02 - Power Supply

Organization Responsible

Level of Responsibility	Name of Ministry/Agency/Institution
Ministry	Ministry of Power & Renewable Energy
Name of Licensee	Ceylon Electricity Board (CEB)
District	
DS Division	
GN Division	

Concepts and Definitions

Power Supply Sector

The power/energy or electricity sector is composed of the different types of power-generating and distribution systems like dams, power lines, equipment and other facilities used to generate and supply energy or electricity to households and industries. They may be owned by the government or by private individuals or corporations.

Damages

In power supply, damages are cost of: a) repair of partially destroyed assets and/or b) replacement of totally destroyed assets and infrastructure under each of the components of the power sector such as:

- Power generation plants: dams, tunnels, turbines, generators, control systems, etc.
- Transmission: high-voltage power lines, grid substations and control centers.
- Distribution: MV & LV lines, primary & distribution sub stations and control centers

The following are the other types of assets in the power sector:

- Structures such as office buildings, storage buildings, etc. including access roads.
- Office equipment like computers, air conditioners, etc.
- Equipment, machinery, tools, and spares etc.
- Vehicles

Damages occur at the time of, or shortly after the disaster and are to be measured in physical terms (such as kilometers of power lines) for which monetary replacement values are subsequently estimated.

Losses

Losses are the values of foregone revenues or income due to the change in economic flows (income and expenditures) during the period of recovery and reconstruction following the disaster. They are the current value of goods and services that were not and/or will not be produced over a time span due to the disaster until full recovery is attained.

Losses in the energy sector will include the following:

- Foregone sales in electricity due to the shut-down of the power system while the system is under repair or reconstructed after a disaster. This can include both short-term shut-down for repairs and longer-term shut-down due to reconstruction.

- Lower sales in electricity due to the decline in demand from consumers (households or companies) that have been affected by the disaster.
- Higher cost of operation which occurs when damaged power units are substituted by alternative stand-by plants that have a higher unit cost of production or when electricity has to be imported from a different system that has higher operating costs.
- Additional expenses to clean up the debris.

Steps in Undertaking Post-Disaster Damage and Loss Assessment for Power Supply Sector

In conducting a post-disaster damage and loss assessment in the power sector, the following steps are normally followed for every disaster-affected district. The CEB, as the government agency with expertise on the power sector, should be responsible for the post-disaster assessment of the sector. It should lead the assessment team in case a PDNA is needed.

Step 1. Collect and/or validate the baseline data for each of the disaster-affected district

Baseline information must be compiled and validated at the national, provincial or district levels before the field assessment or, if possible, prior to the occurrence of disaster. The table below must be completed by the CEB to be used for the baseline information in the online system. (Power transmission and distribution are with the CEB and they will be included in the assessment of damages and losses.)

Table 1. Power generation firms in a District

District						
Power generation plants by ownership	**Number of Power Plants**				**Total Capacity (kW)**	**Average Income per Year (LKR/Year)**
	Hydro	**Coal**	**Diesel**	**Others**		
CEB						
IPP						
IPP 1						
IPP 2						
IPP N						
SPPA						
SPPA 1						
SPPA 2						
SPPA N						

Notes for Table 1.

- *Licensees for power generation are with the CEB and the independent power producers (IPPs) and small power producers (SPPAs) which belong to the private sector that sell power to the CEB.*
- *'Others' will include renewable sources of energy.*

Step 2. Estimate damages and losses

With the baseline information, field assessment should be undertaken in the affected districts after a disaster. The CEB must assess all the damages and losses of its operating units.

- ✓ *Step 2.1. Estimate the damages and lossesof the CEB*

The value of damages and losses can be summarized in the following table which will appear in the online reporting system. The damages and losses of the CEB will include its power generation, transmission and distribution operations.

Table 2. Damages and losses of the CEB

District					
Number of Employees	**Male**		**Female**		
Number of Customers Affected	**Domestic**	**Industrial**	**Commercial**	**Others**	**Total**
Damages					
Assets	**Number of Totally Destroyed Assets**	**Total Replacement Cost (LKR)**	**Number of Partially Damaged Assets**	**Total Repair Costs (LKR)**	**Total Damages (LKR)**
Power Generation					
Dams					
Tunnels					
Turbines					
Generators					
Control systems					
Others					
Total					
Power Transmission					
High-voltage power lines					
Grid substations					
Control centers					
Others					
Total					
Power Distribution					
MV Line (Km)					
LV Lines (Km)					
Primary sub stations					
Distribution sub stations					
Control centers					
Total					
Structures					
Office buildings					
Storage buildings					

Access roads (Km)					
Others					
Total					
Office equipment					
Computers					
Air conditioners					
Others					
Total					
Equipment/machinery					
Tools					
Others					
GRAND TOTAL					

Losses						
	Average Income per Year (LKR/Year)	**Reduction in Income (%)**		**Total Losses (LKR/Year)**		**Total Loses (LKR)**
		Year 1	**Year 2**	**Year 1**	**Year2**	
Income Losses						
Other Losses						
Cleaning up of debris						
Higher operating costs						
Other unexpected expenses						
TOTAL						

Notes in filling out table 2:

- *It is possible that the assets of CEB are located in several districts. Therefore, CEB must exercise caution in order not to double count the estimates.*

✓ *Step 2.2. Estimate the damages and losses of the private power producers*

To fully estimate the effects on the power sector, the damages and losses of the private independent power producers (IPPs) and small power producers (SPPs) that sell electricity to the CEB should be assessed by the CEB. The assessment team should interview all the IPPs and SPPs to get the necessary information using the table below.

Table 3. Damages and losses of private power producers

District					
Name of IPP or SPP					
Number of Employees	**Male**		**Female**		
Assets	**Damages**				
	Number of Totally Destroyed Assets	**Total Replacement Cost (LKR)**	**Number of Partially Damaged Assets**	**Total Repair Costs (LKR)**	**Total Damages (LKR)**
Power generation equipment					
Machinery					
Structures					
Office equipment					
Vehicles					

Others					
Total					
	Losses				
Types of Losses	**Year 1 (LKR)**		**Year 2 (LKR)**		**Total Losses (LKR)**
Income Losses					
Cleaning up of debris					
Higher operating costs					
Other unexpected expenses					
Total					

✓ *Step 2.3. Summarize the damages and losses in the district*

Based on the assessment of the CEB and all of the IPPs and SPPs in the district, the damages and losses will be summarized in the following table.

Table 4. Summary of damages and losses in the district

District					
Number of Customers Affected	**Domestic**	**Industrial**	**Commercial**	**Others**	**Total**
Name of Firm	**Damages (LKR)**	**Losses (LKR)**			**Total (LKR)**
		Year 1	**Year 2**		
CEB					
IPPs					
IPP 1					
IPP N					
Total					
SPPs					
SPP 1					
SPP N					
Total					
GRAND TOTAL					

✓ *Step 2.4. Summarize the damages and losses in the province*

Based on the assessment of all the districts, the damages and losses will be summarized at the province level using the following table.

Table 5. Summary of damages and losses in the province

Province					
Number of Customers Affected	**Domestic**	**Industrial**	**Commercial**	**Others**	**Total**
District	**Damages (LKR)**	**Losses (LKR)**			**Total (LKR)**
		Year 1	**Year 2**		
District 1					
CEB					
IPPs					
SPPs					
Total					
District N					
CEB					
IPPs					
SPPs					
Total					
TOTAL					

✓ *Step 2.5. Summarize the damages and losses nationwide*

Based on the assessment of all the districts, the damages and losses will be summarized at the province level using the following table.

Table 6. Summary of damages and losses nationwide

Number of Customers Affected	Domestic	Industrial	Commercial	Others	Total
Province	**Damages (LKR)**	**Losses (LKR)**			**Total (LKR)**
		Year 1	**Year 2**		
Province 1					
CEB					
IPPs					
SPPs					
Total					
Province N					
CEB					
IPPs					
SPPs					
Total					
TOTAL					

Step 3. Analyze the impacts of the damages and losses to the economy and affected population

The assessment team must be able to analyze potential impacts to the people and the economy, among others, if the sector is not restored immediately. The following are some of the issues that should assessed, among others:

- ***The possible impacts on the welfare of the people.*** Living conditions, housing, health, education, access to services and resources.
- ***Economic impacts***. Business productivity (decline in output and income); reduction in employment; increase in prices; food supply; etc.
- ***Government services.*** Reduction in provision of services in education; health; security; administrative matters; etc.
- ***Added risks.*** The additional hazards and risks brought about by the disaster like the creation on new landslide-prone areas; epidemics; etc.
- ***Environment.*** The potential environmental risks like oil spills, destruction of watershed areas; etc.
- ***Gender and other cross-cutting issues and concerns.*** The potential impacts to vulnerable groups like women, children, elderly, indigenous peoples, etc.

Step 4. Identify the recovery strategies and estimate the recovery and reconstruction needs

The post-disaster needs must be based on a framework where policies and strategies are coherent and integrated. After analyzing the potential effects and impacts if no assistance will be provided to the sector, the aggregate needs of the sector must be estimated.

✓ *Step 4.1. Identify recovery and reconstruction strategies*

After the consolidation of the field assessment, the assessment team must identify or recommend the policies and strategies for the recovery and reconstruction for the sector. The following are some of the general policies and strategies that could be considered, among others.

- ***Tax breaks to business firms***. Exempting firms from paying certain taxes for a certain period, like temporary reduction in the collection of value-added tax, building permits and other related fees; temporary elimination of import duties on essential items required as inputs to recovery operations; etc.
- ***Credit.*** A credit scheme with soft terms, like low interest rate with longer repayment periods, which can provide firms the resources to buy machinery and equipment that will normalize operations.
- ***Equity*.** In some special cases, the government may opt to provide equity in private firms instead of subsidy or credit or tax exemptions.

The following strategies can be adopted for the post-disaster recovery and reconstruction activities:

1. ***Building Back Better (BBB).*** Recovery activities based on BBB principles will promote longer-term disaster risk reduction and management. BBB principle should look at the how to make infrastructure and facilities safer from future disasters like stronger engineering design, the advantages of resettlement of facilities in disaster-safe areas instead of rebuilding in the same disaster-prone areas, etc.

2. ***Focus on the most vulnerable and socially disadvantaged groups such as children, women, and the disabled.*** Recovery programming should give priority to those that will benefit the most vulnerable groups, including women, female-headed households, children, the poor, and take into account those with special needs.

3. ***Community Participation and Use of Local Knowledge and Skills.*** The participation of the community in all process (identification, planning, design and implementation) of recovery activities will help ensure the acceptability of projects and optimize the use of local initiatives, resources and capacities.

4. ***Coordinated and coherent approaches to recovery.*** The effective coordination among all involved agencies should be established based on uniformity of policies, flexibility in administrative procedures, etc. In some instances, a special new agency may be needed to oversee, coordinate and monitor complex disaster recovery programs.

5. ***Efficient use of financial resources.*** Fund sources from the national budget and the international donor partners that are suited for the recovery activities should be identified. Assistance to the recovery of the private sector, if any, should be clearly outlined.

6. ***Transparency and accountability.*** The overall plan and implementation of projects for recovery must be transparent, especially to those affected, through open and wide dissemination of information on all aspects of the recovery process. An effective monitoring system must be established.

✓ *Step 4.2. Identify, estimate and prioritize recovery and reconstruction needs*

Recovery needs are intended to bring back normalcy to all affected areas and sectors as soon as possible while reconstruction needs are generally long-term in nature (3 years or more) and are intended to 'build back better' from the ruins of a disaster. The sector assessment team must identify and prioritize their recovery and reconstruction projects based on their impact assessment.

✓ *Step 4.3. Summarize the estimated needs and draft the implementation schedule*

Based on the prioritized recovery and reconstruction needs, a summary should be created by the assessment team enumerating the post-disaster projects for the recovery and reconstruction with a rough general schedule of implementation outlining at the very least the activities, timing and budget required. The following table can be used.

Table 7. Summary of needs

Name of Project	Estimated Budgetary Requirement (LKR)			Total (LKR)
	Year 1	Year 2	Year N	

Step 5. Draft the post-disaster damages, losses and needs (PDNA) report of the sector

With all the information gathered using the previous steps, a report can be drafted by the assessment team which will be the inputs of the sector in the overall recovery and reconstruction plan. The draft sector report should be submitted to the DMC for consolidation.