the following table. Among them, "Single-Digit System Loss," "Concessional Loan" and "Calamity Loan" are the programs supporting EC capital projects.

Table 12 NEA's major lending programs

Program	Purpose	Amount
Stand-by Credit Facility for ECs Power Accounts with GenCos and Market Operator	To strengthen ECs creditworthiness with the GenCos and Market Operator	One month average power bill
Short-Term Credit Facility	To finance ECs monthly cash shortfalls on the settlement of power accounts with the GenCo and NGCP	Max. 50M PhP
Rural Electrification Loan: Working Capital	To help the ECs comply with the prudential requirement and security payment with WESM, assigned TSCs and bilateral contracts with GenCos/IPPs; and for the timely payment of power account	One month average power bill
Single-Digit System Loss Loan	To assist the ECs in the reduction of the national average system loss	Max. 12M PhP
Concessional Loan (for ECs in ARMM and off-grid islands and other critically situated ECs)	To help finance the implementation of programs on expansion, rehabilitation, structural and other reforms in order to comply, operate and compete in the deregulated electricity market and provide quality electric service to member consumers	
Calamity Loan	For the repair of damaged distribution lines and restoration of power in the coverage areas caused by typhoons and other calamities	Evaluated cost, subject to availability of fund

(Source: NEA)

(Current status of NEA's loan provision to ECs)

The following table shows the actual loan releases from NEA to ECs in recent years. Capital projects (including calamity loans) had been accounting for about 50% of the total amount for respective years until 2012. However, since 2013 the share of capital projects has been growing

as a result of increase in calamity loans for restoration after calamities such as Typhoon Yolanda and in 2014 it reached about 80% of the total amount (of which, calamity loans accounted for about 30%).

Table 13 NEA's loan releases to ECs

(Amount Unit: PHP million)

		2010	2011	2012	2013	2014
Short-Term Credit Facility (ave.)	Amount	465	343	163	206	203
	No. of ECs	21	13	9	8	8
Stand-by Credit (ave.)	Amount	105	121	206	59	43
	No. of ECs	4	6	9	3	2
Capital Projects	Amount	727	712	838	1,552	1,078
	No. of ECs	42	33	30	45	28
Modular Generator Sets	Amount					149
	No. of ECs					3
Working Capital	Amount	222	219	442	866	232
	No. of ECs	13	12	14	21	12
Calamity Loans	Amount					829
	No. of ECs					31
Total Releases	Amount	1,519	1,395	1,649	2,683	2,534

(Source: NEA)

Note. Calamity Loans for the years 2010, 2011, 2012 and 2013 are included in Capital Projects.

NEA's loan program is meeting only about 10% of the capital requirement of the ECs, as shown in the following table of ECs' CAPEX funding requirements and NEA's CAPEX loan releases. However, it is necessary to take into account that the ECs' CAPEX funding requirements are not based on ERC approvals and include capital investment amounts that are not being implemented. Even though the share of NEA's lending is actually bigger than is indicated by the table, due to the above-mentioned reason, it is inferred that its capacity to meet the CAPEX funding requirements of ECs is still limited, because its loan program depends mainly on the NEA's internally generated fund (hereinafter referred to as IGF).

Table 14 ECs' CAPEX funding requirements and CAPEX loan releases by NEA

(Unit: PHP million)

Year	Funding requirements of ECs	Loan releases by NEA	%
2010	10,441	727	7%
2011	11,598	712	6%
2012	15,017	838	6%
2013	11,307	1,552	14%
2014	20,967	2,056	10%

(Sources: Prepared from NEA "NEA Achievements & Next Phases of Countrywide Electrification Program" (2014/8/6) and information provided by NEA)

When an EC wants a term loan from a financial institution (such as a government-owned bank or private commercial bank), it needs to obtain NEA approval (though it is not necessary in the case of borrowing working capital). An interview with NEA revealed that there is no eligibility requirement related to the rating of EC's performance in order to get its approval to borrow from a commercial bank. However, in the case of the guarantee program of LGU Guarantee Corporation (LGUGC), only ECs with NEA's Key Performance Standards (KPS) ratings of higher than B are considered eligible (details of LGUGC's guarantee program are explained in the next section).

The study team inquired whether NEA has information about the composition of ECs' financing sources (including the amounts that ECs are borrowing from NEA and from financial institutions, with and without the LGUGC guarantee respectively), and found out that such data were not available yet[8]. According to study team estimates, base on limited available data, it seems that borrowings from NEA and from commercial banks with the LGUGC guarantee account for about 50% and 10%, respectively, of the ECs' total loan outstanding; thus, the remaining 40% is inferred to be borrowings from financial institutions without the LGUGC guarantee[9].

2.4.2 Financial Guarantee Program by LGUGC

LGUGC was incorporated in 1998 with the primary mandate of granting local government units (LGUs) and companies owned by LGUs access to private sources of capital by providing credit enhancement with respect to their debts, including both bank loans and bonds. LGUGC is the first private corporation to go into the financial guarantee business in the Philippines. LGUGC has since extended its financial guarantee not only to ECs but also to water districts, state

[8] NEA was about to start collecting such information.

[9] The study team conducted the estimate based on ECs' balance sheets available at the NEA website, the amount of loan outstanding and the loan outstanding of the LGUGC guarantee program (all data are as of Dec. 2014) that were provided by NEA. However, there were some inconsistencies found between the NEA loan outstanding shown in the balance sheet and that provided by NEA; thus, the study team conducted this estimation to be used as just a reference in order to grasp the rough image of ECs' financing structure.

universities and colleges, and renewable energy projects. LGUGC's stockholders are the Bankers Association of the Philippines and the Development Bank of the Philippines (DBP), and its stockholders' equity amounts to PHP501 million as of December 2013. The Asian Development Bank (ADB) was also one of the stockholders, but in December 2013 it exercised its option to redeem its shares under the agreement with LGUGC since ADB believed its development objective had been achieved. LGUGC's issuer credit rating from the Philippine Rating Services Corporation is PRS Aa plus (corp.), which enables the risk weight of LGUGC's guaranteed debts to be reduced to 20%.

Japan Bank for International Cooperation, the United States Agency for International Development (USAID) and DBP had a pilot financing scheme for water projects with LGUGC, referred to as the "Municipal Water Loan Financing Initiative". In this initiative, JICA provided official development assistance (ODA) loans through DBP, while LGUGC and USAID guaranteed loans from commercial banks, and thus the scheme combined ODA lending with commercial bank financing with financial guarantee. The Metro Iloilo Water District was assisted in its financing under this program in 2006.

As for LGUGC's support to ECs, the World Bank, with the full backing of the Department of Energy (DOE), tapped LGUGC as its program manager for the USD 10 million system loss reduction project of the Electric Cooperative Partial Credit Guarantee (ECPCG) program in 2004, and LGUGC has operated this program since then. As of March 2015, the outstanding principal of LGUGC's guaranteed loans is PHP 1,992 million, including unused amounts under the commitment lines. Six banks (DBP as well as Security Bank, Bank of the Philippine Islands, United Coconut Planters Bank, Allied Bank, and Philippine National Bank) have extended loans to 19 ECs under this program. According to LGUGC, there has been no default or execution of guarantee for the loans under this program, and the original capital of USD 10 million has now increased to USD 16 million. The following chart shows terms and conditions of LGUGC's financial guarantee under this program.

Table 15 ECPCG indicative terms and conditions

Eligible borrowers	✓ Creditworthy ECs ✓ Duly registered with the NEA or the CDA ✓ Have ERC-approved capital investment proposals ✓ Must meet the minimum projected debt service coverage ratio of 1:1 based on the forecasted cash flow
Eligible projects	Upgrade of EC power distribution systems to realize energy and emission savings
Lenders	Any LGUGC private financial institution (PFI)
Term	Coterminous with the PFI loan but not to exceed 15 years

Single guarantee limit	25% of ECPCG Guarantee Reserve and Interest Income Escrow Accounts
Guarantee coverage	✓ Up to 80% of the debt service with interest, subject to LGUGC interest rate cap ✓ Actual guarantee coverage will be determined based on PFI request and internal borrower risk rating system results
Guarantee fee	0.25 % per annum
Processing fee	One-time fee of up to 1.5% of the guarantee portion of the principal amount of the loan, exclusive of taxes and collected upfront
Collateral	✓ Assignment of proceeds of power billings ✓ Assignment of Debt Reserve Fund ✓ Other assets acceptable to the Lender and LGUGC

(Source: LGUGC)

Table 16 Number of ECs with LGUGC guaranteed loans based on performance assessment rating

Performance Assessment Rating of ECs	The number of ECs	The number of ECs with LGUGC guaranteed loans
AAA	50	10
AA	17	2
A	5	1
B	13	3
C	13	1
D	10	0

(Sources: NEA and LGUGC)

According to LGUGC and a consultant of the World Bank, the World Bank is now considering launching a new financial guarantee program referred to as "Philippines Renewable Energy Development (PhRED), in which the bank will provide initial capital of USD 44 million to establish a new guarantee line of USD 500 million for ECs' renewable energy projects and so forth. With this new guarantee program being implemented, the role of LGUGC in ECs' financing from commercial banks will become more important.

2.4.3 Current Status of Other Financial Institutions

ECs are receiving their funding from government financial institutions—the Development Bank of the Philippines (DBP) and Land Bank of the Philippines (LBP)—as well as the non-bank Rural Electrification Financing Corporation (REFC). This section summarizes the relationship between ECs and these three financial institutions, as well as issues of the loans to ECs.

(1) EC relations with DBP, LBP and REFC

DBP was established in 1958 as the main authority on development financing in the Philippines. It offers EC loans as part of its medium-term financing for agricultural and industrial business and support for infrastructural and development projects. DBP has positioned ECs as a priority sector due to their role as key drivers in local economic growth and started lending to ECs in 1990. Outside of NEA, DBP was the only commercial bank at the time to give loans to ECs and has continued to provide them financing via a network of 90 branches nationwide.

The LBP is a government bank established in 1963 to provide the capital for farmland purchases in promotion of land reform programs. Currently, it lends primarily to SMEs. It has lent greater amounts to ECs in recent years, but this still only accounts for a small 1.3% share of loan totals.

Meanwhile, REFC is a private non-bank institution established in 2002 with joint EC funding to provide capital for electric distribution projects conceived by NEA. It provides PHP 400 million in loans to ECs under the supervision of Philippines Securities and Exchange Commission (SEC). Seventy-three ECs hold an approximately 90% of REFC capital, and seven of the 11 members of the board of directors, including its chairman, are top executives of ECs. Further, the REFC president is from the NEA and has developed a tight NEA-EC relationship.

(2) Loans to ECs from DBP, LBP and REFC

The status of loans to ECs by each of the DBP, LDB and REFC are sorted in the following table in terms of (1) recent loan amount to ECs and its trend, (2) main loan criteria, (3) main loan review documents, (4) co-financing, (5) credit decisions, (6) loan management and (7) EC loan policies.

Regarding main loan criteria, all three institutions provide both capital expenditure (CAPEX) and working capital, but more for CAPEX. The maximum period for CAPEX financing is 15 years, and all three have similar fixed CAPEX interest rates. Also, for credit decisions, all three stress the ECs' KPS credit ratings and determine their interest rates based on credit ratings with internally set ratings standards.

Table 17 Loans to ECs from DBP, LBP and REFC

Item/Institution	DBP	LBP	REFC
1) Recent loan amount to ECs, and its trend	Amount approved for financing is PHP 5 billion, with PHP 1.8 billion in outstanding loans. More loans in recent years.	Outstanding loans as of December 2014 were PHP 4.8 billion to 22 ECs. Loan amounts have increased in recent years.	Amount approved for financing for 2013 is PHP 200 million to 32 ECs, with PHP 440 million in outstanding loans. 40 ECs in total.

2) Main loan criteria			
a. Loan categories	Almost all loans are for equipment (CAPEX), but some for working capital.	More than half of the loans are for equipment (CAPEX); the remainder for working capital.	60% of loans are for equipment (CAPEX), 40% for working capital.
b. Loan periods	Maximum 15 years for CAPEX (3 years grace period).	Maximum 15 years for CAPEX (2-3 years grace period).	Maximum 10 years for CAPEX (1 year grace period).
c. Interest rates	Fixed rate 6-8% for CAPEX. Floating rate 4-6% for working capital.	Fixed rate 6-7% or floating rate 5-6% for CAPEX. 5-6% rates for working capital.	Fixed rate 6-6.25% for CAPEX and working capital.
d. Collateral	Less than half of loans are guaranteed by LGUGC. Collateral is from deposits or accounts receivable.	No loans guaranteed by LGUGC. Generally, distribution facilities are required as collateral.	No collateral, no guarantees, including LGUGC guarantee.
3) Main loan review documents	・Financial statements ・Capital expenditure (CAPEX) plan ・ERC application documents	・Financial statements ・Power purchase agreement ・CAPEX plan	Loan application documents submitted to NEA.
4) Co-financing	Offers syndicated loans with private commercial banks (coordinated by LGUGC).		Has previously co-financed with NEA, but currently none.
5) Credit decisions	Decides based on internally designed rating system. Refers to NEA, including its KPS rating system.	Internal credit ratings are aligned with KPS rating system by NEA.	Categorizes the 73 shareholder ECs into four ranks from A to D by internal ratings and assigns loan criteria by category.
6) Loan management	DBP has signed an MOU with NEA with exercisable step-in rights, but has not exercised them.	LBP has no experts who are able to evaluate EC technical levels.	REFC has had three problem projects: two suspended repayment and for one, REFC stepped in to revise.
7) EC loan policies	Actively working with	Only 1.3% of all LBP	Actively works with EC

	ECs as priority sector. Discusses co-financing with NEA for ECs with low KPS ratings.	loans are to ECs, but looking to expand EC loans as government bank in the future.	loans. Plans to procure resources for EC loans, including the increase of capital.

(3) Issues of the loans to ECs

All three institutions are actively providing loans to ECs and looking to increase lending, but there are various issues in doing so. First, they have had CAPEX loans delayed by the Energy Regulatory Commission (ERC), which has taken up to 1-2 years to approve CAPEX in some cases. Each institution also has its own individual issues. DBP co-finances loans for KPS low-rated ECs with NEA; LBP has no experts to evaluate EC technical levels; and REFC is still awaiting SEC approval for a PHP 300 million increase in capital, needed to secure loan resources. In addition, in the case of REFC, for which ECs comprise both the biggest shareholders and the biggest borrowers, conflict of interest is a major issue, even with strict SEC supervision.

2.5 NEA's Current Systems of ECs' Performance Assessment

At the time of the implementation of this study, NEA had two systems to assess ECs' performance: the previously mentioned Key Performance Standards and Classification of ECs. These two assessment systems have been implemented independently so far, but in 2015, a new rating methodology that reflects the results of both systems began for assessment of ECs' performance during the year 2014. Below is the overview of the KPS as well as its current situation and issues, the overview of the Classification of ECs system and its current situation, and explanation on the recent developments on introduction of an overall EC performance assessment rating system that reflects the ratings of these two assessment systems.

2.5.1 KPS

According to section 58 of the Electric Power Industry Reform Act of 2001 (EPIRA), NEA is mandated to prepare the ECs to operate and compete in the deregulated electricity market, to strengthen the technical capability and financial viability of rural ECs and to review and upgrade regulatory policies with a view to enhancing the viability of rural ECs as electric utilities. Based on this Act, NEA formulated the KPS in order to assess the performance of ECs. According to NEA's Memorandum No. 2011-020, the objectives of the KPS are as follows.

1) To establish standards that will be used as a tool to measure the ECs' financial, institutional and technical performance as distribution utilities, thus determining credit worthiness, level of development and protection of its customers
2) To ensure technical compliance with the standards
3) To serve as basis for developing performance incentive mechanisms for EC officials and employees

4) To prescribe reportorial requirements, thus promoting accountability and responsibility in its compliances and fiduciary obligations

The KPS is composed of financial, institutional, technical and reportorial parameters. The following tables show the score allocation and departments in charge as well as performance indicators of the KPS.

Table 18 Composition of KPS parameters and NEA's departments in charge

Parameters	Weight	NEA's departments in charge
Financial	30%	Financial Services Dept. and Accounts Management & Guarantee Dept.
Institutional	35%	Institutional Development Dept.
Technical	30%	Engineering Dept.
Reportorial	5%	(evaluation of reporting performance)

Table 19 KPS performance indicators

Performance Indicators	Standards	Weight/ Score
I. Financial Parameters		**30%**
1. Leverage		8
a. Debt Ratio	Up to 0.60x	4
b. Debt Service Cover	At least 1.20x	4
2. Liquidity Ratio		4
a. Quick Ratio	At least 1.00x	
3. Efficiency		13
a. Payment to Power Supplier/Transmission (Main Grid)	Currrent	5
b. Payment to NEA	Current	4
c. Average Collection Period	2014: Not more than 40 days 2015: Not more than 35 days	4
4. Profitability	Positive	5
II. Institutional Parameters		**35%**
1. Human Resource: Leadership and Management		14
a. Good Governance		
(1) Performance Rating of BOD	Compliant	5
(2) Performance Rating of GM	Very Satisfactory	4
(3) NEA/External Audit Rating	Blue Color Coding/Unqualified	2
b. Employee-Customer Ratio	1:350 (Except Off-Grid Ecs)	1
c. Capacity Building	One training per employee per year	1
d. Retirement Plan/Fund	Funds availability based on updated or periodic actuarial study	1
2. Stakeholders		14
a. Customer Service Standards		
(1) Processing/approval of applications for service connection	Within 1 day upon receipt of application	2
(2)Service drop connection	Within 2 days upon payment of fees	2
(3) Restoration of service after line fault on the secondary side, including service drop/lateral	Within 4 hours upon on-site arrival	2
(4) Response time on consumer complaints	Within 24 hours after receipt of complaints	2
(5) Timeframe in informing customer on scheduled power interruptions	At least 3 days before scheduled interruption	2
(6) Response time to emergency calls	Within 30 minutes after receipt of call	2
(7) Response time to reconnection of service due to disconnection	Within 24 hours after settlement of amount due/compromise agreement	2
b. Members' Participation/Involvement		5
(1) Annual General Membership Assembly	5% of Total Member-Consumers	3
(2) District Election	5% of Total members	2
c. Information, Education & Communication Technology	Website, Short Messaging System, Hotline of Complaints, Automated Meter Reading, Billing & Collection, On-line Tellering	2
III. Technical Parameters		**30%**
IV. Reportorial		**5%**
1. Monthly Financial & Statistical Report		1
2. Monthly Engineering Report		1
3. Audited Financial Statements		1
4. Performance Standard Monitoring Report		1
5. Enhanced Integrated Computerized Planning Model (e-ICPM)		1

(Source: NEA Memorandum No. 2013-024 [October 29, 2013])

ECs are to be rated once a year according to the KPS and are classified into six rating categories (AAA, AA, A, B, C and D). Fifteen ECs were rated as AAA, ten as AA, five as A, twenty-nine as B, thirty-three as C and five as D at the assessment of EC performance in the first semester of 2013[10], thus more than half were rated at B or below. NEA started the KPS rating system in 2012 and its implementation is still considered as being on a pilot basis. The KPS parameters

[10]Aannual assessment was not conducted for the year 2013 due to disaster caused by Typhoon Yolanda, and so forth.

were reviewed by a World Bank consultant and currently they are being reviewed for revision within NEA.

The benefits of receiving higher ratings include more management autonomy, setting the salary levels of EC officials and employees according to the ratings, and so forth. However, preferential interest rates have not been introduced yet as financial incentives for ECs at organizational level—for example, like the one that this study examined in its recommendation. Rather the preference is given via adjustment of the loan amount.

The KPS Technical Working Group has been organized within NEA as the implementation body of the KPS. The director of the Institutional Development Department (IDD) is serving as the chairperson and the Group is mainly composed of director-level officers and includes representatives from finance-related departments (AMGD, FSD) and the Engineering Dept., among others. Its meetings are held when necessary, not on a regular basis.

Table 20 Members of the KPS Technical Working Group

Chairperson	Director, Institutional Development Dept.
Members	Director, HR Dept.
	Deputy Administrator
	Director, EC Audit Dept.
	Director, Account Management & Guarantee Dept.
	Director, IT Dept.
	Director, Engineering Dept.
	Manager, Corporate Planning Dept.
	Division Manager, Finance Service Dept.
	Community Relations Chief, Institutional Development Dept. (KPS-TWG Secretariat)

(Source: Information provided by NEA)

NEA utilizes the result of the KPS rating as a tool to assess EC performance together with the result of its Classification of ECs (explained in the next section) as a reference for its loan appraisal, monitoring of EC management and so forth. During the implementation of this study, it was also found that there are institutions other than NEA (DBP, LBP, LGUGC and a private commercial bank that the study team interviewed during the study) that are also using the result of the KPS rating as a reference for their loan appraisal for ECs.

The study team analyzed issues and needs of the KPS as NEA's existing EC assessment system from the perspective of introducing a new rating system, one based on the assessment of disaster resiliency. The results of the analysis are shown in the following table.

Table 21 Institutional issues and needs with regard to KPS

	Institutional & Financial Aspects	Technical Aspects
Issues	➢ The KPS is composed of financial, institutional, technical and reportorial parameters and does not include parameters to assess disaster resilience of ECs ➢ Acceptability by ECs is one of the issues on implementation of the KPS rating system. Some ECs consider certain parameters are difficult to comply with. It is important to consider effective measures to encourage ECs' efforts to comply. ➢ Preferential treatment according to the result of the KPS rating is provided on the loan amount and not on the interest rate.	➢ The KPS does not include indicators to assess ECs' efforts in upgrading and operation & maintenance of distribution facilities, preparing plans/institutional arrangement for post-disaster recovery work, participation in the TFK and preparation of buffer stocks for recovery work.
Needs	➢ The KPS rating system could become a comprehensive EC evaluation tool if disaster resilience parameters were also included. ➢ When it revises the KPS parameters, NEA consults with ECs and other stakeholders such as the DOE. Therefore, consultation with ECs is important when introducing disaster resilience parameters. ➢ There is room for consideration to invite financial institutions that are using the results of KPS ratings for reference during loan appraisal in order to promote their understanding.	➢ NEA recommends the upgrading of distribution facilities, which would contribute to disaster resiliency enhancement. Therefore, the necessity of pre-disaster investment for such enhancement is already understood. ➢ The necessity of securing buffer stocks is recognized and discussions between NEA and ERC are being conducted.

2.5.2 Classification of ECs

In the Republic Act No. 10531, National Electrification Administration Reform Act of 2013, NEA is mandated to strengthen ECs, to help them become economically viable and to prepare them for the implementation of retail competition and open access. Based on this Act, NEA introduced "Classification of ECs" in 2014, in order to identify ailing ECs as soon as possible and to provide intervention for management improvement when necessary and strengthen viability of distribution utilities. The NEA Memorandum No. 2014-001 "Guidelines for the Classification of ECs and Provision for NEA Intervention" lists the following objectives.

1) To formulate and prescribe standards for the classification of ECs according to financial, technical and institutional performance
2) To ensure early detection of adverse financial condition and to serve as triggers for NEA intervention in the EC operation
3) To institute preventive, remedial and mitigating measures prior to being categorized as ailing EC
4) To implement alternative options for the ailing ECs

There are six parameters mainly focusing on financial aspects for the Classification of ECs. The classification is to be conducted quarterly and ECs are to be classified into four categories (Green, Yellow-1, Yellow-2 and Red) based on the results of the assessment. The results of the classification recently conducted are as follows.

Table 22 Parameters and assessment standards of EC classification

Parameters	Standards
1. Cash General Fund	At least one month power cost and non-power cost
2. Collection Efficiency	95%
3. Accounts Payable-Power	Current/Restructured-current
4. Profitability	Positive
5. Net Worth	Positive
6. System Loss	13%

(Source: NEA Memorandum No. 2014-001 Guidelines for the Classification of ECs and Provision for NEA Intervention)

Table 23 Results of EC classification

Classification	No. of ECs	%
Green	47	39%
Yellow 1	50	41%
Yellow 2	13	11%
Red	11	9%
Total	121	100%

(Source: NEA Compliance Report on the Performance of Electric Cooperatives for the Fourth Quarter of 2014)

The degree of intervention depends on the classification category: if an EC is classified as green, there would be less intervention; if classified as yellow-2, more support by NEA would be necessary; and if classified as red, there is a possibility to consider a partnership arrangement with the private sector. In addition, according to the interview with the Account Management & Guarantee Dept. of NEA, they are referring to Classification of EC results, together with the results of the KPS rating, when they conduct loan appraisal[11].

There is no technical working group as an implementation body for this classification system, unlike the case of the KPS. The Office of Performance Assessment and Special Studies (OPASS), whose function is to assess ECs' performance, is mainly in charge of implementation of this system. It compiles the results of the reviews conducted by the Financial Services Dept., Engineering Dept. and Institutional Development Dept. and conducts the classification quarterly.

2.5.3 Recent Developments for Overall EC Performance Rating

As described above, currently there are two systems of assessment and rating of ECs. In 2015, NEA introduced a new rating methodology (Performance Assessment Rating) reflecting the results of both systems, to conduct assessment of EC performance during the year 2014. According to this new methodology, the rating is given to an EC based on the scores calculated by aggregating the results of both systems, giving weight of 80% to the KPS rating and 20% to Classification of ECs. Like KPS, there are six rating categories: AAA, AA, A, B, C and D.

The result of the rating for the 2014 performance (tentative) is shown in the table below. ECs rated as AAA, AA and A account for close to 70%.

Table 24 Results of EC performance rating (tentative) (2014)

Performance Rating	Number of ECs
AAA	50
AA	17
A	5

[11] Interview with Account Management & Guarantee Dept of NEA (in Feb. 2015)

B	13
C	13
D	10
Total	108

(Source: NEA "The Administrator's Report" 22nd NEA-EC Consultative Conference 05 August 2015)

As for an implementation body for this system, there is a possibility to set up a committee before performance assessment for the year 2015, which is to be conducted in 2016. Because this system has just been introduced in 2015 and the NEA is reviewing the parameters of the KPS for revision, it seems it will take some time for this new system to be established.

2.6 Human Resource Development Plan

2.6.1 Human Resource Development Plan for NEA and ECs

(1) High-Tech Training【for Engineers】

Engineers of each EC take technical training courses shown in the following table, courses taught a professor of the University of the Philippines and some others.

Table 25 Technical training for NEA and ECs

Technical Training for NEA and EC	・ Planning Courses for Engineers ・ Distribution System Modeling and Analysis ・ Distribution System CAPEX Planning ・ Distribution System OPEX Planning ・ Power Supply Planning, Aggregation and Contracting ・ Distribution System Protection ・ Distribution System Automation

(2) NEA-IIEE Partnership【for Engineers】

NEA and the Institute of Integrated Electrical Engineers of the Philippines (IIEE) held the following assembly on May 6, 2015, and agreed to work in close partnership to move forward with the Registered Master Electricians (RME) program. As part of the partnership, general managers of ECs and PHILATMEC[12], which is an association of ECs, have been conducting pilot projects in INEC[13] and ANECO[14]. In the near future, the role of IIEE at the time of disaster response is expected to be clarified so that they can achieve the restoration at a high-technological level.

- The roles of IIEE
  a) Develop and implement competency/training programs for barangay electricians and

[12] Philatmec (Philippine Association of Technical Managers of Electric Cooperatives)
[13] INEC (Ilocos Norte Electric Cooperative, Inc.)
[14] ANECO (Agusan Norte Electric Cooperative, Inc.)

linemen who are qualified to be upgraded to registered master electricians

b) Provide facilitators/trainers and manuals for competency/training programs, including those from other government and non-government agencies involved in competency training programs

- The roles of NEA
  a) Complement and supplement the necessary resources, in terms of promotion of various training programs for non-licensed electrical practitioners
  b) Facilitate in ensuring funding support for the implementation of the competency/training programs
  c) Conduct a semi-annual performance review of the partners
- The joint roles of NEA and IIEE
  a) Advocate, implement and recognize best practices of electrical practitioners in the industry
  b) Promote competency upgrading programs for technical personnel in the E Cs
  c) Promote and maintain harmonious relationship among partners
  d) Work toward excellence that will lead barangay electricians to become registered master electricians that will in turn lead to greater efficiency and service delivery

(3) NEA-EC-TESDA Partnership【for Technicians】

The National Skills Training Program was established on June 16, 2015 among three parties: NEA, the ECs and the Technical Education and Skills Development Authority. All ECs have an agreement, with a total of 2,521 certified[15] linemen from 68 technical high schools throughout the country

Those linemen who have the certificate are expected to have practical training provided by NEA and ECs so they may become a "certified installation & maintenance electrician". The adjudicators for the certificate are dispatched from the following ECs.

Regions I, II & CAR: Cagayan II Electric Cooperative, Inc. (CAGELCO2)
Region III: NEA
Region IV: Batangas II Electric Cooperative, Inc. (BATELEC2)
Regions V, VI: NEA
Region VII: Cebu II Electric Cooperative, Inc. (CEBECO2)
Region VIII: NEA
Regions IX, X, XI & Caraga: Agusan Norte Electric Cooperative, Inc. (ANECO)

(4) NEA-EC Management Course【for Managers】

NEA regularly provides their managers with the programs shown in the table below. Training programs in regard to regional procurement of equipment are planned to be held in addition to

[15] Certificate No. NC II (ELECTRIC POWER DISTRIBUTION LINE CONSTRUCTION) can be awarded after30-daystraining

the above programs. It is desirable to interweave the training for business continuity management rating into the institutional training portion of the NEA-EC management training, in order to deepen the understanding of NEA and the ECs.

Table 26 NEA-EC Management Course

Course	Contents
Cooperative Management Course I	・ Directorship of Electric Cooperatives and Good Governance
Cooperative Management Course II	・ Part I - Entrepreneurial Management ・ Part II – Problem Solving and Decision Making
Cooperative Management Course III	・ Managerial Proficiency through the Experiential Approach and Values Enhancement
Finance Training	・ Risk Based Internal Auditing ・ Work Order Procedures ・ Procurement and Bidding Procedure
Institutional Training	・ Succession Planning ・ Grievance Handling and Mediation, and Conflict Resolution ・ Effective Business and Technical Writing ・ Effective Performance Coaching
MSEAC Training	・ Guidelines of the Multi-sectoral Electrification Advisory Council

Chapter 3 Power Network Resiliency in the Philippines with Focus on Distribution Assets

3.1 Technical Aspects

3.1.1 Current Situation

(1) Standards

For institutional systems, improvements are not needed. Standards have been defined in the NEA Engineering Bulletin based on the US Rural Electrification Act (REA) and American National Standards Institute (ANSI) standards. However, EC tenders have recently focused on economizing and led to the purchase of sub-standard equipment (e.g., electric poles that did not meet tender specifications). Some electric poles do not meet the standards of any region in the Philippines. Improvements will come with the development of human resources for material quality management at tender. Collective EC tendering and purchasing could also be of value.

- Electric Poles

  Electric pole specifications are prescribed in NEA's Engineering Bulletin DX2211 (Wood Pole), DX2212 (Concrete Pole) and DX2213 (Steel Pole). These specifications are not far behind those of Japanese products in strength and other specifications. However, in some cases electric poles do not satisfy economic specifications, based on the study team's direct observation.

- Distribution Lines

  The specifications for distribution lines are prescribed in NEA Engineering Bulletin DX2240 and DX2241. These specifications are not far behind those of Japanese products.

- Guy Wires

  There are no institutional systems which describe specification of guy wires. However, the study team confirmed that wires in the field are of similar quality to Japanese products on a visit to BATELEC2.

(2) Design & Installation

In terms of institutional systems, improvements are unnecessary. Standards have been defined in NEA Engineering Bulletin based on REA and ANSI standards. However, there were some undesirable "enhancements" of distribution facilities. Examples include insufficiently deep installation of electric poles due to a lack of design knowledge at the EC. It would be useful to development expertise in electric pole selection and route engineering.

- Selection of Electric Poles

  There is no central standard for electric poles and each EC has its own internal regulations. In actuality, electric poles are selected according to the needs of a particular locale, and concrete poles are prominent. Steel poles were widely installed in places inaccessible to delivery vehicles after Typhoon Yolanda because they are light enough to be carried by teams of men. Additionally, because of lack of vehicles, some ECs in remote areas are forced

to use steel poles that can be delivered by hand.

At site visits, the study team confirmed that testing of electric pole strength requirements are done manually at BATELEC2, Leyte II Electric Cooperative Inc. (LEYECO2), and Camarines Sur II Electric Cooperative, Inc. (CASURECO2). Software is usually utilized in Japan.

- Span between Electric Poles

There are no central standards prescribing the span between poles, and each EC has its own regulations. Based on NEA information, the national average is an 80-90m span for the main distribution network, which is longer than the average in Japan of 50-60m. The situation in the Philippines leaves room for improvement.

- Installation Depth of Electric Poles

Pole depth is detailed in "NEA Engineering Bulletin" and "NEA Specifications and Drawings for 7.6/13.2kV Line Construction". Installation depth was calculated as follows: "length of pole x 1/10 + 2 feet" in BATELEC2 at the time of the study team site visit. However, in some cases poles are not installed according to the guidelines due to geological conditions. Actual installations use specifications set by the electric pole manufacturers.

Additionally, in the Philippines there are few with actual experience in installing the concrete supporters that strengthen the foundation of electric poles.

- Guy Wires

Guy wire specifications are described in "NEA Engineering Bulletin" and "NEA Specifications and Drawings for 7.6/13.2kV Line Construction". Guy wires are required to meet the following specifications: "Angle of distribution line: 0-5°→ No guy wire is necessary, 5-60°→one guy wire, 60-90°→two guy wires". During a site visit the study team confirmed that BATELEC2, LEYECO2, CASURECO2 design and install guy wires according to these regulations.

(3) Operation & Maintenance

Operation and maintenance (O&M) specifications have not been standardized. The study team was able to ascertain the following situation in the Philippines.

- General Operation & Maintenance

BATELEC2 dispatches staff for comprehensive O&M, training conducted by the University of the Philippines, which has its own internal regulations. The study team judged that BATELEC2 O&M, including visual inspection and ground resistance measurements, are roughly equivalent to those in Japan. However, each EC responds to actual conditions based on its own evaluation. Therefore, in the future, uniform O&M standards covering the Philippines would be a good issue for NEA to organize. They would compile the necessary

manuals and help educate ECs on O&M best practice.

- Installation Skills

The Institute of Integrated Electrical Engineers of the Philippines, Inc. collaborates with NEA to train EC engineers to improve their installation skills. After Typhoon Yolanda, NEA understood that some damage to distribution facilities was due to installation skill inexperience, even when superior equipment was used. In the future, training should help to alleviate these types of problems and may contribute to a certification system for engineers.

- Tree Trimming

In the Philippines, there are many large trees in tropical areas in proximity to distribution lines. Tree trimming, done sufficiently, reduces damage to distribution facilities after a natural disaster. The NEA Engineering Bulletin describes the minimum clearance between trees and distribution lines, and ECs trim trees regularly. However, private property rights require negotiations with owners and compensation is often necessary. For federal property, approval of the Department of Environment and Natural Resources (DENR) is necessary. These approvals are time-consuming and may lead to insufficient tree trimming in some locations. To address this, it is important to negotiate with private property owners periodically and not only after a typhoon strikes. For national property, NEA and the DENR could make an agreement for uniform tree trimming.

- Buffer Stock Management

At present, ECs have no standard quantity/volume of spare parts for restoration work after calamities. This was apparent after Typhoon Yolanda, when ECs suffered from a shortage of spare parts during their restoration work. These shortages affect the timeline to regain power supply in areas affected by typhoons.

In particular, all the ECs in the Philippines should conform to the following rules or guidelines.

- To ensure the availability of vital materials and equipment for immediate restoration/rehabilitation of distribution lines damaged by disasters and/or calamities
- To establish ample stocks of materials and equipment for emergency responses in the rehabilitation/ restoration of distribution lines damaged by natural or man-made disasters
- To assure that buffer stocks of materials and equipment specifications for distribution line restoration are in conformity with the Build Back Better scheme
- To build a pool of linemen and electricians on a regional basis to, in times of calamity, handle emergency power restoration work; and, in normal times, to handle sub-village and household electrification projects

- Establish a buffer stock composed of, but not limited to, poles, insulated conductors, distribution transformers, electronic KwH meters and service wires
- Prepare distribution electric system design in conformity with the Build Back Better scheme
- Adopt a Regional Procurement process through the assigned regional offices to undertake the procurement of the identified buffer stock materials
- Identify costs for buffer stock recovery and mobilization

Philippine Association of Technical Managers of Electric Cooperatives (PHILATMEC), consisting of engineering managers of the ECs, conducted the survey about the impact of buffer stocks of 2%-6%, 10% and 20%.

The 10% and 20% bases are from a PHILATMEC study considering historical data regarding the scope of damages incurred from previous calamities brought by typhoons, tropical depressions and earthquakes as well as man-made disasters.

The 10% and 20% are conservative figures because the actual cost of damaged materials is typically more than 10% and 20% of the ECs' distribution system. The proposed 10% and 20% buffer stock is just the initial material requirement to immediately launch reconstruction/restoration activities of the backbone line.

Table 27 Current situation of activities regarding disaster resiliency for distribution facilities

Study Items			Study Results (Issues Underlined)
Standards	Electric Poles	Institutional System	No need to improve, because meets NEA Engineering Bulletin standards
		Current	Because EC tenders focus on price, all over the Philippines there are cases of electric poles not meeting regulations
	Distribution Lines	Institutional System	No need to improve, because meets NEA Engineering Bulletin standards
		Current	Quality equivalent to that in Japan; no problems
	Guy Wires	Institutional System	None exists
		Current	Quality equivalent to that in Japan; no problems
Design & Installation	Selection of Electric Poles	Institutional System	None exists (ECs have their own internal regulations)
		Current	Selection depends on condition of installation site
	Strength Calculation	Current	Calculated manually, so possibility of miscalculation
	Span between Electric Poles	Institutional System	None exists (ECs have their own internal regulations)
		Current	80-90m national average for main distribution lines is a little longer than the average in Japan
	Installation Depth of Electric Poles	Institutional System	Described in NEA Engineering Bulletin and NEA Specification and Drawings for 7.6/13.2KV Line Construction
		Current	Calculation: "length of pole x 1/10 + 2 feet". Actual installations according to pole manufacturer specifications However, in some cases pole installations do not meet specifications due to geological conditions
	Concrete Supporters	Current	Very few installations have concrete supporters
	Guy Wires	Institutional System	Described in NEA Engineering Bulletin and NEA Specification and Drawings for 7.6/13.2KV Line Construction (Angle of distribution line: 0-5°→guy wire not necessary, 5-60°→1 guy wire, 60-90°→2 guy wires)
		Current	Design and installation conducted according to the above-mentioned regulations
Operation & Maintenance	General	Institutional System	None exists (NEA Operation and Maintenance Procedures Manual recommendation exists and ECs have their own internal regulations)
		Current	Actual actions according only to ECs' viewpoints Conduct and management not uniform throughout all of the Philippines
	Installation Skills	Current	Existence of training in collaboration with NEA and IIEE; however, post-training maintenance of ability does not exist and is left to be addressed in the future
	Tree Trimming	Institutional System	Minimum clearance described in NEA Engineering Bulletin
		Current	Troublesome, time-consuming procedures; so, tree trimming is not conducted everywhere it is needed

(Source: Created by the study team.)

3.1.2 Issues

(1) Issues in NEA

- Maintenance of Electric Poles

As mentioned above, electric poles sometimes do not meet national standards. It is very important to develop expertise in material quality management for tenders and purchasing at ECs. They should also consider collective tenders and collective purchasing with neighboring ECs. Additionally, it is desirable that NEA create national standards for the Philippines.

- Quantitative Evaluation for Enhancement of Distribution Facilities

After Typhoon Yolanda, NEA recommended the following three enhancements to distribution facilities on main distribution lines:

1) Electric Poles: Change from Class 6 to Class 2 or higher
2) Span between Poles: Shorten from an average of 80-90m to 50-70m
3) Guy Wires: Install additional guy wires ("Storm Guy") every 500m along main distribution lines

Though NEA believes the above recommendations would be beneficial, they did not conduct a cost-benefit analysis. Japanese examples of quantitative cost-effectiveness studies would be useful.

- Uniform Operation & Maintenance

In order to standardize operation and maintenance, it is important that NEA take a leading role to arrange necessary manuals and education for ECs.

- Training

As mentioned above, training methodology to improve installation skills of EC engineers is ongoing and the need for follow-on training is understood. However, overall efforts have fallen short and an NEA system for certifying engineers would be useful.

- Simplification of Tree Trimming

The situation at ECs would improve if NEA and the DENR concluded an agreement to standardize tree trimming.

- Buffer Stock Management

Proper funding is necessary for ECs to maintain appropriate buffer stock; however, currently the priority of ECs goes to sitio electrification and barangay network enhancement. Discussions on pre-disaster preparation have just commenced in the Philippines in addition to those on post-disaster response.

On the other hand, NEA is holding discussions with the ERC since resiliency countermeasures are closely related to the impacts of power tariffs. Examples are the smaller-size ECs, which provide opposing opinions based on their limited funding. Smaller-size ECs must operate with smaller buffer stock rates.

Additionally, the materials and the specifications of the buffer stock should be defined by NEA to maintain the facilities' durability against typhoons.

Here are the specifications recommended by NEA.

a) Conductor - #4/0 ACSR (Insulated) and Bare conductor #2/0 ACSR (Bare)
b) Average Horizontal Span –50 meters
c) Pole Height and Class (Wood Pole Equivalent) –40/Class 3 Steel Pole, 35/Class 3 Steel Pole
   - Pole Load
     40/Class 3 Steel Pole (Wood Pole Equivalent) – 1,875 lbs
     35/Class 3 Steel Pole (Wood Pole Equivalent) – 1,875 lbs
   - 35/Class 3 Steel Pole (Wood Pole Equivalent) – 1,875 lbs
     40/Class 3 Steel Pole (Wood Pole Equivalent) – 8.2100 ft / 12.41 ft
     35/Class 3 Steel Pole (Wood Pole Equivalent) – 8.2100 ft / 11.89 ft
d) Pole Embedment –10% of Pole Length + 2 ft

➢ Mobilization of Pool System for Disaster Restoration

For calamities, it is very important to secure not only buffer stocks but also the means to mobilize them.

Task Force Kapatid (TFK), described in section 2.1.1, is launched by NEA in accordance to the level of disaster expected. Additionally, NEA mandates that ECs cooperate mutually with each other.

Unfortunately, there are situations in which linemen are likewise the victims of calamities. Such situations make it difficult to maintain sufficient numbers of linemen to fix damaged facilities.

However, the currently discussed buffer stock plan includes a mobilization plan. One of the main solutions is to train surplus linemen in each EC and share them with other ECs in the regions in need of linemen, as mentioned in section 2.6 Human Resource Development Plan.

(2) EC Issues

➢ Maintenance of Electric Poles

As mentioned above, sometimes poles of lesser quality are accepted in a tender due to economic considerations. These poles often do not meet the standards of any region of the

Philippines. Accordingly, ECs should set firm standards addressing both quality and cost.

- Selection of Minimum Strength for Electric Poles

As mentioned above, strength calculations for electric poles in the Philippines are done manually, increasing the chance of error. Accordingly, it is desirable to use strength calculation software.

- Installation Route Selection at Design

As mentioned above, geological conditions sometimes cause less favorable route selection. It is desirable to improve the design for the installation routes of electric poles.

- Utilization of Concrete Supporters

As mentioned above, concrete supporters improve the foundation strength of electric poles. They are cost-effective and therefore have been commonly installed in Japan, especially since the Great East Japan Earthquake. In the Philippines, concrete supporters are not commonly used, which should be rectified.

- Standardized Tree Trimming

As mentioned above, tree trimming has reduced damage to distribution facilities from natural disaster. However, tree trimming is still insufficient at times due to cost and bureaucracy. For installations on private lands, ECs should negotiate periodically with owners, and not only when there is the threat of a typhoon.

- Buffer Stock Management

ECs should report their buffer stock plans to NEA before submitting them to the ERC. NEA evaluates and validates their impacts. Currently, NEA also considers the following matters in terms of materials requiring buffer stocks.

  - Buffer stocks for five items (pole, insulated conductor, distribution transformer, electronic KwH meter and service wire) are considered on the basis of their importance, availability and length of production time.
  - Costing will be based on the NEA Material Price Index.
  - Material specification and construction works should conform to NEA standards.
  - Insulated conductor #4/0 ACSR, bare conductor #2/0 ACSR, and steel poles equivalent to Class 3 wood poles were used in the study.

Table 28 Issues and proposed solutions of activities regarding disaster resiliency for distribution facilities

Study Items		Issues	Proposed Solutions
Issues in NEA	Maintenance of Electric Poles	All over the Philippines there are cases of distributed materials not meeting regulations	・When ECs engage in tendering and purchasing, develop human resources for material quality management ・Consider collective tendering and purchasing by neighboring ECs
	Quantitative Evaluation for Enhancement of Distribution Facilities	No quantitative evaluation of the cost-effectiveness of the distribution facility enhancements recommended by NEA	Introduce example Japanese cases
	Uniform Operation & Maintenance	Lack of uniform operation & maintenance throughout the Philippines	・Arrange necessary manuals ・Educate ECs about operation & maintenance
	Maintenance of Skills regarding Installation	Lack of post-training maintenance of linemen's abilities	Establish a system for authorizing trained engineers
	Simplification of Tree Trimming	Troublesome and time-consuming procedures to obtain DENR approval for tree trimming on federal land	Conclude a uniform tree trimming agreement with DENR
Issues in Ecs	Maintenance of Electric Poles	All over the Philippines there are cases of materials not meeting regulations	Conduct thorough internal instruction on valuing not only price but also specifications
	Selection of Minimum Strength of Electric Poles	Possibility of miscalculation due to manual calculation	Utilize high-quality calculation software
	Installation Route Selection at Design	Some electric pole installations not meeting specifications due to geological conditions	Improve capacities in selecting electric pole installation routes
	Utilization of Concrete Supporters	Very few installations have concrete supporters despite their high cost-effectiveness	Introduce and utilize concrete supporters
	Standardized Tree Trimming	Troublesome and time-consuming negotiations with owners, including on compensation cost, for tree trimming on private property	Implement periodic and continuous negotiations with owners

(Source: Created by the study team.)

3.2 Financial Aspects

3.2.1 Calamity Loan

Subsidies from the national government[16] and NEA calamity loans could be considered as financing sources to procure necessary funds for recovery work of disaster-damaged ECs.

In order to receive subsidies from the national government, damaged ECs need to submit calamity grant requests. NEA is intermediating the subsidy request procedure by, for example, verifying that the amounts that ECs apply for in their damage reports are consistent with their actual needs.

On the other hand, NEA has a loan program, "Calamity Loan", for calamity affected ECs, supporting them via financial assistance for their service restoration, and doing so with concessional lending terms, such as lower interest rates. The overview of the Calamity Loan is shown in the following table.

Table 29 Overview of NEA's Calamity Loan

Objective	For the repair of distribution lines and restoration of power in the coverage areas damaged by typhoons and other calamities
Amount	Evaluated cost, subject to availability of funds
Terms	(Subsidy funded) ・Interest rate: 3% per annum ・Payable in 10 years ・Grace period: maximum 1 year
	(IGF funded) ・Interest rate: Lower by 50% of the prevailing NEA lending rate (3.25% as of this study's implementation) ・Payable in 10 years ・Grace period: maximum 1 year
Requirements	・Board resolution ・Budget request ・Bill of materials ・Information on cost of repairs ・Damage report/restoration report ・Photo

(Sources: Information provided by NEA and interview with NEA.)

Sometimes it takes time for the EC to receive the subsidy from the national government, due to

[16] This study only covered national government subsidies, for which NEA is intermediating, and did not collect information on subsidies by regional governments.

the EC's document preparation, the government's approval process, and so forth. Considering the importance of restoring utilities as soon as possible, NEA provides calamity loans to the ECs and settles their loan outstanding later, once the national government subsidy is provided.

The table below shows calamity loan and the government's grant amounts in recent years. The amount of government subsidy could be affected by factors such as the fiscal situation of the government at that time. Therefore, in order to realize the soonest recovery from disaster damage, it is important to make pre-disaster preparation that minimizes the necessary financing requirement by enhancing disaster resilience in advance or that secures the necessary post-disaster liquidity, by utilizing financial products such as insurance.

Table 30 Calamity Loan and Calamity Grant provisioning

Year	Calamity Loan	Calamity Grant
2010	8,218,666.17	54,739,091.84
2011	1,724,615.73	43,098,852.45
2012	0.00	65,120,009.62
2013	221,918,086.87	487,829,225.02
2014	530,538,557.46	2,853,060,668.79

(Source: NEA)

3.2.2 Securement of Necessary Funds for EC's Disaster Resiliency Program

The NEA board approved the "Policy on Electric Cooperatives' Resiliency Program" in June, 2015. According to this policy, all ECs are to set up a Disaster Resiliency Program and NEA may provide a loan to ECs to support financing acquisition of buffer stocks and other costs (e.g., for deployment of personnel and vehicles). In this policy, it is stated that the EC would establish funds for (1) the buffer stocks and (2) mobilization of personnel and vehicles in times of calamities/emergencies. More concretely, the Rules and Regulations Implementing the Policy on the Electric Cooperatives' Resiliency Program stipulates the following.

(1) Buffer Stock: The buffer stocks and expenses for force majeure and fortuitous events of ECs will be submitted to ERC as part of the CAPEX Plan and or to be sourced from RFSC[17] (additional).
(2) Mobilization: Sinking fund to cover mobilization expenses for immediate deployment of personnel & vehicles in time of calamities/emergencies shall be established and submitted to the ERC as part of CAPEX Plan and or to be sourced fromRFSC (additional).

[17] The Reinvestment Fund for Sustainable CAPEX (RFSC) is a fund used only for capital investment, and a certain amount is allocated to this fund from the electricity tariff. The allocated amount varies among the ECs.

Introducing such a system (setting up a fund) requires the approval of the ERC. And an industry association of ECs, Philippine Rural Electric Cooperatives Association, Inc. (PHILRECA), is planning to apply for the approval in coordination with NEA[18].

3.2.3 Initiatives Related to Insurance

(1) Current status of disaster insurance for power networks

In the Philippines, the Government Service Insurance System (GSIS) insures state assets with property and casualty insurance under direct control of the Philippine president, while private non-life insurance companies cover private assets. There is a demarcation to a certain extent between the two in terms of the coverage of insurance. The GSIS is mainly for paying out civil servant pensions, but also handles property and casualty insurance that protects assets for government agencies and listed government-owned and controlled corporations (GOCCs), of which NEA is one.

Viewing the power sector through this filter, National Power Corporation (NPC), an owner of generation facilities, and National Grid Corporation of the Philippines (NGCP), an owner of transformer facilities, are seen as state property and insured by the GSIS; but as ECs are not on the list of GOCCs, the GSIS will not insure their ownership of distribution facilities.

On the other hand, private non-life insurance companies will not insure distribution lines and utility poles, which are the main distribution facilities of ECs. Unlike generation and transformer facilities, power lines and poles are spread out over distances in excess of 1 km, making their property value difficult to assess. Insurance covers the buildings and equipment of a company, but distribution facilities are usually not included in the general insurance agreement terms. Given this, while special insurance products eliminating such exclusions could be created to cover power lines and utility poles, this would require Insurance Commission (IC) approval and put private insurance companies at high risk. Further, insurance for typhoons, floods, earthquakes and other such disasters are treated as riders on fire insurance policies in the Philippines, which increases insurance premiums and puts a great burden on smaller ECs.

In short, many ECs are unable to carry fire insurance because 1) ECs that own distribution facilities are not insured by GSIS, 2) there are no private insurance products for power distribution lines and utility poles grids, and 3) insurance premiums would be too expensive for most ECs to pay, even if there were such products.

(2) Discussions on new insurance scheme for disaster

Given the circumstances outlined in (1) above, the International Finance Corporation (IFC) of the World Bank group and relevant Philippine agencies are currently in the process of

[18] Interview with PHILRECA (July 2015)

discussing new schemes for disaster insurance which will or can cover ECs. Specifically, three types of disaster insurance are under consideration: 1) index insurance for ECs being considered by NEA and IFC; 2) Philippine Catastrophe Insurance Pool (PCIP), insurance for landowners and SMEs being considered by PIRA; and 3) insurance for LGUs being considered by GSIS. While the PIRA and GSIS schemes being considered would not directly insure ECs, the PIRA scheme would insure ECs if smaller ECs were to be treated as SMEs, and GSIS is considering the possibility of expanding coverage to ECs in the future. Including these, an overview of the new insurances for disaster, and issues concerning them, follows below.

1) Overview of new insurances

The timeline (and cooperating institutions), schemes to be discussed (insured parties, insurance types and formats, main insured content, government support, schedules) and implementation issues have been sorted into the chart below.

The NEA/IFC and PIRA schemes are index insurances which pay out when predetermined conditions are met, with specific natural disasters indexed by scale with certain observed values. The new insurance Typhoon Guard was the first in the Philippine non-life insurance sector to reach market, in August 2014. Typhoon Guard is insurance for mitigating damage to agricultural producers from typhoons on Mindanao. It is a product of PGA Sompo Japan, a joint venture between PGA, which is the largest non-life insurance firm in the Philippines, and Sompo Japan Nipponkoa.

2) Common issues

The following are issues common to all insurance schemes. Issues regarding implementation of each individual scheme are given in the chart below.

a) As mentioned above, creating new insurance requires IC approval. For instance, the IC sets the premium rates for the typhoon and flood riders on fire insurance. Insurance companies are not free to adjust these premium rates according to insured content, which they would like to do.
b) With smaller ECs unable to pay index insurance premiums, which are higher than for traditional insurance, insured content must be reviewed in order to lower insurance premiums. Specifically, the points under consideration are i) limiting insurance coverage, ii) adjusting the percentages for partial loss, and iii) simplifying assessments.
c) Although the Philippines has an agency corresponding to Japan Meteorological Agency (JMA), the agency has not implemented detailed meteorological observation. As a result, due to the lack of national-level observational data, sophisticated calculations for index insurance payouts are difficult.

Table 31 Overview of new insurance to be discussed by NEA, PIRA and GSIS

Agency	NEA/IFC	PIRA	GSIS
Timeline and cooperating institutions	NEA has been considering disaster insurance for ECs with IFC since August 2014 as priority support for the private power sector.	Considering insurance for earthquake and typhoon risks (PCIP), originally with IC/ADB as the private non-life insurance sector groups and now with IFC.	As part of its insurance for protecting state assets, GSIS is considering insurance covering typhoon and earthquake damage with the World Bank.
Scheme to be discussed			
a. Insured parties	ECs under NEA	Landowners and SMEs	LGUs
b. Insurance type and format	Index insurance pool	Index insurance pool	Traditional insurance pool
c. Main insured content	NEA will pool the ECs together and contract with a foreign insurance company as an SPV to handle premiums and payouts. (Currently, 3 companies have expressed interest in reinsurance operations.)	Landowners and SMEs contract with local non-life insurance companies and are pooled, and then a foreign reinsurance company is contracted with a PCIP fund through IFC with World Bank contributions as SPV.	GSIS underwrites an international reinsurance company, pooling individual LGUs and collecting premiums so that it can handle LGU payouts in times of disaster.
d. Government support	Philippine Department of Finance (DOF) supports the IC's role.	The IC is involved as facilitator for deciding premium rates and insured content.	GSIS has World Bank support as an institution under direct control of the president of the Philippines.
e. Schedule	Under consideration by DOF-led working group to conclude within the year.	Establishment of the Review Committee to conclude in 2016.	Currently under discussion with relevant parties.
Implementation issues	Considerations are not following traditional rules; they are DOF-led with no direct participation from the IC, which traditionally	Composition and operating body are not clear for the PCIP fund to be created with World Bank contributions and IFC	As non-life insurance is not its main operation, GSIS has less expertise in reinsurance and other insurance operations as well as insufficient

	approves new insurance. NEA also lacks the human resources to handle the insurance work.	cooperation.	profit management.

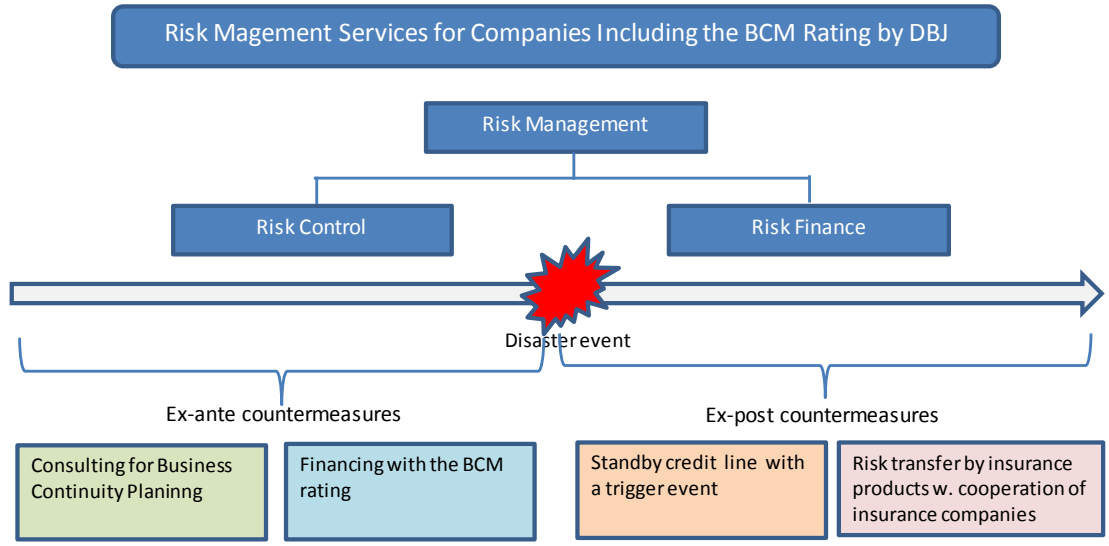
Chapter 4 Proposal of Rating and Incentive Systems Based on Disaster Resilience Evaluations

4.1 Experiences in Japan: Overview of Development Bank of Japan BCM Rating

In 2006, Development Bank of Japan Inc. (DBJ) inaugurated a financing method employing a comprehensive method of rating disaster preparedness. This new rating system called "BCM rating" was developed to help businesses create countermeasures to hedge against increasing risk of natural disasters and to assist early recovery of their operations in the event that they are affected by disaster. While companies are evaluated mainly based on financial indicators and their creditworthiness in conventional corporate finance, the BCM rating is designed to assess non-financial information, including disaster preparedness and business continuity planning, and to evaluate capability of ensuring revenue operations and surviving as an enterprise. DBJ provides preferential interest rate loans based on its rating results. DBJ also provides companies with comprehensive risk management services, and it aims to create a better financial market in which disaster resilience of companies is properly evaluated.

Since the Great East Japan Earthquake in 2011, the number of loans with a BCM rating has remained at a high level, and the accumulated total amounts to JPY 190 billion as of the end of FY 2014.

DBJ holds "BCM Rating Club (Seminar)" annually, in which companies with DBJ's BCM rating in various industries and from different regions gather and exchange information on their activities in disaster preparedness. Forty-seven people from thirty-five companies participated in the seminar titled "Management leadership and BCM achievement" in 2015. The approach of this Seminar is suggested for setting up the "Platform" recommended in this report.



(Source: DBJ)

4.2 Methodology to Introduce BCM Rating for ECs

As described earlier, NEA has been implementing Key Performance Standards to evaluate overall performance of ECs. In 2015, NEA introduced a new rating system called "Performance Assessment Rating" by modifying the KPS.

The study team has had discussions with KPS Committee members of NEA as well as EC participants of the regional seminars about whether the new BCM rating should be embedded in KPS or separated from KPS, including talk about the pros and cons of each scenario. As a result, we have reached broad agreement that the new BCM rating will be designed as a rating system separate from KPS, due to the fact that the focus of each rating system is different. The Engineering Department of NEA will play a leading role in introducing the BCM rating.

Table 32 Pros and cons of 2 possible scenarios

Integration into the current KPM rating system	Establishment of an independent rating system
◎ Comprehensive rating system could be established to assess ECs' performance including BCM	◎ Higher possibility to encourage ECs to make efforts for disaster resiliency enhancement depending on the contents of incentives given, as a rating system solely focused on BCM
○ Relatively less additional workload for NEA and EC staff	○ Easier application in case of adoption by other sectors other than ECs and other institutions other than NEA (such as policy-based financial institutions)
△ Financial incentives are not used in the current KPS rating	× NEA and EC staff might feel additional burden with high possibility of additional business flow creation
× Limited function as an incentive mechanism to promote ECs' effort in BCM improvement if relatively smaller points are allocated to disaster resilience parameters	

(1) New KPS

Parameters	Weight	Departments in charge
Financial	30%	Financial Services Dept, Account Management & Guarantee Dept
Institutional	35%	Institutional Development Dept
Technical	30%	Engineering Dept
Reportorial	5%	
BCM	*??*	*???*

(2) Independent BCM rating

(3) Mixture of (1) and (2)

(Source: The study team)

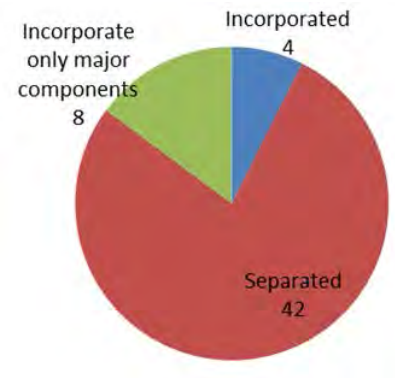


Figure 8 Answers by ECs on how to introduce the BCM rating

(Source: The study team)

4.3 Implementation Framework within NEA

During the implementation of this study, the study team held discussions with relevant departments of NEA, including the KPS Technical Working Committee, on the possible implementation framework, as well as on the methodology to introduce the BCM rating system.

As described in the previous section, the establishment of an independent system was considered more appropriate as the methodology to introduce the BCM rating system. Therefore, as its implementation framework, it is considered necessary to establish a working group, like the one for KPS, chaired by the Engineering Dept., which is in charge of disaster risk reduction and management within NEA (as the main department in charge), and support it with finance-related departments (Account Management & Guarantee Dept.and Finance Service Dept.) as this system utilizes financial incentives. It would be also desirable to have Office of Performance Assessment and Special Studies, which is in charge of assessment of EC performance, and Institutional Development Dept., whose director chairs the KPS Technical Working Committee, as main members of this new committee to support the Engineering Department and finance-related departments.

The diagram below shows the operational procedure of the BCM rating which the study team proposes. First each EC reports to NEA its current efforts on disaster resiliency enhancement. NEA reviews the content of each EC's reporting and then visits them to conduct interviews and on-site checks of the facilities for validation. NEA feeds back the results of the rating to each EC, and each EC makes improvement efforts based on the feedback.

Currently NEA does not implement on-site checks for implementation of the KPS. Therefore, during the initial stage of introducing the BCM rating system, it could also be considered realistic that in each checking cycle, NEA chooses some ECs to visit, rather than visits all ECs.

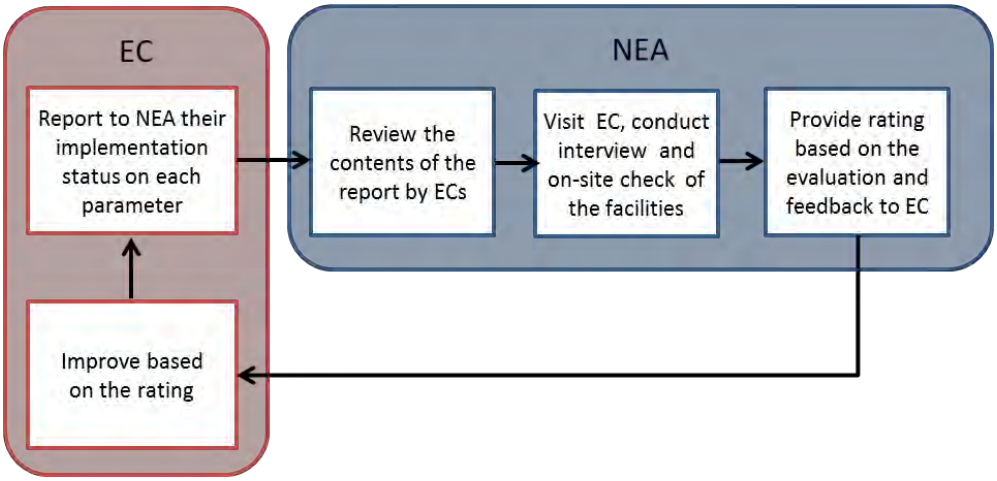


Figure 9 Proposed operational procedure of the BCM rating

4.4 Monitoring Mechanism

DBJ's BCM rating institutes a monitoring mechanism: when the borrower company cannot maintain the disaster preparedness that was the basis for its evaluation, or when the company's disaster preparedness changed materially after the evaluation was conducted, the company is required to report such situation to DBJ according to the agreement in the BCM memorandum. Depending on the magnitude of the change, the company's BCM rating could change, including being suspended or completely cancelled.

For the BCM rating proposed by this study, it is important for NEA to consider the reporting requirements from an EC to NEA in case of the drastic change in the situation since the time of assessment. It is also necessary to take measures such as revising the rating, in addition to fulfilling the regular monitoring mechanism to check whether an EC is maintaining the status that was the basis for the assessment, and to provide feedback on the results of the monitoring to the ECs. In particular, because this study recommends taking into account the medium-to-long-term BCM plan of each EC (explained in "4.6 Rating Methodology"), it is necessary to follow up the implementation status of the BCM plan within the regular monitoring activities.

The table below shows the monitoring mechanism proposed by the study team. As the proposed BCM rating system aims to encourage EC efforts to enhance their disaster resiliency, the recommendation by the study team emphasizes its incentive function—that is, its function of promoting proactive efforts of ECs. More specifically, the interest rates can not only be made less preferential, in cases in which the EC's disaster preparedness becomes worse, but also be made more preferential, if the EC's efforts become better.

Table 33 Proposed monitoring mechanism

	Monitoring procedures and Measures to be taken by NEA	Frequency of implementation
Regular monitoring	・ After the rating is provided, each EC reports to NEA in writing about its compliance with the rating indicators and progress of BCM plan implementation. ・ NEA provides feedback in writing to the EC about the results of the monitoring. ・ Depending on the results of the monitoring, NEA revises the rating based on the on-site visit and check, in case the EC's disaster preparedness efforts have changed drastically, either better or worse, compared with at the time of assessment. ・ The interest rate is changed according to the revised rating.	Every year
In case an EC's disaster preparedness has changed drastically from the time of assessment	・ Each EC reports to NEA in writing. ・ NEA visits and consults with the EC and examines the necessity of revising the rating of the EC. ・ If necessary, NEA provides a new rating. ・ The interest rate is changed, according to the revised rating.	When necessary

4.5 BCM Rating Item Proposal for ECs

4.5.1 Considerations in Rating Item Selection

The power distribution grid is large-scale electricity supply infrastructure covering the entire Philippines, and the dangers from a natural disaster differ depending on geography, topographic features and land use. Depending on differences in the type of power distribution grid and design specifications, the facilities also do not possess the same durability. As a result, the vulnerabilities of the power distribution grid to natural disasters are thought to be numerous and diverse. From the viewpoint of business continuity management, we have selected rating items for facility resilience against natural disasters from the following perspectives: "appropriately assesses the natural disasters that can be envisaged", "possesses physical strength corresponding to the degree of risk" and has "restoration capabilities corresponding to the degree of damage resulting from a disaster".

- Appropriately envisaged nature of the intensity of natural disasters in the region where the power distribution grid is located

- Power distribution grid facilities installed based on the type and intensity of the envisaged natural disasters
- Damage assumptions prepared appropriately based on site conditions and the present state of the facilities
- Effective disaster prevention measures prepared and executed based on the damage assumptions

  An organization established to undertake these measures continuously as part of business continuity management of the electric power business

While it is impossible to fully prevent the occurrence of damage from natural disasters, damage will be mitigated if effective countermeasures are in place. Damage mitigation helps lighten the burden of recovery operations and is believed to contribute to early recovery. We have selected our BCM rating items by giving consideration to the characteristics of the power distribution grid and the various natural disaster risks, which differ from those for industrial installations, while using the Development Bank of Japan approach concerning BCM rating items as a base.

4.5.2 Components

We have sorted, organized and aggregated the BCM rating items into 15 assessment categories (LEVEL 1) and the following three key elements.

- Measures to mitigate damage immediately (mitigation of scale of damage)
- Measures to secure post-disaster early recovery (shortening of restoration period)
- Approach to business continuity management that undertakes these efforts continuously (business continuity readiness)

From the viewpoint of business continuity management, these efforts are not independent, and should be planned and executed comprehensively. When the envisaged damage is to be mitigated by physical reinforcement of electric power distribution facilities, required level of restoration capacity may be lower and easily achievable. Continuous improvement of disaster prevention measures and response capabilities will require the appropriate plans and resource support. Therefore, effective preparation against natural disaster risks will require balancing the three components.

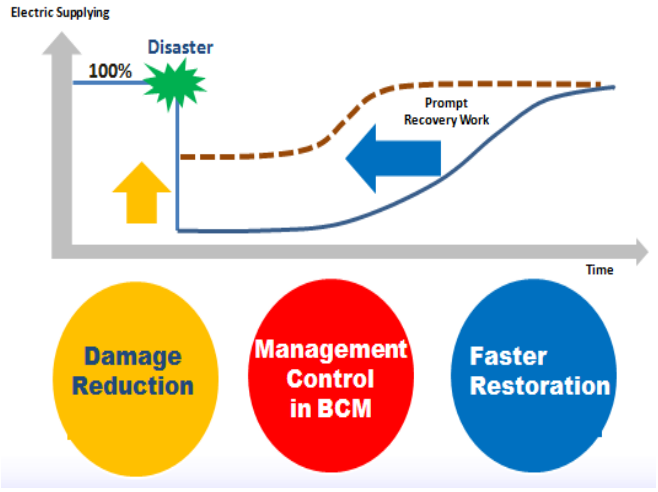


Figure 10 Relationship of assessment classifications and business continuity (3 key elements)

Figure 11 Image of business continuity readiness assessment framework

Therefore, we have looked at the vulnerability of power distribution grid facilities and the operational framework in terms of the envisaged natural disaster risks and prepared an assessment framework to promote not only individual disaster prevention measures but also improvements to business continuity management in the electric power supply business (Figure 11).

4.5.3 Assessment Classifications, Item Proposal and Rating Methodology

(1) Key Assessment Element A: Mitigation of scale of damage

Using the classifications to assess the validity of measures to mitigate the scale of damage to the power distribution grid that can be expected from the occurrence of natural disaster risks, we have a total of 21 confirmation items from the following viewpoints.

- Validity of natural disasters that should be envisaged
- Design specifications of the power distribution grid based on natural disasters (utility pole design load, span shortening, embedding, substation facilities protection)
- Use and installation level of products that conform to designs (quality control)
- Maintenance and inspection programs (daily inspections, special inspections before and after typhoon passage, telecommunications cable management)
- Prevention of secondary disasters (electric power supply disruptions caused by toppled trees or flying debris, toppled utility poles caused by high water, flooding or collapsed dwellings)
- Electric power supply reverse transmission routes, switching facilities
- Additional protection measures for critical facilities

(2) Key Assessment Element B: Shortening of restoration period

We have a total of 15 confirmation items from the following viewpoints, based on a prior understanding of the scale of damage to the power distribution grid (scope of damage and extent of damage, and scope of the influence power failures), that are derived from the type and strength of natural disasters and present state of the power distribution grid, and classifications to assess restoration plans and the status of restoration organization preparations corresponding to the scale of damage.

- Prior evaluation of damage estimate and formulation of restoration plans based on the results
- Restoration capacity corresponding to damage estimate and restoration plans (damage comprehension abilities, restoration materials, staff, support, etc.)
- Ensuring EC business unit functions when hit by a disaster
- Ensuring access and coordinating functions with related organizations for recovery efforts
- Continuous mutual assistance organization

(3) Key Assessment Element C: Business continuity readiness

To mitigate the damage from natural disasters and achieve early recovery, a restoration plan that has been backed up by securing the materials and personnel for the improvement or repair and restoration of facilities from a hard aspect based on an assessment of present status is required. The intentions at the management level to prompt action from normal operating periods, and the EC efforts based on this action, are essential. From this perspective, for this item we assess 11 items in total.

- Management level commitment to a business contingency plan
- Business plan for strengthening facilities
- Emergency action plan

(4) Approach to rating assessments

The total points for each assessment classification are shown in Table 34. To apply weighting to Key Assessment Element A for assessing mitigation of the scale of damage for natural disaster risk, a point allocation of 50% was assumed.

Table 34 Point allocation: numbers of assessment classifications and questions

Assessment Classification (Key Elements)	Point Allocation	Number of Assessment Classifications (LEVEL 1)	Number of Questions
A Mitigation of scale of damage	50	7	21
B Shortening of restoration period	35	5	15
C Business continuity readiness	15	3	11
Total	**100**	**15**	**47**

Even if one measure has been implemented, its effects against natural disaster risk might not be achieved in some cases when other measures are flawed. For example, even if the power distribution grid's design strength for typhoons is sufficient, the original level of disaster prevention cannot be ensured when there are flaws in the quality of the construction or facility. And even if materials for restoration are sufficiently deployed, any recovery effort will make little headway if construction capabilities are lacking at the time of the disaster. Although rating methodologies for each assessment classification include systems for adding points, deducting points and averaging points, we have utilized a system for deducting points as a base because of the thinking that no result is achieved if the important items are not implemented as described above. Using an assessment methodology that incorporates a point deduction system makes it possible to broaden the width of the deduction point items considered to be essential for improving the resilience against natural disaster risks, to modulate the assessments, and to encourage a response for important items.

The specific assessment and rating methodologies are outlined below.

- Allocate the large assessment classification allocation points to each intermediate assessment classification as allotted points, and set the allotted points for each of the 15 total LEVEL 1 categories.
- If the maximum number of deduction points is allocated to each assessment item and an item is not achieved, deduct points from the allotted points of the corresponding intermediate classification.
- If multiple items are not achieved because two or more check questions are in the LEVEL 1 category, the allotted points for the LEVEL 1 will become (-) in some cases, but when the allotted points for LEVEL 1 have dwindled to (0) points as a result of deducting points, assume the assessment for said LEVEL 1 to be (0) and a (-) assessment. This is done to maintain the independence from other check questions.
- Aggregate the remainder number of the LEVEL 1 in the Key Element category, and use this as the assessment points for the BCM rating.

Using an assessment methodology that incorporates a point deduction system makes it possible to broaden the width of the deduction point items considered to be essential for improving the resilience against natural disaster risks, and to modulate the assessments.

The assessment classifications (Key Element, LEVEL 1 Category), allocation points breakdown, and number of check questions are shown in Table 35.

Table 35 Assessment classifications, allocation points breakdown, and number of check questions

	Core Categories of Rating Indicators (Key Element)	Point allocation	Evaluation Level - 1	Points allocated	Evaluation Level - 2 Number of checkpoints	Total
A	Damage Reduction (Maximum Points 50)					
1	Well designed electric distribution system prepared for Natural hazards.	30	Sufficient and appropriate natural hazard evaluation	5	1	
			Well adapted specification in design to cope with natural hazards	10	6	
			(Quality Control) - Installation	10	3	
			Inspection, Maintenance and Repair	5	4	
2	Protection against secondary damage	10	Tree and vegetation mgmt, Flying debris, Storm surges, Landslides	10	4	
3	Electrical distribution loop and isolation	5	Power line redundancy, loop distribution	5	1	
4	Additional protection for important facilities	5	Reliable power lines to important facilities - hospitals, water & waste water plants, communication facilities	5	2	21
B	Faster Restoration (Maximum Points 35)					
1	Forecast power outage area	5	Pre-typhoon damage assessment	5	1	
2	Restoration Capability	17	Adequacy of EC's capacity for restore works	17	9	
		3	EC's command and control in a disaster	3	1	
3	Conditions to restore works	5	Redundancy in power supply, possible obstruction to access for restoration	5	1	
4	Mutual aid system	5	Effectiveness of Taskforce Kapatid - Mutual Aid Partnership	5	3	15
C	Management Control in BCM (Maximum Points 15)					
1	Management commitment	5	Clear commitment for upgrading facilities prepared for natural hazards	5	1	
2	System hardening plan	5	Facility upgrade and rehabilitation plan w/funds	5	2	
3	Emergency response plan	5	Development, update and training, Pre-disaster acitivity, Outage monitoring system	5	8	11
					47	

The assessment items and maximum number of deduction points for each check questions are shown in Table 46.

4.6 Rating Methodology

Based on our discussions with NEA and ECs, most of the ECs are either in the very early stage of BCM activities or have not started such activities yet. Considering such situation, many ECs must be rated at very low levels in the new BCM rating, and it will be less likely that the financial incentive mechanism embedded in the rating scheme will work effectively. Hence, we recommend that NEA should evaluate ECs' BCM activities both as of today and at some future point, and should provide financial incentives based on degree of future improvement in their BCM ratings.

In order for such a scheme to work effectively, ECs will need to develop reasonable and feasible mid- and long-term BCM plans. In addition, ECs will need to be required to set a target for major BCM rating indicators. This target should be one that is achievable at some future point and could include such indicators as the buffer stock levels that NEA requires.

Furthermore, in order for this scheme to be implemented effectively, it will be necessary for NEA to build up capability to fairly evaluate the feasibility of ECs' mid- and long-term BCM plans and to conduct periodical monitoring to check their progress toward their targets.

Our recommendation has three BCM rating levels, from A to C. In the early stage of implementation of the BCM rating, it would be better to simplify the rating level so that ECs can easily understand them. Among the total 100 points in the Rating, total over 80 points are rated A, totals between 60 and 80 points are rated B, and totals below 60 points are rated C[19].

4.7 Financial Incentives in the BCM Rating

We recommend that financial incentives in the BCM rating for ECs be determined based on three factors: (1) the BCM rating as of today, (2) the BCM rating at some future point, which will be achievable based on their BCM plan, and (3) disaster-proneness of location. We believe (3) should be included both because ECs that are located where there are higher frequencies of natural disasters or are more vulnerable to calamities should be prioritized for enhancement of disaster resilience and because NEA will have a limited funding source for providing financial incentives in the BCM rating.

An example of financial incentives is illustrated in the following table. As in the case of DBJ's BCM rating, we propose preferential interest loans from NEA to ECs as a financial incentive, and discounted interest rates will be applied depending on the improvement of BCM rating from day one to the future. For example, consider an EC with a current BCM rating of C. If its future rating is A, it will borrow from NEA with an interest rate discount (tentative) of -1.5%. If the future rating is B, the interest rate discount will be -0.75%. And if the rating stays at the same

[19] Appropriate relations between rating levels and rating points will need to be further examined through trial implementation and detailed check.

level, there will not be a discount.

It would be possible to consider a scheme in which the interest rate discount is larger for ECs in high disaster-prone regions and is lower for those in low disaster-prone areas. Also, given that NEA has only limited funding for financial incentives, such a scheme would make it possible to accelerate the implementation of BCM rating for ECs in high disaster-prone regions.

Table 36 Proposed financial incentive mechanism of the BCM rating

- Evaluating ECs' disaster preparedness as of today will not be sufficient to solve the current challenge.
- Assessing the ECs' future disaster preparedness based on their BCM planning should be incorporated in this rating scheme.
- Also, disaster-proneness of each location needs to be considered for NEA to prioritize funds allocation.

(1) BCM rating as of Today		(2) BCM rating in [3-5] years		(3) Disaster-proneness of location
A	X	A	X	High
B		B		Middle
C		C		Low

(1)	(2)	(3)	Preferential rates* (compared with base rate)
A	A	Middle	[- 0.5%]
B	A	Middle	[-1.0%]
C	A	Middle	[- 1.5%]
B	B	Middle	[- 0.2%]
C	B	Middle	[-0.7%]
C	C	Middle	Not applicable

In order for NEA to prioritize limited funds allocation, the following possibilities could be considered.

- In year 1, 2, NEA provide loans only to ECs in "high" disaster-prone area. (In year 3, 4, in "middle" area and year 5 in "low" area)
- Interest rates discount would be [2 x] in "high" area and [0.75 x] in "low" area.

*The rates are tentative proposal

In this financial incentive mechanism, follow-up measures including periodical monitoring of progress of the long-term BCM plan will be indispensable, and a provision of adjustment of discounted interest rate should be considered depending on the outcome of monitoring. For example, if an EC that borrows at -1.5% discounted interest rate based on its planned improvement of the rating from C to A will be likely to achieve only B instead of A based on the results of NEA's monitoring and consultation with ECs one year after the loan disbursement, then the interest rate discount will be reduced to -0.75% thereafter. Or if that example EC will be likely to stay at the same C level in the future, then the discount will not be applied thereafter. Such penalty measures should be stipulated in the loan agreement between NEA and the ECs, and would incentivize the ECs to implement their BCM plan as originally scheduled.

4.8 Response to Cost Impact

Each EC submits its Five-Year Investment Plan to ERC in order to receive a tariff approval and achieve investment recovery. In order to recoup additional investment in disaster countermeasures, it is necessary to raise the tariff. The cost for buffer stock especially greatly affects the tariff, as it is necessary to possess a certain amount of equipment.

Therefore, tariff increase should be considered, evaluated and approved. At the time of the tariff approval by the ERC, the additional investment cost for improving disaster resilience is crucial. NEA and the ERC are currently considering the suitability of formulating the following rules for ECs in terms of buffer stocks and mobilization.

- Each EC shall file with the Energy Regulatory Commission for the approval on tariffs for recovery of buffer stock and mobilization costs.
- Upon approval by the ERC, the following should occur.
  i) The purchase of materials must be done on a regional basis. Each EC within the region should determine its buffer requirements for poles, conductors, distribution transformers, KwH meters and service wire.
  ii) A Bids and Awards Committee (BAC) from the region composed of member ECs must be created.
  iii) The bidding of the total requirements of all ECs in the region must be centralized. It can be on a per lot/material basis. The details must be published in a newspaper of national general circulation.
  iv) Contracts will be made individually or between each EC and the supplier; thus, the awarding of the contract is on a per EC basis.
  v) Delivery of materials will also be done by the supplier per EC.
  vi) Before the bidding process, each EC must pass a resolution requesting the Regional Association to conduct the purchasing of materials on its behalf.
  vii) The bidding procedure must be in accordance with NEA Memorandum No. 2005-030 on the Procurement Guidelines for Electric Cooperatives dated 07 October 2005.
  viii) Replenishment shall be made when the materials are used.
  ix) Proposals of ECs shall be supported by resolutions of their respective boards of directors.

Also, with regard to the effects of the tariff, NEA has conducted the following surveys and reported the unit cost per kilometer for phase 13.2kv as well as the cost for mobilization of labor.

As to how the mobilization of labor and increases in buffer stock will affect the electricity tariff, it is estimated to be PHP 0.13 /KWh, if the buffer stock is increased by 20% and the payback

period is five years. The smaller the EC is, the more it is affected. The system should be designed taking into account the different sizes of the ECs.

Table 37 Cost of phase 13.2kv line（per km, per connection）

Item	Unit Cost (PHP)	Quantity / km	Total Price (PHP)
Pole 35 ft.	18,500	18	333,000
Pole 40 ft.	25,500	2	51,000
#4/0 ACSR (Insulated)	350/m	3,000 m	1,050,000
#2/0 ACSR (Bare)	40/m	1,000 m	40,000
DTR 25 KVA	78,000	2	156,000
		Total	1,630,000
KwH meter	1,400	1	1,400
#6 Duplex (service wire)	22/m	30	660
		Total	2,600

Table 38 Mobilization cost（labor cost and fuel）

EC Class	Cost (PHP)		
	Fuel Cost	Labor Cost	Total
Mega Large	495,000	1,980,000	2,475,000
Extra Large	405,000	1,620,000	2,025,000
Large	315,000	1,260,000	1,575,000
Medium	225,000	900,000	1,125,000
Small	135,000	540,000	675,000

Table 39 Electric service tariff impact

Buffer Stock (2%, 10%, 20%)	Cost (PHP)/KWHr				
	RECOVERY PERIOD				
	1 YEAR	2 YEARS	3 YEARS	4 YEARS	5 YEARS
2% of Total Facility	0.08	0.04	0.03	0.02	0.02
10% of Total Facility	0.31	0.16	0.11	0.09	0.07

20% of Total Facility	0.59	0.30	0.21	0.17	0.13

Chapter 5 Management and Enhancement of Operation of Rating and Incentive Systems Based on Disaster Resilience Evaluations

5.1 Analysis of the Cost-Effectiveness of Costs for Disaster Resiliency-Related Investment

5.1.1 Purpose of the Cost-Effectiveness Analysis

As described in “0

BCM Rating Item Proposal for ECs”, the physical reinforcement of facilities (hardening) and strengthening of restoration response capabilities, and the creation of measures and systems to achieve these, are thought to be essential for enhancing the resiliency of the power distribution grid from the standpoint of electric power supply business continuity. Among these, the hardening of facilities is the foundation of business continuity management because even though it involves investment, hardening directly diminishes the extent of damage to the power distribution grid and is linked to faster recovery activity. Decisions on investment in hardening require cost effectiveness analysis that takes into consideration the extent of damage to facilities in their present state given the strength and frequency of occurrence of envisaged disasters, and the extent of damage after the investment. Cost effectiveness analyses that are consistent with BCM assessments for the purpose of facilitating enhancements of power distribution grid resiliency against natural disasters are also required for studies for the introduction of incentive systems, and are implemented as discussed below.

5.1.2 Cost-Effectiveness Analysis Methodology

(1) Natural disaster risks targeted

The natural disasters in the Philippines are diverse, and the site conditions of the electric power supply grid facilities, which are broadly distributed, vary as well. Consequently the countermeasures that are effective differ depending on the type and location of the disaster. While disasters such as earthquakes and landslides & debris flow cause serious damage to the power distribution grid, their scope of damage and incidence are limited. Typhoon disasters, on the other hand, occur repeatedly year after year, making them a type of disaster that produces widespread damage. Although items for assessing vulnerability to a wide range of natural disasters are included in our BCM assessment indicators, in this section we will limit our example cost-effectiveness analysis to assessing the strength of the power distribution grid against the wind loads that occur frequently when typhoons strike.

(2) Assessment methodology considerations

A power distribution grid’s vulnerability to typhoons is determined by the combination of a “passing typhoon’s strength” and the “strength of the power distribution grid”. In the Philippines, the power distribution grid is a facility distributed widely and continuously throughout the country, stretching across diverse topographic features, and therefore differs from an industrial installation such as a power plant whose strength can be assessed on a

standalone basis. Not only is the strength of the power distribution grid not uniform, the hazards differ in strength because of various topographical conditions, meaning there is no single model by which the typhoon damage to the power distribution grid in the Philippines can be assessed quantitatively[20]. Therefore, we prepared an assessment tool based on the following thinking and performed a cost effectiveness analysis with the goal of promoting the introduction of an incentive system.

- Used the eastern coast of southern Luzon (specifically the northern part where CASURECO2 is located), where the typhoon risk is high, as the analysis target
- Indicated the map positions of utility poles and electric wires based on the power distribution grid site information obtained from CASURECO2, and aggregated the number of utility poles and present state of their span into 1km grid units
- Used Typhoon No. 21 in 2006 (Durian), which inflicted severe damage to CASURECO2, as the hazard (scenario typhoon)
- Using the Weather Research and Forecasting (WRF) area weather model, simulated the mean wind speed placed on the 1km-interval grid in the analysis target region when the scenario typhoon passed, while reflecting the roughness of topographic features and earth's surface
- Assessed the peak gust speed during the scenario typhoon's passage by multiplying the mean wind speed calculated by the simulation model by a gust coefficient
- Based on research case histories in the United States and Japan and interviews at the Central Research Institute of Electric Power Industry, which developed the typhoon hazard assessment model for the power distribution grid in Japan, developed a damage rate curve of the power distribution grid at various wind speeds
- Because the power distribution grid's strength against wind load differs depending on utility pole span and strength of the utility poles that serve as the structure supporting the electric wires, prepared individual proportions of damage curves
- Assessed the power distribution grid damage ratio as a result of the scenario typhoon for seven cases that combined the present state and a reinforcement plan for the average utility pole span and utility pole strength in each grid
- Comprehended the damage mitigation effect from the resiliency enhancements by analyzing the power distribution grid damage ratio after shortening the mean span and increasing utility pole strength
- Based on data received from NEA, assessed the amount of investment needed for resiliency enhancement and the amount of damage mitigation, and analyzed the cost effectiveness

The important assumptions and hypothetical conditions are described below.

[20] SJNK-RM Co. judgment based on interviews with U.S. natural disaster risk modeling companies

- Wind velocity within the 1km grids was assumed to be uniform.
- Current strength of utility poles within the scope of analysis (No information on the strength class is recorded; uniformly assumed to be Class 5.).
- Utility pole length and embedded depth uniformly assumed to be 12m and 2m, respectively.
- Regardless of the direction of the wires and installations, the power distribution grid is assumed to be constructed at a right angle to the wind direction (maximum working wind load on the utility poles and electric wires).
- Thinking regarding wind load and utility pole breaking strength follows the Power Distribution Code 2012 Edition.
- Assumed the power distribution grid installations and facilities meet specifications and there are no product defects or substandard construction.
- Assessed only utility pole destruction as a result of wind load acting on the utility poles and electric wires. Did not consider the wind load acting on telecommunications cables.
- Did not consider power distribution grid damage caused by secondary disasters such as trees falling on electric wires.

5.1.3 Cost-Effectiveness Analysis Conditions

(1) Power distribution grid system map in the target region (northeastern area where CASURECO2 is located) (Figure 12)

Figure 12 Power distribution grid system map used for the analysis

(2) Image of utility pole electric wire count in each grid and count result (Figure 13)

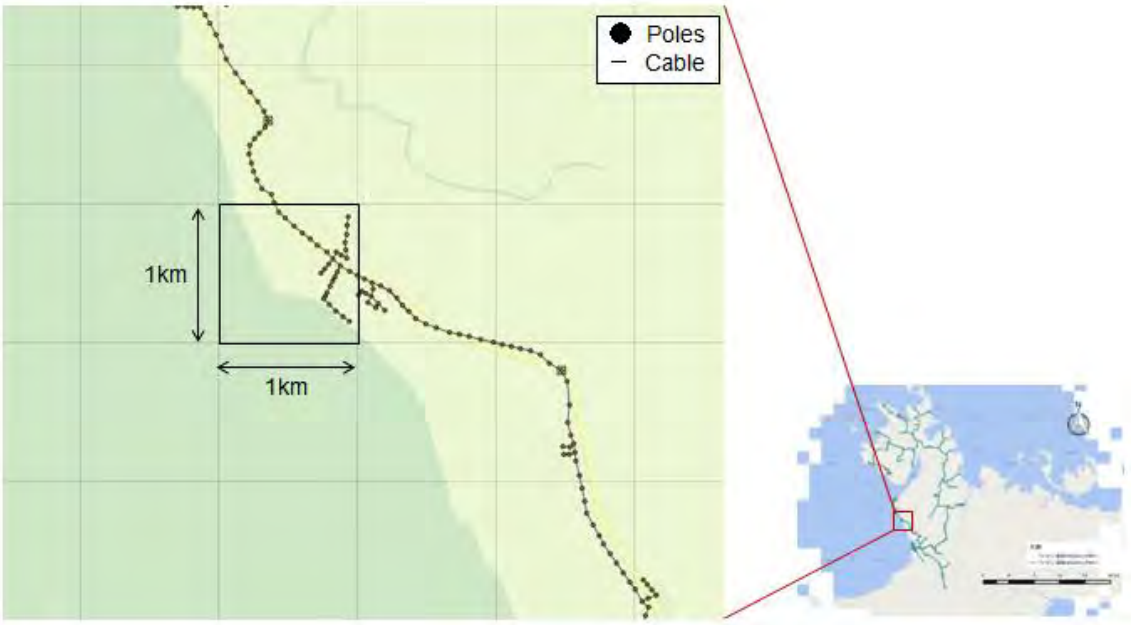


Figure 13 Image of utility poles and power distribution lines

CASURECO2 TINAMBAC area		
Total electric wire length: 211,724m	Total number of utility poles: 2,673 poles	Mean spans: 79.2m (≒80m)

(3) Summary of scenario typhoon and passage route (Figure 14)

Typhoon No. 21 of 2006 (Durian); Category 4; Central atmospheric pressure at nearest approach to EC 930-940 hPa[21]

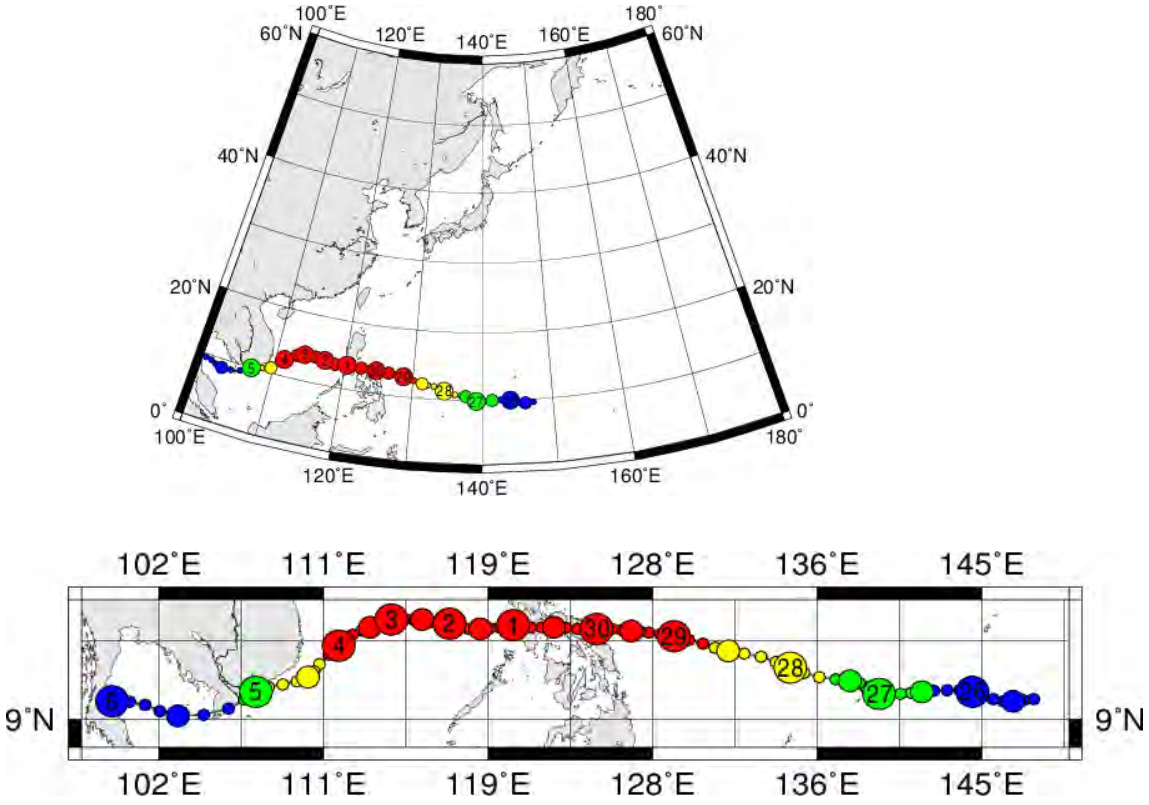


Figure 14 Scenario typhoon track record

(4) Scenario typhoon reproduction period (central atmospheric pressure standard immediately prior to landfall in the Philippines) (Figure 15)

Immediately prior to landfall in the Philippines (Greenwich Mean Time 2006/11/30 00:00)

Category	Strong typhoon (TY)
Center position	N 13.4 degrees, E 124.6 degrees
Central atmospheric pressure	940 hPa
Maximum wind velocity	90 kt (45m/s)

[21] Central atmospheric pressure information is from Japan Metrological Agency.

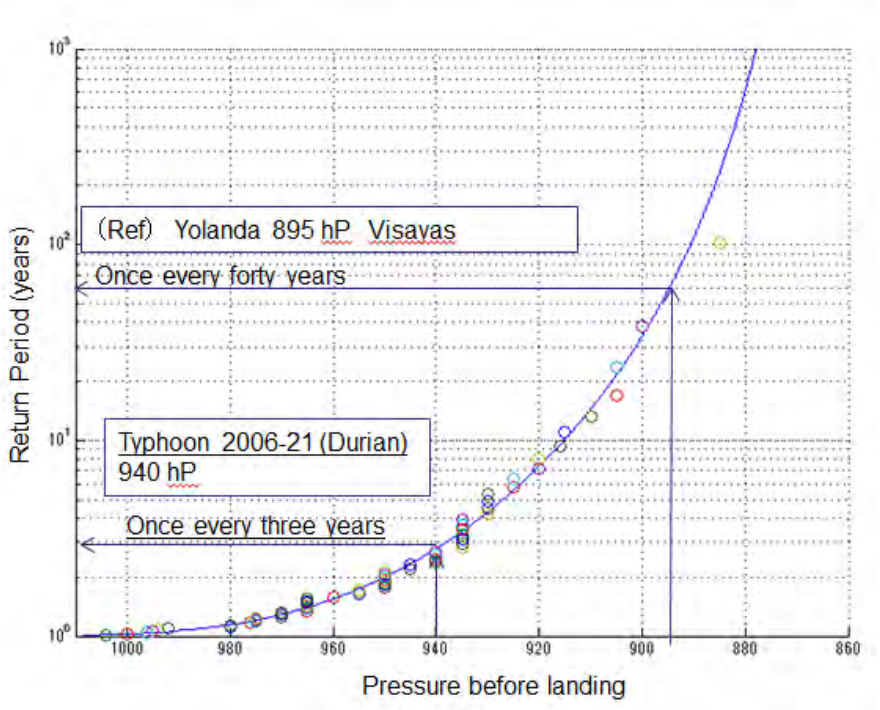


Figure 15 Calculated return period of Durian and Yolanda

(5) Distribution diagram of maximum instantaneous wind speed produced by scenario typhoon (Figure 16)
Simulation result of maximum instantaneous wind speed distribution produced by scenario typhoon

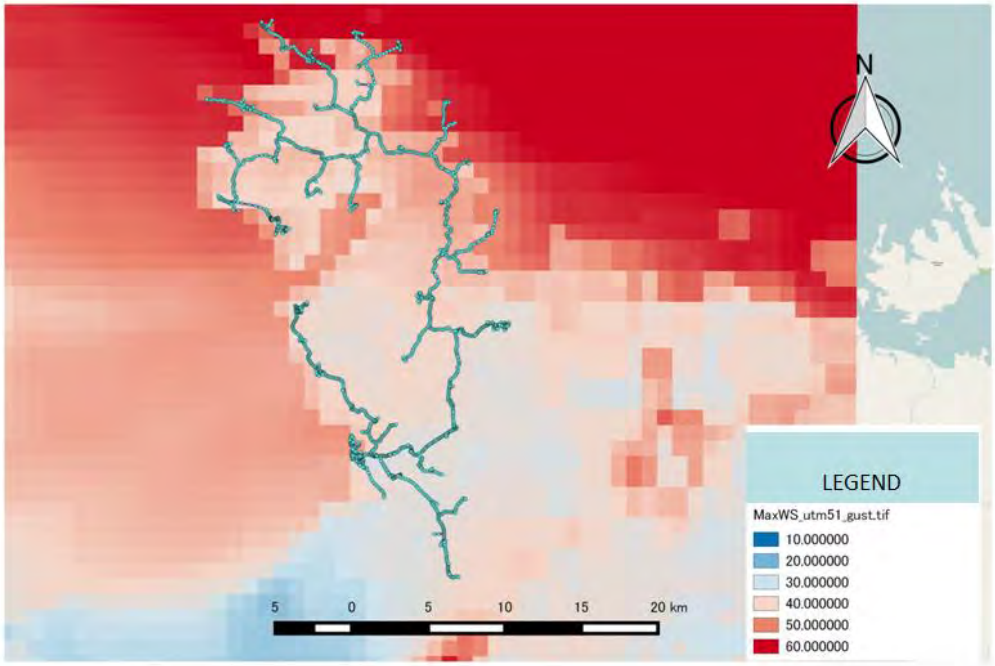


Figure 16 Wind speed distribution at the target area

(6) Utility pole damage curves (Class 5; utility pole spans from 25m to 125m) (Figure 17)

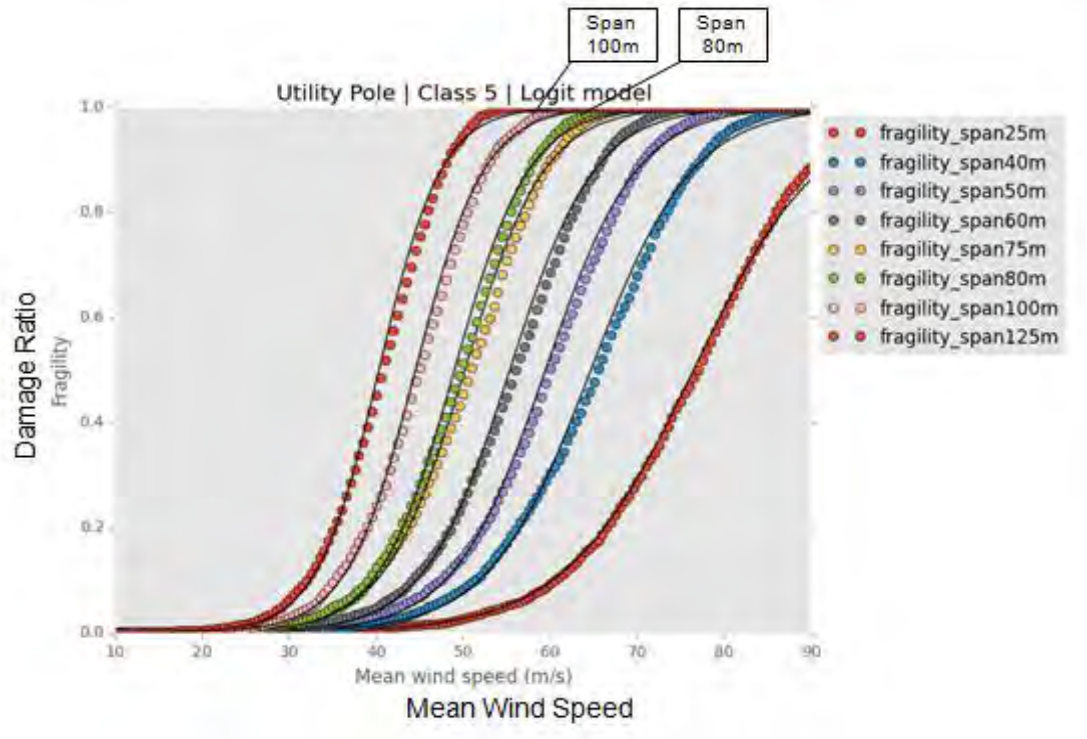


Figure 17 Damage curves for class 5 poles

(7) Utility pole damage curves (Class 2; utility pole spans from 25m to 125m) (Figure 18)

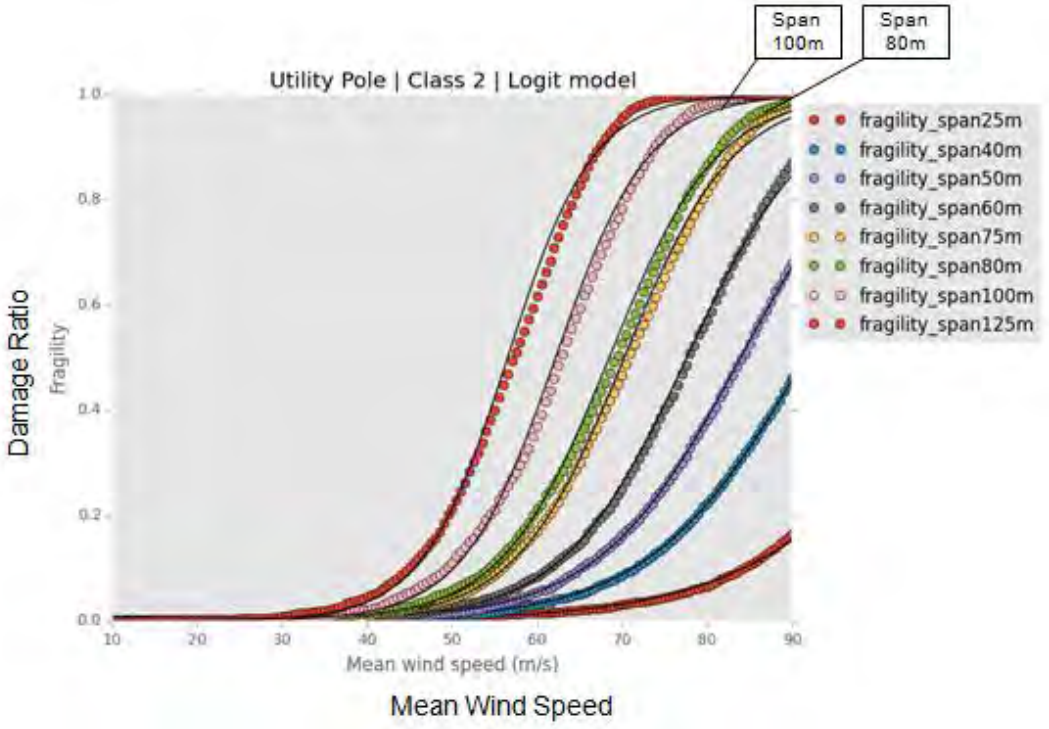


Figure 18 Damage ratios for class 2 poles

(8) Image of span shortening for power distribution grid resiliency enhancement (Figure 19)

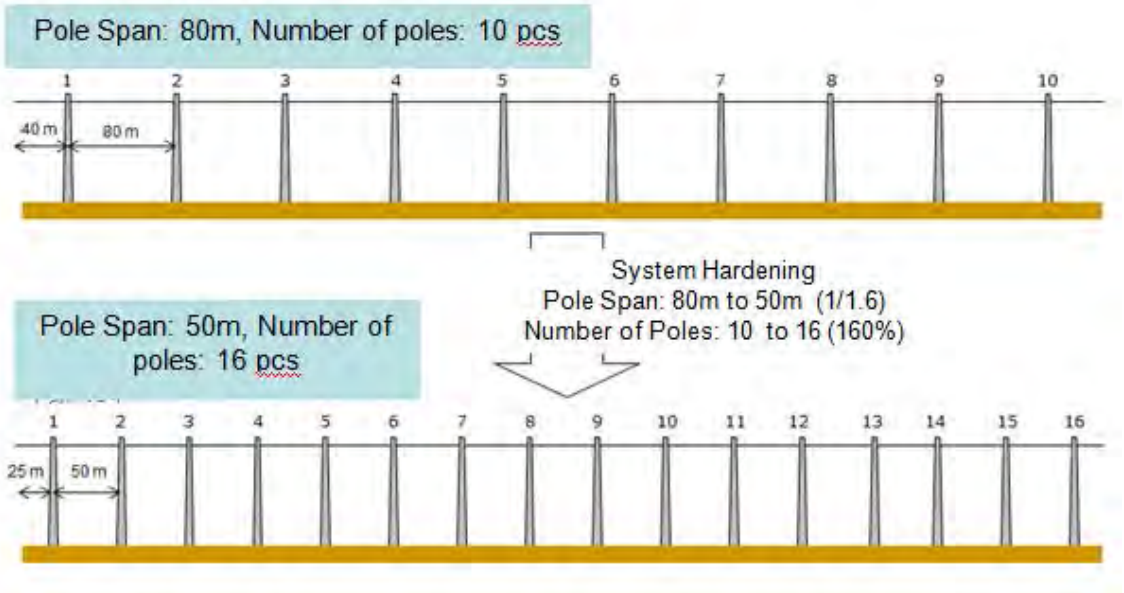


Figure 19 Pole span shortening

(9) Calculation results

Based on the assumptions described above, a damage ratio (damaged utility pole failures to total

number of poles) compares damage under existing conditions with what could be expected either by shortening pole spans alone or by shortening pole spans in conjunction with upgrading the pole class
. (Table 40)

Table 40 Case study: expected number of damaged poles

Cases for System Hardening	Pole Class	Average Length Pole Span (m)	Number of Poles (1)	Damaged Poles (2)	Damage Ratio (2) / (1)	New Installation of Poles	Saved Poles by Hardening	Benefit
Existing	5	80	2,673	282	10.50%	0	0	-
Span Shortening only	5	60	3,564	166	4.70%	891	116	13.02%
	5	50	4,277	115	2.70%	1,604	167	10.41%
	5	40	5,346	75	1.40%	2,673	207	7.74%
Span Shortening and Upgrade of Pole Class	2	80	2,673	30	1.10%	2,673	252	9.43%
	2	60	3,564	21	0.60%	3,564	261	7.32%
	2	50	4,277	18	0.40%	4,277	264	6.17%
	2	40	5,346	15	0.30%	5,346	267	4.99%

5.1.4 Study of Results Produced by Countermeasures

(Occurrence)

- Statistically, the Luzon landfall recurrence interval for Durian, the scenario typhoon, was calculated as three years. The recurrence interval in the assessment region is substantially shorter than the 40-year design life of the utility poles, and even if the target region size and north-south scope of the Philippines are considered, and the recurrence probability is assumed to be once in seven years, damage is envisaged to occur several times during this 40-year period.

(Effectiveness)

- According to the results in the table above, which are now being studied by NEA, the damage ratio as a result of the scenario typhoon is improved from 10.5% under the present state to 0.40% when hardening by shortening the utility pole span to reflect the BCP rating assessment (from 80m to 50m) and upgrading the utility pole strength to the highest class is undertaken. When only shortening of the utility pole span or only strengthening of the utility poles is adopted, the damage ratio is improved to 2.70% and 1.10%, respectively.

(Considerations)

- Although upgrading the utility pole strength requires utility pole replacement, this work can be performed without power outages.
- In addition to the need for additional sites for poles, shortening the utility pole span will require electric wire repairs.

- In addition to the installation of new utility poles and electric wires, damaged poles and wires must be removed and scrapped during post-disaster restoration, but in the Utility Pole Span Shortening Plan prepared before the disaster, the existing utility poles, electric wires and transformers can be used by installing additional utility poles between existing poles.
- Although the damage ratio will be reduced from 10.5% under the present state to 2.7% as a result of enhancing power distribution grid resiliency by shortening the utility pole span, this will not be immediately linked to an increase in revenue from electric power sales.
- The cost-effectiveness of shortening the span and strengthening utility poles will vary depending on the number of electric wires subject to wind load.
- For this analysis we studied the mean span between utility poles. The on-site inspection at CASURECO2 revealed that actual utility pole spans are not identical; when upgrading it would be effective to shorten the spans by concentrating on the locations with long utility pole spans.

5.1.5 Comparison of Damage Forecast under Present State and Damage Mitigation as a Result of Span Shortening

As part of the above resiliency enhancement trial calculations, for the utility pole span shortening (50m) case that the NEA is now planning we provisionally calculated the damage mitigation effect versus the investment cost for the typical 40-year utility pole design life. The following premises were used.

- We assumed an upfront investment and the materials and construction work unit cost per utility pole required for restoration as shown in the table below, based on the attached NEA Buffer Stock Plan materials. (Table 41)

Table 41 Unit cost estimation used for the analysis

Unit Cost to install Distribution Network per 50m			Unit: PHP
Case	Material and Installation（per 50m）		(per 80m)
Category	Cost before Damage	Restoration (50m)	Restoration (80m)
Poles	25,500	25,500	25,500
Cables	2,725	62,300	99,685
Installation	1,375	5,500	8,800
Total	29,600	93,300	133,985

- From the damage calculation results, we assumed a damage ratio of 10.50% for the present state case, and a damage ratio of 2.70% for the span shortening case.
- We assumed the scenario typhoon recurrence interval in the target region to be seven years.

(Improvement case: Prior investment for span shortening)

- Improvement investment in year 1 and damage from the typhoon in year 7, with a resulting damage ratio of 2.70% based on the calculation results.
- Thereafter, similar damage occurs in years 14, 21, 28 and 35, and restoration is made to the pre-damage state.

(Present state case: Restoration to present state after being damaged)

- Damage from the typhoon occurs in year 7, and the damage ratio is 10.5% based on the calculation results.
- Thereafter, a damage ratio of 10.5% including restored portions occurs in years 14, 21, 28 and 35, and restoration is made to the identical present state.

- As interest rates to obtain the capital required for the upfront investment we assumed annual interest at 8% and at 4%. For interest payments we assumed simple interest payment every year without carry-over, and the principal portion of the loan is assumed to be renewed as is. Therefore, principal repayments are not included in the trial calculation.
- The total capital required over 40 years both under the improvement case and under the present state case is shown in the table below. Trial calculations were made for both funding interest rate cases (4% and 8%). (Unit: PHP thousands) (Table 42)

Table 42 Cost to benefit summary for 40 years

			Interest 4% / year		PHP 1,000
Case	Investment	Restoration	Total	Interest (4%)	Total
Refurbish	47,478	53,871	101,349	119,062	220,412
Existing (as is)	0	188,025	188,025	150,420	338,444
			Interest 8% / year		PHP 1,000
Case	Investment	Restoration	Total	220,412	Total
Refurbish	47,478	53,871	101,349	229,732	331,081
Existing (as is)	0	188,025	188,025	300,839	488,864

- While the improvement as a result of span shortening is not immediately linked to an increase in revenue from electric power sales, the damage mitigation effect is clear. Over a 40-year period, the improvement cost including upfront investment is PHP 101,349,000, compared with a total restoration cost for the present state case of PHP 188,025,000.
- Although the capital must be procured in advance for the upfront improvement, the total cost over 40 years is less than in the improvement case.

5.1.6 Considerations concerning Investment Cost-Effectiveness

(1) Investment cost-effectiveness comparison

- For the utility pole 40-year design life, the total cost of the improvement case entailing an upfront investment in year 1 is lower than for the present status case in which the power grid is restored after being damaged. The comparison results for both cases are similar even if the funding interest rate is taken into consideration.
- In addition to the difference in damage ratios for the improvement and present state cases (10.5% vs. 2.7%), the similarity regardless of the funding interest rate used is attributable to the fact that prior improvement can use the existing electric wires (partial, adjustment required) but recovery work also requires electric wire replacement, which increases the work unit cost.
- The utility pole span shortening and increase in utility pole strength planned by NEA are expected to greatly diminish the power distribution grid damage ratio resulting from the scenario typhoon (utility pole span shortening: 2.7%; when combined with an increase in utility pole strength: 0.40%), making it an effective plan to enhance power distribution grid resiliency against typhoons.
-

(2) Other considerations

- The societal costs in conjunction with storm damage and power outages are not considered in the above trial calculations. In addition, based on the field investigation the present-state facilities are thought to have quality-related problems, including material and construction defects that are linked directly to vulnerability to natural disasters, so there is a possibility of damage actually being greater. An opportunity to fix these defects through appropriate management of the improvement plan exists.
- In contrast to post-disaster restoration, prior strengthening has other advantages as well, including the possibility of utilizing existing utility poles and electric wires, elimination of removal costs for damaged facilities, being able to perform preplanned works based on priority level, and achieving lower societal costs, such as a reduction in the scope of power outages and a shorter recovery period.
- Although we assumed the recurrence interval of the scenario typhoon in the region in question to be seven years, many more smaller-scale typhoons occur. This also is believed to increase the advantages of improvement, because given the history of past damage, the power distribution grid will suffer damage as a result of these storms as well.
- For these calculations we assumed the mean span as a base, but because utility pole spans actually are varied, the preferred approach would be to preferentially make repairs in intervals where the span currently exceeds 50m.

5.2 Future Expansion of the Application

5.2.1 Prospects for Collaboration with Credit Guarantee Companies

LGUGC is positioned as an extremely important player. As previously mentioned, it has been

guaranteeing EC loans by government and commercial banks since 2004. The World Bank, who contributes capital to this guarantee program, has praised the LGUGC program, and the participating government and commercial banks seem to have a deep trust in LGUGC. LGUGC also provides guarantees for rural waterworks projects and is encouraging private bank participation in enhancing disaster resilience through future rural infrastructural projects in the Philippines.

LGUGC has strong interest in our role of facilitating private bank loans to ECs investing in disaster resilience and participating in future disaster resilience projects as a credit enhancement entity. Also, LGUGC's president has expressed hopes for the possibility of JICA funding LGUGC.

It should be noted here that LGUGC also helped gather partner banks in holding the August 2015 briefings for this study, and opinions were obtained via a questionnaire at the briefing. In the questionnaire, banks expressed high expectations for LGUGC to guarantee EC loans, and all respondents answered "Positive" to the possibility of LGUGC starting up a new guarantee program for the EC disaster resilience sector.

Given the limitations of the nonetheless important NEA role in EC financing, there is sufficient value in discussing the role of LGUGC in achieving improved EC disaster resilience. This could mean utilizing JICA overseas investment loans, strengthening ties with the World Bank with its new guarantee program, or other methods.

5.2.2 Prospects for Collaboration with Government Financial Institutions and Private Commercial Banks

This section will discuss the prospects for collaboration with DBP, the representative government bank, and with either BDO Unibank (BDO), the largest of the three biggest private universal banks, or the Bank of the Philippine Islands (BPI), the third largest and the oldest private universal bank, on whether the BCM ratings and incentive mechanism for disaster resilience evaluated by NEA could expand the lending to ECs or be adopted for other infrastructure and the industrial sector.

(1) Prospects for collaboration with government financial institutions

1) Expanding loans to ECs

DBP has been addressing the financial needs of ECs in line with government policy and assisting the promotion of a new model and methods to provide loans to ECs. Therefore, DBP is highly interested in the incentive mechanism based on the BCM rating scheme that NEA is considering to introduce for the first time in the Philippines. Given that, NEA's introduction of the incentive mechanism presents a chance for NEA and DBP to collaborate with each other in designing a special loan program for ECs.

However, DBP must raise the concessional funds so that it can provide long-term, low-interest loans to ECs with high BCM ratings, meaning DBP needs to procure ODA funding from the ADB, World Bank, JICA and other donors. Without ODA funding, the loan maturity and interest rate would be the same level as those offered by private commercial banks, even for loans with no guarantees by LGUGC or no collateral.

According to one DBP officer, in order to provide loans to ECs with relatively high credit risk but with high BCM ratings, DBP is considering the possibility of increasing co-financing with NEA and providing syndicated loans arranged by LGUGC as representative of its 13 partner banks. Also, DBP is considering no-collateral loans for ECs with relatively low credit risk. Given that the ECs essentially hold regional monopolies in terms of power distribution utilities and earn their income by collecting fees from end-users, non-recourse-type loans for ECs will be another option, depending on the cash flow.

2) Expanding application to other sectors

DBP is considering the water sector as the next priority infrastructure after providing loans to ECs based on the NEA model for BCM rating. If DBP will expand the BCM rating model to the water sector, it will need to develop a BCM rating organization to implement the same role as NEA. DBP's initiative to take on this task will be a key issue.

DBP could also contribute to disaster response in the industrial sector by providing funding for advanced investment in disaster preparedness. That would require DBP to design disaster risk finance, including contingency loans for disasters. Taking such future needs into consideration, DBP is expected to take the initiative in providing new financing options as a government financial institution.

(2) Prospects for collaboration with private commercial banks

1) Expanding loans to ECs

BPI, the third biggest private commercial bank, has recently provided loans to seven ECs amounting to a total of just under PHP 1 billion with maturity of 5-8 years at (floating) interest rates of 5-8% through the LGUGC guarantee program. BPI intends to continue its lending to ECs, based on the guarantee by LGUGC. To make this possible, BPI will need to strengthen ties with LGUGC as mentioned in5.2.1 and to use an appropriate performance assessment rating by NEA.

On the other hand, unlike BPI and other commercial banks and despite being the largest private bank in the Philippines, BDO has not relied on the LGUGC guarantee program and as a result has provided almost no loans to the ECs. Its reasons are twofold: 1) most of the ECs are weak in terms of business entity and have low credibility regarding repayment of loans, and 2) BDO does not believe that NEA's credit rating system for ECs is sufficient. As long as these issues are not resolved, BDO would be reluctant to give loans to ECs, even if NEA could introduce a

BCM rating system.

In order to enable BDO and other private commercial banks to provide loans to ECs without the LGUGC guarantee program, given private commercial banks' difficulty in fully grasping the credit information for the individual ECs, it is important to improve NEA's peformance assessment rating system and strengthen the organizational capacity of the ECs. In particular, the ECs must avoid the need for political intervention and must enhance their capacity development to make their operations commercially viable.

2) Expanding the applicability of the NEA model to other sectors

Private commercial banks are to provide loans to other industrial sectors for post-disaster rehabilitation. And, in case of investments in new CAPEX financing for some companies, including a component to prepare for disaster in advance, such investments related to disaster-prevention management will also be open to private banks' loans. As only a limited number of private companies in the Philippines have introduced BCM from a strategic point of view, there is no BCM-based financing program in place and currently no risk finance, such as contingency loans for disaster. As a first step to introducing this in the future, it is necessary to disseminate the NEA model to other sectors.

The following table summarizes the prospects for collaboration with government and with private commercial banks:

Table 43 Prospects for collaboration with government and with private commercial banks

Institution/Item	Expanding loans to EC	Expanding the applicability of the NEA model to other sectors
Government financial institutions (DBP)	・ Design a special loan program to raise ODA financing ・ Loans to high-risk ECs by co-financing with NEA and private banks ・ Loans to low-risk ECs with non-recourse-type finance	・ Consider the water sector and build a BCM rating organization for it ・ Consider funding in advance of disaster management and provide disaster risk finance.
Major private commercial banks (BDO, BPI)	・ Strengthen ties with LGUGC ・ Improve NEA's performance assessment rating system and strengthen the organizational capacity of the ECs	・ Strengthen the finance for post-disaster rehabilitation and disaster preventive measures

5.2.3 Prospects for Collaboration with Insurance Companies

This section will discuss the prospects for collaboration with insurance companies that are taking initiatives to prepare insurance for ECs with other institutions based on the disaster insurance for power networks and new insurance scheme for disaster outlined in "3.2.3 Initiatives Related to Insurance".

While private insurance companies are not currently able to provide ECs with disaster insurance alone, there are two schemes which likely could be adopted to do so while mitigating their underwriting risks: the Philippine Insurers and Reinsurers Association scheme and the Government Service Insurance System scheme. The PIRA scheme is a disaster risk insurance pool for landowners and SMEs being discussed with the IFC, and the GSIS scheme is a disaster insurance pool for LGUs being discussed with the World Bank. The reasons that these two schemes could be adopted to insure ECs, and some anticipated issues, are outlined in the following table.

Table 44 Applicability of PIRA scheme and GSIS scheme to ECs

	PIRA scheme	GSIS scheme
Why the applicability to ECs is possible	1) PIRA can coordinate matters based on the interest of insurance companies. 2) PIRA is discussing disaster insurance for landowners and SMEs under the support of IFC, and NEA is also consulting with IFC about disaster insurance for the ECs. These schemes can be verified through comparison.	1) NEA is one of the GOCC agencies to be insured by GSIS. 2) GSIS has already offered non-life insurance for power generation and transformers. 3) GSIS premium rates are the same as those of private insurance companies, but GSIS is exempt from documentary stamp tax and VAT.
Expected issues related to insuring ECs	Strengthening the insurance pool will require adding a significant number of the large ECs with assets above a certain level. NEA must pool the ECs and manage them appropriately. Insurance risk must be diversified with reinsurance. IFC support is also needed, as in the scheme for the ECs currently being discussed.	Whether GSIS can insure ECs in light of its purposes and authority must be discussed. NEA must pool the ECs and manage them appropriately. As GSIS lacks the expertise in practical non-life insurance operations, including reinsurance, it will need support from private insurance companies.

5.2.4 Prospects for Collaboration with International Organizations

This section will primarily discuss the prospects for collaboration with the Association of Development Financing Institutions in Asia and the Pacific (ADFIAP), Asian Development Bank (ADB) and World Bank/IFC in expanding the applicability of the NEA model.

(1) ADFIAP

1) Overview

ADFIAP is a non-profit international organization established in 1976 in Manila with the support of ADB to promote sustainable growth and mutual cooperation among development banks and other development financing institutions in Asia and the Pacific. Currently, ADFIAP has 45 member countries and 131 member institutions.

The 12 corporate members of ADFIAP in the Philippines are listed below. Except for the ADB and IFCL Group, all of the members are financial institutions (including non-banks). Representative institutions among them are DBP and LBP, which provide loans to ECs.

Table 45 Philippine members of ADFIAP

Names of Institutions	Notes
1) Alalay Sa Kaunlaran Incorporated	
2) Asian Development Bank (ADB)	International financial institution
3) Development Bank of the Philippines (DBP)	Government financial institution
4) Esquire Financing, Inc.	
5) IFCL Group	Consulting for infrastructure
6) Land Bank of the Philippines (LBP)	Government financial institution
7) Optimum Development Bank	Bank for SMEs
8) PAG-IBIG Fund	Mortgage fund
9) People's Credit and Finance Corporation	Microfinance institution
10) Philippine Export-Import Credit Agency	Trade finance institution
11) Planters Development Bank	Bank for SMEs
12) RCBC Savings Bank	Bank for SMEs

2) Prospects for collaboration

Through DBP, LBP and the other Philippine member institutions, ADFIAP should be capable of functioning as the platform for developing and expanding the BCM rating model for ECs established by NEA to other infrastructure and industry sectors domestically, as well as the platform for spreading awareness of this model to other Asian Pacific member countries. In fact, in a questionnaire distributed and collected at the briefing for ADFIAP member institutions held in September, many of the attendees (8 of the 12) responded "positive" to the prospect of introducing BCM ratings at their institution.

Within the Philippines, ADFIAP could introduce the NEA model to bank associations, regional bank groups, microfinance and other finance circles, chambers of commerce and industrial associations for major industry, as well as hold workshops on making the NEA model applicable to other sectors. Interest is expected to be particularly high in financial circles, given that the commercial banks have developed a risk-based credit scoring model for credit analysis related to loans to SMEs, but no banks have adopted the evaluation items of BCM for disaster risk.

Also, with DBP and LBP hosting the ADFIAP CEO seminar to be held in Manila in December 2015, this could be taken as an opportunity to disseminate the NEA model in the Philippines to executives of development financial institutions participating in the seminar.

Based on everything above, the approach for financing entities to fund EC CAPEX loans for disaster resilience should be arranged as given in the chart below according to the credit risk and disaster risk attributes of the insured ECs. What this means is that NEA grants and long-term, low interest loans through ODA financing from JICA (including grant aid) should be discussed for ECs that are financially and technically weak and/or in regions subject to relatively frequent natural disasters, regardless of the credit risks. Conversely, ECs that are financially and technically strong and in regions not subject to frequent natural disasters should be funded with private capital from commercial banks. ECs finding themselves somewhere in the middle should mainly be covered with LGUGC credit enhancement and financing from government banks and the REFC.[22] It should be expected that both public and private financial sectors will provide financing to ECs for their efforts in disaster resilience.

[22] While standards in the chart for (A) EC performance assessment ratings and (B) EC BCM ratings are assumed to be proportional and (C) natural disaster incidence is assumed to be inversely proportional to (A) and (B) in the interest of simplicity, there are likely ECs where (A), (B) and (C) are all high and ECs where (A) is high and (B) is low. Such exceptions are thus left out of such a simplified chart. Further, as credit decisions are actually greatly influenced by EC-specific issues with credit risks and so forth, the categorizations for financing entities are also not as simple as given in the chart.

(A) Performance Assessment Rating by NEA	(B) BCM Rating by NEA	(C) Frequency of Natural Disasters (≒ Urgency of Policy Support)	Financing Entities	Notes
Highest (AAA: 50 ECs)	High	Low	Commercial banks w/o LGUGC guarantee, commercial banks w/ LGUGC guarantee	LGUGC: JICA ODA financing expected
High (AA: 17 ECs)	Medium	Small to medium	Commercial banks w/ LGUGC guarantee	
High to medium (AA: 17 ECs, A: 5 ECs, B: 13 ECs)	Medium to low	Medium to high	Government banks, REFC	DBP: JICA ODA financing expected
Medium to low (B: 13 ECs, C: 13 ECs, D: 10 ECs)	Low	High	NEA	NEA: JICA ODA financing expected

5.3 Recommendations

Through this study, in addition to NEA and the ECs, the financial institutions lending to and guaranteeing the ECs, including commercial banks, government banks and the LGUGC, have also shown great interest in the possibility of introducing a BCM rating and incentive system to improve disaster resilience. The DOF, overseeing Philippine Disaster Risk Finance (DRF), also has reason to expect future progress because of this study. Also, the main DRF donor organizations, those being the World Bank and IFC in the power and other sectors and ADB in terms of LGUs, are providing various assistance in enhancing Philippine disaster resilience and are actively seeking to increase future collaboration and complementary relations with JICA in order to achieve a more comprehensive and effective approach.

A pressing issue to achieving stable, sustainable growth over the medium to long term in the Philippines, a country susceptible to typhoons, earthquakes and other natural disasters, is improving disaster resilience for major infrastructure, including the power distributors focused upon in this study. Based on the results of data collection surveying at present, the study team recommends the following in terms of introducing and spreading a BCM rating and financial incentive system in the Philippines.

5.3.1 Introducing Appropriate BCM Ratings and Assisting NEA and ECs in Capacity Building for Effective Application

In this study, we have proposed to NEA a BCM rating with 47 indicators based on the current state of Philippine power distributors, NEA equipment guidelines and other resources. The NEA Engineering Department, the main constituent for introducing and managing BCM ratings in the future, has agreed to the proposal outline.

The actual introduction and future application of this proposal on the ECs will likely require the following processes, and NEA and the ECs will also likely require assistance in building capacity for the processes to go smoothly and efficiently.

1) NEA creation of BCM planning guidelines and EC BCM planning

As stated above, the current level of EC initiatives for BCM is low overall, and thus it would not be feasible to provide ECs with financial incentive based solely upon current BCM ratings. Accordingly, an NEA-led scheme for providing financial incentives based on expected levels of improvement should be effective in urging the ECs to strengthen their future disaster resilience. In this scheme, ECs would be required to have a medium- and long-term BCM plan, with evaluations for incentive based upon future BCM levels if the BCM plan is followed as planned.

In order to see this scheme come to fruition, first NEA should develop BCM planning guidelines with 3- to 5-year disaster resilience target values, and each EC should plan its own BCM targets for appropriate and achievable actions based on the NEA guidelines and their own

current situation. Ideally, this would be set in motion as soon as possible.

Also, while the NEA is building up a buffer stock and helping with Task Force Kapatid as part of Build Back Better initiatives, it is important for them to continue to transition from reacting ad hoc to natural disasters as has been the strategy in the past to building comprehensive preventive measures, including BCM planning by the ECs and NEA themselves.

2) Trial implementation of BCM ratings for multiple ECs

In order to further refine the 47-indicator BCM ratings proposed in this study towards their implementation, trial runs for rating multiple ECs with the proposed scheme will be required in order to determine the appropriateness of each indicator and their weights, and to arrange scoring standards. ECs in regions highly vulnerable to disaster will be selected for the trial run. As DBJ did with target companies when considering its BCM ratings, it will be appropriate for the NEA Engineering Department staff to score each indicator by means of site visits, EC hearings and consultations. Also, the importance of the content of the consultations with the ECs is to be reflected in the proposed rating indicators, through addition or revision, to increase the accuracy of the BCM rating indicators so that ECs can properly score themselves in the future.

3) Appropriate correspondence on the 47-indicator BCM ratings

In order to enhance disaster resilience most efficiently, each EC should determine which items of the above mentioned 47 indicators to prioritize. In order to do this, the ECs first have to determine approaches to obtain high scores for all of the 47 indicators, and then they can prioritize them.

In addition, it is crucial with regard to each of the 47 indicators, to plan and execute specific activities in order to achieve the disaster resilience goals.

As the ECs have just begun to adopt BCM at this point, they need technical assistance based on Japan's know-how and experience, which are applicable to the Philippines, in order to take the most appropriate approaches.

5.3.2 Launching a Platform with Participation by Major Financial Institutions

Participation by the government banks, private commercial banks and LGUGC with their guarantee of loans from these banks is crucial to keeping NEA financing for EC CAPEX from exceeding 10% of overall EC demands and for maintaining sustainable EC CAPEX to improve future disaster resilience. Still, with BCM ratings and DRF being totally new fields for Philippine financial institutions, the major financial institutions will need to gain a deeper understanding of the significance of BCM ratings and specific BCM methods in order for the ratings scheme to spread more effectively and efficiently. To do so, a platform should be

launched so that banks can share their achievements and challenges and have a forum for discussing the potential for expansion to other infrastructural sectors and industries beyond the ECs. Such a platform would also require BSP participation for financial institution oversight.

In August 2015, the study team held a briefing on its proposed BCM ratings and financial incentive system for LGUGC partner banks with the help of LGUGC. In a questionnaire distributed and collected at the briefing (respondents: 11 banks, 19 individuals), many of the attendees (13 of the 19) responded "positive" to the prospect of introducing BCM ratings at their institution in the future, showing high interest in a BCM rating scheme by the financial institutions. Also, most all the attendees (15 of 19) approved of launching and participating in the aforementioned platform.
In September 2015, the study team held a similar briefing for ADFIAP member institutions with the help of ADFIAP. In a questionnaire distributed and collected at the briefing (respondents: 8 institutions, 12 individuals), many of the attendees (8 of the 12) responded "positive" to the prospect of introducing BCM ratings at their institution in the future. Also, most all the attendees (10 of 12) approved of launching and participating in the platform.

5.3.3 Coordination with ERC Streamlining Initiatives

Following the former rules, CAPEX for improving disaster resilience would mean that each EC had to individually apply for ERC approval. If the cost of such CAPEX was to be recovered with income from future electricity charges, this would inevitably result in future rate increases for the region.

Through JICA technical cooperation, the ERC is currently discussing introduction of a new risk-based approach to EC CAPEX approval. This approach will eliminate the requirement of detailed appraisal of CAPEX plans for ECs that pass certain risk standards, thereby helping to streamline the overall ERC approval process.

Based on the progress of the current technical cooperation with the ERC, the study team sees the following ongoing study as necessary for early and smooth investment in EC disaster resilience in the future.

1) Incorporating a risk-based approach in the ERC's approval for disaster resilience investment

The ERC should consider instituting a risk-based approach to either automatically approve or simplify the approval process for qualifying investment plans. Here, qualifying investments would be those EC disaster resilience investments that conform to the aforementioned NEA BCM planning guidelines and the individual BCM plan formed by the EC and will not have a significant degree of impact on the finances associated with investing in disaster resilience (e.g., investments that keep debt ratio under 60% as defined in KPS financial metrics).

2) Establishing EC resilience investment reserves

Currently, ECs divert a portion of operating expenses to a reserve fund for future capital expenditures, labeled the Reinvestment Fund for Sustainable CAPEX (RFSC). A scheme similar to this fund will need to be discussed for future disaster resilience investments to be kept sustainable. The ERC will likely need to be consulted on resilience investment reserves and contribution levels as its approval is required for RFSC contribution levels.

3) Discussing the prospects of grant aid to minimize impact on electricity rate increases

ECs with weak business and financial bases find it difficult in terms of community relations to implement CAPEX that will raise electricity rates. While questionnaire results from regional seminars conducted in the study for the ECs confirmed that most of them are aware of the importance of disaster resilience as local utility operators, financing such CAPEX and the impact it will have on electricity rates were seen as two important issues. As such, grant funding should be discussed, particularly for those ECs with weaker business and financial bases and those at high risk for natural disaster.

5.3.4 Promoting Dialogue and Coordination with Major Donor Agencies

The BCM ratings and financial incentive system proposed in this study differ in nature from post-disaster assistance. Both the existing emergency post-disaster financial assistance and disaster insurance currently under consideration, where payouts are made automatically based on disaster scale or based on actual damages, are post-disaster measures. The proposed system, however, is an ex-ante measure in that it promotes advance activities, such as enhancing existing equipment before a disaster occurs, developing internal and external systems in anticipation of disaster, and advance planning for business recovery. Dialogue and coordination with the major donor agencies will become increasingly important. For NEA and the ECs, effectively complementing post-disaster initiatives with preventive initiatives will allow the ECs to enhance their overall disaster resilience. Also, expanding the system beyond power distribution will have to be discussed in order to improve disaster resilience for the Philippines as a whole.

Energy Sector Management Assistance Program (ESMAP, http://wbi.worldbank.org/developmentmarketplace/partner/energy-sector-management-assistance-program-esmap) of the World Bank Group scheduled a DRF workshop for major ECs and NEA staffs near Manila on October 1st, and the Bank showed strong interest in JICA's effort in the field of DRF including this study. ADB scheduled a DRF seminar in collaboration with the OECD on September 15th and 16th. These are the kinds of opportunities in which donor agencies and major Philippine stakeholders should be encouraged to share their understanding of the BCM ratings and financial incentive system and in which these parties should discuss how to effectively work together and complement their various initiatives.

The following figure illustrates proposals by the study team for the next steps to enhance disaster resilience in the Philippines.

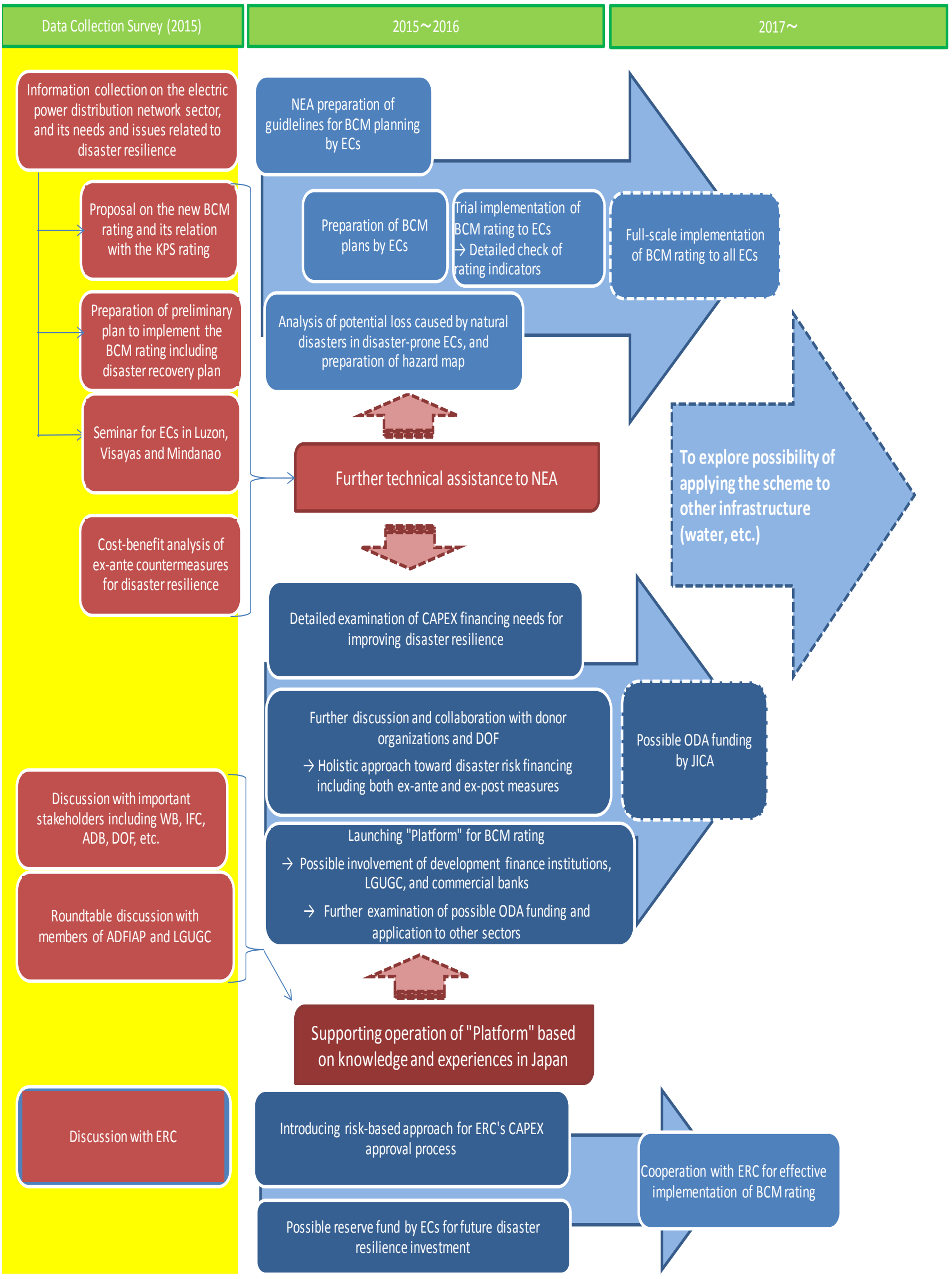


Figure 20 Roadmap to enhance disaster resilience in the Philippines

Table 46 Rating Indicators for preparedness of Power Distribution System exposed to Natural Hazards

	Core Categories of Rating Indicators (Key Element)	Point allocation	Evaluation Level - 1	Point allocated	Evaluation Level - 2	Maximum deductible	Viewpoint of Evaluation and Support Document	ID
A	**Damage Reduction (Maximum Points 50)**							
1	Well designed electric distribution system prepared for Natural hazards.	30	Sufficient and appropriate natural hazard evaluation	5	Use of recognized EQ and Storm zone or actual damage experience in the past	5	EC's rule requires that appropriate natural hazard evaluation is applied for planning ofa power distribution system	101
			Well adapted specification in design to cope with natural hazards	10	Design wind load of electric poles - NEA standard	5	Facility design parameter is chosen in accordance with recognized zoning and the largest damage in the past	102
					Shortening span per NEA standard	3	Shortening span program per NEA standard is implemented	103
					Storm Guy and additional Guy per NEA standard	3	Particular locations needing additional protection are identified, and addressed in accordance with NEA standard	104
					Standard design system	2	Outdated design (incorrect application, shortfall, or excessive) is eliminated by introducing a design support system.	105
					Reinforcing of pole foundation - installation of concrete supporter at buried section	3	Reinforcement of pole foundation is addressed for the poles located in seismic prone areas and inadequate soil condition areas	106
					Protection of substation prepared for Natural hazards	5	Substation is protected from earthquakes, floods, tidal waves, typhoons and collapse of tress.	107
			(Quality Control) - Installation	10	Quality control procedure is well ruled and implemented through design, fabrication, and installation	5	Verified by Inspection and audit program for material fabrication and inspection record during installation	108
					Monitoring system for Quality control	3	External (NEA) audit program for ensuring quality control when the facility is installed, replaced and restored	109
					Defective work and material	3	No structurally critical defect on the existing facility has been found during replacement process	110
			Inspection, Maintenance and Repair	5	Inspection, Maintenance and Repair	3	Action plans for Inspection, maintenance and rehabilitation are in place and actively implemented	111
					Special Inspection program pre and post typhoon	3	Special inspection procedures at pre and post typhoon are implemented for identifying weak points for an emergency repair	112
					Post - restoration work inspection	2	Restoration work is done in accordance with design specifications. Defective works are properly addressed for repair	113
					Control of communication cables	2	Inspection program on communication lines attached to the poles (Inspection on Third party attachment)	114
2	Protection against secondary damage	10	Tree and vegetation management	10	Identify and administrate particular areas where trees and vegetation may cause power outrage.	5	Identify and administrate particular areas where trees and vegetation may cause damage to power distribution lines resulting in power outrage.	115
			Flying debris		Inspection program to locate possible hazards causing flying debris	3	No apparent hazards exist near the facility, such as from flying debris or fallen structures, e.g. house, industrial facility, tower …	116
			Storm surges		A program to identify particular areas affected by storm surges and mitigation measures	2	Risk assessment is properly conducted, and mitigation measures are developed and implemented	117
			Landslides, flash flood or mud flow		Identify possible land slide, mud flow and flash flood areas, and mitigation measures are taken	2	High risk areas for slope collapse, mudflow, and flash flow are identified, and relocation or other protection is implemented	118
3	Electrical distribution loop and isolation	5	Power line, redundancy, loop distribution	5	Power distribution loops and isolation systems	5	Provision of power distribution network loops with isolation facility is reasonably planned and implemented	119
4	Additional protection for important facilities	5	Reliable power lines to important facilities - hospitals, water & waste water plants, communication facility	5	Redundancy in power distribution network for a critical facility	3	Special protection measures are planned and implemented to continue power supply to important facilities in the community	120
					Safety measures of service drops such as underground placement ….	3	Special protection at service drop such as an underground connection is planned and implemented	121
B	**Faster Restoration (Maximum Points 35)**							
1	Forecast power outage area	5	Pre-typhoon damage assessment	5	Damage estimation (extent and severity) needed to effectively proceed an emergency action plans	5	EC is capable of simulating damage extent and level based on similar disasters in the past	122
2	Restoration Capability	20	Adequacy of EC's capacity to restore works	17	Adequacy of buffer stock and stored location	10	Quantity of buffer stock and storage location is determined based on the damage evaluation	123
					Protection of buffer stock	3	Buffer stock is adequately protected and free from natural hazard risks	124
					Restoration crew	3	Adequate workforce for recovery work is warranted in disaster situation	125
					Restoration equipment	3	Equipment and tools are adequately secured. Equipment necessary for night work such as lighting , generator, and construction equipment for debris removal. Vehicle fuel is secured.	126
					Damage evaluation	3	EC is capable of evaluating damage and power outrage area in an expediting manner	127
					Safety work	3	Safe work during restoration is ensured with safety equipment, rules, training and well-established work procedure. Safety office can be assigned	128
					Logistics	3	EC is capable of effective logistics for restoration crews i.e, transportation, accommodation, food, and arrangement of materials and tools	129
					Supporting team	3	EC is capable of providing a support team for enhancing restoration work	130
					Temporary restoration capability	3	EC is capable of temporary restoration prior to complete restoration in order to reduce power outage areas faster	131
			EC's command and control in a disaster	3	Protection of control center at EC and contingent plan	3	Control office of EC is well protected from potential natural hazards so that it can continue to work as a control center. Resource of the control center is secured. A contingent plan for alternative control center is in place.	132
3	Conditions to restore works	5	Possible obstruction to access for restoration	5	No serious access issue to restoration work	3	Confirming that no serious hazard concerning access to the power outage area exists such as road closure, collapse of slope	133
4	Mutual aid system	5	Effectiveness of Task Force Kapatid - Mutual Aid Partnership	5	Mutual aid based on damage simulation	3	Restoration support needed for restoration work based on evaluated damage from other EC is expected	134
					Communication / instruction protocol	3	Administration of Task Force Kapatid including work assignment procedure, restoration materials and work force management is planned. Pre-disaster drill is implemented.	135
					Capacity to support other EC. Actual support to other EC done in past.	3	EC is financially and has resourcefully capable of supporting other ECs when they are damaged by natural hazard	136
C	**Management Control In BCM (Maximum Points 15)**							
1	Management commitment	5	Clear commitment for upgrading facilities prepared for natural hazards	5	Management commitment to enhance for upgrading disaster resilience	5	Management commitment is clearly shown and effective in practice. Such policy is supported by EC employees	137
2	System hardening plan	5	Facility upgrade plan w/funds	5	Facility hardening and increase of redundancy - Resiliency	3	An effective action plan with goal setting to system hardening and redundancy to mitigate natural hazard risks is in place	138
			Rehabilitation plan w/funds		Rehabilitation program for existing facility	3	A rehabilitation plan to reduce damage extent for particular high risk areas is in place	139
3	Emergency response plan	5	Development, update and training	5	An emergency response plan based on the existing facility condition and damage estimate	3	An emergency response plan is developed and regularly updated, A training based on the plan is implemented.	140
			Pre-disaster activity		Damage evaluation	1	Simulation of damage by natural hazards is reasonably implemented and updated	141
					Command and reporting protocol	1	Command and reporting route during an emergency are well established	142
					Communication and co-operation with other municipalities	1	Relationship with municipal governments, utility suppliers, power suppliers, and customers is well maintained	143
					A trigger which initiates an emergency response plan	1	A trigger to initiate an emergency action plan is distinct and clear for everyone	144
					Priority for restoration	1	Priority in an emergency action plan and restoration work is clearly agreed	145
			Outage monitoring system		Identify power outage areas	1	There is a systematic procedure for identifying power outage areas and damage levels	146
					Communication system to dispatched crews	1	Communication system during natural disasters such as satellite communication phones is secured	147

Annex

BCM Rating Manual

1.1 Purpose of BCM Rating Manual

This BCM rating manual describes concept, approach and rating methodology for the BCM rating system adopted by ECs in order to enhance their resiliency against natural disasters. The guideline described in the manual is prepared to assist every of 120 ECs in evaluate their facility and preparedness in an objective and fair manner.

1.2 Approach to BCAM Rating for Power Distribution System against Natural Disasters

1.2.1 Thinking on rating item selection

The power distribution grid is a large-scale electricity supply infrastructure covering the entire Philippines, and the dangers from a natural disaster differ depending on location, topographic features and land use. Depending on differences in the type of power distribution grid and design specifications, the facilities also do not possess the same strength. As a result, the vulnerabilities of the power distribution grid to natural disasters are thought to be numerous and diverse. From the viewpoint of business continuity management (BCM), we have selected rating items for facility resilience against natural disasters from the perspectives “appropriately assesses the natural disasters that can be envisaged”, “possesses physical strength corresponding to the degree of risk” and has “restoration capabilities corresponding to the degree of damage resulting from a disaster”.

- Appropriately envisages the intensity of natural disasters in the region where the power distribution grid is located
- The power distribution grid facilities have been installed based on the type and intensity of the envisaged natural disasters
- The damage assumptions have been prepared appropriately based on site conditions and the present state of the facilities
- Effective disaster prevention measures based on the damage assumptions have been prepared and executed
- An organization for undertaking these measures continuously as business continuity management of the electric power business has been established

While it is impossible to fully prevent the occurrence of damage from natural disaster risks, damage will be mitigated if effective countermeasures are in place. Damage mitigation helps lighten the burden of recovery operations and is believed to contribute to early recovery. We have selected our BCM rating items by giving consideration to the characteristics of the power distribution grid and the various natural disaster risks, which differ from those for industrial installations, while using the Development Bank of Japan’s approach concerning BCM rating items as a base.

1.2.2 Components

We have sorted, organized and aggregated the BCM rating items into 15 assessment categories (LEVEL 1) and three key elements based on the following viewpoints. The key elements are as follows. (Figure 1)

- Measures to mitigate damage immediately (mitigation of scale of damage)
- Measures to secure post-disaster early recovery (shortening of restoration period)
- Approach to business continuity management that undertakes these efforts continuously (business continuity readiness)

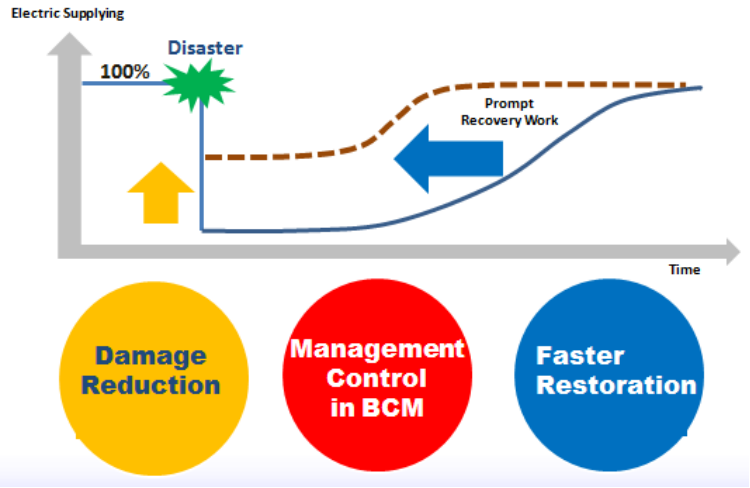


Figure 1　Relationship of assessment classifications and business continuity (Three Key Elements)

From the viewpoint of business continuity management, these efforts are not independent, and should be planned and executed comprehensively. If the envisaged damage is to be mitigated by physical reinforcement of electric power distribution facilities, effective preparation against natural disaster risks will require balancing the three components, such as anticipating reductions in recovery and response capabilities thought to be necessary and the appropriate plans and resource support needed for continuous improvement of disaster prevention measures and recovery capabilities.

Therefore we have looked at the vulnerability of power distribution grid facilities and the operational framework to the envisaged natural disaster risks, and prepared an assessment framework to promote not only individual disaster prevention measures but also improvements to business continuity management (BCM) in the electric power supply business. (Figure 2)

Figure 2 Image of business continuity readiness assessment framework

1.2.3 Assessment classification, item proposal and rating methodology

Assessment Key Element A: Mitigation of scale of damage

Using the classifications to assess the validity of measures to mitigate the scale of damage to the power distribution grid that can be expected from the occurrence of natural disaster risks, we have a total of 21 confirmation items from the following viewpoints.

- Validity of natural disasters that should be envisaged
- Design specifications of the power distribution grid based on natural disasters (utility pole design load, span shortening, embedding, substation facilities protection)
- Use and installation level of products that conform to designs (quality control)
- Maintenance and inspection programs (daily inspections, special inspections before and after typhoon passage, telecommunications cable management)
- Prevention of secondary disasters (electric power supply disruptions caused by toppled trees or flying debris, toppled utility poles caused by high water, flooding or collapsed dwellings)
- Electric power supply reverse transmission routes, switching facilities
- Additional protection measures for critical facilities

Assessment Key Element B: Shortening of restoration period

We have a total of 15 confirmation items from the following viewpoints, based on a prior understanding of the scale of damage to the power distribution grid (scope of damage and extent of damage, and scope of the influence power failures) that are derived from the type and strength of natural disasters and present state of the power distribution grid, and classifications to assess restoration plans and the status of restoration organization preparations corresponding to the scale of damage.

- Prior evaluation of damage estimate and formulation of restoration plans based on the result
- Restoration capacity corresponding to damage estimate and restoration plans (damage comprehension abilities, restoration materials, staff, support, etc.)

- Ensuring EC business unit functions when hit by a disaster
- Ensuring access and coordinating functions with related organizations for recovery efforts
- Continuous mutual assistance organization

Assessment Key Element C: Business continuity readiness

To mitigate the damage from natural disasters and achieve early recovery, a restoration plan that has been backed up by securing the materials and personnel for the improvement or repair and restoration of facilities from a hard aspect based on an assessment of present status is required. The intentions at the management level to prompt action from normal operating periods, and efforts as the EC based on this are essential. From this perspective, for this item we will make assessments of 11 items in total.

- Management level commitment to a business contingency plan
- Business plan for strengthening facilities
- Emergency action plan

1.2.4 Check questions and their viewpoint

Please see the attached “BCM rating indicators of Power Distribution System against Natural Disasters”

1.2.5 Approach to rating assessments

The total points for each assessment classification are shown in Table 1; to apply weighting to Assessment Key Element A for assessing mitigation of the scale of damage for natural disaster risk, a point allocation of 50% was assumed. (Table 1)

Table 1 Point allocation for each assessment classification and number of check questions

Assessment Classification (Key Elements)	Point allocation	Number of Assessment Classifications (LEVEL 1)	Number of Check Question
A Damage Reduction	50	7	21
B Faster Restoration	35	5	15
C Management Control	15	3	11
Total	100	15	47

Even if one measure has been implemented, the effects from measures against natural disaster risk might not be achieved in some cases when other measures were flawed. For example, even if the power distribution grid strength design for typhoons is sufficient, the original level of disaster prevention cannot be ensured when there are flaws in the quality of the construction or facility. Furthermore, even if materials for restoration are sufficiently deployed, any recovery effort will make little headway if construction capabilities are lacking at the time of the disaster. Although rating methodologies for each assessment classification include systems for adding points, deducting points and averaging points, for our system we have utilized a system for deducting points as a base because of the thinking that no result is achieved if the important items are not implemented as described above. Using an assessment methodology that incorporates a point deduction system makes it possible to broaden the width of the deduction point items considered to be essential for improving the resilience against natural disaster risks, modulate the assessments, and encourage a response for important items.

The specific assessment and rating methodologies are outlined below.

- Allocate the large assessment classification allocation points to each intermediate assessment classification as allotted points, and set the allotted points for each of the 15 total LEVE 1 categories.
- If the maximum number of deduction points is allocated to each assessment item and an item is not achieved, deduct points from the allotted points of the corresponding intermediate classification.
- If multiple items are not achieved because two or more check questions are in the LEVEL 1 category, the allotted points for the LEVEL 1 will become (-) in some cases, but when the allotted points for the LEVEL 1 has reached (0) points as a result of deducting points, assume the assessment for said LEVEL 1 to be (0) and no do give a (-) assessment. This is done to maintain the independence from other check questions.
- Aggregate the remainder number of the LEVEL 1 in the Key Element category, and use this as the assessment points for the BCM rating.

The assessment classifications (Key Element, LEVEL 1 Category), allocation points breakdown and number of check questions are shown in Table 2.

Table 2 Assessment classifications (large classification, intermediate classification), allocation point breakdown and number of check questions

	Key Elements and Level 1 Category	Point		Level 2	
		Allocate	Break down	No of Question	ID No.
A	Damage Reduction (Point 50)				
(1)	Well designed electric distribution system prepared for Natural hazards.	30			
	Sufficient and appropriate natural hazard evaluation		5	1	101
	Well adapted specification in design to cope with natural hazards		10	6	102-107
	(Quality Control) - Installation		10	3	108-110
	Inspection, Maintenance and Repair		5	4	111-114
(2)	Protection against secondary damage	10		4	115-118
(3)	Electrical distribution loop and isolation	5		1	119
(4)	Additional protection for important facilities	5		2	120-121
	Key Element A Total	50	30	21	
B	Faster Restoration (Point 35)				
(1)	Forecast power outage area	5		1	122
(2)	Restoration Capability - Adequacy of EC's capacity for restoration works	17		9	123-131
	Restoration Capability - EC's control and command in a disaster	3		1	132
(3)	Conditions to restoration works (identify difficulty in access)	5		1	133
(4)	Mutual aid system	5		3	134-136
	Key Element B Total	35		15	
C	Management Control (Point 15)				
(1)	Management commitment (Clear Committeemen for upgrading of disaster mitigation)	5		1	137
(2)	System hardening plan (Upgrading plan, retrofit plan)	5		2	138-139
(3)	Emergency response plan (plan, update, preparedness, training)	5		8	140-147
	Key Element C Total	15		11	

1.2.6 Guideline in assessing deduction point

Maximum number of deduction points for each check questions as well as guideline of the point deduction are described in the attached sheets.

1.2.7 BCM rating for Natural Hazards

Assessment point aggregated for each of Key Elements.

Assessment point at Key Element is rated in four categories, i.e. 80% or above, 60% or above, 40% or above, below 40% as shown on Table 3.

Table 3 Point and Element Rating at Key Elements

Key Element	Maximum Point	80%		60%		40%	
A. Damage Reduction	50	40	80%	30	60%	20	40%
B. Faster Restoration	35	28	80%	21	60%	14	40%
C. Management Control	15	12	80%	9	60%	6	40%
Total	100	80	80%	60	60%	40	40%

BCM Rating

BCM rating is determined based on the following criteria;

Excellent: All of three Key Elements attain 80% or above.

Good: All of three Key Elements attain 60% or above, but not 80% or above

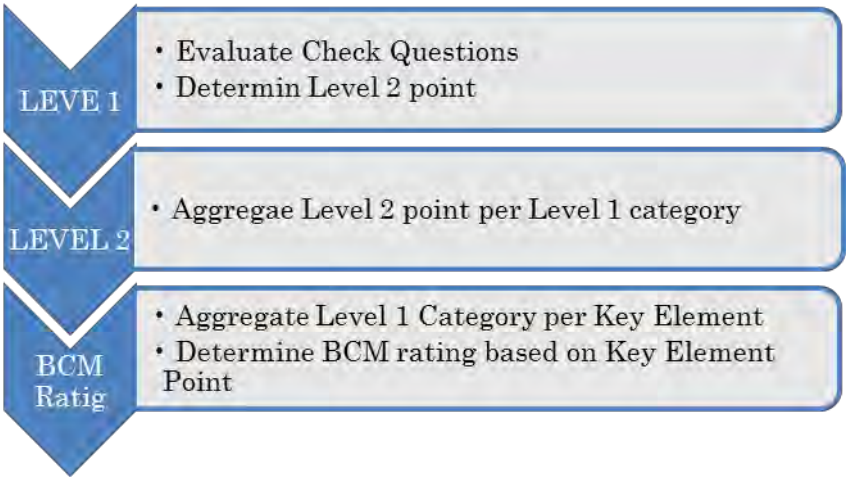
Inadequate: All of three Key Element attain 40% of above, but not 60 % or above

Inferior: Any of Key Elements is below 40%

1.3 Rating Procedure

Table 4 shows BCM rating flow

Table 4 BCM Rating Flow Chart



1.4 Points to be considered in BCM Rating

1.4.1 Hazard Evaluation and Design Standard to be adopted

This BCM rating system is based on the following natural hazard map and design standard.

- Wind Speed: Natural Hazard Risk Map for the Philippines issued by OCHA[1], 2011 edition
- Earthquake: Natural Hazard Risk Map for the Philippines issued by OCHA, 2011 edition
- Design Standard: NEA Engineering Bulletin
- Facility Upgrade Guidelines: Build Back Better Concept by NEA
- Buffer Stock Guidelines: Proposed Policy on Electric Cooperatives' Resiliency Program by NEA

[1] OCHA: Regional office for Asia Pacific, UN

1.4.2 Phased Upgrade of distribution lines

Power distribution grid spread to wide area, and therefore, it is not practical to upgrade entire section in one time. Phased upgrade will be rated based on the ratio of implemented sections to the entire section where upgrade is necessary.

(End of Document)

Guideline for deterring reduction point at Level 2 categories – Key Element A (1/2)

ID	LEVEL 1 Category (Check Question)	Maximum Deduction	View Point	Deduction Example
101	Use of recognized EQ and Storm zone or actual damage experience in the past	5	EC's rule requires that appropriate natural hazard evaluation is applied for planning of a power distribution system	0
			In selection of design standard and materials, EC has specific requirement to cope with natural hazard, however, the rule is not strictly respected.	3
			There is no such requirement and rules. Actual designed does not consider natural hazard risk.	5
102	Design wind load of electric poles - NEA standard	5	Facility design parameter is chosen in accordance with recognized zoning and the largest damage in the past	0
			Design standard refers certain Wind Zone. However, the wind zone adopted is not current, and actual design does not comply with the most updated wind zone.	3
			In facility design, no wind zone is considered. No experience in past disasters are reflected in the facility design to mitigate damage in future.	5
103	Shortening span per NEA standard	3	Shortening span program per NEA standard is implemented	0
			Span shortening is required and implemented based on NEA standard. However, progress to date is below 50% of section where span shortening is necessary.	3
			While 50% or more section exceed 50m span. No span shortening is implemented.	5
104	Storm Guy and additional Guy per NEA standard	3	Particular locations needing additional protection are identified, and addressed in accordance with NEA standard	0
			While not all sections requiring additional support are identified, upgrading work is implemented and in progress.	3
			Sections needed for additional support are not identified. No upgrading and installation of additional support are implemented.	5
105	Standard design system	2	Outdated design (incorrect application, shortfall, or excessive) is eliminated by introducing a design support system.	0
			There is no practical way to find design error	2
106	Reinforcing of pole foundation - installation of concrete supporter at buried section	3	Reinforcement of pole foundation is addressed for the poles located in seismic prone areas and inadequate soil condition areas	0
			There is no standard procedure for judgment if additional supporter is required for buried section of certain poles when poor soil condition is expected.	3
			No additional support at the buried section of the pole is implemented.	3
107	Protection of substation prepared for Natural hazards	5	Substation is protected from earthquakes, floods, tidal waves, typhoons and collapse of tress.	0
			No natural hazard risk assessment on substation is implemented. However, countermeasures such as tree management is implemented based on experience.	3
			No natural hazard risk assessment on substation is implemented. No specific protection is implemented.	5
108	Quality control procedure is well ruled and implemented through design, fabrication, and installation	5	Verified by Inspection and audit program for material fabrication and inspection record during installation	0
			While Quality Control System is officially adapted, however, practice in implementation is not respected. QC issues are found in actual installation.	3
			No Quality Control System is not established. Quality Control is poorly implemented in general.	5
109	Monitoring system for Quality control	3	External (NEA) audit program for ensuring quality control when the facility is installed, replaced and restored	0
			No third party audit, i.e. NEA, to monitor quality control practice is implemented.	3
110	Defective work and material	3	No structurally critical defect on the existing facility has been found during replacement process	0
			Bad quality of the product and poor workmanship during the installation are found in some cases during after installation of the facility.	2
			Bad quality of the product and poor workmanship during the installation are often found during after installation of the facility.	3
111	Inspection, Maintenance and Repair	3	Action plans for Inspection, maintenance and rehabilitation are in place and actively implemented	0
			An authorized plan for regular inspection, maintenance and repair is in place, however, it is not followed adequately. Need an improvement.	2
			No authorized plan for regular inspection, maintenance and repair is in place.	3
112	Special Inspection program pre and post typhoon	3	Special inspection procedures at pre and post typhoon are implemented for identifying weak points for an emergency repair	0
			Special inspection procedure as such are required by EC standard, however, it is not adequately followed.	2
			No special inspection procedure as such is in place within EC standard of practice.	3
113	Post - restoration work inspection	2	Restoration work is done in accordance with design specifications. Defective works are properly addressed for repair	0
			Inspection after hit by natural hazard is required and implemented, however, it is not adequate.	2
			No inspection after hit by natural hazard is not required nor implemented.	3
114	Control of communication cables	2	Inspection program on communication lines attached to the poles (Inspection on Third party attachment)	0
			Installation of communication cables are reported to EC for control. However, EC does not examine the effect of such installation against the design wind pressure.	2
			Situation of communication cables is not monitored by EC. No information to EC.	2

Guideline for deterring reduction point at Level 2 categories – Key Element A (2/2)

ID	LEVEL 1 Category (Check Question)	Maximum Deduction	View Point	Deduction Example
115	Identify and administrate particular areas where trees and vegetation may cause power outrage.	5	Identify and administrate particular areas where trees and vegetation may cause damage to power distribution lines resulting in power outrage.	0
			No high hazard area / section are identified. However, tree management is always implemented.	2
			No high hazard area / section are identified. No specific tree management is in place.	5
116	Inspection program to locate possible hazards causing flying debris	3	No apparent hazards exist near the facility, such as from flying debris or fallen structures, e.g. house, industrial facility, tower…	0
			While possible hazard is identified, it is not adequately addressed.	1
			No possible hazard is identified.	3
117	A program to identify particular areas affected by storm surges and mitigation measures	2	Risk assessment is properly conducted, and mitigation measures are developed and implemented	0
			While high tide risk area is identified, not countermeasures are implemented.	1
			High tide risk area is not identified, and no countermeasures are implemented.	2
118	Identify possible land slide, mud flow and flash flood areas, and mitigation measures are taken	2	High risk areas for slope collapse, mudflow, and flash flow are identified, and relocation or other protection is implemented	0
			High risk areas for the above hazards are identified, however, no countermeasures are implemented.	1
			High risk areas for the above hazards are not identified, and no countermeasures are implemented.	2
119	Power distribution loops and isolation systems	5	Provision of power distribution network loops with isolation facility is reasonably planned and implemented	0
			While it is not for entire sections, distribution network has redundancy future in some area.	2
			No redundancy feature in the distribution network is in place.	5
120	Redundancy in power distribution network for a critical facility	3	Special protection measures are planned and implemented to continue power supply to important facilities in the community	0
			Special protection measures on critical facilities in the community is partially implemented.	1
			Special protection measures on critical facilities in the community is not implemented.	3
121	Safety measures of service drops such as underground placement ….	3	Special protection at service drop such as an underground connection is planned and implemented	0
			Special protection for service drop (hardening and / or isolation features) is implemented in some sections.	1
			Special protection for service drop (hardening and / or isolation features) is not implemented. Once house or building is collapsed, the connection pole may be damaged.	3

Guideline for deterring reduction point at Level 2 categories – Key Element B

ID	LEVEL 1 Category (Check Question)	Maximum Deduction	View Point	Deduction Example
122	Damage estimation (extent and severity) needed to effectively proceed an emergency action plans	5	EC is capable of simulating damage extent and level based on similar disasters in the past	0
			EC has capability to implement such estimate or simulation with limited scope.	3
			EC doesn't have such expertise to simulating damage extent at all.	5
123	Adequacy of buffer stock and stored location	10	Quantity of buffer stock and storage location is determined based on the damage evaluation	0
			Buffer stock is secured but quantity, model/type and stored location should be improved	3
			Buffer stock is secured but quantity, model/type and stored location should be greatly improved	6
			No further stock for a natural disaster is stored, and no plan to implement. Is in place	10
124	Protection of buffer stock	3	Buffer stock is adequately protected and free from natural hazard risks	0
			Buffer stock storage is located in natural hazard prone area, and no specific protection is in place.	3
125	Restoration crew	3	Adequate workforce for recovery work is warranted in disaster situation	0
			No authorized plan to secure workforces during an emergency is developed.	3
126	Restoration equipment	3	Equipment and tools are adequately secured. Equipment necessary for night work such as lighting , generator, and construction equipment for debris removal. Vehicle fuel is secured.	0
			No authorized plan to secure equipment and tools during an emergency is in place.	3
127	Damage evaluation	3	EC is capable of evaluating damage and power outrage area in an expediting manner	0
			No concrete plan and procedure to estimate for sivererity and extent of damage to the facility is developed.	3
128	Safety work	3	Safe work during restoration is ensured with safety equipment, rules, training and well-established work procedure. Safety office can be assigned	0
			No guideline for safety work under an emergency situation is in place. No training assuming hazardous situation caused by an emergency is implemented.	3
129	Logistics	3	EC is capable of effective logistics for restoration crews i.e. transportation, accommodation, food, and arrangement of materials and tools	0
			No authorized plan for an emergency logistics is in place.	3
130	Supporting team	3	EC is capable of providing a support team for enhancing restoration work	0
				3
131	Temporary restoration capability	3	EC is capable of temporary restoration prior to complete restoration in order to reduce power outage areas faster	0
			No action plan and equipment & materials for temporally restoration is developed.	3
132	Protection of control center at EC and contingent plan	3	Control office of EC is well protected from potential natural hazards so that it can continue to work as a control center. Resource of the control center is secured. A contingent plan for alternative control center is in place.	0
			Control office of EC during an emergency situation is not adequately protected against natural hazard, and no plan to implement is in place.	3
133	No serious access issue to restoration work	3	Confirming that no serious hazard concerning access to the power outage area exists such as road closure, collapse of slope	0
			The area where access for restoration work during an emergency is identified, however, no countermeasure to mitigate this difficulty is in place.	2
			The area where access for restoration work during an emergency is not identified.	3
134	Mutual aid based on damage simulation	3	Restoration support needed for restoration work based on evaluated damage from other EC is expected	0
			Mutual aid plan wit other ECs and contractors is in place although it is limited scope and not completely reliable.	1
			No mutual aid plan in a proactive manner is in place. It is plan to wait NEA's action.	3
135	Communication / instruction protocol	3	Administration of Task Force Kapatid including work assignment procedure, restoration materials and work force management is planned. Pre-disaster drill is implemented.	0
			No authorized plan followed by a training are implemented However, an emergency action is fairly agreed in EC based on the experience in previous emergency events.	2
			No plan and followed by a training are implement.	3
136	Capacity to support other EC. Actual support to other EC done in past.	3	EC is financially and has resourcefully capable of supporting other ECs when they are damaged by natural hazard	0
			EC is not capable to respond to participate the mutual aid system.	3

Guideline for deterring reduction point at Level 2 categories – Key Element C

ID	LEVEL 1 Category (Check Question)	Maximum Deduction	View Point	Deduction Example
137	Management commitment to enhance for upgrading disaster resilience	5	Management commitment is clearly shown and effective in practice. Such policy is supported by EC employees	0
			Management commitment is clearly shown, even viewing from out side, however, a concrete action plan does not exist or inadequate.	3
			No distinct management commitment is observed.	5
138	Facility hardening and increase of redundancy - Resiliency	3	An effective action plan with goal setting to system hardening and redundancy to mitigate natural hazard risks is in place	0
			An effective action plan with goal setting to system hardening is not in place.	3
139	Rehabilitation program for existing facility	3	A rehabilitation plan to reduce damage extent for particular high risk areas is in place	0
			No rehabilitation plan exists.	3
140	An emergency response plan based on the existing facility condition and damage estimate	3	An emergency response plan is developed and regularly updated. A training based on the plan is implemented.	0
			No effective emergency response plan is in place.	3
141	Damage evaluation	1	Simulation of damage by natural hazards is reasonably implemented and updated	0
			EC implemented "Damage Estimate" in past, but not updated for last 5 years.	1
			EC has not implemented to estimate their damage by natural hazards.	1
142	Command and reporting protocol	1	Command and reporting route during an emergency are well established	0
			Such communication and report route is not established.	1
143	Communication and co-operation with other municipalities	1	Relationship with municipal governments, utility suppliers, power suppliers, and customers is well maintained	1
			No pre-incident relationship with relevant entities is not encouraged and implemented.	1
144	A trigger which initiates an emergency response plan	1	A trigger to initiate an emergency action plan is distinct and clear for everyone	0
			No criteria or specific guideline "event trigger" to initiate an emergency action is established	1
145	Priority for restoration	1	Priority in an emergency action plan and restoration work is clearly agreed	0
			No priority, procedure to decide priority, is established	1
146	Identify power outage areas	1	There is a systematic procedure for identifying power outage areas and damage levels	0
			No effective countermeasures are available	1
147	Communication system to dispatched crews	1	Communication system during natural disasters such as satellite communication phones is secured	0
			No effective countermeasures are available	1

Point Summary

	Key Elements and Level 1 Category	Point		Level 2	
		Allocate	Break down	No of Question	ID No.
A	Damage Reduction (Point 50)				
(1)	Well designed electric distribution system prepared for Natural hazards.	30			
	Sufficient and appropriate natural hazard evaluation		5	1	101
	Well adapted specification in design to cope with natural hazards		10	6	102-107
	(Quality Control) - Installation		10	3	108-110
	Inspection, Maintenance and Repair		5	4	111-114
(2)	Protection against secondary damage	10		4	115-118
(3)	Electrical distribution loop and isolation	5		1	119
(4)	Additional protection for important facilities	5		2	120-121
	Key Element A Total	50	30	21	
B	Faster Restoration (Point 35)				
(1)	Forecast power outage area	5		1	122
(2)	Restoration Capability - Adequacy of EC's capacity for restoration works	17		9	123-131
	Restoration Capability - EC's control and command in a disaster	3		1	132
(3)	Conditions to restoration works (identify difficulty in access)	5		1	133
(4)	Mutual aid system	5		3	134-136
	Key Element B Total	35		15	
C	Management Control (Point 15)				
(1)	Management commitment (Clear Committeemen for upgrading of disaster mitigation)	5		1	137
(2)	System hardening plan (Upgrading plan, retrofit plan)	5		2	138-139
(3)	Emergency response plan (plan, update, preparedness, training)	5		8	140-147
	Key Element C Total	15		11	

Questionnaire Distributed in the Seminars

～ Questionnaire ～

Seminar on Incentive Mechanism for Improving Disaster Resiliency

◆ Basic Information:

Name of EC	
Department or Division	
Name of Attendance	
Contact Address	

Q1. What do you think of the seminar?

	← ←			→ →
Seminar Topics	Good ☐	☐	☐	Poor ☐
Contents	Good ☐	☐	☐	Poor ☐
Meeting Time	Too long ☐	☐	☐	Too Short ☐
Arrangement	**Good** ☐	☐	☐	**Poor** ☐

Q2. Possible Financial Incentive Scheme

Name of Manufacturer			
1. Does your EC have Business Continuity Management / Plan (BCM/BCP) currently?	Yes ☐	No ☐	No, but plans to establish it. ☐
2. How do you think of introducing "new BCM rating" to improve your disaster resilience?	Positive ☐	Negative ☐	
Please describe the reason of your answer briefly			
3. Do you think "new BCM rating" should be incorporated into the KPS or separated from the KPS?	incorporated into the KPS ☐	separated from the KPS ☐	major components to be incorporated into the KPS ☐

Please describe the reason of your answer briefly.		
4. Do you think the rating indicators proposed by the JICA study team would be appropriate or sufficient?	Yes ☐	No ☐
If you think of other indicator(s) to be included in the rating, please describe it.		
5. Which possible financial incentives (slide 19) proposed by the JICA study team do you think would be effective or appropriate to promote disaster resilience?	To enhance ex-ante preparedness ☐	To enhance ex-post business continuity ☐
6. For your EC to enhance disaster resilience, which of the followings do you think would be possible hurdle?	(1) ☐Finance for conducting pre-disaster investment	
	(2) ☐ Consequent increase of electricity tariff	
	(3) ☐Lack of understanding internally on the importance of disaster resilience	
	(4) ☐ Needed coordination with other stakeholders	
	(5) ☐Other (please describe it briefly)	
7. Are your EC's major assets (headquarters, distribution lines, substations, etc.) covered by disaster insurance?	Yes ☐	No ☐

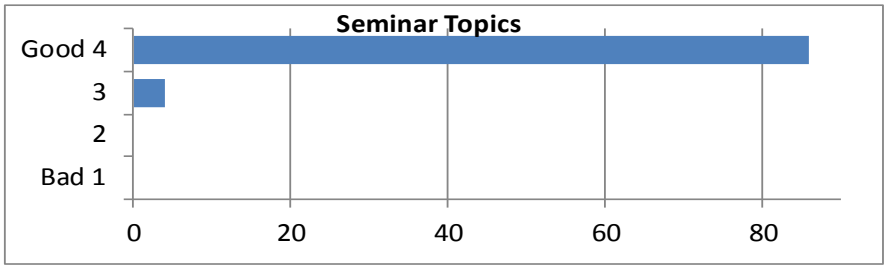
Q3. ***Please share any other comments, suggestions or opinions regarding this project.***

Thank you very much for your cooperation!

Questionnaire Summary

Q1. What do you think of the seminar?

1



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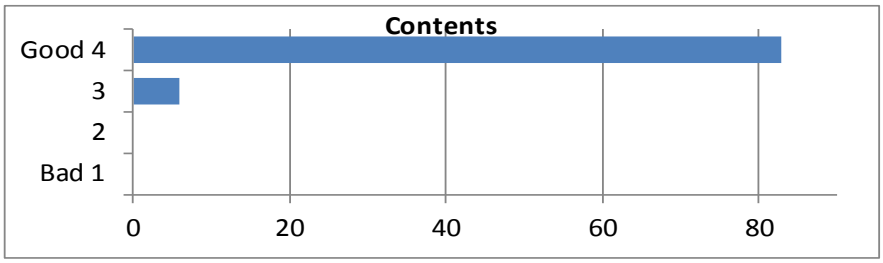

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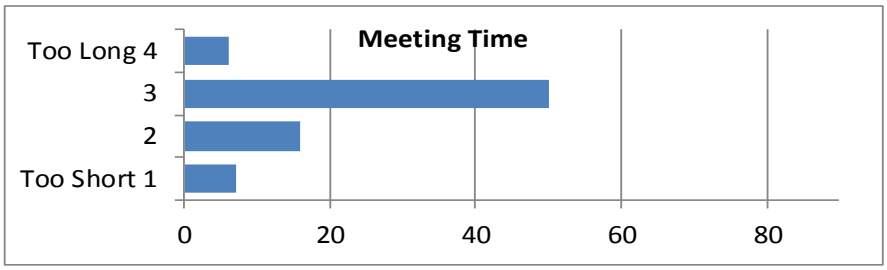

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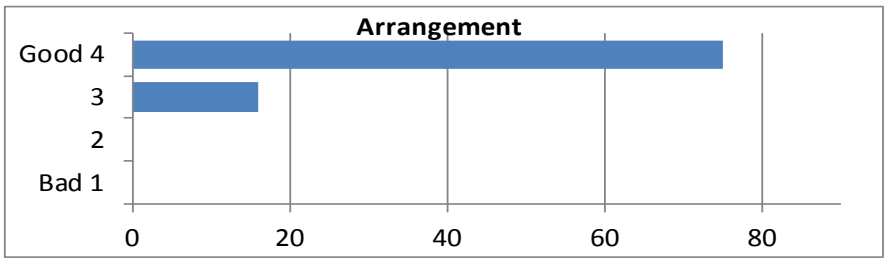
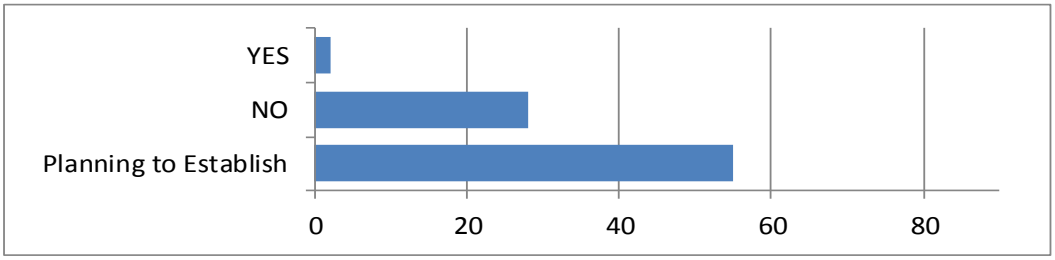
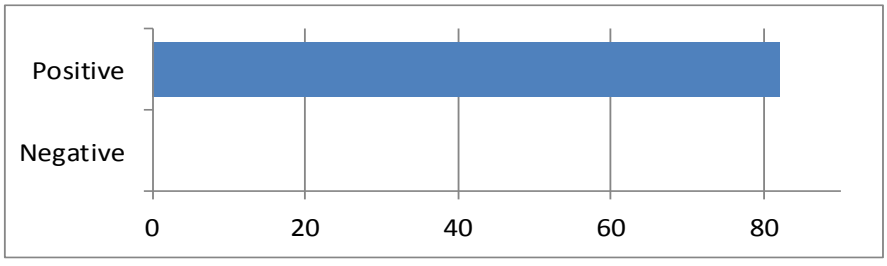


Q2. Possible Financial Incentive Scheme

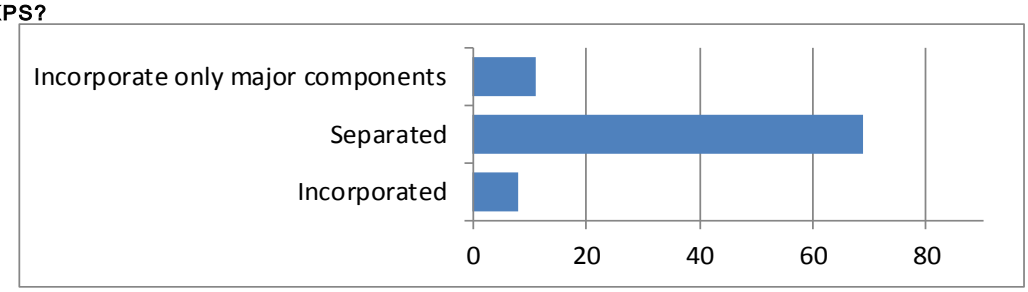
1. Does your EC have Business Continuity Management / Plan (BCM/BCP) currently?



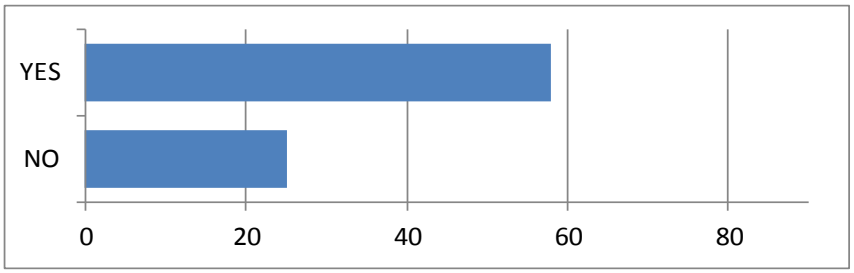
2. How do you think of introducing "new BCM rating" to improve your disaster resilience?



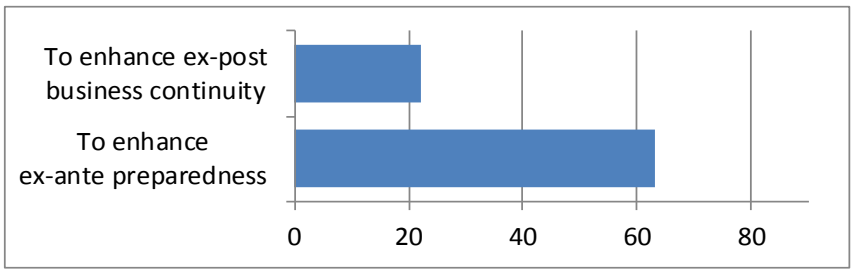
3. Do you think "new BCM rating" should be incorporated into the KPS or separated from the KPS?



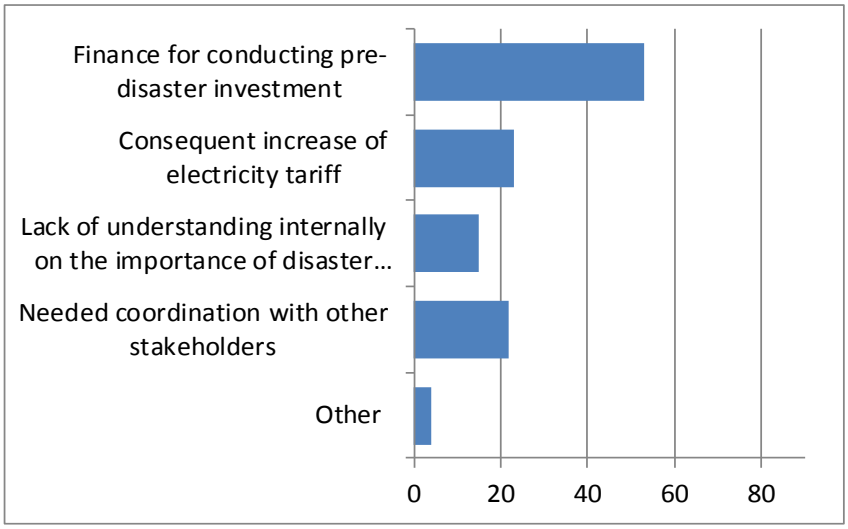
4. Do you think the rating indicators proposed by the JICA study team would be appropriate or sufficient?



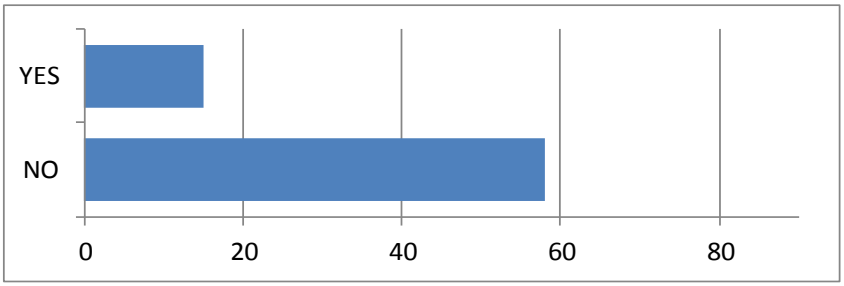
5. Which possible financial incentives (slide 19) proposed by the JICA study team do you think would be effective or appropriate to promote disaster resilience?



6. For your EC to enhance disaster resilience, which of the followings do you think would be possible hurdle?



7. Are your EC's major assets (headquarters, distribution lines, substations, etc.) covered by disaster insurance?



Q2-2 How do you think of introducing "new BCM rating" to improve your disaster resilience?

Answer	Why?
Positive	・ Preparedness for natural disaster for electric distribution system to provide overall preparedness with strong points in areas needing improvements. ・ In BCM, the damages will be minimized and the restoration will be faster due to preparedness to natural hazards. ・ This will provide immediate action to restoration. ・ Positive but not immediate. Please give ECs ample time to prepare because preparedness entails a lot of cost. ・ BCM is very important to all distribution utility because we have to invest on service reliability. ・ The new BCM rating is a positive response especially on the electric cooperative's response and actions during typhoons. ・ Disaster preparedness is very important since it will minimize the damage to the EC. BCM rating is very important also since this will be the barometer for the coop. ・ You are helping the coop but because of the interest rate, please provide a lower interest rate with one year capitalized interest. ・ Having the BCM is ideal if not necessary given the new normal situation at this time. Restoration of power service would come earlier than without BCM at all. ・ Much better to create a standard BCM for EC uniformity purposes. Only typhoon contingency plan. ・ It helps ECs to mitigate cost and damage. ・ Imperative to ECs to establish BCM after we experienced the 2 calamities, the earthquake and the super typhoon Yolanda, to improve our resiliency as a distribution company. ・ Yes, it is important to measure how resilient the EC is. ・ Ours is only typhoon contingency plan. ・ To be able to prepare and respond automatically in the event disasters come. ・ BCM is very important to distribution utilities to act as a guide on what to do during and after calamities. Hence, provide continuous service to our member/consumers.

	・ Considering that we are all prone to disaster and we are a public utility. ・ The new BCM rating will pose as a motivator for the EC to do better and work toward a more disaster-resilient cooperative. ・ BATELEC II can take some time to talk on this for a better plan regarding preparedness. ・ EC will be responsible to the needs of its customers in times of disasters.
Negative	・ None

Q2-3 Do you think "new BCM rating" should be incorporated into the KPS or separated from the KPS?

Answer	Why?
Incorporated	・ As additional performance. ・ So that coop will be required to do so which ultimately will benefit them.
Separated	・ To avoid complexity in reportorial (To ERC, NEA and other concerned agencies) ・ Because this is a long-term and costly process and may impair our efforts done to attain the factors in the current KPS. ・ To incorporate this would be unfair to ECs that are most often visited by typhoons and are already severely cash-strapped ・ BCM is for risk management. KPS is for Technical and investment capabilities of the ECs/Cooperatives. ・ In order not to affect the categorization set by NEA. ・ Presently, the ECs are having difficulties in complying the present KPS. It will become an additional burden on the part of the ECs. ・ So that it will not be a burden to the ECs in terms of compliance. ・ In order not to affect the KPS, categorization of EC should also not be affected. ・ Need support at the time of the disaster. Payment should be made upon recovery. Categorization should not be affected. ・ We do not want additional standards. ・ There are already many kinds of KPS. BCM rating should be separated but given bonus points to coops having one ・ Properly monitor the results.

	・ Because NEA-KPS is based on EC performance. ・ Due to some external factors not controlled by coop like NSCP transmission line and power supply/generation. ・ BCM is more on the planning side but KPS is based on actual EC performance. ・ This should be a separate evaluation. KPS is performance based. ・ The BCM is already complete and maybe difficult to determine or apportion percentage to the BCM. ・ I think this should have its own tabulation so that it will not affect the original KPS that NEA has. ・ Should have a transition period before fully incorporated into the KPS.
Incorporate Major Components	・ It determines ECs financial and technical capability. ・ To make coops become proactive when it comes to dealing with disasters. ・ To be proactive whenever casualties hit our franchise area.

Q2-4 Do you think the rating indicators proposed by the JICA study team would be appropriate or sufficient?

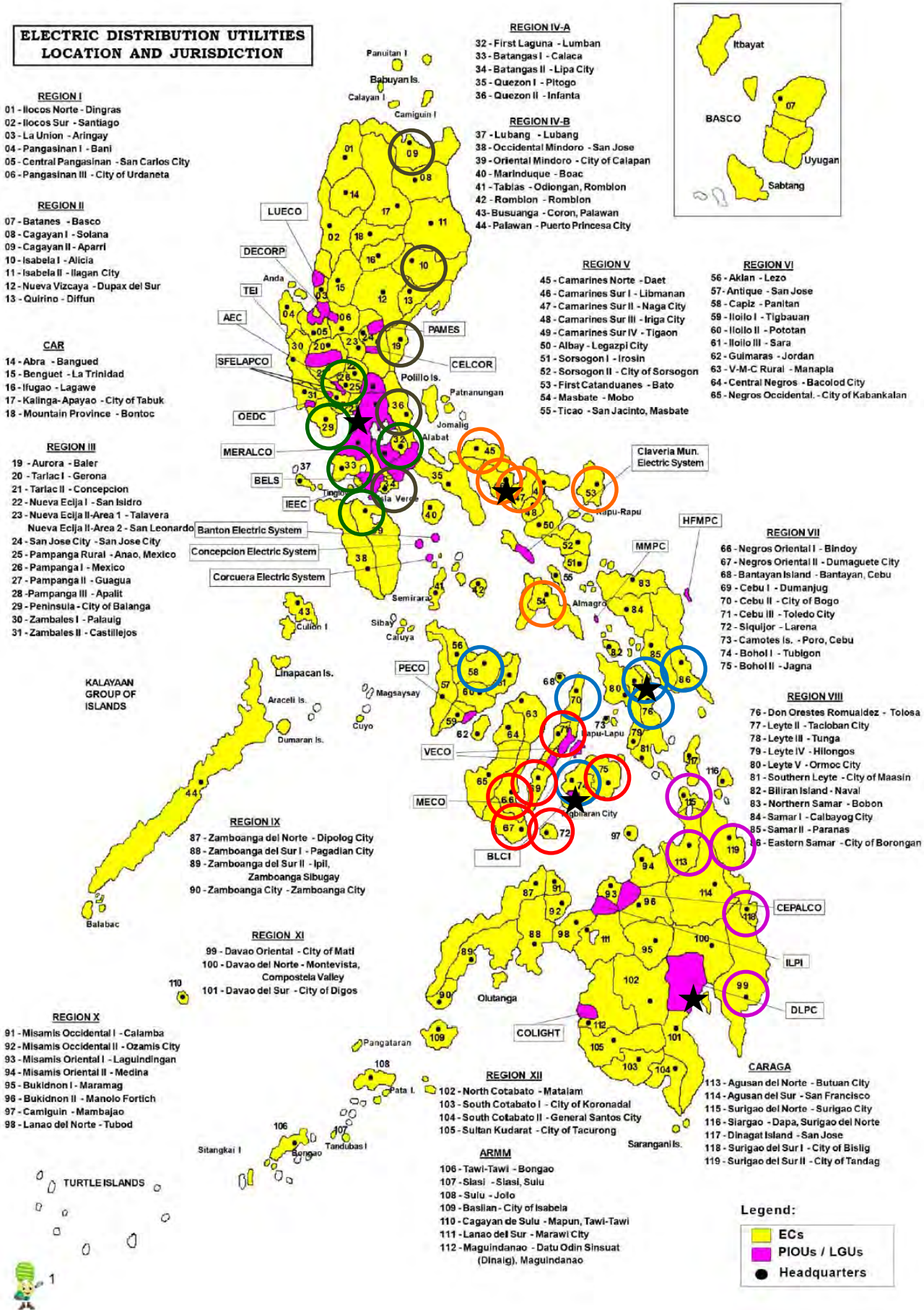
Answer	Any other indicator (s)?
Yes	・ Calamity insurance/ review on distribution standards/ NEA subsidy assistance. ・ Reasonable.
No	・ Consider supervising factors or external factors that may affect. ・ We suggest the team should visit other cooperatives for additional inputs on the study.

Q3 Any other comments, suggestions or opinions regarding this project.

The initial incentive should not be dependent on how prepared the ECs are but rather on the ECs vulnerability to natural disasters to financially aid the ECs who are mostly in need of the fund.
Enlighten more the ECs to be prepared more in case of calamity. Introduce pre-disaster activity program.
The question is when the incentive will come in? Or when does it matter greatly or most needed? The presentation dwelt on past disaster incentives but to be qualified means cost to the ECs.
Provide provision on rates to be used for disaster restoration.
Expenses incurred during the disaster must be included in the provision of rate setting.
The project is a great help to the ECs in improving disaster resiliency of the distribution system.
To enhance the ECs disaster preparedness, there should be a sufficient funding for BCM. Offering a very low interest rate will be helpful. Inclusion of BCM in the CAPEX provision is also necessary.
Only the insurance for fire. We want to avail the loan with a lowest interest rate.

As your rate is break-even, it needs to be included in the rate-marking provision in time of disaster.
Disaster preparation on disaster resiliency or immediate restoration needs a prompt action. Is it possible to use the Long Term Development Plan (LTDP) as submitted by the coop to be used as an attachment or reference in filing for availing the loan to JICA?
Task Force Kapatid should be enhanced thru this program like expenses of the task forces sent to area should be recovered.
This is a good project which should be given importance at this point in time. However, appropriate assistance should be given to the affected coops in the form of lowest interest rate when loan is needed as well as the lowest insurance premium for insurance coverage.
a. Improve thru BCM/BCP the national DRRP. b. Educate community stakeholder. c. Stakeholder pole JPA awareness of EC. d. NEA awareness assistance training thru BCM-DRRP e. NEA upgrade of NEA bulletin standard.
Need a follow-up seminar to enhance the subject matter.
If materialized, this will be a big help to ECs particularly on areas that are prone to disaster, not only typhoon especially that we have normalize this time. Thanks for the help.
This project, once materialized, will help ECs to be more resilient and prepared in times of disasters and be more cautious on the things the ECs must consider because the Philippines is not free from natural disasters or calamities. ECs can work hand on hand on this project to be more successful.
We suggest study should not be generalized to all ECs but should be clustered or based on EC status or location. There should be visits done by the team to other ECs for additional input in the study.
This is very timely because we are experiencing 20x minimum typhoon hitting our country every year especially in our area, ISELCO. We do hope that JICA will continue in providing assistance to ECs in the Philippines.
NEA is always ready to respond to the needs of ECs in times of calamities. But ERC should also respond to the application of emergency CAPEX filed to them for the recovery of the loan for payment to the concern agency.

Seminar Venue and Participated ECs



○: In Tacloban City on May 15th

○: At NEA on May 19th

○: In Naga City on July 3rd

○: In Davao City on July 6th

○: In Tagbilaran City on September 4th

○: At NEA on September 9th

★: Seminar Venue

Presentation Slides

1st Seminar
Data Collection Survey
on the Incentive Mechanism for Improving Disaster Resiliency of Electric Power Distribution Network

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
National Electrification Administration (NEA)

Manila, 19th of May 2015

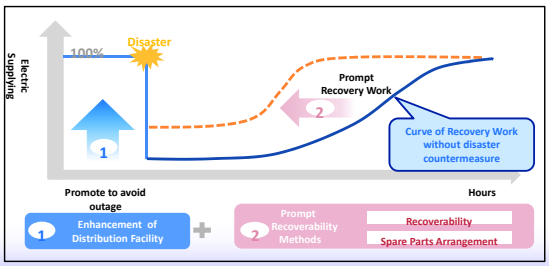
Data Collection Survey on the Incentive Mechanism for Improving Disaster Resiliency of Electric Power Distribution Network

May, 19th 2015

Objectives of the Project

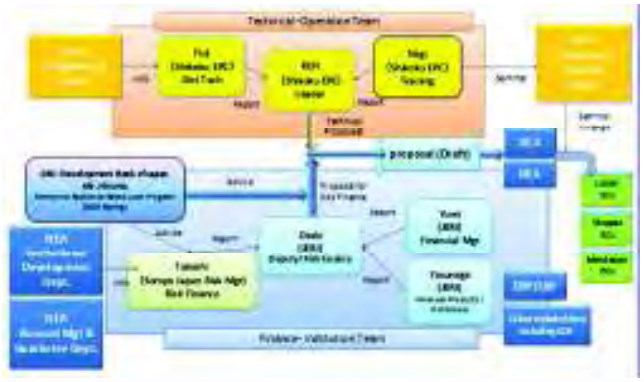
1. Information Collection of related with Power Distribution and analyze the problems
2. To introduce the financial scheme and experiences in Japan
3. To examine how similar scheme could be introduced in the Philippines
4. To propose preliminary plan to implement a new financial incentive scheme
5. To discuss on possibility of introducing financial incentive scheme for enhancing disaster resilience

Holding seminar for Ecs in Luzon, Visayas and Mindanao



Schedule of the project

Stakeholders of the project



From the UN world Conference on Disaster Risk Reduction

DEVELOPMENT PROGRAMS FOR ECs

Business Continuity Management (BCM) Credit Rating for ECs

With JICA assistance, a possible framework for a credit rating based financing is being developed.

BCM is proposed to be integrated as part of NEA's Key Performance Standards which will require Disaster Risk Resilience/Mitigation Plan.

Interest rates will be set by taking into account the EC's disaster preparedness, which will be a financial incentive. The higher the rating of an EC, the lower will be its interest rates.

BCM if applied in the Philippines will be the first ever.

Source: Presentation Ms. Edita S. Bueno, Administrator, NEA

Disaster Resiliency Program for DRRM

DRRM: Disaster Risk Reduction Mgt.

1. Identify Threats and Risk
2. Upgrade structure design of Infrastructure
3. Funding Build Back Better
4. Other measurements

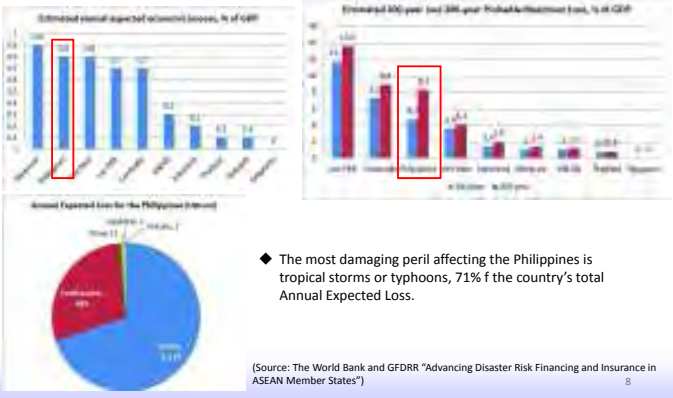
(Warning, community awareness, Capacity Training, restoring manual)

"Investment for resiliency & risk reduction will save 5-7 times in reconstruction and rehabilitation"

Source: Department Public Works and Highways

Economic Assessment of Natural Disasters in Philippines

- Philippines is regarded as a country with one of the most serious potential economic loss caused by natural disasters among ASEAN countries.



- The most damaging peril affecting the Philippines is tropical storms or typhoons, 71% f the country's total Annual Expected Loss.

(Source: The World Bank and GFDRR "Advancing Disaster Risk Financing and Insurance in ASEAN Member States")

Importance of Improving Disaster Resiliency of ECs (1)

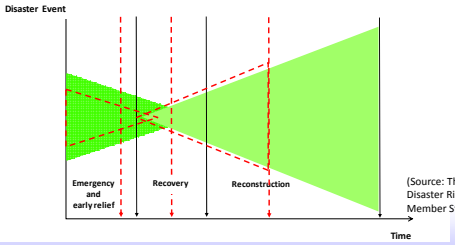
☆ Building disaster resilience of electric power distribution network, which is an essential infrastructure in the Philippines, is very important in order to …

- **Maintain stability of people's lives and business activities in a region**
- **Enhance the long-term socio-economic attractiveness and competitiveness of the region**
- **Reduce potential fiscal burden for the central and local governments and for the ECs**

☆ Business Continuity Management (BCM) is an integral part of strengthening disaster resilience of a company. BCM has two main components;

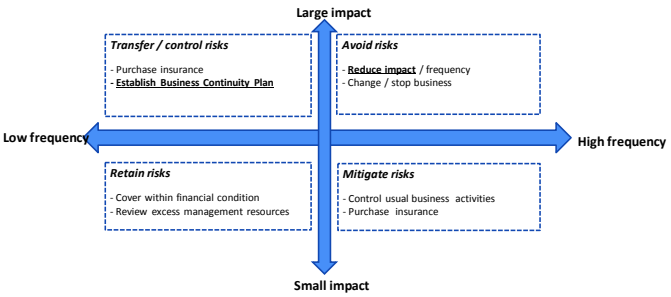
- Preparedness / mitigation to prevent operation level decrease (1)
- Business continuity plan to achieve optimum and prompt recovery (2)

☆ With good BCM being implemented, post-disaster phases could be shortened and post-disaster financing needs could be reduced significantly.



(Source: The World Bank and GFDRR "Advancing Disaster Risk Financing and Insurance in ASEAN Member States")

Risk Control Measures



(Source: Sumitomo Mitsui Trust Holdings, Inc.)

Conventional Disaster Management Activities and Business Continuity Management of a Company

	Conventional Disaster Management Activities	Business Continuity Management
Main purposes	□ Securin sa ety o persons □ Reduction o property dama e	□ Securin sa ety o persons, and continuation or early recovery o critical operations t˜at s˜ould ˜e continued or restored on a priority ˜asis
Events to be covered	□ ˜ ntiicipated disaster in t˜e re ion o a ˜usiness ˜ase	□ ˜ ll incidents ˙ ˜ic˜ could interrupt an enterprise's ˜usiness
Important matters to be emphasized	□ , inimi˜e t˜e ollo˙ in ˜ um˜er o casualties ˜ mount o dama e □ ! on irm t˜e sa ety o employees, etc", and rescue and support a ected persons □ Recover a ected sites as soon as possi˜ le	□ , inimi˜e t˜e num˜er o casualties and amount o dama e, con irm t˜e sa ety o employees, etc", rescue and support a ected persons, and do t˜e ollo˙ in ˜ #˜ c˜ieve t˜e recovery time o˜ $ctive and t˜e recovery level o˜ $ctive or critical operations #%eep t˜e impacts on mana ement and sta&e˜olders ˙ it˙ in t˜e permissi˜ le ran e #˙ nsure revenue eneration and survive as an enterprise
Scope of examination of activities and measures	□ ˜ ac˜ site o an enterprise" (ead o ice ˜uildin) lant ˜ ata center, etc"	□ ! ompany# ide ˜includin all sites, □) arties in t˜e supply c˜ains, etc" on ˙ ˜ic˜ an enterprise relies" Su˙ contractors Suppliers ! lients, etc"
Units involved in efforts	□ ˜ orts are made ˜y speci ic divisions in c˜ar e o disaster mana ement, includin t˜e disaster mana ement division, eneral a airs division and acility division"	□ ˜ orts are $jointly made ˜y t˜e mana ement, eac˜ ˜usiness division, procurement and sales divisions, and support divisions ˜corporate plannin , pu˙lic a airs, inance, eneral a airs, in ormation systems, etc","
Types of strategies and measures to be examined	□ , easures or reducin dama e to sites and or recoverin sites a ter a disaster as soon as possi˜ le ˜eart˙ - ua&#esistant improvements, stoc&piles, prevention o secondary disasters, rescue, recovery ˙ or&s, etc",	□ Site su˜stitution strate y ˜securin alternative sites, securin redundant sites and acilities, implementin . ˙ , , etc", □ Site recovery strate y ˜includin many measures in common ˙ it˙ t˜ose or sites o disaster mana ement activities,

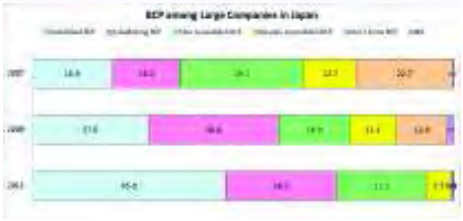
(Source: Cabinet Office, Government of Japan "Business Continuity Guidelines")

Quick Questions on Your Business Continuity Management

1. The management understands the necessity and advantages of BCM?
2. The management establishes a basic policy indicating the enterprise's concept of business continuity?
3. The management establishes a company-wide BCM implementation system by designating persons responsible for BCM?
4. Your company assesses the impact of an interruption (or significant deterioration) of the supply of services and quantifies matters where possible?
5. Your company identifies critical operations which must be continued or restored on a priority basis?
6. Strategies and measures for the continuation or early recovery of critical services are established depending on the predicted damage?
7. Measures for reducing the damage arising from an anticipated incident for facilities are taken?
8. Important information (or vital records) is backed up and stored at tow or more places?
9. Measures for procuring funds in case of emergency are established?
10. Your company concludes agreement with the local governments in order to contribute to the local community, and build close collaborative relationships with various actors in the local community?
11. Your company develops an education and training plan for BCM?
12. A review and improvement plan which includes the systems, schedule and procedures for inspecting, reviewing and improving BCM, is established?

How many "Yes" answers do you have???

BCP penetration in Japan



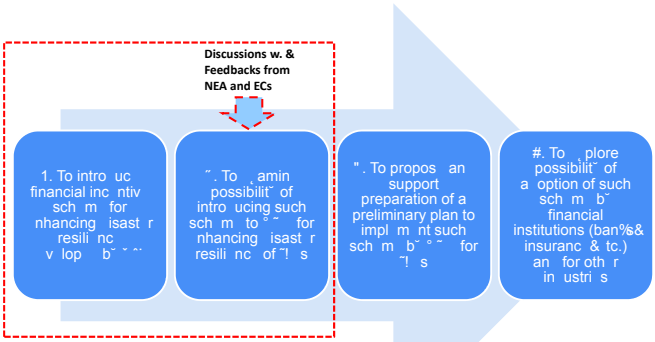
- Number of companies that have already established their BCP or are in the process of establishing their BCP or have plan to establish BCP has been gradually increasing for both large and medium-sized companies.

(Source: Cabinet Office, Government of Japan)

Incentive Mechanism for Improving Disaster Resiliency of Electric Power Distribution Network

May 2015

Financial Incentive Scheme for Enhancing Disaster Resilience



- Discussion with NEA and ECs to find out the current situation and their potential needs
- Seminars for NEA, ECs and other stakeholders to promote understanding on importance and benefits of enhancing disaster resilience and how such financial incentive scheme could be adopted

Overview of BCM rating by the Development Bank of Japan

Enterprise Resilience Rated Loan Program

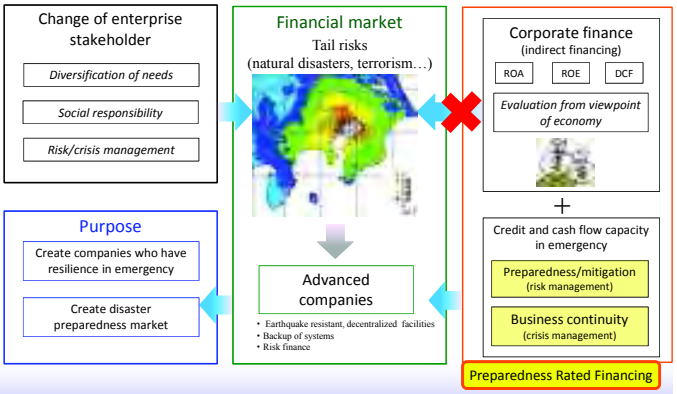
-BCM rating-

Such recent disasters as the Great Hanshin-Awaji Earthquake, the Chuetsu Offshore Earthquake and in 2011 the Great East Japan Earthquake caused tremendous damage to the economy, with many organizations forced to suspend operations for extended periods.

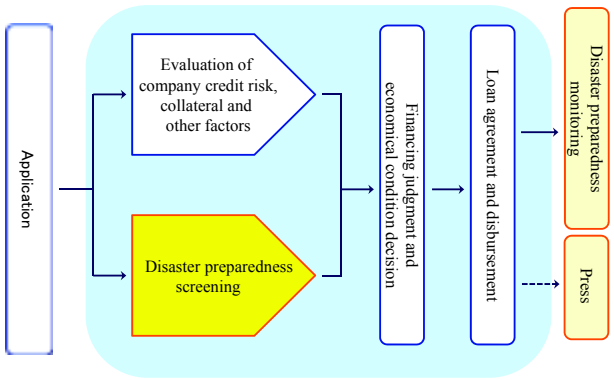
In addition to planning for protection for personnel and property, companies face the need to draft business continuity plans to hedge themselves against lost revenue and protect their clients in the event of disaster.

Enterprise Resilience Rated Loan Program（BCM rating）

Product Philosophy



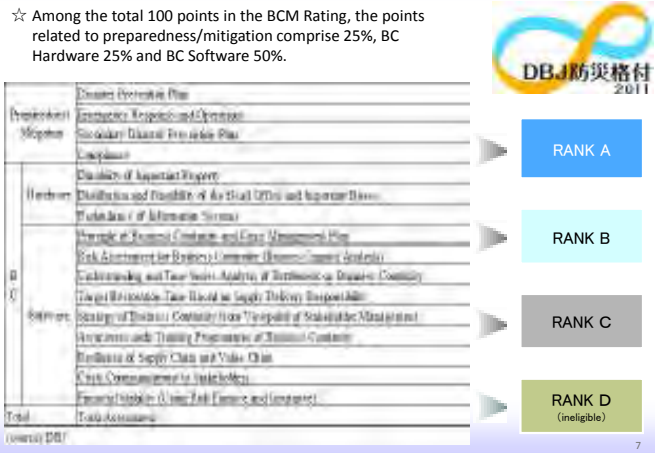
Enterprise Resilience Rated Loan Program



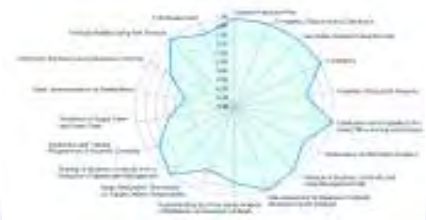
Interest rates are set by taking into account client's disaster preparedness.

Outline of Screening

☆ Among the total 100 points in the BCM Rating, the points related to preparedness/mitigation comprise 25%, BC Hardware 25% and BC Software 50%.

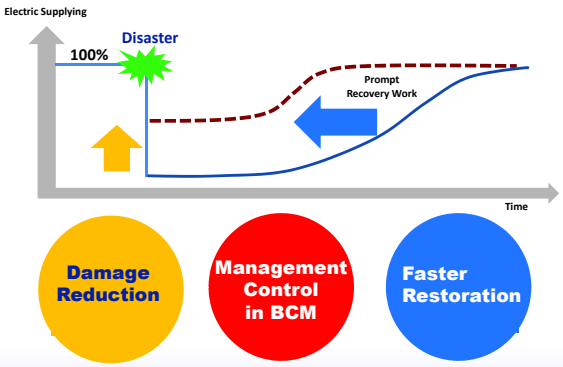


Global Risk Report 2012



Financial Incentive Scheme for Enhancing Disaster Resilience of ECs

Key Elements in Business Continuity Management for Electric Distribution Service



Damage Reduction | **Management Control in BCM** | **Faster Restoration**

Rating Indicators for each category

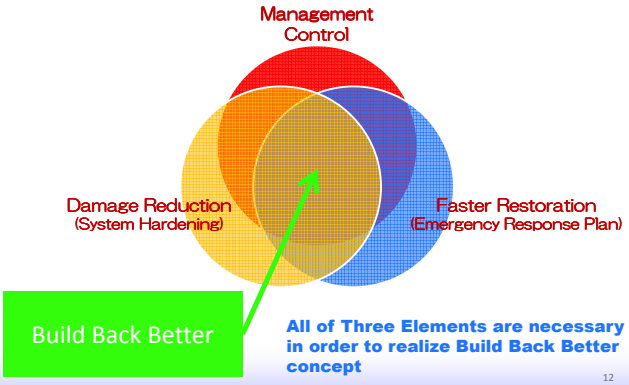
Damage Reduction
1) Well Designed Facility for Natural hazard
2) Protection against Secondary Damage
3) Power Distribution Loop and Isolation
4) Additional Protection for Important Facility

Faster Restoration
1) Forecast Power Outage Area
2) Restoration Capability
3) Conditions to Restoration Work
4) Mutual Aid System

Management Control in BCM
1) System Hardening Plan
2) Emergency Response Plan

Note: Rating indicators are further breakdown into around 50 items in total

Building a stronger, more resilient electric distribution system that can withstand future natural hazards



All of Three Elements are necessary in order to realize Build Back Better concept

Damage Reduction — Assessment of vulnerability of the power distribution facility against Natural Hazards

Rating indicators	
1) Well designed electric distribution system prepared for Natural Hazard	● Sufficient Natural Hazard assessment
	● Well adapted specification in design
	● Quality control - Installation
	● Inspection, Maintenance & Repair
2) Protection against secondary damage	● Tree and vegetation management
	● Flying debris
	● High tide during storm
	● Land slide, flash flood or mud flow
3) Electric distribution loop and Isolation	● Redundancy, loop distribution
4) Additional Protection for Important Facilities	● Reliable power lines to important facilities – hospital, water, communication,

Faster Restoration — Assessment of restoration capability of EC within the pre-set time frame after a disaster

Rating indicators	
1) Forecast power outage area	● Pre-typhoon damage assessment
2) Restoration Capability	● EC's capacity for restoration works
	● EC's control and command in a disaster
3) Conditions to restoration works	● Redundancy in power supply
	● Possible access obstruction for restoration
4) Mutual aid system	● Effectiveness of Taskforce Kapatid

Mgmt Control in BCM — Assessment of management control for enhancing preparedness for Natural Disasters

Rating indicators	
1) Management commitment	● Clear commitment for upgrading facility prepared for Natural Hazards
2) System hardening plan	● Facility upgrade plan w/funds
	● Rehabilitation plan w/funds
3) Emergency response plan	● Development, update and training
	● Pre-disaster activity
	● Outage monitoring system

A Rating System for Business Continuity Management

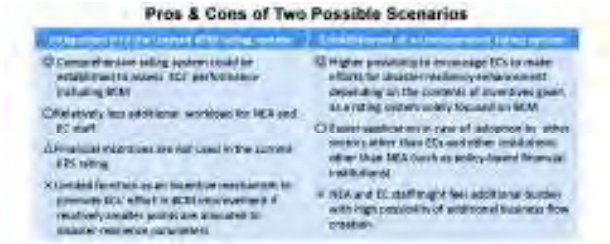
✓An assessment tool on "Preparedness for Natural Hazards" for Electric Distribution System that provides an overall view on the preparedness along with Strong points and areas needing improvement.

✓Rating should be designed to allow financial institutes to decide if the facility is entitled to preferred financial scheme.

Introduction of BCM rating to ECs

- Should BCM rating be embedded in the current KPS rating system?

Pros & Cons of Two Possible Scenarios



(1) New KPS

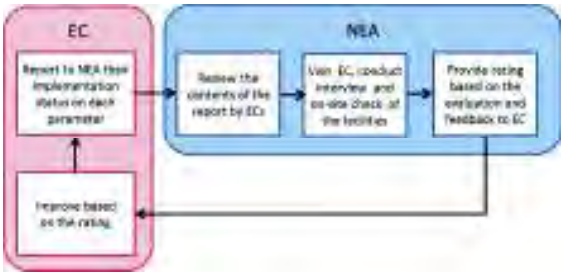
Parameters	Weight	Departments in charge
Financial	30%	Financial Services Dept, Account Management & Guarantee Dept
Institutional	35%	Institutional Development Dept
Technical	30%	Engineering Dept
Reportorial	5%	
BCM	***??***	***???***

(2) Independent BCM rating

(3) Mixture of (1) and (2)

Operational Procedure of BCM rating

- Identification of responsible department(s) within NEA will be needed.
- ECs will need to report periodically their BCM implementation status to the NEA.
- In the BCM rating process, NEA will need to conduct on-site check of ECs, especially in the start-up stage, to have mutual understanding of the rating system and its importance.
- PDCA cycle should be introduced for continuing improvement of BCM by ECs.

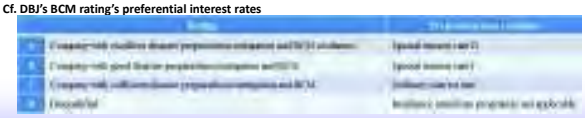


Possible Financial Incentives in BCM rating

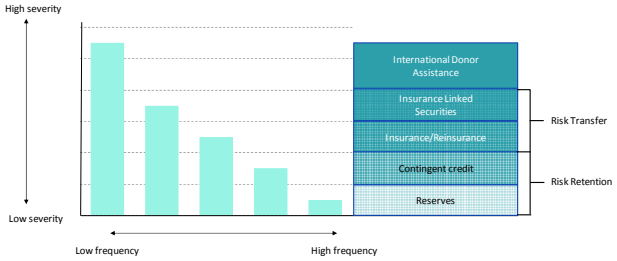
- For ECs with higher BCM rating, the following financial incentives should be considered.

To enhance ex-ante preparedness	To enhance ex-post business continuity
(1) Preferential loans to promote pre-disaster investment to strengthening facilities of ECs - Lower interest rate (cf. current interest rate: 6.5%) - Longer loan term (longer than 15 years)	(4) Preferential contingent loan program (possibly by commercial banks)
(2) Preferential guarantee program (possibly by LGUGC) to help pre-disaster investment funding by commercial banks - Lower guarantee fee (cf. current guarantee fee: 0.25%) - Larger guarantee amount (cf. current upper limit: 80%)	(5) Preferential calamity loans (by the central government/NEA)
(3) Similar preferential loans to be applied by commercial banks	(6) Preferential disaster insurance program - Lower insurance premium

Cf. DBJ's BCM rating's preferential interest rates



Ex-post Fiscal Risk Management of Natural Disasters



(Source: The World Bank and GFDRR "Advancing Disaster Risk Financing and Insurance in ASEAN Member States")

BCM activities to be shared with other stakeholders

Issues to be discussed on the financial incentive scheme

- Appropriate and effective economic incentive(s) for ECs to promote their BCM activities
- How to create funds for EC's pre-disaster investment for strengthening facilities within NEA
- Possibility to exclude pre-disaster investment for BCM from energy cost calculation
- Possible coordination with the IFC's current initiative for risk transfer program
- Possible coordination with other stakeholders including local governments, LGUGC, commercial banks, etc.

Insurance Programs for Natural Disasters
- Earthquake Insurance in Japan & Typhoon Guard Insurance for Mindanao -

Presentation

1. Outline of the structure of earthquake insurance for residential properties in Japan
2. Typhoon Guard Insurance for Plantation industries in Mindanao

Slide 1

1. Outline of the structure of earthquake insurance for residential properties in Japan

Slide 2

Great East Japan Earthquake / 2011

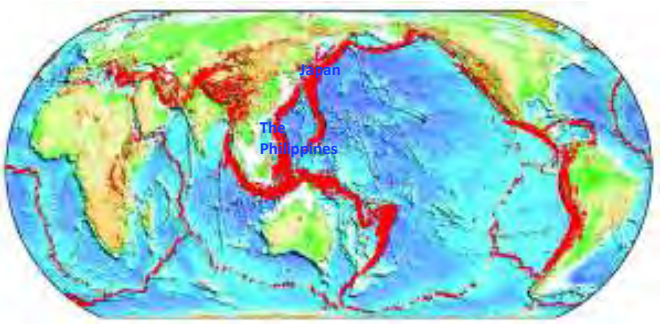
Slide 3 Source: Institute for Fire Safety & Disaster Preparedness of Japan

Significant Damage by Tsunami along a long coastline

Slide 4 Source: U.S. Marine Corps. Photo by Lance Cpl. Ethan Johnson

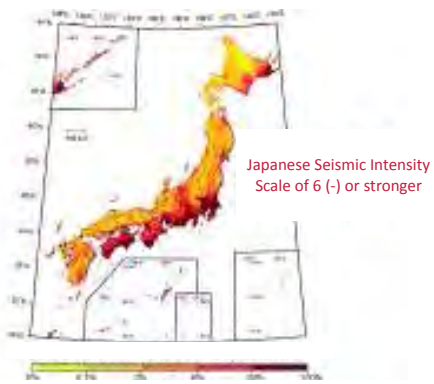
Japan is located in one of the most seismic active regions

Land area of Japan: less than 1% of the globe
Earthquakes: 10 % of EQ in the world occurred in and around Japan



Slide 5

Strong Earthquake may happen at anywhere in Japan at any time



Provability of Earthquake stronger than Scale of 6 (-) in next 30 years from 2014

Slide 6

Earthquake Insurance Program Scheme in Japan

In order to cope with sever Seismic Risks in Japan,

- Building code has been reviewed and upgraded after large earthquakes in past
- Insurance program for residential property - Japanese Government and Insurance Industry

Earthquake Insurance in Japan

Industrial and Commercial Property:
Property Insurance Program by private insurance programs

Residential Property:
Earthquake insurance through a legislative scheme adopted by EQ Insurance Law since 1966

Slide 7

Residential Earthquake Insurance

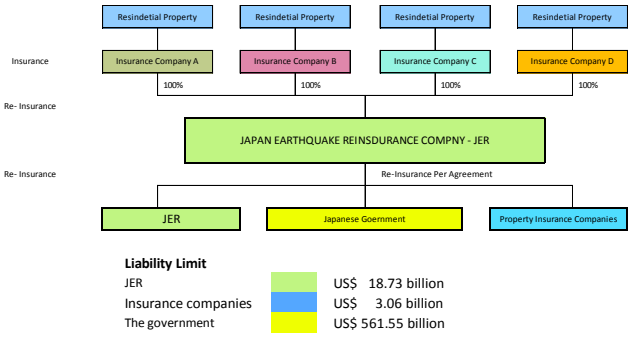
- **Challenge in Earthquake Insurance Program in Japan**
  - Very high frequency of strong earthquakes in Japan
  - Entire area of Japan is situated in earthquake prone area
  - Population and Property Value are located at sever seismic zones such as Tokyo

Earthquake Insurance Scheme made by Private Insurance Companies alone can not be feasible because "Exposure is too big" to insurers

A legislative earthquake insurance scheme was adopted by Law in 1966

Involvement of
Private Insurance Companies,
Purposed Reinsurance Company
and Japanese Government

Reinsurance Scheme



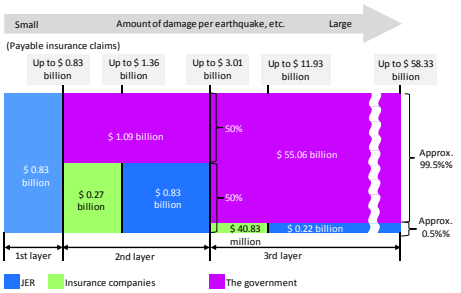
Liability Limit

JER	US$ 18.73 billion
Insurance companies	US$ 3.06 billion
The government	US$ 561.55 billion

Source: Prepared by SJNK-RM based on Japan Earthquake Reinsurance Company Annual Report 2014 , http://www.nihonjishin.co.jp/disclosure/2014/a_05.pdf

Allocation of Liability per One Earthquake

Earthquake Reinsurance scheme after April 1, 2014



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Source: Japan Earthquake Reinsurance Company Annual Report 2014 , http://www.nihonjishin.co.jp/disclosure/2014/a_05.pdf

Residential Earthquake Insurance

- **Covered Risks**
  Coverage is for direct damage to the residential building and household goods resulting, directly or indirectly, from earthquake, volcanic eruption or tsunami .
- **Coverage is Market Value Basis (not "Replacement Value")**
- **Limit of Liability**
  Between 30% and 50% of insured amount of fire insurance.
  Limit of liability is JPY 50 million for a building structure and JPY 10million for household goods.
- **Combined with Fire Insurance**
  Earthquake Coverage is endorsed to "Fire Insurance Policy". Not an EQ alone policy.
- **Simplified Claim Adjustment Procedure for Faster Payment**
  In order to expedite claim process after an disaster, loss is adjusted in one of three levels of damage categories - 5%, 50% and 100% damage

Incentives for enhancing enrollment - 1

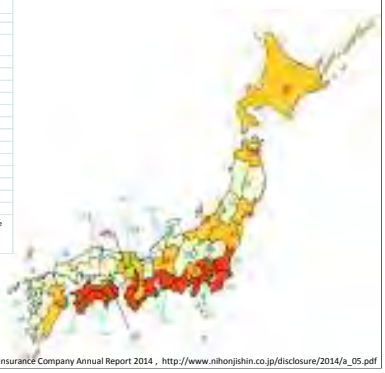
- **Insurance Premium Rate per EQ exposure**
  - Insurance Premium differs based on Location and Type of Structure

Basic rate (applicable to buildings and personal property) - Examples of premiums

Per one year insurance period and 10 million yen of amount insured (Unit: %)

Local Classification		S/RC revised	Wooden revised	Wooden (with) revised
Zone 1	A	0.07	0.11	0.08
	B			
Zone 2	A	0.07	0.13	0.08
	B			
	C	0.07	0.17	0.11
	D			
Zone 3	A	0.12	0.24	0.15
	B	0.14		0.18
	C	0.12	0.28	0.15
	D	0.2	0.33	0.26
	E			

(Note) To put a limit on changes in premium rates, if premium rates by structure and location classification were calculated to rise beyond 30%, the rise was reduced to 30%.



Source: Japan Earthquake Reinsurance Company Annual Report 2014 , http://www.nihonjishin.co.jp/disclosure/2014/a_05.pdf

Incentives for enhancing enrollment - 2

- **Various Discount Program applied to EQ Insurance Premium**
  - 50% discount for Seismic Proof Structure
  - up to 50% discount for seismic resistive structure – Certified Seismic Performance Class
  - Seismic Retrofit
  - Residence built after 1981 (Current building code for EQ)
- **Tax Benefit**
  - Insurance Premium for EQ can be exempted from Individual Income TAX Return

Current Enrollment to the Program:

Number of Households	55,577,000	(as of 2013.3)
Number of EQ Insurance Policy	15,838,000	
Enrollment Rate	28.5%	

Source: Japan Earthquake Reinsurance Company Annual Report 2014 , http://www.nihonjishin.co.jp/disclosure/2014/a_05.pdf

2. Typhoon Guard Insurance

Typhoon Guard Insurance

An index based insurance program developed by PGA Sompo Japan (A property and casualty insurance company set up between PGA and Sompo Japan Group) to mitigate typhoon damage to an Agricultural Corporations in Mindanao .

Recent Typhoon Trend in the Philippines

MAJOR Typhoons in Philippines

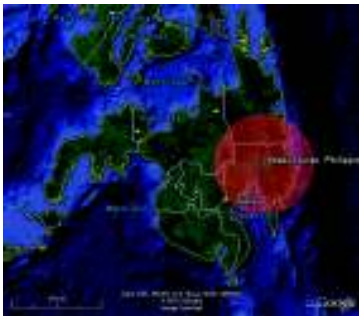
1. November 2013 -Typhoon Haiyan (Yolanda). - Tacloban City. (Over 5,000 deaths)
2. December 2012 - Typhoon Bopha (Pablo) island of Mindanao (1,900 deaths)
3. December 2011 -Typhoon Washi (Sendong) – north Mindanao (over1,000 dead)
4. September 26, 2009 - Typhoon "Ondoy"
5. June 2008 - Typhoon Fengshen "Frank" (800 dead)
6. November 2006 - Typhoon Durian (0ver 1,000 dead)
7. September 2006 - Typhoon Xangsane (200 dead)
8. October 1998 - Typhoons Zeb and Babs (over 300 dead)
9. October 1995 - Typhoon Angela "ROSING" - (0ver 1,000 dead)
10. September 1993 - Typhoon Flo (600 dead).
11. November 1991 - Tropical storm Thelma (over 6,000 deaths)

South

Slide 16

Background of Typhoon Guard Insurance

- Unlike Visayas and Luzon, less frequency of Typhoon hit Mindanao island in past.
- Tropical storm Washi hit Mindanao, and triggered flash flooding resulting in serious damage to the region. In 2012, Typhoon Bopha made landfall on Mindanao caused widespread destruction on the island.
- Plantations were seriously damaged, and therefore, need of insurance to mitigate this type of damage has been realized.



Slide 17

General Practice of Typhoon Guard Insurance

- Index Based Insurance Program
  - ✓ Insurance payment is made when predetermined condition is met.
- Predetermined Condition
  - ✓ Center of Typhoon passed within an agreed distance from the selected city.
  - ✓ Agreed distance can be selected from 100km, 150km or 200km.
- Industry to be covered and Location
  - ✓ Plantation business for Banana in Mindanao
- Payment assessment
  - ✓ Actual damage of the plantation is not necessary for the insurance payment.
  - ✓ No filed assessment is required.

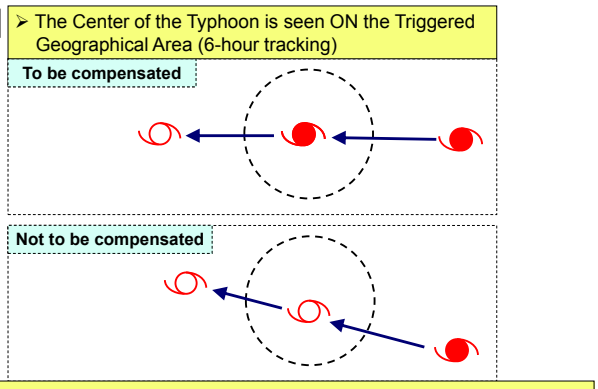
Slide 18

➢ BENEFIT: PAYOUT will happen when the Center of the Typhoon passes within the chosen Triggered Geographical Area regardless of damages on crops

Slide 19

Trigger to Insurance Payment

Case 1 ➢ The Center of the Typhoon is seen ON the Triggered Geographical Area (6-hour tracking)



Slide 20

Challenges in Typhoon Guard Insurance

- Insurance premium including relevant taxes VS Insurance Payment & Risk Awareness
  - ✓ Inadequate wind speed information area by area
- Correlation between actual damage to the agricultural product and index used for Typhoon Guard Insurance
  - ✓ Distance of Center of Typhoon
  - ✓ Category of Typhoon……, Tropical depression

Slide 21

Future of Typhoon Guard Insurance

- PGA Sompo Japan is currently working with potential clients to adjust the design of the Typhoon Guard Insurance.
  - ✓ More category of Typhoon and tropical storm
  - ✓ More options on agreed distance to trigger an insurance payment
  - ✓ Market acceptance of Insurance Premium
- Once the Typhoon Guard Insurance is well accepted in the market, PGA Sompo will examine expansion to other geographical areas of the Philippines.

Slide 22 / End

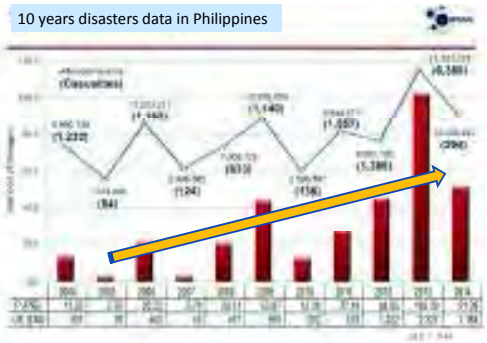
Data Collection Survey on the Incentive Mechanism for Improving Disaster Resiliency of Electric Power Distribution Network

Lessons Learned from Japan

May, 2015

From the UN world Conference on Disaster Risk Reduction

10 years disasters data in Philippines



Number of Disasters for 10 yrs

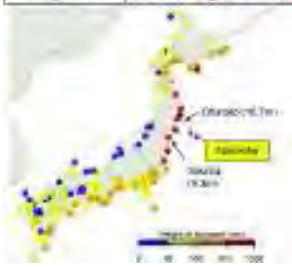
1.China (286)
2.USA(212)
3.Philippines(181)
4.India(167)
5.Indonesia(141)
・
・
9. Japan(62)

How recent weather phenomena fit the **'new normal'**

Great East Japan Earthquake lessons and learned

Earthquake

Name	The 2011 off the Pacific coast of Tohoku Earthquake (The Great East Japan Earthquake)
Date & Time	11th Mar. 2011, 14:46 JST (05:46 UTC)
Magnitude	9.0 (the largest earthquake recorded in Japan)



Tsunami

- Observed data by tide gauges
  Maximum height... 8.5m or higher (Soumas)
- Results of survey after earthquake
  Maximum height... 16.7m or higher (Ofunato)

Damages (as of September 2013)

- Human Casualties
  Dead...18,703 / Missing...2,674
- Property Damage
  Collapse of Houses...1,172,276

Source: Japan Electric Power Information Center

Great East Japan Earthquake lessons and learned

Countermeasures for Disaster Damage Prevention

The Good Practices of

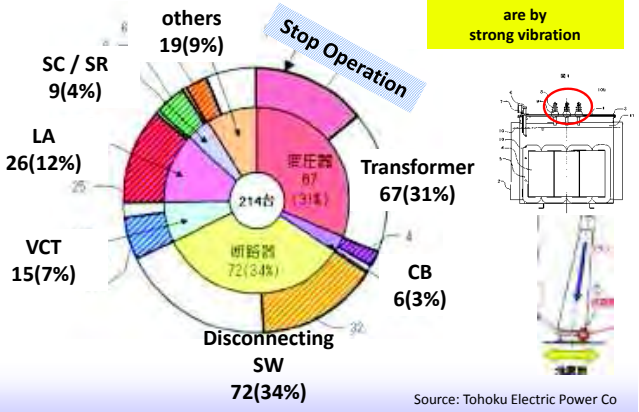
Strengthen Power Facilities
→1) Natural Disaster Damage in Japan
→2) Main countermeasure for Network Facilities

For the prompt recovery
→ 3) Recovery Countermeasures to Supply Power

1）Natural Disaster Damage in Japan_1

Damage in Sub Station

The most of the causes are by strong vibration



Source: Tohoku Electric Power Co

1）Natural Disaster Damage in Japan_2

Damage in Distribution Facilities

	Stop Supply	Supply	Damage rate	Cause
Pole	8,471	54	0.3%	Indirect Damage By Other Obstacles 82%
	Collapse			
HV Wire	1,370	86	0.07%	
	Disconnection			
Pole TR	3,381	507	0.3%	
	Pole collapse			

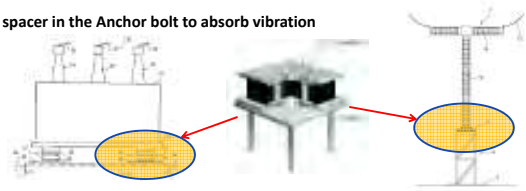
Pole Collapse **Wash away** **Flooding**

Source: Tohoku Electric Power Co

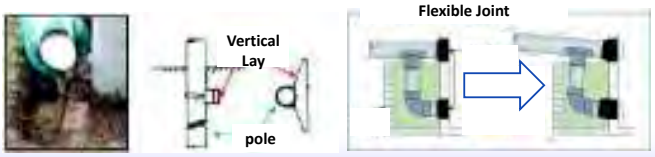
2) Main countermeasure for Network Facilities_1

Substations Facilities

Insert spacer in the Anchor bolt to absorb vibration



Distribution Facilities (Undergrad)

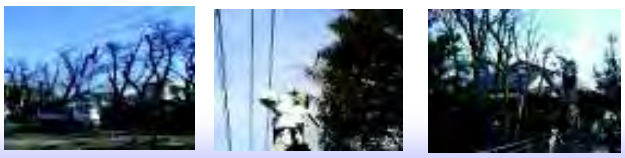


2) Main countermeasure for Network Facilities_2

Before **Dark & Danger**

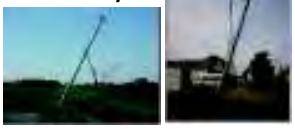
Vegetation trimming

After **Bright & Safe**



3）Recovery Countermeasures to Supply Power

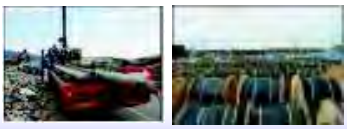
Emergency Recovery



Support pole and support wire
As temporary measurements

Communications For Cooperation

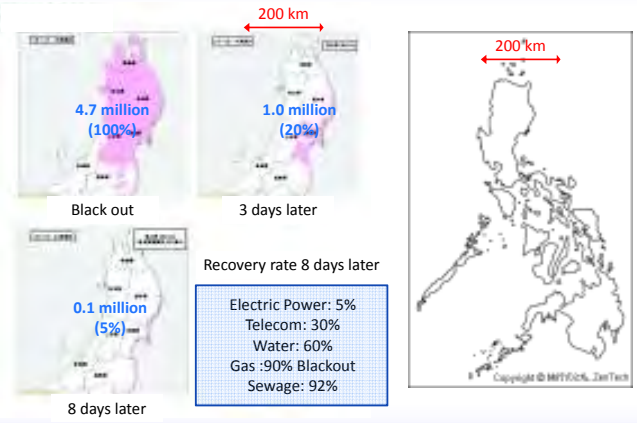
Buffer Stock and transformation



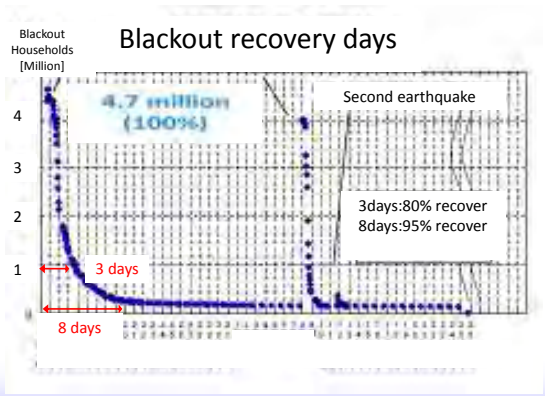
Heavy Vehicle and buffer stock yard

Insulation Resistance

3）Recovery Countermeasures to Supply Power

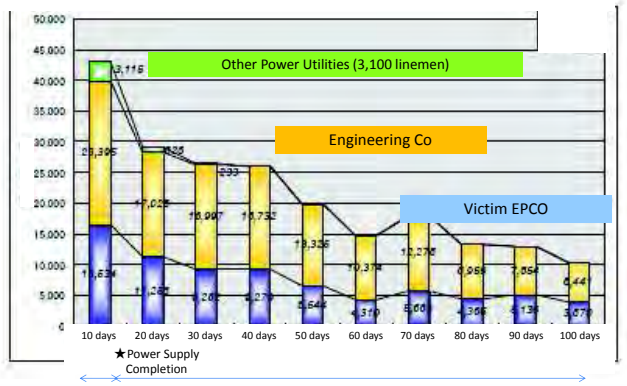


3）Recovery Countermeasures to Supply Power



3）Recovery Countermeasures to Supply Power

Wide Area Cooperation (only Distribution)



Source: Tohoku Electric Power Co

3）Recovery Countermeasures to Supply Power

Emergency Action Plan by Electric power Co.

<According to Disaster Countermeasure Law>

1_ Role sharing in In-house organization and training

*Restoring team(Engineering/material/information), Back office(Mas media, General Affair,,,,,,)
*Training, maintain and disseminate the manual

2_Information Sharing by communication with in / our of the office

* DOE/NEA, LGU, Fire Dept., Police office, PAGASA, Engineering Co., Gas Stand
* Which area is still blackout and what is the causes, what material is necessary to fix.
* Vehicles, Road condition, Fuel condition, Communication devices,(Wireless/Cell)

3_Backup Function

*In case the headquarter would damage…._? , Branch office takes place, instead?

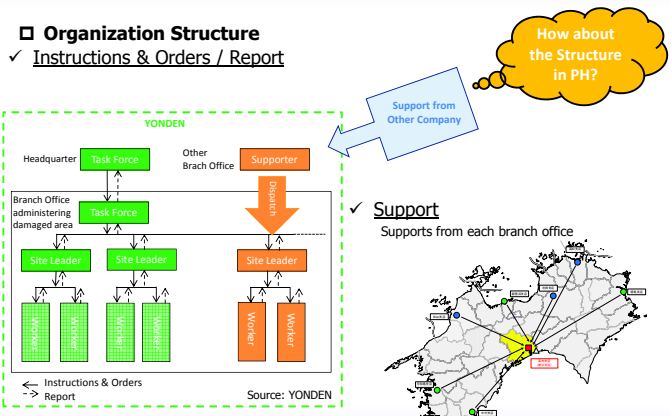
4_Secureing restoring manpower and buffer parts

*Some of the staff are also the victims of the disasters(They need to take care their family.)
*Stock material storage is to be distributed in other separate area <Diversification of Risk>
*Prepare food and accommodation for the recovery workers from other area

3）Recovery Countermeasures to Supply Power

□ Organization Structure

✓ Instructions & Orders / Report



✓ Support

Supports from each branch office

Source: YONDEN

Cost-Effectiveness for Enhancement of Distribution Facilities

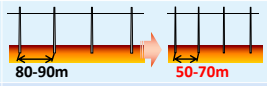
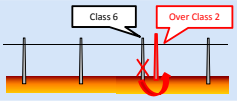
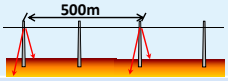
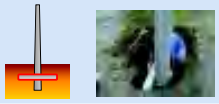
May 2015

YONDEN
Yoshitetsu Fujisawa

The Results of 1st Survey

Resilience	Study Item			Study Results	Problem	Necessary Measure	Proposal
Enhancement of Distribution Facility	Materials	Electric Pole	Legal(SPEC)	NEA Engineering Bulletin	None	None	None
			Material	Equivalent to Japanese productions			
		Distribution Line	Legal(SPEC)	NEA Engineering Bulletin			
			Material	Equivalent to Japanese productions			
		Guy Wire	Legal(SPEC)	Specification is not prescribed in anything			
			Material	Equivalent to Japanese productions			
	Design & Installation	Span between Poles	Legal	Not exist (EC has their own internal regulation)	None	None	None
			Current	80-90m on national average in main distribution line			
		Installation Depth of Electric Pole	Legal	NEA Engineering Bulletin, NEA Specification and Drawings for 7.6/13.2kV Line Construction			
			Current	The depth is calculated in "length of pole x 1/6 + 2 feet". The actual installation refers to the mark in pole showed by manufacturer.			
		Concrete Supporter	Legal	Not exist	–	–	Verification of Cost-Effectiveness
			Current	No use			
		Guy Wire	Legal	NEA Engineering Bulletin 3; (NEA Specification and Drawings for 7.6/13.2kV Line Construction Angle of distribution line 0-5°→not necessary, 5-60°→1 guy wire, 60-90°→2 guy wires)	None	None	None
			Current	Design & installation are conducted according to the above-mentioned regulations			
		Strength Calculation	Legal	Not exist	Miscalculation	– Proof Calculation – Automatic Calculation	Introduction of Proof Calculation
			Current	Calculated by manual			
	Operation & Maintenance	Plan	Legal	Not exist (Recommended by NEA Operation and Maintenance Procedure Manual/EC has their own internal regulation)	None	None	None
			Current	Conducting items are mostly equivalent to ones in Japan.			
		Tree Trimming	Legal	Not exist (Recommended by NEA Operation and Maintenance Procedure Manual/EC has their own internal regulation)	None	None	None
			Current	Conducted according to the above-mentioned manual. In order to mitigate damage from distance, measures such as root clamping of distribution line or tree trimming from the roots, etc. are necessary, however correct implementation of these measures is difficulty to be realized in term of cost performance and possibility. Enhancement of distribution facility is more realistic in comparison with improvement of accuracy of tree trimming to mitigate damage from disaster.			
	NEA Recommendation	Span Shortening		In main distribution line, 80-90m on national average is shorten to 50-70m			
		Improvement of Strength of Electric Pole		In main distribution line, over Class 2 is utilized in the place utilizing (will utilize) Class4.	No verification of improved effectiveness	Verification of Cost Performance	Verification of Cost-Effectiveness
		Installation of Additional Guy Wire		In main distribution line, additional guy wires at electric pole of each 500m in through main distribution line are installed.			

Recommendations for Enhancement of Distribution Facility

	Measurements		Target	Applicability: To Existing Facilities	Applicability: At New Installation	Effectiveness: Against Break	Effectiveness: Against Leaning
NEA	***1. Span Shortening***		Main Distribution Line	○ New Installation	◎	◎	○
	Improvement of Strength of Electric Pole			× Rebuilding	◎	◎	×
	Installation of Additional Guy Wire			◎	◎	◎	◎
YONDEN	***2. Concrete Supporter***		Soft Soil	× Rebuilding	◎	×	◎

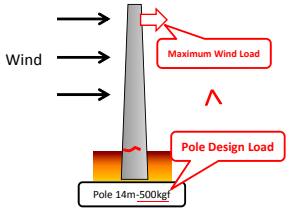
Evaluation Method of Cost-Effectiveness

$$\text{Cost-Effectiveness} = \frac{\text{Improved Safety Level}}{\text{Additional Cost}}$$

Concept of Safety Level

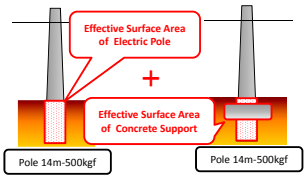
1. Span Shortening

$$\text{Safety Level of Electric Pole} \ (\geqq 1) = \frac{\text{Pole Design Load}}{\text{Maximum Wind Load}}$$



2. Concrete Supporter

Safety Level of Foundation = is improved according to increasing "Effective Surface Area"

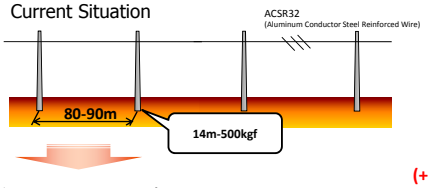


Strength Calculation System for Electric Pole (Software)

1. Span Shortening

■Cost 14m-500kg: USD 810/pole (Material + Installation, Japanese Price, USD1=¥120)

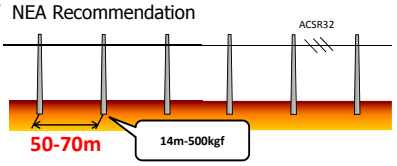
✓ Current Situation



Electric Pole: 11-13 poles/km

+ 2 – 9 poles/km (+ USD 1,620 - 7,290/km)

✓ NEA Recommendation



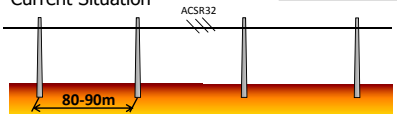
Electric Pole: 14-20 poles/km

1. Span Shortening

■Improvement of Strength (Safety Level of Electric Pole)

$$\text{Safety Level of Electric Pole} \ (\geqq 1) = \frac{\text{Pole Design Load}}{\text{Maximum Wind Load}}$$

✓ Current Situation

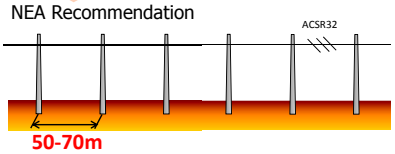


Safety Level (80-90m): 1.20 – 1.30

Maximum wind load is reduced according to shorten distance

+ 0.13 – 0.57

✓ NEA Recommendation



Safety Level (50-70m): 1.43 – 1.77

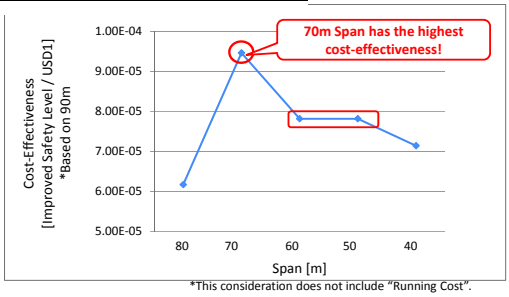
1. Span Shortening

■Cost-Effectiveness

Span (m)	Electric Pole: Poles/km	Electric Pole: Difference (Based on 90m)	Additional Cost(USD): USD810/Pole	Safety Level	Safety Level: Difference	Cost-Effectiveness (Improved Safety Level/USD1)
90	11	-	-	1.20		
80	13	2	1,620	1.30	0.10	6.17E-05
70	14	3	2,430	1.43	0.23	9.47E-05
60	17	6	4,860	1.58	0.38	7.82E-05
50	20	9	7,290	1.77	0.57	7.82E-05
40*	25	14	11,340	2.01	0.81	7.14E-05

*Reference

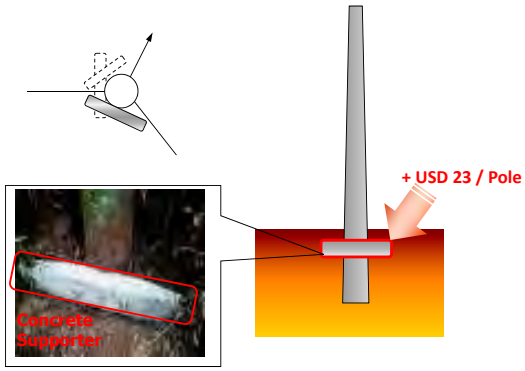
Shorter span has stronger safety level!



*This consideration does not include "Running Cost".

2. Concrete Supporter

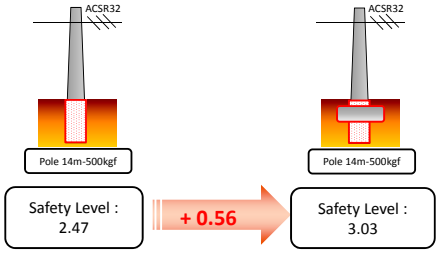
■Cost 1.2m: USD 23/Pole (Material + Installation, Japanese Price, USD1=¥120)



2. Concrete Supporter

■Improvement of Strength (Safety Level of Foundation)

Soil : Soft Soil
Both Span : 90m

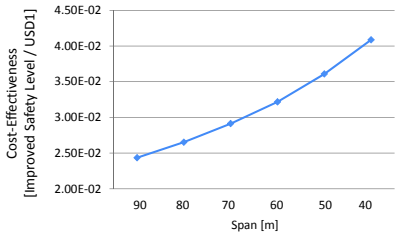


2. Concrete Supporter

■Cost-Effectiveness

Span (m)	Additional Cost(USD)	Safety Level of Foundation			Cost-Effectiveness
	USD23/Pole	No Concrete Supporter	Concrete Supporter	Difference	(Improved Safety Level/USD1)
90	23	2.47	3.03	0.56	2.43E-02
80	23	2.68	3.29	0.61	2.65E-02
70	23	2.93	3.60	0.67	2.91E-02
60	23	3.24	3.98	0.74	3.22E-02
50	23	3.61	4.44	0.83	3.61E-02
40*	23	4.09	5.03	0.94	4.09E-02

*Reference



*This consideration does not include “Running Cost”.