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1. Operating Code No.6 (OC6) : Significant Incident Reporting
  2. Operating Code No.7 (OC7) : Emergency Operations

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TRANSMISSION DIVISION  
TENAGA NASIONAL BERHAD

January 2014



# Operating Code No.6 (OC6) Significant Incident Reporting

## **OC 6.1 Introduction.**

## **OC 6.2 Objective.**

## **OC 6.3 Scope**

## **OC 6.4 Procedures**

### **OC 6.4.1 Procedures for Significant Incidents.**

### **OC 6.4.2 Significant Incident Report**

# Operating Code No.6 (OC6) Significant Incident Reporting

## OC 6.1 Introduction.

- Sets out the requirement for reporting of Significant Incidents.

## OC 6.2 Objective.

- Facilitate the provision of detailed information in reporting Significant Incidents.

# Operating Code No.6 (OC6) Significant Incident Reporting

## OC 6.3 Scope

**Applies to GSO and following Users:**

- ✓ **All CDGU Generators.**
- ✓ **Grid Owner.**
- ✓ **Distributors.**
- ✓ **Network Operators.**
- ✓ **All generators not dispatched by GSO.  
( total on site not less than 30MW )**
- ✓ **Directly connected customers.**
- ✓ **Interconnected parties.**
- ✓ **Single buyer.**

## OC 6.4 Procedures

### OC 6.4.1 Procedures for Significant Incidents.

#### OC 6.4.1.1

**A Significant Incident will include events having Operational effect that will or may result in the following:**

- 1) Abnormal operation of plant and/or apparatus.**
- 2) System voltage outside Normal operating Condition limits.**
- 3) Frequency outside Normal operating Condition limits.**
- 4) System instability.**

## OC 6.4 Procedures

### OC 6.4.1 Procedures for Significant Incidents.

#### OC 6.4.1.2

- **GSO and User shall nominate person, contact locations and communication channel.**
- **GSO and User shall promptly inform each other in writing if any changes to nominated person, contact locations and communication channel .**

#### OC 6.4.1.3

- **If event reported to GSO by User (and determined to be significant Incident by GSO and Single Buyer), written report shall be given to GSO and Single Buyer by User**

## OC 6.4 Procedures

### OC 6.4.1 Procedures for Significant Incidents.

#### OC 6.4.1.4

- If event reported to User by GSO, written report shall be given to User by GSO

#### OC 6.4.1.5

- In all cases, GSO responsible for compilation of final report.
- Report will be issued to relevant parties including the Energy Commission.

## OC 6.4 Procedures

### OC 6.4.2 Significant Incident Report

#### OC 6.4.2.1

- **Report shall be in writing or any means mutually agreed between two parties.**
  
- **It shall contain :**
  - 1) **confirmation of notification.**
  - 2) **detailed explanation or statement relating to Significant Incident.**
  - 3) **additional information which has become known to Significant Incident.**



## OC 6.4 Procedures

### OC 6.4.2 Significant Incident Report

#### OC 6.4.2.2

Report shall as a **minimum contain** the following details:

- 1) Date, time and duration of Significant Incident.
- 2) Location.
- 3) Apparatus and or plant involved.
- 4) Description of Significant Incident and its cause.
- 5) Conclusion and recommendations of corrective and preventive actions (if applicable).

#### OC 6.4.2.3

**Written report shall be prepared as soon as reasonably practical after initial notification.**

# Sample of Reporting Form in IOM

**TNB – LPC COMPANY** Interconnection Operation Manual

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**APPENDIX V**

**LPC COMPANY**

To: NLDC, 6<sup>th</sup> Floor NLDC Building, 129, Jalan Bangsar, 50990 Kuala Lumpur.  
Fax No: 03- YYYYYYYY  
Tel No : 03- YYYYYYYY / YYYYYYYY

**FAULT REPORT**

- 1) Fault Report No:
- 2) Time and date of fault:
- 3) Location of fault:
- 4) Circuit breaker(s) tripped/involved together with protection relays indication:
- 5) Cause of fault:
- 6) Injuries to personnel:  
Details of damage to equipment of plant:
- 7) Load interrupted and duration:
- 8) Operation after trip:
- 9) Remark:

Signature:.....

Reported by:.....

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## OC 6.4 Procedures

### OC 6.4.2 Significant Incident Report

#### OC 6.4.2.4

- Generally GSO will request relevant user for a preliminary written report within **four (4) hours** of being aware of any Significant Incident.
- User have to investigate the cause of incident and to take any corrective measure necessary.
- User to submit formal written report within **three (3) business days**.
- User may request additional time up to **two (2) calendar months** from GSO to carry out relevant investigations and submit final report.

## OC 6.4 Procedures

### OC 6.4.2 Significant Incident Report

#### OC 6.4.2.5

- If Significant Incident occurred on the Grid System, GSO will submit a preliminary report to the Energy Commission within **three (3) business days** of the Significant Incident.
- Final report to be submitted within **two (2) calendar months**.

----- end of OC6 -----



----- **end of OC6** -----

# Operating Code No.7 (OC7)

## Emergency Operations

### **OC 7.1 Introduction**

### **OC 7.2 Objectives**

### **OC 7.3 Scope**

### **OC 7.4 Procedures**

#### **OC 7.4.0 General**

#### **OC 7.4.1 Determination of Emergency Condition.**

#### **OC 7.4.2 Grid System Restoration Plan.**

#### **OC 7.4.3 Restoration Procedures.**

#### **OC 7.4.4 Demand Restoration.**

#### **OC 7.4.5 Dealing with System Splits.**

#### **OC 7.4.6 Grid System Restoration Plan Familiarisation Plan and Test.**

#### **OC 7.4.7 Recovery Procedures from Abnormal Operating Condition.**

#### **OC 7.4.8 Loss of NLDC .**

#### **OC 7.4.9 Fuel Supply Emergency.**

## OC 7.1 Introduction

### OC 7.1.1

**Concerned with the operation of the Grid System by the GSO under Grid System Emergency Conditions.**

## OC 7.1 Introduction

### OC 7.1.2

**Grid System Emergencies** are of the following situations:

- 1) Total or partial blackout of the Grid System.
- 2) Imminent occurrence of disruption of supply.
- 3) Separation of one or more Power Island with associated loss of synchronisation due to activation of automatic decoupling scheme.
- 4) Voltage collapse of part of the Grid System.
- 5) Loss of strategic transmission group due to adverse weather, environmental emergencies etc.
- 6) Fuel Supply emergency.
- 7) Loss of NLDC



## OC 7.2 Objectives

- To ensure **normal supplies to all customers are restored as quickly and as safely as practicable in accordance to Prudent Utility Practice.**
- **Outline general contingency and strategies which shall be adopted by the GSO.**
- **Initiate communication procedures between GSO and relevant users when System Emergency:**
  - a. **is anticipate to occur**
  - b. **when Critical Incident is imminent**
  - c. **has occurred**

## OC 7.3 Scope

**Applies to GSO and the following Users:**

- ✓ **Generators with CDGUs**
- ✓ **Generators with Black Start Capability**
- ✓ **Distributors.**
- ✓ **Network Operators.**
- ✓ **Grid Owner**
- ✓ **Directly connected customers.**
- ✓ **Interconnected parties.**

## OC 7.4 Procedures

### OC 7.4.0 General

#### OC 7.4.0.1

- **GSO shall establish, maintain and regularly review a “Grid System Restoration Plan”.**
- **Users can be called into action immediately during Grid System Emergencies.**

#### OC 7.4.0.2

- **Users shall also establish, maintain and regular review their respective “Restoration Plan”.**
- **Users must be aware of the Grid System requirement through consultation with the GSO.**

# System Restoration Plan (Part 1)

SERDANG Island Restoration Plan Manual – Part 1

**PART ONE**

**SERDANG ISLAND RESTORATION PLAN OVERVIEW**

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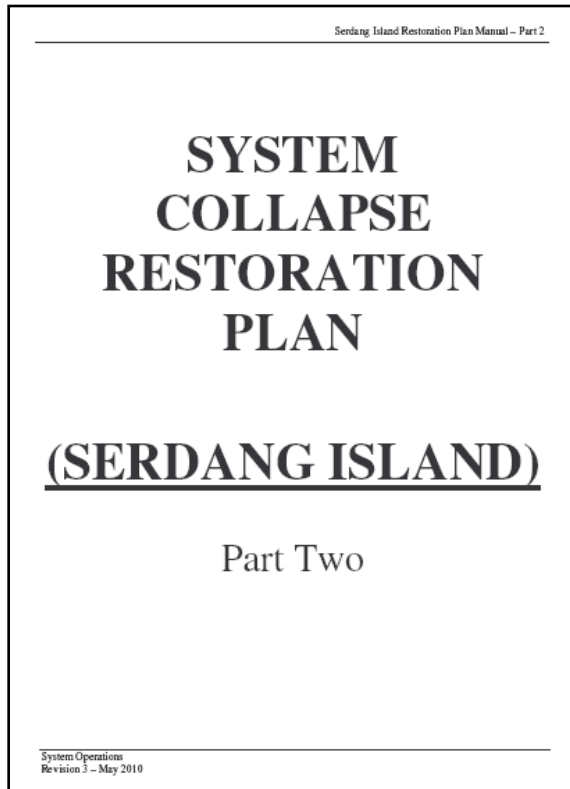
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SERDANG Island Restoration Plan Manual – Part 1

SERDANG ISLAND RESTORATION PLAN	
<b>Issued &amp; Prepared by</b>	System Operation Department Transmission Division
<b>Approved by</b>	Ir. Gurcharan Singh General Manager System Operation Department Transmission Division

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# System Restoration Plan (Part 2)



Serdang Island Restoration Plan Manual – Part 2

### Table of Contents

- 1.0 Introduction
- 2.0 Scope
- 3.0 Responsibility
- 4.0 Definitions
- 5.0 Plan Guidelines
- 6.0 Salient Points
- 7.0 SERDANG Island Restoration Plan
  - 7.1 Scenario 1 from Putrajaya Power Station
  - 7.2 Scenario 2 from Genting Sanyen Power Station

Appendix G: Generation

- G1: Generation Data
- \*G2: Putrajaya Power Station Islanded Operation Procedures
- \*G3: Genting Sanyen Power Station Islanded Operation Procedures

\*(For NLDC & Individual Power station only)

Appendix T: Transmission (Asset Maintenance)

- T1: SERDANG Island Grid System
- T2: Mnemonics List for Transmission PMU
- \*T3: Underfrequency Load Shedding Feeders
- \*T4: Reactor & Capacitors
- T5: TNB Transmission mobilisation – Kuala Lumpur
- \*T6: Critical substations Single Line Diagram (SLD)

\*(For NLDC, TNBT & MRCC only)

Appendix D: Distribution

- D1: Process Flow chart for Distribution A/P at Designated PMU
- D2: Distribution System Restoration Plan
- D3: Mnemonics List for Distribution PPU

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Appendix C: Communication Manual

- C1 : Communication list of NLDC Control Room and OPU
- C2 : Communication list of Distribution - MRCC
- C3 : Communication list of Distribution – Kuala Lumpur
- C4 : Communication list of Distribution – Selangor
- C5 : Communication list of Distribution – Putrajaya
- C6 : Communication list of Transmission – AM Kuala Lumpur
- C7 : Communication list of Putrajaya Power Station
- C8 : Communication list of Genting Sanyen Power Station

Appendix S : Duty list

- S1 : Duties of Distribution - MRCC Operations Room manager
- S2 : Duties of Distribution – Kuala Lumpur Operations Room manager
- S3 : Duties of Distribution – Selangor Operations Room manager
- S4 : Duties of Distribution – Putrajaya Operations Room manager
- S5 : Duties of Distribution Authorized Personnel
- S6 : Duties of Transmission – AM Kuala Lumpur Operations Room manager
- S7 : Duties of Putrajaya Power Station Operations Room manager
- S8 : Duties of Genting Sanyen Power Station Operations Room manager

Appendix A : Audit list after system normalisation

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## OC 7.4 Procedures

### OC 7.4.0 General

#### OC 7.4.0.3

- **All users to make themselves fully aware of contingency requirement.**
- **Failure to act in accordance with GSO will risk further disruption to the grid system.**

## OC 7.4 Procedures

### OC 7.4.1 Determination of Emergency Condition.

#### OC 7.4.1.1

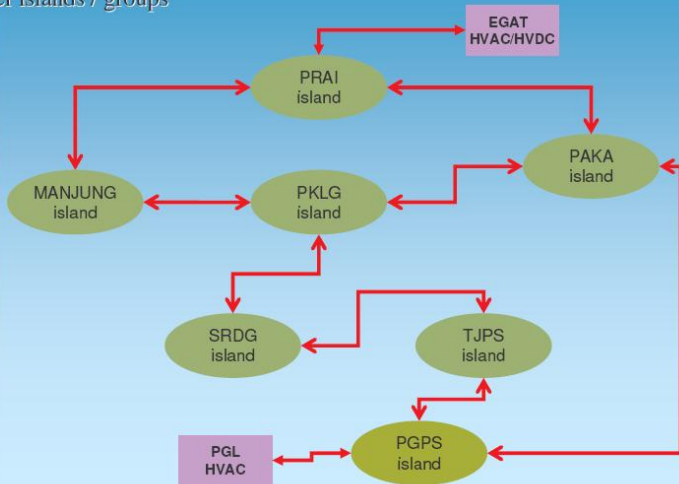
**GSO will activate the “Grid System Restoration Plan” when any of the following has occurred:**

- 1. Data arriving at NLDC indicating a Transmission System Split.**
- 2. Reports & Data from Power Stations.**
- 3. Reports & Data via SCADA system that indicate a Partial or Total blackout is imminent or exists.**
- 4. Loss of NLDC.**
- 5. Fuel Supply Emergencies.**
- 6. Report from field staff / users / public of imminent danger to critical installation of the grid system.**
- 7. Adverse weather.**
- 8. Reports of fire affecting or may affecting critical installation of the grid system.**

# 7 Island for Total System Collapse restoration

## The Restoration Plan

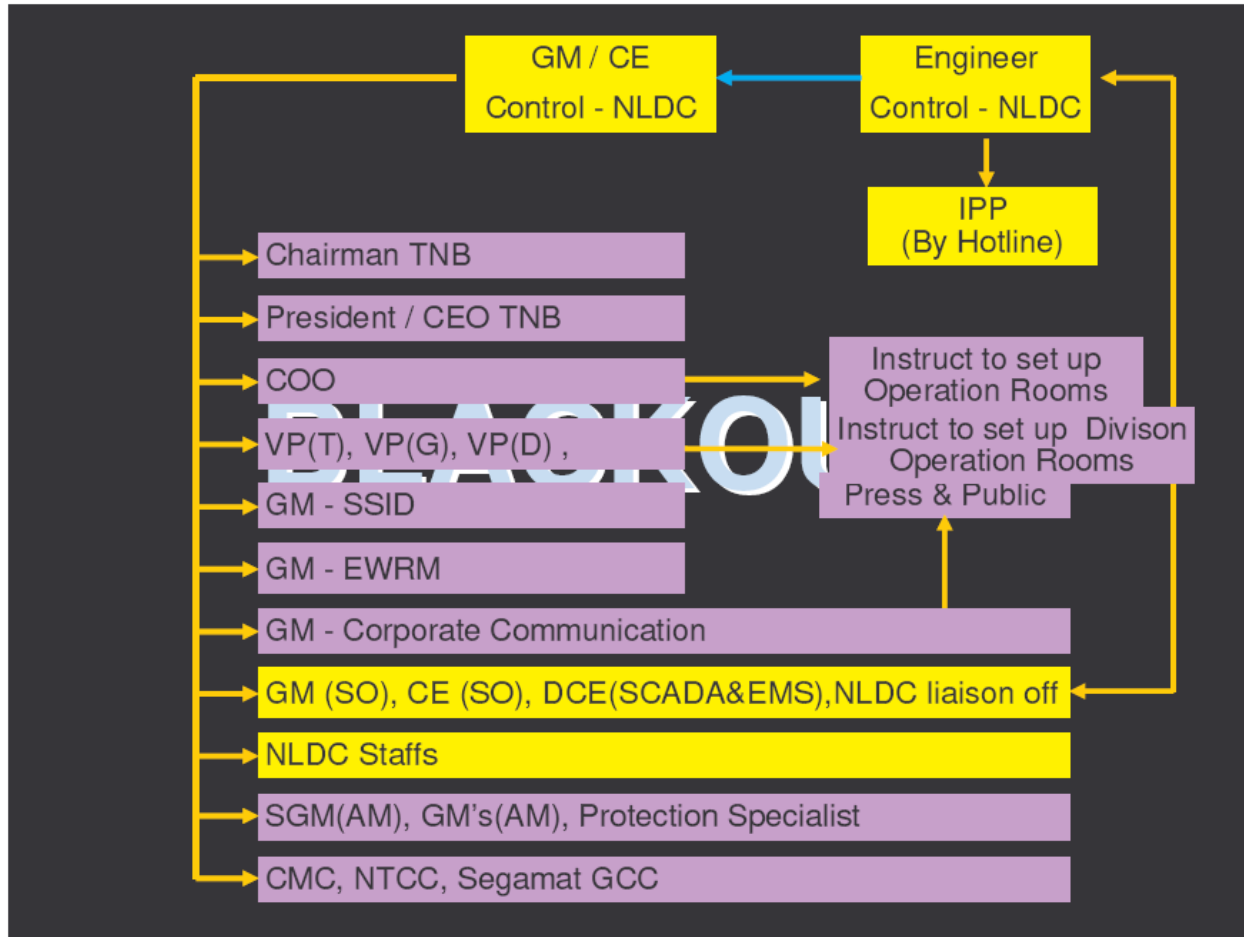
Other islands / groups



No	Island (Installed Cap.)	Power Stations	Regional / State Office	
			Transmission	Distribution
1	Prai Island	Temenggor, Bersia, Kenering, Pergau, Gelugor, Perlis Power, SKS Power, Telok Ewa	PERLIS/ KEDAH, PULAU PINANG, KELANTAN, PERAK	PERLIS, KEDAH, PULAU PINANG, KELANTAN
2	Manjung Island	Cameron Highlands, Segari, GB3, Chenderoh, Piah, Janamanjung	PERAK	PERAK
3	Port Klang Island	Port Klang, Connaught Bridge	KL , SELANGOR	SELANGOR, WILAYAH PERSEKUTUAN
4	Serdang Island	KLPP, Putrajaya	KL , SELANGOR	SELANGOR, PUTRAJAYA , W.P.
5	TJPS Island	PDPS, Panglima, Powertek, Malacca Power Station, Tunku Jaafar Power Station, Jimah	N.SEMBILAN, MELAKA	NEGERI SEMBILAN, MELAKA
6	Pasir Gudang Island	Pasir Gudang, YTL P.G., Pasir Gudang GIS , Tg. Bin	JOHOR 1 JOHOR 2	JOHOR
7	Paka Island	Paka, Kenyir, YTL Paka	TERENGGANU, PAHANG	PAHANG, TERENGGANU



# Activation of System Restoration Plan



## OC 7.4 Procedures

### OC 7.4.2 Grid System Restoration Plan.

#### OC 7.4.2.1

- “Grid System Restoration Plan” serve as a guide during system emergencies.
- Outline operational structure to facilitate a safe & prompt restoration process.

#### OC 7.4.2.2

- “Grid System Restoration Plan” will address restoration priority of the different Consumers group.
- Also address the ability of each CDGU to accept sudden loading of demand block.

# Salient points

## PRAI Island – Salient points

- Preferably Pergau and Temenggor to be used to power up the island.
- Supply from EGAT AC via CPNG 132/275kV can be use for initial powering up of Perlis Power GTs.
- Supply to GRNE should be restored as soon as possible. Supply from EGAT DC should only be taken once PRAI Island has been stabilized.

## OC 7.4 Procedures

### OC 7.4.2 Grid System Restoration Plan.

#### OC 7.4.2.3

- Upon GSO instruction, a registered “Black Start Stations” for at least one of their CDGU to start-up from shutdown to energise a part of the total system or be synchronised to grid.
- Within shortest reasonable time.
- Without external electrical power supply.

## OC 7.4 Procedures

### OC 7.4.2 Grid System Restoration Plan.

#### OC 7.4.2.4

Generic tasks outlined in the “Grid System Restoration Plan” are:

1. Re-establishment of full communication if communication is cut off.
2. Post critical incident system - status and condition of HV Apparatus and plant.
3. Action and instruction to Users for restoration and recovery of Grid system from imminent disruption of supply.
4. Action and instruction to Users for restoration and recovery of Grid system from loss of supply.
5. Instruction by the GSO to relevant parties.
6. Coordination procedures between adjacent Users.

## OC 7.4 Procedures

### OC 7.4.2 Grid System Restoration Plan.

#### OC 7.4.2.4 - Continue

- 7. Preparation of Power Station and the Transmission System for Systematic restoration.**
- 8. Mobilisation and assignment to personnel.**
- 9. Re-energisation of Power Island using Black Start Station.**
- 10. Re-synchronisation of various Power Island to restore interconnected Grid System.**
- 11. Staffing levels requirement during emergencies.**
- 12. Priority of categories of load to be restored.**
- 13. Audit of the Transmission system after restoration**

# Mobilization

## 6.0 MOBILISING PERSONNEL

On confirming System Collapse, the following personnel shall carry out the following activities:-

### (i) TNBG & IPP

No	Status of machines upon blackout	Action by Power Station
1	Tripped	Initiate safe shutdown and ready to Blackstart
2	Standby	Ready to Blackstart
3	House Load	Stabilise the unit and ready to close to dead bus

After blackstart procedures Power Station to coordinate with TNBT and TNBD personnel to start loading of generating units to a stable level.

### (ii) TNBT

To send personnel to identified strategic PMUs for switching, synchronising and assisting restoration of supply.

### (iii) TNBD

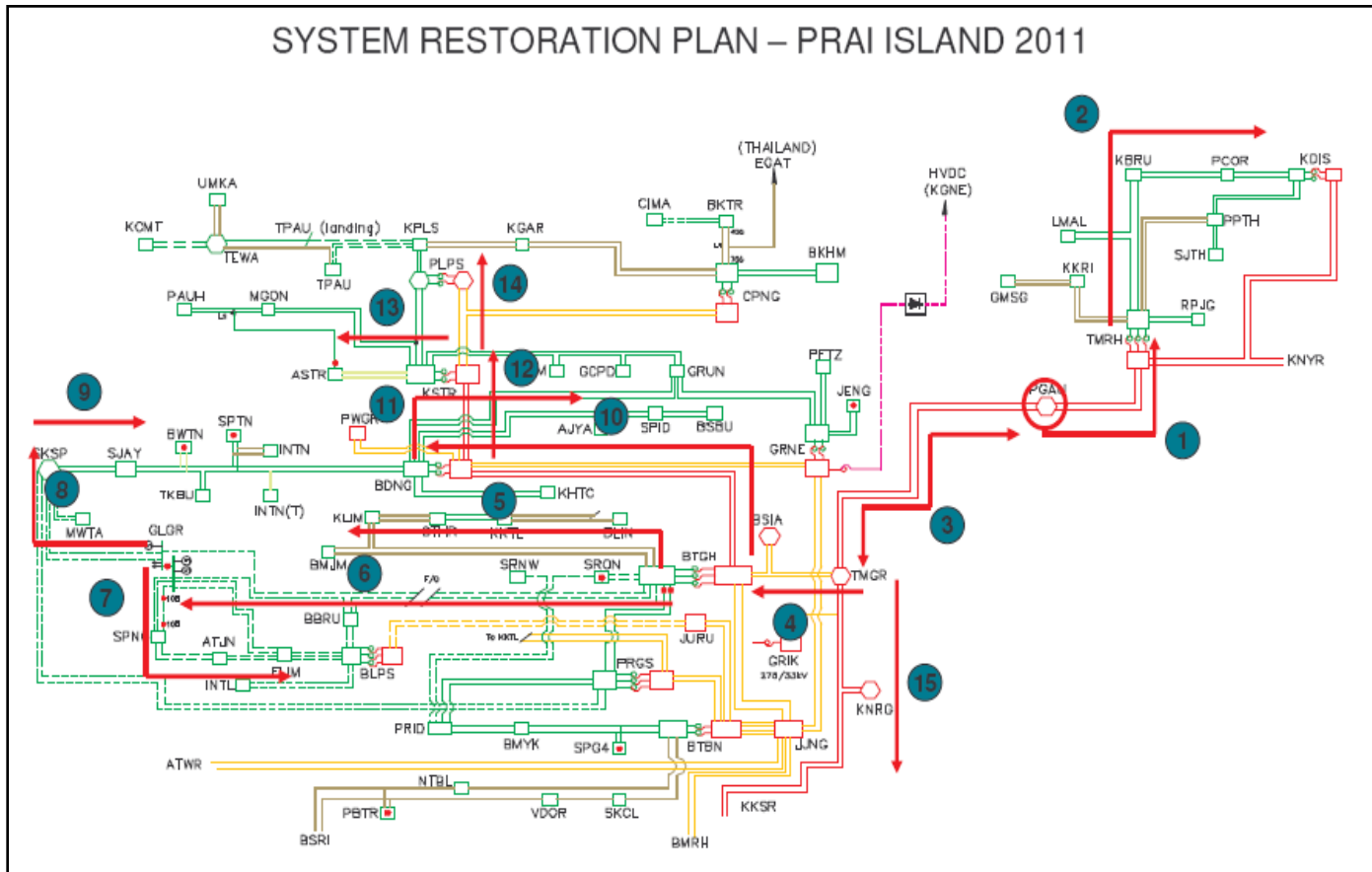
To send personnel to identified strategic PMUs and PPU's for switching and assisting restoration of supply.

## 2.1 CRITICAL SUBSTATIONS (*All-open strategy*)

Please refer to APPENDIX T6 for the single line diagram (SLD) of the critical substations

MAIN INTAKE	
1. Serdang (SRDG) 275kV	Serdang (SRDG) 132kV
2. Kuala Langat Power Plant (KLPP) 275kV	
3. Kuala Lumpur South (KULS) 275kV	Kuala Lumpur South (KULS) 132kV
4. Hicom (HCOM) 275kV	Hicom (HCOM) 132kV
5. Olak Lampit (OLPT) 275kV	
6. National University (NUNI) 275kV	National University (NUNI) 132kV
7. Pudu Ulu (PULU) 275kV	Pudu Ulu (PULU) 132kV
8. Kuala Lumpur East (KULE) 275kV	Kuala Lumpur East (KULE) 132kV
9. Galloway (GWAY) 275kV	Galloway (GWAY) 132kV
10. Ampang GIS (AMPG) 275kV	Ampang GIS (AMPG) 132kV
11. Abu Bakar Baginda (ABBA) 132kV	
12. Bukit Jalil (BJLL) 132kV	
13. Cyberjaya North (CBJN) 132kV	
14. KL International Airport (KLIA) 132kV	
15. Proton (PROT) 132kV	

# Sectionalization / Various options





# Island Interconnection Point

## PRAI ISLAND – Salient points

- Interconnection points for the island are :-

- 275kV

JJNG (BMRH)

JJNG (ATWR)

TMGR/KNRG (KCSR)

TMRH/KDIS (KNYR)

GRNE (EGAT DC)

- 132 kV

CPNG (EGAT AC)

NTBL/VDOR (BSRI)

## OC 7.4 Procedures

### OC 7.4.2 Grid System Restoration Plan.

#### OC 7.4.2.5

- **“Grid System Restoration Plan” shall be developed and maintained by GSO.**
- **GSO will issue plans and subsequent revisions to appropriate Users and other relevant parties.**

#### OC 7.4.2.6

- **Implementation of “Grid System Restoration Plan” may not be in the order as defined in the plan.**
- **Up to discretion of GSO to implement actual order.**

## OC 7.4 Procedures

### OC 7.4.3 Restoration Procedures

#### OC 7.4.3.1

- **Procedure** for the “Grid System Restoration Plans” shall be that **notified by writing by the GSO to the Users** for use at time of System Emergencies.

#### OC 7.4.3.2

- **Each User shall abide by GSO’s instruction** during restoration process **unless endanger life or would cause damage to plant or apparatus.**

## OC 7.4 Procedures

### OC 7.4.3 Restoration Procedures

#### OC 7.4.3.3

- In the event of an area shutdown of generating capability, each system should set up necessary operating instruction and procedures.
- Instruction and procedures to cover emergency condition, including loss of communication.

#### OC 7.4.3.4

- The contingency plan must be in place to address the overall strategy of restoration and management of the process.
- This is due to the complexities and uncertainties of recovery from total or partial System collapse.

## OC 7.4 Procedures

### OC 7.4.3 Restoration Procedures

#### OC 7.4.3.5

- **During total or partial collapse and subsequent recovery, the Transmission System may be operated outside normal voltage and frequency standard.**
- **Normal Schedule and Dispatch process will cease and will only be re-implemented under instruction of the GSO.**

#### OC 7.4.3.6

- **Generators in consultation with GSO shall set up their own contingency plan for normalisation after total or partial collapse.**
- **All contingency plan to be reviewed and updated once every three (3) years or as when necessary as determined by GSO to reflect changes in Grid Systems.**

## OC 7.4 Procedures

### OC 7.4.3 Restoration Procedures

#### OC 7.4.3.7

- **GSO can vary procedures in real-time under System Stress Condition.**
- **Users are required to comply with instruction from GSO unless to do so would endanger life or would cause damage to Plant or Apparatus.**

#### OC 7.4.3.8

- **GSO shall ensure a systematic process is conducted by energising each part of Power Island in such a way to avoid load rejection by CDGUs.**
- **When energising a substation, isolation of outgoing feeders at that substation may be necessary to prevent excessive load pick-up of the CDGU connected.**
- **Where a Power Island has become de-energised (no CDGUs are operating to supply consumer demand), then the GSO will need to call the service of Black Start Station to re-establish voltage and frequency.**

## OC 7.4 Procedures

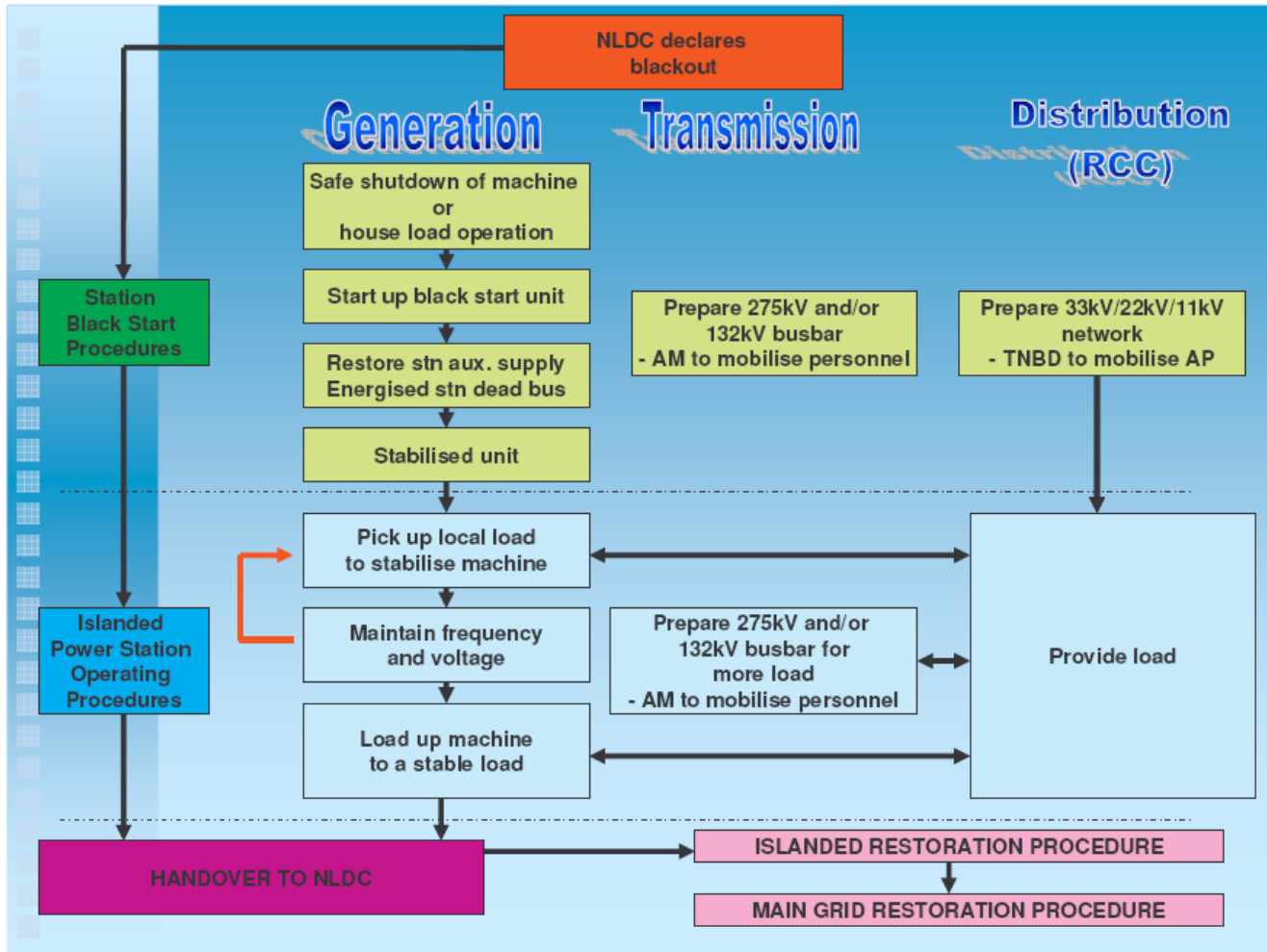
### OC 7.4.3 Restoration Procedures

#### OC 7.4.3.9

The following switching guideline shall be used in preparation for restoration:

1. NLDC establish its communication channels for Power Island concern.
2. NLDC sectionalises the Transmission System into pre-determined Power Islands.
3. If possible, power should be made available at auxiliary board of generating
4. Station within four (4) hours of system collapse to start CDGUs.
5. During restoration, steel mills instructed not to operate arc furnaces.
6. A “Selective Open Strategy” is adopted for 275 KV and 132 KV transmission substation.
7. A “Cross feeding Strategy” is adopted for utilising Black Start Power Stations to support start up for other Power Station in the same Power Island.

# Communication Channel





## OC 7.4 Procedures

### OC 7.4.4 Demand Restoration

#### OC 7.4.4.1

- **Re-energisation of Transmission substation and Power Island will involve the balancing of available generation capacity to the Grid System Demand.**
- **Responsibility of NLDC to have detail of each transmission substation demand by circuit.**
- **This is in order that CDGU shall not be presented with load pickup in excess of the weakest CDGU load acceptance limit.**

# System Island Generation Vs Demand

## 8.1 Island Restoration

The identified power stations in the SERDANG island are as follows:-

No	ISLAND	POWER STATIONS		DEMAND May 2010	
		Name	MW	Peak	Trough
1	SERDANG ISLAND	<ul style="list-style-type: none"><li>Putrajaya Power Station</li><li>Genting Sanyen Power Station</li></ul>	1331	3452	2163

## OC 7.4 Procedures

### OC 7.4.4 Demand Restoration

#### OC 7.4.4.2

Re-energisation procedures should address the following issues:

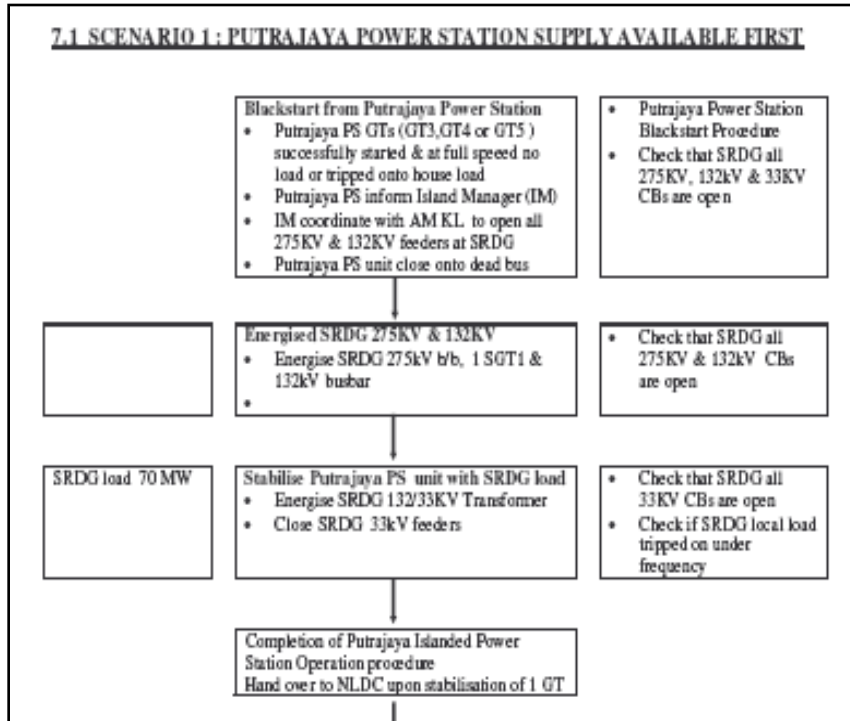
- 1) CDGU maximum load pickup shall not be exceeded.
- 2) Long transmission line should be energised with shunt reactors in circuit.
- 3) Demand shall be predicted and also monitored in real time to determine when additional transmission circuit can be re-energised.
- 4) At least one of Generating Unit in each Power Island to be operating in frequency sensitive mode.

#### OC 7.4.4.3

Whenever practical, “High Priority” customers such as Federal Government administrative center shall be restored first.

# Loading during restoration

## 7.1 SCENARIO 1: PUTRAJAYA POWER STATION SUPPLY AVAILABLE FIRST



### Appendix D

### SERDANG Island Restoration Plan Manual - Part 2

#### 9- PMU SERDANG (SRDG) 132/33KV

- Close 33kV circuit breakers according to permitted load

NO.	CIRCUIT BREAKER	FEEDER	VOLT (kV)	OPERATED BY	OPERATION	AS PER	MW
1	1L5	SSU MAEPS-MARDI (6S5)	33	AP 33KV SDE / SCADA	CLOSE	MRCC	25
2	3L5	PPU IKATAN (1P5)	33	AP 33KV SDE / SCADA	CLOSE	MRCC	17
3	5L5	PPU CYBERJAYA 6 (3P5)	33	AP PTY 33KV / SCADA	OPEN	MRCC	0
4	7L5	PPU PUTRAJAYA 1 (3P5)	33	AP PTY 33KV / SCADA	CLOSE	MRCC	3
5	9L5	PPU PUTRAJAYA 5 (5P5)	33	AP PTY 33KV / SCADA	CLOSE	MRCC	3.7
6	2L5	PPU PUTRAJAYA 1 (2P5)	33	AP PTY 33KV / SCADA	CLOSE	MRCC	3.6
7	4L5	PPU UPM TEMPORARY (3P5)	33	AP 33KV SDE / SCADA	CLOSE	MRCC	13
8	8L5	SSU PETRONAS RESEARCH (2S5)	33	AP 33KV SDE / SCADA	CLOSE	MRCC	1.2
9	10L5	PPU CYBERJAYA 6 (4P5)	33	AP PTY 33KV / SCADA	OPEN	MRCC	0
10	12L5	PPU PUTRAJAYA 5 (2P5)	33	AP PTY 33KV / SCADA	CLOSE	MRCC	3.6

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## OC 7.4 Procedures

### OC 7.4.4 Demand Restoration

#### OC 7.4.4.4

- Such a **priority list**, as contained in the “System restoration Plan” shall be **prepared on the basis of Customer** categories and the Power Island by GSO.
- **List must be approved by the Energy Commission.**

#### OC 7.4.4.5

- **During restoration of Demand, the Transmission System Frequency shall be monitored to maintain above 49.5 Hz as far as is possible.**

# High Priority Load

## Concerns - Priority Load

- ❖ National Load Despatch Centre (NLDC)
- ❖ Regional Control Centre (RCC)
- ❖ Segamat Gas Control Centre
- ❖ Petronas Gas Processing Plant
- ❖ Putrajaya / KL City Centre
- ❖ State Capital
- ❖ KTMB / LRT / ERL
- ❖ Airport
- ❖ Essential Services (i.e. Hospital, Police Station, Water Works, etc.)



## OC 7.4 Procedures

### OC 7.4.5 Dealing with System Splits.

#### OC 7.4.5.1

- Where **Transmission System becomes split**, any existing **Power Islands** are to be **re-synchronised as soon as practicable** to main system.
- If **not possible**, consumers should be **kept on-supply** from the **Power Island** they are connected.

#### OC 7.4.5.2

- **GSO will have to consider available generating capacity and prospective demand that will be restored to ensure Power Island operates within Frequency limit given in Licence Standard,**

## OC 7.4 Procedures

### OC 7.4.5 Dealing with System Splits.

#### OC 7.4.5.3

- For extended duration of system split, GSO shall apply a contingency plan.
- The plan may include issuing of warnings, ROTA load disconnection etc.

#### OC 7.4.5.4

- When Power Island occurs under System Stress, NLDC should have available ROTA load shedding.

#### OC 7.4.5.5

- The GSO shall agree on communication channels for this purpose.



## OC 7.4 Procedures

### OC 7.4.6 Grid System Restoration Plan Familiarisation Plan and Test

#### OC 7.4.6.1

- **Responsibility of User** to ensure any personnel who be expected to be involved in Grid System Restoration Plan are **trained, experience** to implement procedures notified by GSO.

#### OC 7.4.6.2

- **GSO shall be responsible for training** and exercise of relevant parties.
- **Once parties familiar with role, then exercise can be conducted.**

## OC 7.4 Procedures

### OC 7.4.6 Grid System Restoration Plan Familiarisation Plan and Test

#### OC 7.4.6.3

- **User shall have responsibility to ensure own staff are familiar with Restoration procedures and coordination.**
- **User may seek the cooperation of the GSO in order to facilitate this.**

#### OC 7.4.6.4

- **GSO in consultation with each user or at least once in three (3) years to carry out a Grid System Restoration Drill.**
- **Content of drill shall be notified in advance to relevant parties.**
- **The date and time of drill shall be agreed.**
- **Users must co-operate with any such drill.**

## OC 7.4 Procedures

### OC 7.4.7 Recovery Procedures from Abnormal Operating Condition

#### OC 7.4.7.1

- **GSO shall establish its Grid System Restoration Plan with regards to requirement associated with Abnormal Operational Condition.**
- **Condition may lead to issue of warnings related to imminent disruption of supply.**

#### OC 7.4.2.2

- **GSO shall withdraw the warning issued if removal of condition through implementation of the relevant of Grid System Restoration Plan is successful.**

## OC 7.4 Procedures

### OC 7.4.8 Loss of NLDC

#### OC 7.4.8.1

- In event of **NLDC being evacuated or subject to major disruption, GSO to resume control from Alternative Control Facility**
- **GSO to ensure continuity of control function until primary control center of NLDC can be restored.**

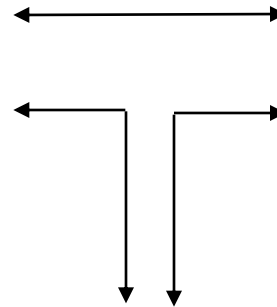
#### OC 7.4.8.2

- **While the Alternative Control Facility is being establish, GSO shall handover control of Grid System to an Interim Control Center.**
- **Interim Control Center must be sufficiently equipped to control Grid System.**

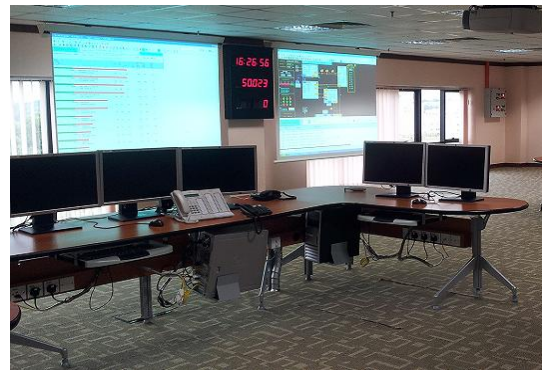
# CONTROL CENTRES CONFIGURATION



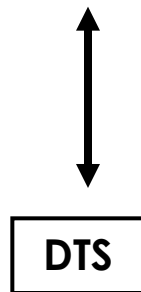
**MAIN CONTROL CENTRE  
(NLDC)**



**BACKUP CONTROL CENTRE  
(BCC)**



**BACKUP CONTROL ROOM  
(BCR)**



**DTS**

## OC 7.4 Procedures

### OC 7.4.8 Loss of NLDC

#### OC 7.4.8.3

- **GSO shall prepare all necessary plans and procedure and from time to time conduct necessary exercise to ensure satisfactory change-over can be achieved.**

## OC 7.4 Procedures

### OC 7.4.9 Fuel Supply Emergency.

#### OC 7.4.9.1

- Single buyer and GSO shall prepare fuel inventory advice for primary, alternative and standby fuel
- As applicable in accordance with obligation placed by the Government of Malaysia on the electricity industry.
- Generators shall report the compliance of their fuel stock to Single Buyer and GSO.

## OC 7.4 Procedures

### OC 7.4.9 Fuel Supply Emergency.

#### OC 7.4.9.2

- **Single buyer and GSO shall report the adequacy of fuel supply inventory to EC**
- **In event of fuel shortage, reporting will be on daily basis.**
- **Under fuel shortage condition, Single Buyer and GSO will abandon Least Cost Generation and revert to Fuel Availability Based Scheduling.**
- **To take all necessary measure to extend the endurance of the fuel supply.**



## OC 7.4 Procedures

### OC 7.4.9 Fuel Supply Emergency.

#### OC 7.4.9.3

- If Single buyer and GSO foresees an imminent or possible fuel shortage or curtailment of supply, Generators instructed to increase fuel stock to extent of Generators capacity available at Power Station .

----- end of OC7 -----



----- **end of OC7** -----



# THANK YOU



**The Malaysian Grid Code Awareness Programme Funded by  
Akaun Amanah Industri Bekalan Elektrik (AAIBE)**