



“Practicing RESILIENCY in the Electricity Supply Chain”

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E-POWER MO – Towards an Energy Resilient Philippines
26 June 2018 | Department of Energy, Energy Center, BGC, Taguig City



resilient in Tagalog

translation and definition "resilient", English-Tagalog Dictionary online

resilient 

Type: adjective; **Kunat**




Able to endure tribulation without cracking.

Able to endure tribulation without cracking.

 more

Show declension of resilient

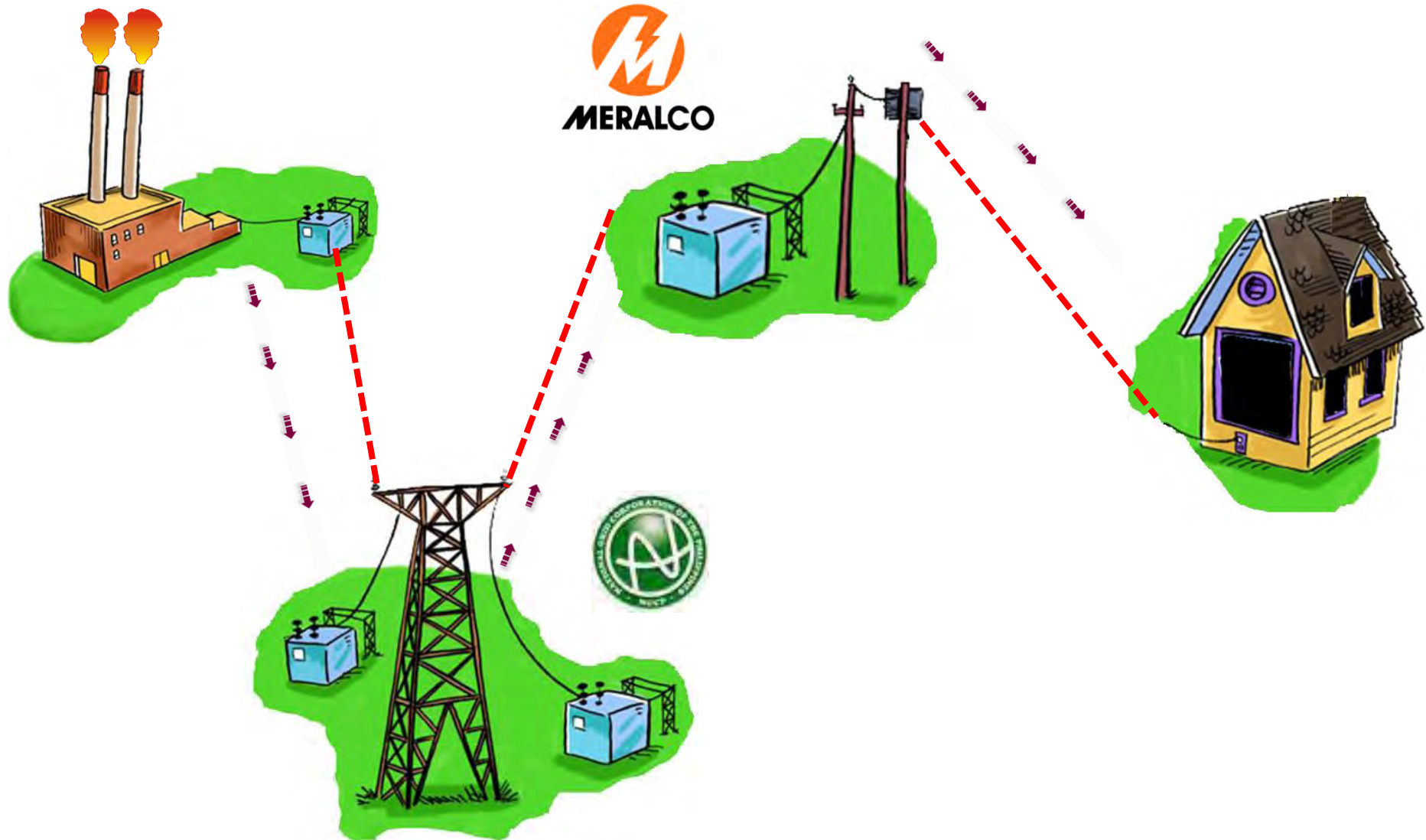
Resilient 

Similar phrases in dictionary English Tagalog. (1)

Manhid, Matatag, Hindi Natitinag



Power Demand and Supply Chain



Power Stakeholders



PHILIPPINE ELECTRICITY MARKET CORPORATION (PEMC)



NATIONAL GRID CORPORATION (NGCP)



DEPARTMENT OF ENERGY (DOE)



ENERGY REGULATORY COMMISSION (ERC)







POWER GENERATION COMPANIES (GENCOs)



DISTRIBUTION UTILITIES (DU)



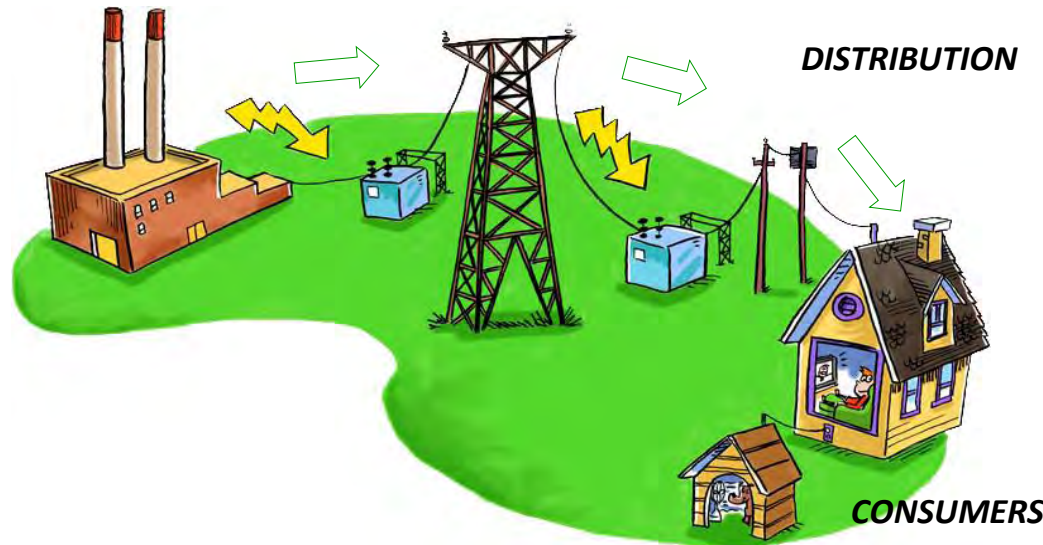
DIRECTLY CONNECTED CONSUMERS

-  San Miguel Energy Corp.
-  Aboitiz Power Corp.
-  First Gas/First Gen.
-  PSALM
-  AES Transpower
-  SEM Calaca
-  NPC
-  Global Business Power Corp.
-  Energy Development Corp.
-  Salcon Phils./Atlas
-  K-Water
-  Others

GENERATORS

TRANSMISSION

DISTRIBUTION



CONSUMERS



Why is a more **RESILIENT** power system needed?



Cornerstone for the Power System

High Impact, Low Frequency Events



Uncercentainties

Interoperability



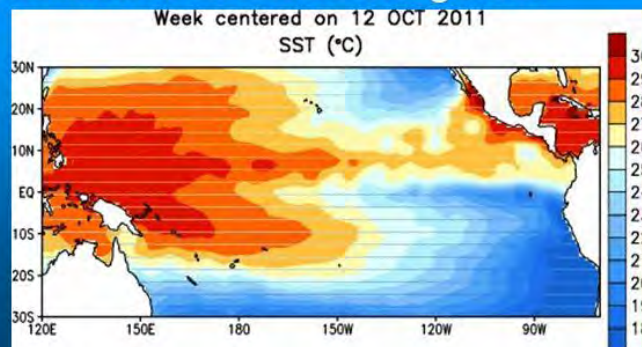
Resiliency at times of Inevitable Consequences Beyond Control Events



EL NIÑO & LA NIÑA

El Niño and La Niña

El Niño is characterized by unusually warm ocean temperatures in the Equatorial Pacific, as opposed to La Niña, which is characterized by unusually cold ocean temperatures in the Equatorial Pacific. El Niño is an oscillation of the ocean-atmosphere system in the tropical Pacific having important consequences for weather and climate around the globe.



2011
El Niño



Malampaya Facility Shutdown January 2017



Bombing of NGCP transmission tower in Mindanao



Photo courtesy of facebook.com/NGCPhv



Resiliency in the **Transmission Sector**

Transmission Cause Codes Forced Outages Chargeable to NGCP

- FO01 Momentary Outage / Interruption
- FO03 Vegetation within Right of Way (ROW)
- FO04 Violation of Safe Electrical Clearance
- FO05 **Substation Equipment Trouble**
 - FO05AA Power Transformer
 - FO05AB 125 VDC Power Supply System
 - FO05AC Instrumentation and Controls System
 - FO05AD Power Circuit Breaker
 - FO05AE Disconnect Switch
 - FO05AF Lightning Arrester
 - FO05AG Air Compressor System
 - FO05AH Instrument Transformer, Voltage
 - FO05AI Instrument Transformer, Current





Resiliency in the **Transmission Sector**

Transmission Cause Codes Forced Outages Chargeable to NGCP

- FO05AJ Capacitor Bank
- FO05AK Shunt / Line Reactor
- FO05AL Power / Control Cable
- FO05AM Grounding / Earthing System
- FO05AN Mini (Molded) Circuit Breaker
- FO05AO Switchgear

- FO02AA Delayed Completion / Maintenance
- FO02AB Delayed Completion of Project
- FO18 Customer-Caused Outage due to
Uncoordinated Protection
- FO20 HVDC Equipment
- FO26 Design / Construction Deficiency
 - FO26AA Design Deficiency
 - FO26AB Construction Deficiency



Resiliency in the **Transmission Sector**

Transmission Cause Codes

Forced Outages Chargeable to NGCP

- FO06 Human Error
- FO07 Misaligned / Broken Crossarm
- FO08 Cut Power Line Conductor
- FO09 Insulator Failure
- FO10 Damaged Pole / Tower
- FO11 Defective Connector
- FO12 Cut Guy Wire
- FO14 Sustained Outage / Interruption
- FO15 Cut Overhead / Optical Ground Wire
- FO16 Line Equipment Trouble
- FO17 Delayed Completion of Project /
Maintenance Activities



Earthquake (Batangas April & August 2017)



Resiliency in the **Generator Sector**

PO00 Planned / Scheduled Maintenance Outages

PO00AA Planned / Scheduled Maintenance Outages

PO00AB Corrective / Unplanned Outages

PO00AC Planned Outage Required by Customer

PO00AD Isolation Affected by Planned / Maintenance Outage

OO01 Force Majeure

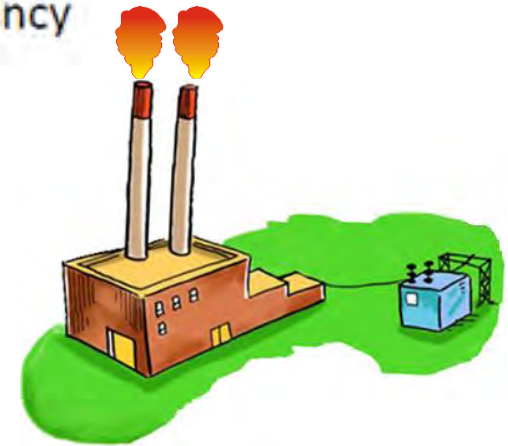
OO01AA Natural Calamity

OO01AB Manmade Calamity

OO02 Manual Load Dropping Due to Generation Deficiency

OO02AA Generation Deficiency

OO02AB Blocking and De-blocking of HVDC



Typhoon (Haiyan Storm Surge Tacloban, Leyte)



Resiliency in the Distribution Sector





Resiliency in the **Distribution Sector**

- 0007 Customer-Caused Outage
 - 0007AA Uncoordinated Protection with Validation
 - 0007AB Owned and Maintained Line
 - 0007AB Substation Equipment Trouble
 - 0007AB Tripping of Generating Plant
- 0008 Delayed Switching / Normalization of Load Affected by Customers
- 0009 Voltage Correction Due to Unavailability of Ancillary Service Providers
- 0010 Accidents / Intrusion / Incursion of Foreign Objects
- 0011 Uncooperative Land Owner

- P000 Planned / Scheduled Maintenance Outages
 - P000AA Planned / Scheduled Maintenance Outages
 - P000AB Corrective / Unplanned Outages
 - P000AC Planned Outage Required by Customer
 - P000AD Isolation Affected by Planned / Maintenance Outage
- 0002 Manual Load Dropping Due to Generation Deficiency
 - 0002AA Generation Deficiency
 - 0002AB Blocking and De-blocking of HVDC



Resiliency in the **Distribution Sector**

- 0022 Temporary Lines after Force Majeure
- 0023 Outage/s Initiated by the System Operator after Occurrence of Significant Incident
 - 0023AA Multiple Transmission Facility Tripping (more than one Transmission Line)
 - 0023AB Generator Tripping and Start-up / Shutdown of Kalayaan Units as Pump Resulting in Automatic Load Dropping
 - 0023AC Yellow or Red Alert Status
 - 0023AD Loss of Large Load resulting in frequency higher than 61 hertz
 - 0023AE Islanding Operation
 - 0023AF Grid Blackout
 - 0023AG Other Events Considered to be significant Incidents by the Grid Management Committee
- 0024 Vegetation Beyond Right of Way (ROW)





Republic of the Philippines
DEPARTMENT OF ENERGY
(Kagawaran ng Enerhiya)

DEPARTMENT CIRCULAR NO. DC 2018-01-0001

**ADOPTION OF ENERGY RESILIENCY IN THE PLANNING AND PROGRAMMING
OF THE ENERGY SECTOR TO MITIGATE POTENTIAL IMPACTS OF
DISASTERS**

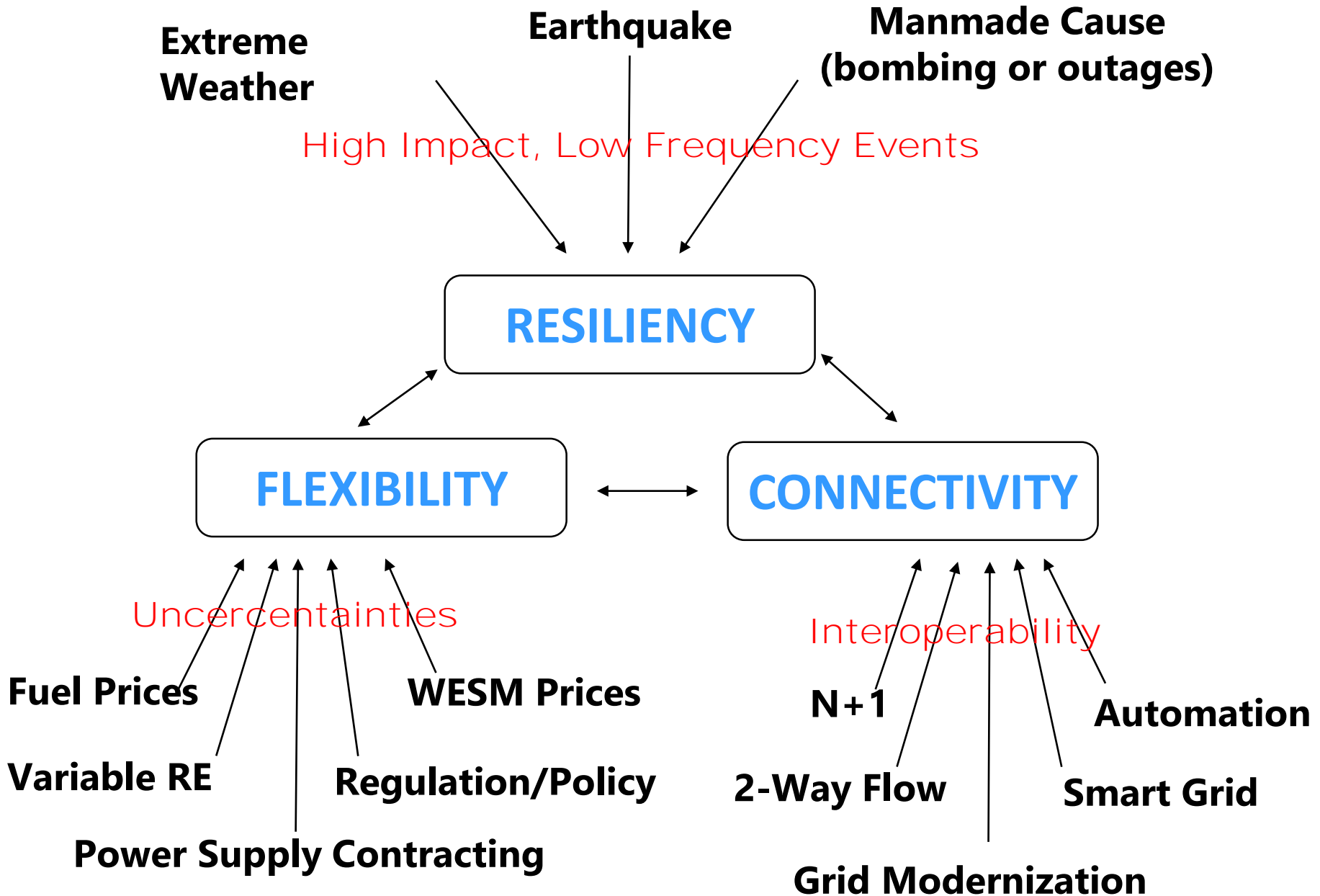
SECTION 1: SCOPE AND APPLICATION

The policy shall apply to all energy industry participants in the energy resource, renewable energy, power, oil and energy utilization sectors.

SECTION 2: GENERAL POLICIES AND PRINCIPLES.

Adoption of resiliency planning and program in the energy industry shall:

- (a) Strengthen existing infrastructure facilities to adapt to and withstand adverse conditions and disruptive events;
- (b) Incorporate mitigation improvements into the reconstruction and rehabilitation of infrastructure damaged in accordance to the Build Back Better principle;
- (c) Improve operational and maintenance standards and practices to ensure expeditious restoration of energy supply in the aftermath of disruptive events; and
- (d) Develop resiliency standards for future construction of energy facilities to ensure minimal damage and adoption of measures in place for timely recovery and restoration of facilities for the continued delivery of supply.



Power Sector Resiliency

**Fuel Supply
Fuel Storage
Fuel Transport
Grid Interconnection**

**Distributed Generation
Distributed Storage System
Smart Grid**



**Smart Grid
Storage System
System Interface Enhancement**

**Smart Grid
Empowering Power Supply Contract
Distributed Generation/Storage**





Republic of the Philippines
DEPARTMENT OF ENERGY

FEB 26 2010

DEPARTMENT CIRCULAR NO. DC 2010-03 - 0003
gas

**DIRECTING ALL POWER GENERATION COMPANIES, THE
TRANSMISSION SERVICE PROVIDER, AND ALL DISTRIBUTION
UTILITIES TO ENSURE ADEQUATE AND RELIABLE ELECTRIC POWER
SUPPLY IN THE COUNTRY**

NOW, THEREFORE, from the foregoing premises and pursuant to the mandate of the DOE under the EPIRA, this Circular is hereby promulgated:

SECTION 1. Scope. This Circular shall apply to all Generation Companies and Distribution Utilities in the country as defined in the EPIRA as well as the National Transmission Corporation (TRANSCO) or its concessionaire, presently the NGCP which is also referred to as the System Operator (SO);

SECTION 2. Responsibilities of Generation Companies.

SECTION 3. Responsibilities of TRANSCO and/or its concessionaire.

SECTION 4. Responsibilities of Distribution Utilities.


ANGELO T. REYES
Secretary



IN REPLYING PLS. CITE:
SE10-019753



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Thank You!



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