COMMERCIAL BUILDING
CASE STUDY

ENERGY MANAGEMENT AND BILLING SERVICES AT A MULTI-STOREY COMMERCIAL BUILDING IN LAHORE, PAKISTAN

PROJECT BACKGROUND

SB Electronics Engineering and Control (Pvt.) Ltd. (SBEEC) is an Energy Services Company (ESCO) Providing a broad range of Energy Solutions including design and implementation of Energy Efficiency Enhancement Projects, Energy Conservation, Energy Infrastructure Outsourcing, Energy Supply and Risk Management for ICT (Internet and Communication Technology Industry), Commercial, and Industrial Customers.

The Commercial Building has about 86 Tenants and had outsourced their Meter Reading & Billing to a Third Party and were facing the following issues:

a. Inaccurate and Delayed Billing which resulted in working capital deployment of more than Rs. 9 Million per month
b. Inaccurate metering resulting in erroneous billing and estimated billing
c. Unidentified and High System Losses in the range of 10 to 12% per Month
d. Due to the above, there were frequent disputes with the Tenants on Billing which resulted in stuck receivables for months increasing overall losses

To cater to the above SBEEC first conducted an Audit to determine the causes of the High losses and also provided a solution for Meter Maintenance to ensure On-Time accurate Billing based on actual consumption.

OBJECTIVES AND KPIs

The objectives of this project were as follows:

1. Complete Reconciliation of Grid and Genset generated Units with bifurcation of consumption with Tenant consumption and identification and elimination of losses to the extent of Monitoring
2. Generate Tenant Bills based on actual Metered consumption within One day of Receipt of DISCO Bill so that Bills can be collected before the Due Date of DISCO Bill to eliminate use of temporary working capital
3. Maintain all Metering equipment and provide pictures of Meter Reading with the Bills so that there is no dispute of Inaccurate Meter reading and Billing
4. Identify and rationalize the System losses to within the inherent loss
5. Provide assistance and defend Bills on behalf of the Building management in case of any query raised by the Tenants on their Energy Billing
6. Identify waste or idling energy use and assist building management in eliminating the same

ANALYSIS OF ISSUES

The Building's previous vendor without a Meter Management and Maintenance program was forced to provide inaccurate/estimated meter readings along with declaring meters defective which would lead to inaccurate billing. To cover losses the vendor would charge the Building (own consumption on common services) more Consumption than recorded by the Meters. All these issues were eliminated by Meter Management, Timely Meter Reading and Billing through software's and SOPs created for a robust and reliable/auditable Meter Reading and Billing system. An explanation of the efforts of SBEEC are detailed below in SBEEC services section.

Another issue being faced by the Building was high distribution loss. The vendor was unable to explain these losses to the building management and the losses being incurred every month were between 7-10%. Table 2 below depicts the Loss being incurred to the Building.

S#	Month & Year	Total Units (From DISCO & Genset)	Total Units (bills generated)	Unit Loss	%age loss
1	Feb-14	247,041	235,849	19,110	7.74%
2	Mar-14	309,901	318,582	21,589	6.97%
3	Apr-14	367,648	368,689	22,101	6.01%
4	May-14	399,811	378,567	30,184	7.55%
5	Jun-14	425,688	373,755	51,933	12.20%
6	Jul-14	404,939	395,060	37,106	9.16%
7	Aug-14	402,963	403,391	32,105	7.97%
8	Sep-14	383,761	370,063	18,985	4.95%

Table 2 - Monthly Losses

Lastly, the Building was facing issues of Inaccurate billing from their vendor as the Tenant meters were recording Grid and Generator usage together. The vendor would manually calculate the portion of each supply which was then charged to the tenants. The major tenants would dispute this regularly as they felt that they were not being charged accurately and this would lead to further delays in collections from the Tenants.

SBEEC SERVICES

SBEEC services were engaged to resolve the above issues. Initially SBEEC deployed their teams with Acquisition software which would download the Load profile Data (Interval Data) from the Meters and a Billing software was developed which would calculate the Grid and Generator units based on the Load Shedding schedule. This resulted in Semi-automated Billing and drastic decrease in the Billing Cycle for the Building. SB also conducted a full Energy audit to determine the cause of the losses which are explained further. SB also assisted the Building Management in any disputes which arose from the Tenants.

Table 3 below depicts the decrease in the Billing cycle after SBEEC services were engaged. This decrease resulted in Tenant Bills having advanced Due Date from DISCO Bill and thus collection would be done before DISCO bill would become due.

S#	Month & Year	DISCO Reading Date	DISCO Bill Due Date	Tenants Bill Submission Date
1	Oct-14	2nd Nov	17th Nov	10th Nov
2	Nov-14	1st Dec	16th Dec	9th Dec
3	Dec-14	4th Jan	22nd Jan	12th Jan
4	Jan-15	1st Feb	16th Feb	10th Feb
5	Feb-15	1st Mar	18th Mar	11th Mar
6	Mar-15	3rd Apr	18th Apr	10th Apr

Table 3 - Decrease in Billing Cycle

To provide accurate billing to the Building, SBEEC provided pictures of all Meter readings for the month and conducted regular testing to ensure the accuracy of the Meters. The previous vendor would charge the Building excess consumption based on erroneous Meter readings to reduce overall losses. Table 4 below depicts the results of Accurate Billing and resulting decrease in the Buildings Own consumption which was now being charged to the Tenants.

S#	Month	Building Own Consumption 2014	Building Own Consumption 2015	Reduction
1	Jan	46,711	39,764	(6,947)
2	Feb	57,033	43,713	(13,320)
3	Mar	99,210	76,376	(22,834)
4	Apr	146,446	106,344	(40,102)
5	May	126,839	103,557	(23,282)

Table 4 - Comparison of Buildings Own Consumption

To identify the losses SB conducted an Audit of the Building energy flow measurements to determine the source and pinpoint cause of the losses. From the analytical Audit it was found out that the Building was energizing two of the three 1000 kVA transformers 24x7 even when the load was partially being used adding No Load losses (Iron Losses to the system). On this correction Transformation Losses from DISCO Supply to their Tenants Supply were not only quantified but reduced by almost 35%. These losses were calculated at about 2.9% and was reduced to less than 2% by better management of the transformers operation.

A complete audit of the building showed us that there was No 'Leakage' of Energy and the balance Losses were Line & Distribution loss which is also inherent and part of the system design. The result of this exercise created awareness in all levels of the building management about their losses and it was advised to them that this Loss be charged to all Tenants as per practice of the DISCOs. Due to this improvement amongst others the Building was able to increase their Billing revenue by more than Rs. 300,000 per month and wipe out their Financial losses. Furthermore, SB also helped the building in any Billing disputes that were raised by the Tenants. Since 2014 when SB services were contracted there has been No dispute or query left unanswered from the Tenants and all queries stand resolved.

Table 5 below depicts the Net loss being incurred to the building after identification and improvement of losses of Losses.

S#	Month & Year	Generated Units	Billed Units	Gross Loss	Transformer Loss	Net Loss	Net loss %age
1	Oct-14	354,529	338,797	(15,732)	5,262	(10,470)	2.95%
2	Nov-14	290,100	278,760	(11,340)	4,206	(7,133)	2.46%
3	Dec-14	233,504	227,858	(5,646)	3,208	(2,438)	1.04%
4	Jan-15	287,419	282,747	(4,672)	4,032	(640)	0.22%
5	Feb-15	371,255	345,841	(25,414)	5,108	(20,306)	5.47%
6	Mar-15	362,857	335,723	(27,134)	5,188	(21,946)	6.05%

Table 5 - Reduction in Losses

CONCLUSION AND RESULTS

With the new entrack system installation the building management was rightfully able to identify and charge the losses coupled with efficiency improvement and Meter Management and Maintenance have resulted in substantial savings to the Building management with satisfied Tenants. Consequently, bills are paid on time. Table 6 below shows the tangible savings made for the Building Management in addition to non-tangible benefits of elimination of disputes, enhancement of Building reputation as a top Landlord with an efficient utility billing system for the Tenants.

S#	Item	Period	Amount
1	Working Capital Deployment reduction*	Monthly	90,000
2	Transformer Loss Reduction from 2.9% to 2%	Monthly	80,000
3	Charging of Transformer Loss to all tenants	Monthly	180,000
4	Savings from accurate billing to the Building	Monthly	520,000
5	**Total savings**	**Monthly**	**870,000**
6	SB Charges	Monthly	80,000
7	**Net Savings**	**Monthly**	**790,000**
Note: Working Capital taken as Rs. 9 Million and charges calculated at 1%			

Table 6 - Monthly Savings to the Building

what gets measured, gets managed.