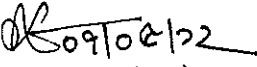


Date: 07/05/2012

Memo No-DESCO/HQ/ADMIN-A(3)/OO-3/2012/1438

## অফিস আদেশ

সংশ্লিষ্ট সকলের অবগতির জন্য জানানো যাচ্ছে যে, গত ০৫/০৫/২০১২ইং তারিখ ডেসকো'র সদর দপ্তরের কনফারেন্স রুমে বিদ্যুৎ বিভাগ, বিদ্যুৎ জ্বালানী ও খনিজ সম্পদ মন্ত্রণালয় ও ডেসকো'র মধ্যে সম্পাদিত Memorandum of Understanding (MOU) মোতাবেক Performance Target Parameters of DESCO এর উপর একটি প্রশিক্ষণ/কর্মশালা অনুষ্ঠিত হয়। উল্লেখ্য, বর্ণিত প্রশিক্ষণ/কর্মশালায় উপস্থিত সকল কর্মকর্তাগণ Memorandum of Understanding (MOU) এর বিষয়ে সম্মতি জ্ঞাপন করেছেন। উক্ত প্রশিক্ষণ/কর্মশালায় Memorandum of Understanding (MOU) মোতাবেক Performance Target Parameters of DESCO অর্জনের লক্ষ্যে সংশ্লিষ্ট সকলকে সচেতন হওয়া এবং তদঅধিনস্থ সকল কর্মকর্তা ও কর্মচারীদের অবহিত ও উদ্বুদ্ধকরণ সহ MOU এর Target অর্জন করার সর্বাঙ্গিক কার্য ব্যবস্থা গ্রহণ করতে নির্দেশনা প্রদান করা হলো।

  
(প্রকৌঃ মোঃ আরজাদ হোসেন)  
ব্যবস্থাপনা পরিচালক

সংযুক্তিঃ MOU এর কপি ১টি।

### অনুলিপিঃ

- ০১। পরিচালক (ইঞ্জিনিয়ারিং/অপারেশন/ অর্থ ও হিসাব)।
- ০২। মহাব্যবস্থাপক (প্রশাসন/পি এন্ড ডি/ডি এন্ড পি/অর্থ ও হিসাব/নেটওয়ার্ক অপারেশন/সংগ্রহ)।
- ০৩। উপ-মহাব্যবস্থাপক, এস এন্ড ডি অপারেশন (গুলশান/মিরপুর/উত্তরা জোন)/ডিএন্ডএমপি/ পি, আই এন্ড টি/থ্রুজেন্টস/ ইন্টারনাল অডিট/সাবস্টেশন এন্ড নেটওয়ার্ক/পিএন্ডডি/প্রশাসন/এইচআরএম/অর্থ/আইসিটি/হিসাব/এম,পি এন্ড এস/কোম্পানী সচিব।
- ০৪। ব্যবস্থাপক, বি ও বি বিভাগ (গুলশান/বারিধারা/উত্তরা/কাফরুল/মনিপুর/পল্লবী/রূপনগর/আগারগাঁও/দক্ষিণখান/শাহআলী/টঙ্গী (পশ্চিম)/টঙ্গী (পূর্ব)।
- ০৫। অফিস কপি।

File 10/

**MEMORANDUM OF UNDERSTANDING (MOU)**

**BETWEEN**

**POWER DIVISION, MINISTRY OF POWER, ENERGY & MINERAL RESOURCES**

**AND**

**DHAKA ELECTRIC SUPPLY COMPANY LIMITED (DESCO)**

This Memorandum of understanding (MOU) is made and entered into on this 1<sup>st</sup> day of January 2012.

**BETWEEN**

Power Division, Ministry of Power, Energy and Mineral Resources, Bangladesh Secretariat, Dhaka-1000 represented by the Joint Secretary (Administration) ( which expression shall include its successor in interest legal representative, executor, administrator & assigns etc.) of the first part.

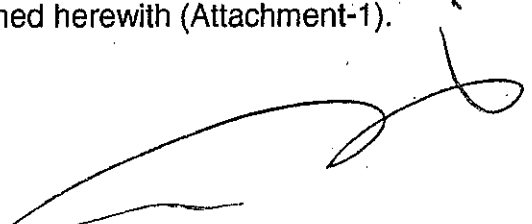
**AND**

Dhaka Electric Supply Company Limited (DESCO), a Public Limited Company (State Owned) duly incorporated under the Companies Act, 1994 represented by its Managing Director having its corporate Office at House #3, Road #24, Block-K, Banani, Dhaka -1213, Bangladesh hereinafter referred to as DESCO (which expression shall include its successor in interest legal representative, executor, administrator & assigns etc.) of the second part.

WHEREAS, it is intended that the Government (hereinafter Power Division) will set and approve some Key Performance Targets annually of the undersigned company with the objective of bringing commercial environment, increase in efficiency, establishment of accountability and dynamism in accomplishing its functions. Power Cell as a designated entity of Power Division, Ministry of Power, Energy and Mineral Resources, having office address at Bidyut Bhaban(10th floor), 1 Abdul Gani Road, Dhaka-1000, will monitor the progress against the targets, measure and submit report to Government time to time.

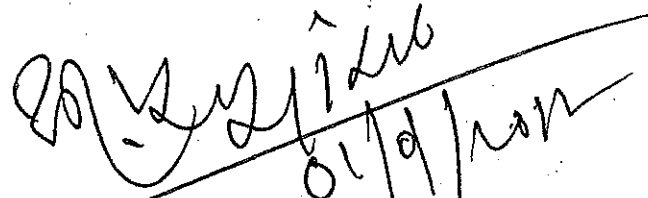
NOW THEREFORE, for and in consideration of the mutual agreement the DESCO and the Power Division do hereby agree to the targets attached herewith (Attachment-1).





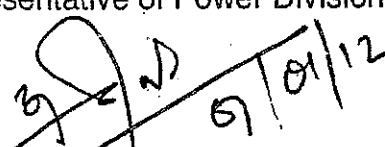
IN WITNESS WHEREOF both parties has caused this MOU to be signed in its corporate name and its corporate seal to be hereunto affixed and attested by its officers thereunto and duly authorized, all as of the day and year first above written.

  
1/1/12  
Managing Director  
Dhaka Electric Supply Co. Ltd.

  
01/01/12  
Joint Secretary (Administration)  
Power Division  
সরকারী আস্থান  
সুগং-সচিব  
বিদ্যুৎ বিভাগ  
বিদ্যুৎ, জ্বালানী ও খনিজ সম্পদ মন্ত্রণালয়  
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

Witnesses:

1. Representative of Power Division:

  
01/01/12  
এ.এম. হুমায়ুন কবীর  
উপ-সচিব  
বিদ্যুৎ বিভাগ  
বিদ্যুৎ, জ্বালানী ও খনিজ সম্পদ মন্ত্রণালয়  
নাৎপারদেপ সচিবালয়, ঢাকা।

2. Representative of DESCO:

## Attachment-1

### 1. Purpose of MOU

Performance Targets will provide the Government reliable measuring tools for monitoring and regulating business activities, technical standards, cost reduction, reliable supply, efficient procurement, human resource development and improved customer service of the organization and thus more effectively guide it to become a financially viable company.

Government (Power Division) is authorized and empowered to set some Key Performance Indicators (KPIs) annually for DESCO. However, Government may consider mid-term review of the yearly targets and re-fix on the basis of six (6) months actual achievements of MOU targets and other related situations.

### 2. Performance Targets and their weight Factor(FY 2011-12) : DESCO

Sl No.	Parameters	Units	Target	Weight Factor
1	System Loss	%	8.65	40
2	Accounts Receivable	Eqv. months	2.35	15
3	Collection Bill Ratio (%)	%	98.50	5
4	Collection Import Ratio (%)	%	89.98	10
5	Current Ratio	Ratio	2:1	5
6	Quick Ratio	Ratio	1:1	5
7	Debt service Coverage Ratio	Ratio	2:1	5
8	System Average Interruption Duration Index(SAIDI)	Minutes	For observation	Not applicable
9	System Average Interruption Frequency Index(SAIFI)	Number	For observation	Not applicable
10	Average Training hour per Employee	Hours	50	5
11	Implementation of Annual development Program (Physical)	%	100	5
12	Implementation of Annual development Program (Financial)	%	100	5
	<b>Total</b>			<b>100</b>

### 3. Effectiveness of the MOU

All the provisions of this MOU become effective and operable by both the parties, namely, the Government of Bangladesh (hereinafter the Power Division) and DESCO, immediately on signing the MOU by the Government (hereinafter the Power Division) and DESCO.

All the relevant provisions of this MOU will continue to be in force and operable from 1<sup>st</sup> January 2012 to 30<sup>th</sup> June 2012 unless the same are modified by the signing of the subsequent MOU between the parties.

### 4. Performance Evaluation: Incentive Bonus and Penalty

4.1 Upon achievement of the targets, the company employees will get an incentive bonus or penalty as mentioned below. The weight factor shown against each of the targets will be used to determine the overall performance achievement.

- a) The company which has achieved minimum 90 marks out of 100 for overall performance achievement will get 20% incentive bonus of basic pay.
- b) The company which has achieved 85 but below 90 marks out of 100 for overall performance achievement will get no incentive bonus or liable for penalty.
- c) The company which has achieved 80 but below 85 marks out of 100 for overall performance achievement will be liable for 5% penalty of basic pay.
- d) The company which has achieved below 80 marks out of 100 for overall performance achievement will be liable for 10% penalty of basic pay.

The amount of incentive bonus or penalty = Basic pay × percentage of incentive bonus or penalty × period worked (months).

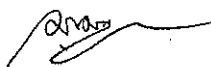
The incentive bonus or penalty will be calculated on the basic pay (other than special pay, technical pay or personal pay) drawn by the employees on 30<sup>th</sup> June of the target year.

### 5. Definition of Parameters of Targets

#### 5.1 System loss

System loss is the difference between the total energy import at 33 KV level and the total retail sold energy. The measure of energy loss can be converted to a direct loss in revenue to the organization/company. In the MOU, the annual target for system loss will be fixed against the Billing Meter.

$$\text{System Loss (\%)} = \frac{\text{Energy Loss}}{\text{Energy Import at 33KV}} \times 100$$



## 5.2 Accounts Receivable

Accounts Receivable is the difference between the Total billed amount minus total collection in million Taka. Accounts Receivable in equivalent month will be determined as the ratio of total billed amount to the average of previous twelve months bill.

## 5.3 Collection-Bill Ratio (CB Ratio)

The ratio of total retail collection in million Taka to the total retail billed amount in million Taka.

## 5.4 Collection Import Ratio (CI Ratio)

The ratio of net collection in million Taka to the net energy import in million Taka. Net energy import in million Taka will be the product of net energy import multiplied by average billing rate.

## 5.5 Current Ratio

Ratio of current assets to the current liabilities.

## 5.6 Quick Ratio

Ratio of quick current assets to the current liabilities.

## 5.7 Debt Service Coverage Ratio

$$DSCR = \frac{\text{Net income} + \text{Interest} + \text{Depreciation}}{\text{Principal} + \text{Interest}}$$

## 5.8 System Average Interruption Duration Index (SAIDI)

The sum of the customer interruption durations due to the distribution system each month divided by the total number of connected customers

## 5.9 System Average Interruption Frequency Index (SAIFI)

The total number of customer interruptions due to the distribution system in a month divided by the total number of connected customers

## 5.10 Average Training hour per Employee

Total number of training hours provided in the year, divided by the number of employees

## 5.11 Implementation of Annual development Program (Physical)

$$= \frac{\text{Total achievement of physical works}}{\text{Target for the financial year}}$$

## 5.12 Implementation of Annual development Program (Financial)

$$= \frac{\text{Total expenditure}}{\text{Total budget allocated in ADP}}$$



Date: 15/04/2012

Memo No-DESCO/HQ/ADMIN-A(3)/OO-3/2012/1187

DESCO

Office of the Director (Operation)

Received on.....Date: 15/4

## অফিস আদেশ

সংশ্লিষ্ট সকলের অবগতির জন্য জানানো যাচ্ছে যে, বিভিন্ন সময়ে দেশের অভ্যন্তরে বিভিন্ন সংস্থা/প্রতিষ্ঠানের আমন্ত্রণে অনুষ্ঠিত প্রশিক্ষণ কোর্সে অংশগ্রহণের জন্য ডেসকো'র কর্মকর্তা/কর্মচারীগণকে মনোনয়ন দেয়া হয়ে থাকে। এক্ষেত্রে প্রশিক্ষণ প্রদানকারী সংস্থা/প্রতিষ্ঠান থেকে দৈনিক ভাতা প্রদানের ব্যবস্থা থাকলে ডেসকো থেকে কোন ভাতা প্রদান করা হবে না। তবে যাতায়াতের জন্য যানবাহনের কোন ব্যবস্থা না থাকলে পদবী অনুযায়ী প্রকৃত খরচ কর্তৃপক্ষের অনুমোদন সাপেক্ষে প্রদান করা যাবে।

কর্তৃপক্ষের অনুমোদনক্রমে,

স্বাক্ষর (মোঃ সফিকুল ইসলাম চৌধুরী)  
মহাব্যবস্থাপক (প্রশাসন)।

### অনুলিপি-সদয় অবগতির জন্যঃ

- ০১। পরিচালক (ইঞ্জিনিয়ারিং)/(অপারেশন)/(অর্থ ও হিসাব) ভারপ্রাপ্ত, ডেসকো।
- ০২। মহাব্যবস্থাপক (পি এন্ড ডি/ডি এন্ড পি/প্রশাসন/অর্থ ও হিসাব/নেটওয়ার্ক অপারেশন/সংগ্রহ), ডেসকো।
- ০৩। প্রকল্প পরিচালক (Strengthening DESCO's Electric Distribution Network/Upgrading & Expanding of Distribution System in Gulshan Circle)।
- ০৪। উপ-মহাব্যবস্থাপক, এস এন্ড ডি অপারেশন (গুলশান/মিরপুর/উত্তরা জোন)/ডি এন্ড এমপি/পি, আই এন্ড টি/প্রজেক্টস/ইন্টারনাল অডিট/সাবস্টেশন এন্ড নেটওয়ার্ক/পিএন্ডডি/প্রশাসন/এইচআরএম/অর্থ/আইসিটি/হিসাব/এম, পি এন্ড এস/কোম্পানী সচিব।
- ০৫। বিভাগীয় প্রধান, বি ও বি বিভাগ (গুলশান/বারিধারা/উত্তরা/কাফরুল/মনিপুর/পল্লবী/রূপনগর/আগারগাঁও/দক্ষিণখান/শাহআলী/টঙ্গী (পশ্চিম)/টঙ্গী (পূর্ব)/টেস্টিং এন্ড রিপেয়ার/মিটার প্লান্ট/প্রশিক্ষণ ও উন্নয়ন/স্টোর/মনিটরিং সেল/গ্রীড এন্ড প্রটেকশন।
- ০৬। স্টাফ অফিসার টু ব্যবস্থাপনা পরিচালক।
- ০৭। অফিস কপি।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার  
বিদ্যুৎ, জ্বালানি ও খনিজ সম্পদ মন্ত্রণালয়  
বিদ্যুৎ বিভাগ  
পাওয়ার সেল  
বিদ্যুৎ ভবন(১১ তলা)  
১, আবদুল গণি রোড, ঢাকা-১০০০।  
(www.powercell.gov.bd)

ADMINISTRATION  
2223  
26/02/12

DESCO  
Office of the Director (Operation)  
Received No: ৮৭ Date: 24/2

1038 26.2.12

স্মারক নং: পাঃসেঃ/০৪/০৯৮/১৭১

তারিখ: ২২/০২/২০১২ ইং

বিষয়ঃ Result Based Management (RBM) শীর্ষক ওয়ার্কশপে অংশগ্রহণ প্রসঙ্গে।

উপর্যুক্ত বিষয়ে আগামী ২৪ ও ২৫ ফেব্রুয়ারী ২০১২ইং তারিখে Key Performance Indicators (KPI) এর উপর ভিত্তি করে বিদ্যুৎ ভবনের বিজয় হলে Result Based Management (RBM) শীর্ষক ওয়ার্কশপ অনুষ্ঠিত হবে। বিভিন্ন সংস্থার জন্য যে সকল KPI নির্ধারণ করা হয়েছে সেগুলোর উপর মৌলিক ধারণা পাওয়ার জন্য উদাহরণস্বরূপ কিছু সমস্যা সমাধান করে এতদসঙ্গে সংযুক্ত করে প্রেরণ করা হলো।

সংযুক্তি: বর্ণনামতে।

M. S. Kainat  
(মাহবুব সারোয়ার-ই-কায়নাত)  
মহাপরিচালক  
ফোন: ৯৫৫৬০৪০  
E-mail: dg@powercell.gov.bd

বিতরণ (জেষ্ঠ্যতার ক্রমানুসারে নয়) প্রয়োজনীয় কার্যার্থে:

- ০১। চেয়ারম্যান, বিউবো, ঢাকা।
- ০২। চেয়ারম্যান, পবিবো, ঢাকা।
- ০৩। ব্যবস্থাপনা পরিচালক, ডিপিডিসি, ঢাকা।
- ০৪। ব্যবস্থাপনা পরিচালক, ডেসকো, ঢাকা।
- ০৫। ব্যবস্থাপনা পরিচালক, ওজোপাডিকো, বয়রা, খুলনা।
- ০৬। ব্যবস্থাপনা পরিচালক, পিজিসিবি, ঢাকা।
- ০৭। ব্যবস্থাপনা পরিচালক, ইজিসিবি, ঢাকা।
- ০৮। ব্যবস্থাপনা পরিচালক, এপিএসসিএল, আশুগঞ্জ।
- ০৯। ব্যবস্থাপনা পরিচালক, আরপিসিএল, ঢাকা।
- ১০। ব্যবস্থাপনা পরিচালক, নওপাজেকো, ঢাকা।

অনুলিপি:

সচিব

বিদ্যুৎ বিভাগ

বাংলাদেশ সচিবালয়, ঢাকা।

26/2/12  
DG, M - Mirpur Galsani  
26/2/12



# Key Performance Indicators

## Exercise on Some Ratio Analysis

24-25 February 2012

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### Dhaka Power Distribution Co. Ltd.

#### Balance Sheet

As on 30 June 2011

I Sources of Funds	TK(Mil.)	II Application of Funds	TK (Mil.)
(1) Shareholders' Funds		(1) Non-Current Assets	31,596.68
(a) Share Capital	13,162.36	Fixed Assets at cost less	
Ordinary Share Capital	5.00	Accumulated Depreciation	24,066.74
Share Money Deposit	13,157.36	Project in Progress	5,363.71
		Other Non-current Assets	2,166.22
(b) Reserves and Surplus	(14,830.45)	(2) Investment	5,976.56
Retained Earnings	(21,761.92)	(a) Current Assets	20,473.82
Appraisal Surplus	5,994.64	Stock & Stores	2,649.48
Grants	14.12	Accounts Rece.-Consumer	6,845.30
Deposit Work Fund	922.70	Accounts Receivables-VAT	920.55
Total Shareholder's Funds	(1,668.09)	Others Receivable	3,969.82
(2) Loan Funds	16,195.88	Provision for Bad &	
Total Capital Employed:	14,527.78	Doubtful Debts	(1478.06)
		Prepaid Expenses	276.17
		Deposit & Advances	1,483.22
		Cash & Cash Equivalents	5,807.32

## Dhaka Power Distribution Co. Ltd.

### Balance Sheet As on 30 June 2011

Investment	TK(Mil.)
(b) Current Liabilities	43,519.28
Accounts Payable-BPDB & PGCB	
Accounts Payable -VAT	27,968.68
Accounts Payable-other	902.93
Current Maturity	659.69
Debt Service Liabilities	790.94
Withholding Tax & Charges	3,491.80
Provision for Income Tax	539.06
Employee Benevolent Fund	117.15
Other Liabilities	18.46
Net Current Assets (a-b)	9,030.51
Net Assets (1+2+3):	(23,045.45)
	14,527.78

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## Dhaka Power Distribution Co. Ltd.

### Income Statement For the year ended 30 June 2011

Operating Revenue	TK(Mil.)
<b>Operating Revenue</b>	<b>22,669.37</b>
Sale of Electricity	22,260.72
Other Operating Revenue	408.64
<b>Less : Energy Cost</b>	<b>16,569.02</b>
Cost of Energy	15,250.66
Transmission Cost	1,318.35
<b>Gross Margin</b>	<b>6,100.35</b>
<b>Less: Total Operating Expenses</b>	<b>3,525.66</b>
Operating Expenses	1,388.03
Maintenance Expenses	127.92
Personnel Expenses	1,841.83
Administrative Expenses	167.87
<b>Operating Margin</b>	<b>2,574.690</b>
Add: Non-Operating Income	760.98
<b>Net Margin Before Financial Expenses</b>	<b>3,335.68</b>
Less: Financial Expenses	1,120.34
Net Earnings Before Tax	2,215.33
Less: Provision for Income Tax (minimum Tax)	117.15
<b>Net Earnings after Tax</b>	<b>2,098.18</b>
Profit/ (Loss) brought forward	(23,857.36)
Prior Year Adjustment	(2.74)
<b>Cumulative Retained Earnings</b>	<b>(21,761.92)</b>
Retained Earning of DESA period (as per Transfer Agreement)	
Retained Earnings to be carried forward	(21,761.92)

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## Financial Ratio Analysis

Accounts Receivable Ratio		
A	Accounts Receivable as on 30 <sup>th</sup> June 2011 in MTK	6845
B	Total Sales during the year in MTK	22261
C	Monthly average sales in MTK	1855
D	Accounts Receivable Ratio	3.69 Months
Collection Bill Ratio		
A	Accounts Receivable Balance (2009-2010)	6640
B	Total Sales during the year in MTK	22261
C	Accounts Receivable Balance (2010-2011)	6848
D	Collection during the year	22053
E	Collection Bill Ratio	99.07%
Collection Import Ratio		
A	Collection During the year	22053
B	Import in MKWH	5945
C	Average sales rate	4.23
D	Collection Import Ratio = A/(BxC)	87.70%

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## Financial Ratio Analysis

Current Ratio		
A	Current Liabilities	15550
B	Current Assets	20474
C	Current Ratio =B/A	1.32
Quick Ratio		
A	Current Liabilities	15550
B	Current Assets	20474
C	Stock & Stores	2650
D	Quick Ratio =(B-C)/A	1.15
Debt Service Coverage Ratio		
A	Net Income	2098
B	Interest	846
C	Depreciation	834
D	Principal dues	791
E	Debt Service Coverage Ratio	2.31

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### Calculation of Distribution Loss

$$\begin{aligned}\text{System Loss (\%)} &= \frac{\text{Energy Loss}}{\text{Energy Import at 33 KV}} \times 100 \\ &= \frac{\text{Total Energy Import} - \text{Total Retail Sold Energy}}{\text{Energy Import at 33 KV}} \times 100 \\ &= \frac{5945 - 5251}{5945} \times 100 \\ &= 11.67\%\end{aligned}$$

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### Calculation of Accounts Receivable

Accounts Receivable as on 30<sup>th</sup> June 2011 in MTK 6845

$$\begin{aligned}\text{Accounts Receivable Ratio} &= \frac{\text{Accounts Receivable as on 30 June 2011}}{12 \text{ months Average Sales}} \\ &= \frac{6845}{1855} \\ &= 3.69 \text{ eqv. months}\end{aligned}$$

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### Calculation of CB Ratio

$$\begin{aligned}\text{CB Ratio (\%)} &= \frac{\text{Total Retail Collection in MTK.}}{\text{Total Retail Billed Amount in MTK.}} \times 100 \\ &= \frac{22053}{22261} \times 100 \\ &= 99.07\%\end{aligned}$$

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### Calculation of CI Ratio

$$\begin{aligned}\text{CI Ratio (\%)} &= \frac{\text{Net Collection in MTK.}}{\text{Net Energy Import in MKWH} \times \text{Average Billing Rate}} \times 100 \\ &= \frac{22053}{5945 \times 4.23} \times 100 \\ &= 87.70\%\end{aligned}$$

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## Calculation of Current Ratio

$$\begin{aligned}\text{Current Ratio (\%)} &= \frac{\text{Current Assets}}{\text{Net Current Liabilities}} \\ &= \frac{20474}{15550} \\ &= 1.32\end{aligned}$$

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## Calculation of Quick Ratio

$$\begin{aligned}\text{Quick Ratio} &= \frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}} \\ &= \frac{20474 - 2650}{15550} \\ &= 1.15\end{aligned}$$

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## Calculation of Debt Service Coverage Ratio

$$\begin{aligned} \text{DSCR} &= \frac{\text{Net Income} + \text{Int.} + \text{Depreciation}}{\text{Principal} + \text{Int.}} \\ &= \frac{2098 + 846 + 834}{791 + 846} \\ &= 2.31 \end{aligned}$$

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## Transmission Loss Calculation

BPDB, Commercial Statistics November, 2011

$$\text{Transmission Loss (\%)} = \frac{\text{Energy Loss}}{\text{Wheeling Energy}} \times 100$$

**Example : PGCB Received energy for wheeling 2311.99 MKWH and it wheeled 2234.569 MKWH to BPDB, REB, DPDC, DESCO & WZPDCO.**

$$\begin{aligned} \text{Transmission Loss (\%)} &= \frac{2311.990 - 2234.569}{2311.990} \times 100\% \\ &= 3.35\% \end{aligned}$$

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## Transmission Line Availability (%)

$$\frac{\text{Total available ckt - km - hr. operation in the month} - \text{Total ckt KMhr. out of operation in the month due to tripping or Emergency outage}}{\text{Total available ckt - km - hr. operation in the month}} \times 100$$

Ex: Grid Circle: Bogra, Tripping month: 9 May 2011, tripping time: 10:00 am, Fault clear: 12:00 pm, Length of this Trans. line: 43 km, Total Trans. line: 23366.62 Ckt-km

A) Total Available circuit Km - Hr Operation in the Month =  $23366.62 \times 24 \times 31$   
 $= 1760765.28$  Ckt KmHr

B) Total circuit Km - Hr out of Operation in the Month =  $43 \times 02 = 86$  Ckt KmHr

$$\text{Transmission Line Availability} = \frac{1760765.28 - 86.00}{1760765.28} \times 100 = 99.9951\%$$

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## SAIFI: System Average Interruption Frequency Index

$$\text{SAIFI} = \frac{\text{Total No. of customer interruptions}}{\text{Total No. of customers served}}$$

$$\text{SAIFI} = \frac{\sum N_i}{NT}$$

- **N<sub>i</sub>**: Number of interrupted customers for each interruption event during reporting period
- **NT**: Total number of customers served for the area being indexed
- **i**: An interruption event
- This index gives information about the average frequency of sustained interruptions per customer over a predefined area
- **Unit**: Times

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## SAIFI & SAIDI

SAIFI & SAIDI including outages at generation and transmission (i.e. including outage incidents uncontrollable by distribution sector):

- \* Statistics for grasping customer satisfaction.

SAIFI & SAIDI confined to 33 KV & 11 KV lines (i.e. controllable):

- \* Statistics for grasping the quality of power distribution service.

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## SAIFI & SAIDI (Necessary data monthly and annual):

No. of outage incidents and duration (minutes) of each incident:

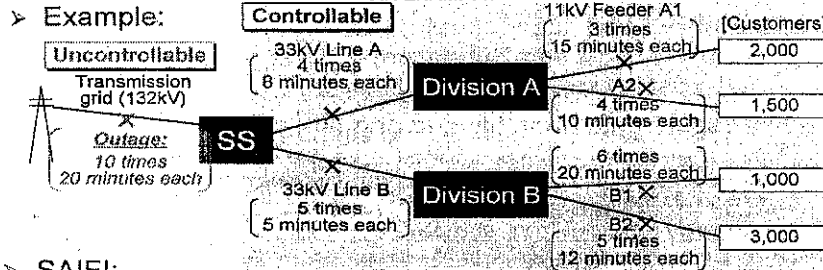
- At each 11 KV feeder (controllable by distribution sector)
  - At each 33 KV sub-transmission line (controllable by distribution sector) and
  - At higher voltage (power generation and transmission grid) (uncontrollable by distribution sector)
- \* Power outage caused by "exceptionally serious" natural disaster and minor interruption/ flickering (shorter than 5 minutes outage) are excluded as well as planned outage i.e. maintenance works.

Number of customers at each 11 KV feeder line

- \* Using approximate number is acceptable if no exact data exist.

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## SAIFI



- SAIFI:
- ✓ Div. A:  $(17 \times 2,000 + 18 \times 1,500) \div (2,000 + 1,500) = 17.4$  [controllable: 7.4]
    - Feeder A1:  $3 + 4 + 10 = 17$  [controllable: 7]
    - Feeder A2:  $4 + 4 + 10 = 18$  [controllable: 8]
  - ✓ Div. B:  $(21 \times 1,000 + 20 \times 3,000) \div (1,000 + 3,000) = 20.3$  [controllable: 10.3]
    - Feeder B1:  $6 + 5 + 10 = 21$  [controllable: 11]
    - Feeder B2:  $5 + 5 + 10 = 20$  [controllable: 10]
  - ✓ Distribution Office Total:  $(17 \times 2,000 + 18 \times 1,500 + 21 \times 1,000 + 20 \times 3,000) \div (2,000 + 1,500 + 1,000 + 3,000) = 18.9$  [controllable: 8.9]

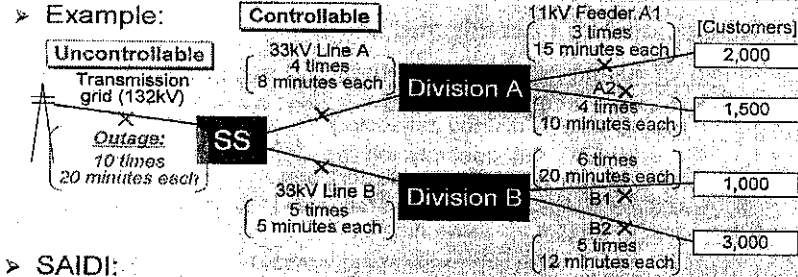
## SAIDI : SYSTEM AVERAGE INTERRUPTION DURATION INDEX

$$SAIDI = \frac{\text{Total Customer Interruption durations}}{\text{Total number of customers served}}$$

$$SAIDI = \frac{\sum r_i \times N_i}{NT}$$

- $r_i$ : Restoration time for each interruption event.
- $N_i$ : Number of interrupted customers for each interruption event during reporting period.
- NT: Total number of customers served for the area being indexed.
- i: An interruption event.
- This index is designed to give information about the average time the customers are interrupted.

## SAIDI



➤ SAIDI:

- ✓ Div. A:  $(277 \times 2,000 + 272 \times 1,500) \div (2,000 + 1,500) = 275$  mins. [75 mins.]
  - Feeder A1:  $3 \times 15 + 4 \times 8 + 10 \times 20 = 277$  mins. [controllable: 77 mins.]
  - Feeder A2:  $4 \times 10 + 4 \times 8 + 10 \times 20 = 272$  mins. [controllable: 72 mins.]
- ✓ Div. B:  $(345 \times 1,000 + 285 \times 3,000) \div (1,000 + 3,000) = 300$  mins. [100 mins.]
  - Feeder B1:  $6 \times 20 + 5 \times 5 + 10 \times 20 = 345$  mins. [controllable: 145 mins.]
  - Feeder B2:  $5 \times 12 + 5 \times 5 + 10 \times 20 = 285$  mins. [controllable: 85 mins.]
- ✓ Distribution Office Total:  $(277 \times 2,000 + 272 \times 1,500 + 345 \times 1,000 + 285 \times 3,000) \div (2,000 + 1,500 + 1,000 + 3,000) = 288$  mins. [controllable: 88 mins.]

## SAIDI & SAIFI OF S & D-X

Name of the Month	Name of the Feeder	Duration (Min)		Outage		No of Customer	Total Duration		Total Outage	
		Total A-1	Controlled A-2	Total B-1	Controlled B-2		A-1 * C	A-2 * C	B-1 * C	B-2 * C
1	2	3	4	5	6	7	8	9	10	11
August/11	E	910	125	29	6	3055	2780050	381875	88595	18330
	F	880	75	26	5	6210	5484800	465750	161460	31050
	G	1050	145	32	7	3842	4034100	557090	122944	26894
	H	910	160	28	7	2935	2670650	469600	82180	20545
	I	1045	165	28	5	6950	7262750	1146750	194600	34750
	J	875	175	26	7	3253	2846375	569275	84578	22771
	K	1290	145	28	6	2092	2698680	303340	58576	12552
	L	1305	135	27	7	2110	2753550	284850	56970	14770
	M	910	140	23	6	770	700700	107800	17710	4620
	N	165	0	8	0	1	165	0	8	0
	O	710	165	15	6	830	589300	136950	12450	4980
	P	760	45	11	2	12	9120	540	132	24
	<b>Total</b>		10810	1475	281	64	32060	31810440	4423820	880203

SAIDI : (Total) : 31810440/32060=992 Min

SAIFI : (Total) : 880203/32060=27

SAIDI : (Controlled) : 4423820/32060=138 Min

SAIFI : (Controlled) : 191286/32060=19.6

SAIDI : (Uncontrolled) : 854 Min

SAIFI : (Uncontrolled) : 21

### Outage Record for SAIDI & SAIFI Calculation

Date	Feeder Name Tripped or ID	Time Tripped	Time Restored	Duration (Min) A	Customers Affected B	YEAR MONTH		Causes
						A * B	Origin (Gen/230/132/33/11KV)	
1.1.12	xx	13:00	13:30	30	500	15000	Any source	
Sum								

SAIDI : (Total):  
 SAIDI : (Controlled):  
 SAIDI : (Uncontrolled):

SAIFI : (Total):  
 SAIFI : (Controlled):  
 SAIFI : (Uncontrolled):

### Exercise

Date	Time	Customer	Duration (Min)	Customer - Min
28 <sup>th</sup>	9:53	10	90	900
28 <sup>th</sup>	11:02	1000	20	20000
28 <sup>th</sup>	13:15	2	175	350
28 <sup>th</sup>	20:48	1	120	120
28 <sup>th</sup>	22:35	1	38	38
Total		1014	443	21408

SAIDI = ?  
 SAIFI = ?

**Information :**  
 Total No of Customer = 50000

## Plant Factor & Availability Factor Calculation of a typical Power Plant

Considering a typical Power Plant Consisting 5 Generating Units

$$\begin{aligned}
 \text{Capacity} \quad & 4 \times 33 \text{ MW} = 132 \text{ MW} \\
 & 1 \times 68 \text{ MW} = 68 \text{ MW} \\
 \text{Total Capacity} & = 200 \text{ MW}
 \end{aligned}$$

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## Plant Factor & Availability Factor Calculation of a typical Power Plant

Considering the data for a particular period of operation (1 month = 720hrs)

Sl. No.	Description	Unit	Generation Units					Combined
			Unit-1	Unit-2	Unit-3	Unit-4	Unit-5	
1	Installed Capacity	MW	33	33	33	33	68	200
2	Outage Period	hrs	10	22	7	22	0	--
3	Available Hrs for	hrs	710	698	713	698	720	--
4	Available Energy Generation	MW	$710 \times 33 = 23430$	$698 \times 33 = 23034$	$713 \times 33 = 23529$	$698 \times 33 = 23034$	$720 \times 68 = 48960$	141,987
5	Energy Gen. according to ins. cap.	MWh	$720 \times 33 = 23760$	$720 \times 33 = 23760$	$720 \times 33 = 23760$	$720 \times 33 = 23760$	$720 \times 68 = 48960$	144,000
6	Availability Factor	%	row4/row5 98.61	row4/row5 96.94	row4/row5 99.03	row4/row5 96.94	row4/row5 51000.00	row4/row5 98.60
7	Actual Gen. during the month	MWh	actual data 20,215	actual data 18,600	actual data 20,320	actual data 19,700	actual data 47,000	actual data 125,835
8	Plant Factor	%	row7/144000 14.04	Row7/144000 12.92	Row7/144000 14.11	row7/144000 13.68	Row7/144000 32.64	Row7/144000 87.39

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