Managing Energy Imbalance During *INTERIM* Market

Presented by
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Interim Rules

The interim Rules authorized Imbalance management and compensation payment.

"Imbalance Energy

31. Where a Disco takes more than its MYTO 2 load allocation, allowing for transmission losses, it shall pay the imbalance price for such excess and where less is taken, it shall be paid the appropriate imbalance price.

32. The imbalance price for the interim period shall be 60% of the charge set by the Commission under MYTO 2

33. The imbalance payment due shall be the imbalance price times the difference between energy delivered and energy due under the MYTO allocation represented in the ----------"

***Source**: Rules for the interim period….. Publish by NERC*

Procedure for Calculating Imbalance

1. Total Energy Sent out from all the grid Generators for the Month (KWh)
2. Energy Wheeled by Transmission (KWh)
3. Transmission Loss KWh = (1- 2)
4. Exports to International Customers (KWh)
5. Determine Available Load KWh = {1 –(3 +4)}
6. Distribute 5 based on the Regulator's Baseline

Load Management (Tariff Order)

Table 1: Regulator (NERC) Load Allocation Baseline

S/No	Discos	Expected Load Allocation
1	ABUJA	11.50
2	BENIN	9.00
3	EKO	11.00
4	ENUGU	9.00
5	IBADAN	13.00
6	IKEJA	15.00
7	JOS	5.50
8	KADUNA	8.00
9	KANO	8.00
10	P/HARCOURT	6.50
11	YOLA	3.50
Total		**100.00**

Note: Available load = {Energy sent out – (Transmission loss , Exports)}

Determine Actual Energy Delivered

7. Determine Actual Energy Delivered (ED)to a Distribution Company.

Note:

(i) ED = $\sum$ { *energy taken at all connection nodes where the company extract energy from the grid*} in respective of the Transmission region.

(ii) The consumption on a feeder or Incomer(*as the case maybe*) may be shared by more than one distribution company, but the load must be 100% shared.

Energy Delivered(ED) to Distribution Companies in Nov' 2013

Table 2: Actual Energy Delivered to Distribution Companies for Nov' 2013

No	Distribution Company PUC	Distribution Company Name	Energy Delivered (kWh)
1	00100600300	ABUJA EDC	287 707 390
2	00300600290	ENUGU EDC	189 737 090
3	02000600277	KANO EDC	61 946 130
4	01900600286	KADUNA EDC	129 795 780
5	03100600314	IBADAN EDC	253 597 800
6	03200600326	JOS EDC	72 463 760
7	02500600339	EKO EDC	148 888 880
8	02500600340	IKEJA EDC	232 820 680
9	03300600350	PORTHARCOURT EDC	128 037 170
10	01400600360	BENIN EDC	247 319 850
11	00500600124	YOLA EDC	22 018 120

Determine Imbalance

8. Imbalance(IQ) = (Expected Energy - Energy Delivered)

If IQ < > 0, for any DISCO, there is imbalance

Do case:

Case 1: If IQ < 0, For any $DISCO_i$, it should be compensated I,e.

Case 2: If IQ > 0, for any $Discos_j$, it will pay compensation.

So we have a double entry table of +ve(KWh) and –ve(KWh)

NOTE: **$\sum$ {(+ve , -ve)}KWh = 0 ∀ period, p .**

Available Load after Tx Loss and Exports for Nov' 2013

Table3A: Expected and Actual Energy for the Month of Nov 2013

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Imbalance Energy Totals Report

for the month of November-2013

No	PUC	Participant Name	Regulated		Actual	
			%	Value	%	Value
1	00500600124	YOLA EDC	3.500	62 101 643	1.241	22 018 120
2	02000600277	KANO EDC	8.000	141 946 612	3.491	61 946 130
3	01900600286	KADUNA EDC	8.000	141 946 612	7.315	129 795 780
4	00300600290	ENUGU EDC	9.000	159 689 939	10.693	189 737 090
5	00100600300	ABUJA EDC	11.500	204 048 255	16.215	287 707 390
6	03100600314	IBADAN EDC	13.000	230 663 245	14.293	253 597 800
7	03200600326	JOS EDC	5.500	97 588 296	4.084	72 463 760
8	02500600339	EKO EDC	11.000	195 176 592	8.391	148 888 880
9	02500600340	IKEJA EDC	15.000	266 149 898	13.122	232 820 680
10	03300600350	PORTHARCOURTEDC	6.500	115 331 622	7.216	128 037 170
11	01400600360	BENIN EDC	9.000	159 689 939	13.939	247 319 850
Totals			100.000	1 774 332 650	100.000	1 774 332 650

Imbalance Quantities

Table3B: Expected and Actual Energy for the Month of Nov 2013

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ImbalanceEnergyTotalsReport

forthemonthofNovember-2013

No	PUC	Participant Name	Gap	Over		Under	
				%	Value	%	Value
1	00500600124	YOLA EDC	- 40 083 523	0.000	0	16.915	40 083 523
2	02000600277	KANO EDC	- 80 000 482	0.000	0	33.759	80 000 482
3	01900600286	KADUNA EDC	- 12 150 832	0.000	0	5.127	12 150 832
4	00300600290	ENUGU EDC	30 047 152	12.679	30 047 152	0.000	0
5	00100600300	ABUJA EDC	83 659 135	35.303	83 659 135	0.000	0
6	03100600314	IBADAN EDC	22 934 556	9.678	22 934 556	0.000	0
7	03200600326	JOS EDC	- 25 124 536	0.000	0	10.602	25 124 536
8	02500600339	EKO EDC	- 46 287 712	0.000	0	19.533	46 287 712
9	02500600340	IKEJA EDC	- 33 329 218	0.000	0	14.064	33 329 218
10	03300600350	PORTHARCOURT EDC	12 705 548	5.362	12 705 548	0.000	0
11	01400600360	BENIN EDC	87 629 912	36.978	87 629 912	0.000	0
Totals			0	100.000	236 976 302	100.000	236 976 302

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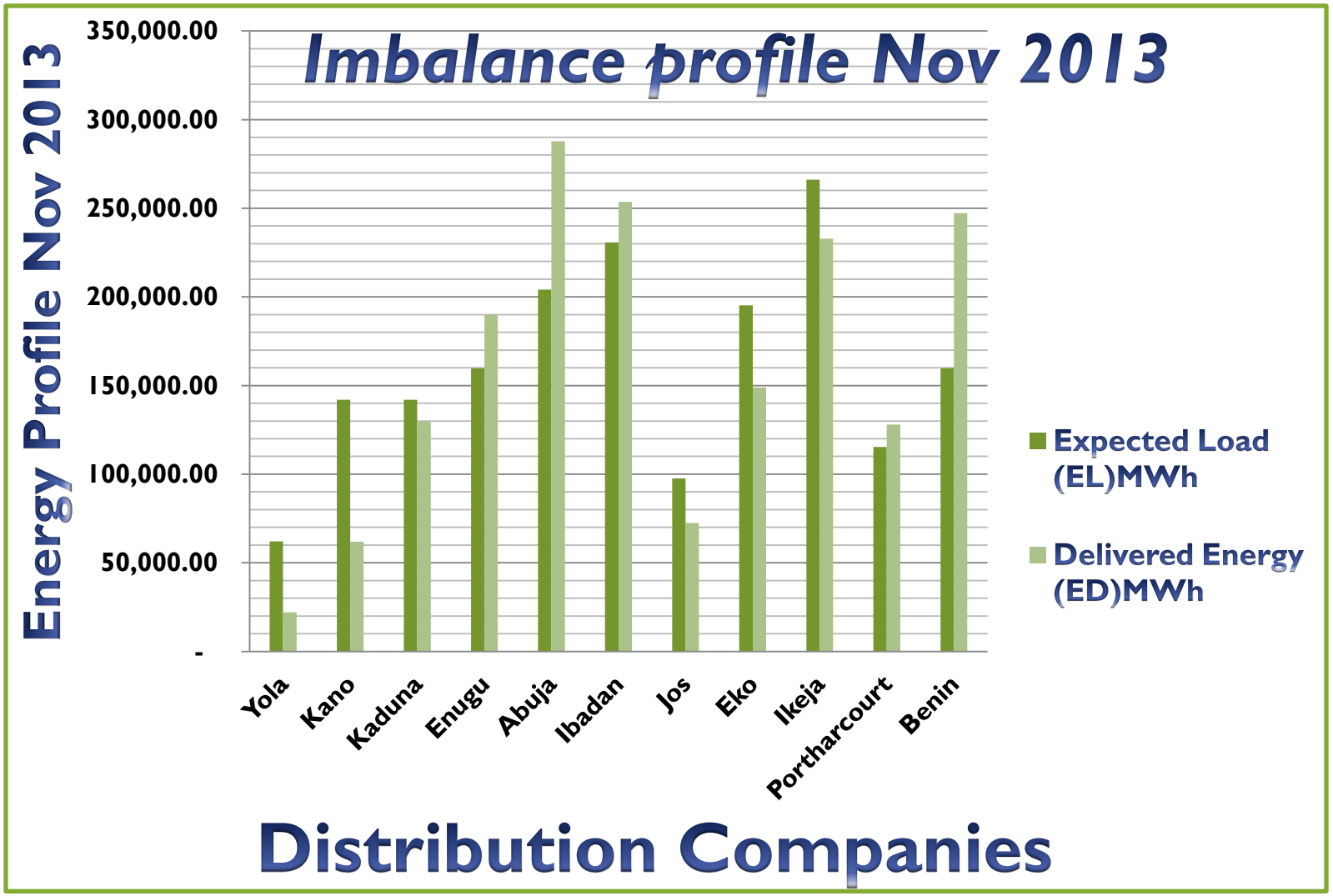
Fig 1: A Bar Chart of DISCOS Imbalance Energy Quantities in MW/h for the Month of Nov 2013



9. Calculate the imbalance amount

= Imbalance Tariff * IQ

Table 4: 60% Imbalance charge effective Nov 2013

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AccountsSystemsConfiguration

Tariff/PricesDetail

No	Start Date	Creditor PUC (Seller) Creditor Participant Name	Unit	Unit Price	
Charge Name: IMBALANCE					
1	2013-11-01	100600300 ABUJA EDC	kWh	3.1014000	
2	2013-11-01	300600290 ENUGU EDC	kWh	3.4380000	
3	2013-11-01	2000600277 KANO EDC	kWh	3.1290000	
4	2013-11-01	1900600286 KADUNA EDC	kWh	3.9378000	
5	2013-11-01	3100600314 IBADAN EDC	kWh	3.7932000	
6	2013-11-01	3200600326 JOS EDC	kWh	3.6432000	
7	2013-11-01	2500600339 EKO EDC	kWh	3.2754000	
8	2013-11-01	2500600340 IKEJA EDC	kWh	2.5584000	
9	2013-11-01	3300600350 PORTHARCOURT EDC	kWh	3.6240000	
10	2013-11-01	1400600360 BENIN EDC	kWh	3.5538000	
11	2013-11-01	500600124 YOLA EDC	kWh	3.9078000	

A sample of Imbalance Charge for a company with ED < EL

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Imbalance Energy Transactions Detail Report for Sellers

for the month of November-2013

(MO426)

No	Participant Name	Participant Name	Allocated %	Allocated Energy (kWh)	Unit Price	Charge
Seller: KANO EDC (02000600277)						
1	00100600300	ABUJA EDC	11.918	28 242 365	3.1290000	88 370 359.30
2	00300600290	ENUGU EDC	4.280	10 143 574	3.1290000	31 739 242.42
3	03100600314	IBADAN EDC	3.267	7 742 443	3.1290000	24 226 103.99
4	03300600350	PORTHARCOURT EDC	1.810	4 289 247	3.1290000	13 421 054.57
5	01400600360	BENIN EDC	12.483	29 582 853	3.1290000	92 564 747.91
KANO EDC Total			33.759	80 000 482		250 321 508.18

A sample of Imbalance charge for a Company with ED > EL for Nov 2013

Operator of the Nigerian Electricity Market

Imbalance Energy Transactions Detail Report for Purchasers

for the month of November-2013

(MO426)

No	Participant Name	Participant Name	Allocated %	Allocated Energy (kWh)	Unit Price	Charge
Purchaser: ABUJA EDC (00100600300)						
1	02000600277	KANO EDC	11.918	28 242 365	3.1290000	88 370 359.30
2	01900600286	KADUNA EDC	1.810	4 289 577	3.9378000	16 891 496.40
3	03200600326	JOS EDC	3.743	8 869 650	3.6432000	32 313 910.14
4	02500600339	EKO EDC	6.896	16 340 832	3.2754000	53 522 760.94
5	02500600340	IKEJA EDC	4.965	11 766 128	2.5584000	30 102 462.07
6	00500600124	YOLA EDC	5.971	14 150 583	3.9078000	55 297 648.70
ABUJA EDC Total			35.303	83 659 135		276 498 637.55

Generator Losses

The Regulator considered 8.05% loss in the generator tariff design.

However,

Transmission company is striving to improved on the loss factor.

From the Market Operator's end, the settlement invoice is prepared for a DISCO based on the energy successfully delivered to it.

References:

1. NERC,(2012) *MYTO 2 for distribution company, Online .* Available from: http://www.nercng.org/index.php/document-library/func-startdown/65/ *pp. 44 -45. (Accessed: 15 December 2013)*
2. NERC, (2012)*New Load Allocation Methodology.* Online. Available from: http://www.nercng.org/index.php/document-library/func-startdown/49/ pp. 13-17 (Accessed: 12 May 2013)
3. NERC, (2013) *Rules for the Interim Period between completion of Privatizaion and the start of the TEM, 2013.* Online. Available from: http://www.nercng.org/index.php/document-library/func-startdown/224/ p. 9. (Accessed: 14 December 2013)

THANK YOU

Suggestions

Questions