



## LOW LOSS TRANSFORMER RETROFIT

**SECTOR: RETAIL**  
**MORRISONS SUPERMARKETS**

### INSTALLATION BENEFITS AT A GLANCE

- 1** Electricity usage reduced by 8.2%
- 2** Annual savings of ~159,000 kWh (~£14,300)\*
- 3** Site voltage reduced from 237V to 226V (5% reduction)
- 4** Improved power factor

### PROJECT SUMMARY

Morrison had identified that its Lichfield site could benefit from voltage management. The site supply voltage was higher than required (average 237 Volts) and there was a high percentage of voltage dependent load bearing equipment. The existing supply transformer was a ten year old, standard loss CRGO unit.

The installation of a Wilson Low loss Transformer, combined with a 5% reduction in site voltage has significantly reduced the kWh used. The measurements taken before installation and those with the Wilson Low Loss unit show a 8.2% reduction in electricity consumption with projected annual savings of 159000 kWh (~£14,000).

Following the installation of a Wilson Low Loss Transformer at site, an energy efficiency and power quality survey was conducted by Power Quality Management Ltd (PQM) to quantify the energy savings. This report presents the recorded data and identifies the savings the new transformer has made. Many aspects of power quality and energy efficiency are inter-related so due diligence requires a comprehensive assessment to represent the best interests of the end customer. Power analysing monitoring equipment was connected at the main incoming LV supply and left in situ for 14 days. The data captured shows the before and after installation readings. The data recorded while the store was under generator supply has been omitted.

### VOLTAGE

The voltage supplied to many sites is higher than it needs to be. The network operator often keeps the Primary Voltage high to reduce transmission losses while keeping within the maximum limit. In 2008 the final stage of the European Voltage Harmonisation came into place setting the voltage levels to 230V ± 10%; the statutory limits for voltage are now from 207 to 253V phase-neutral. Most sites have a L-N voltage of 240V or higher giving rise to equipment running at inappropriate levels. Reducing and maintaining the voltage at the most favourable level is an established way to significantly reduce energy consumption and costs whilst having the additional benefits of reduced maintenance and increased equipment life.

### POWER EFFICIENCY

The efficiency of a supply is expressed as a 'power factor' (pf) where 1.0 (unity) is ideal and anything below 0.95 is highly likely to attract significant penalty charges. Power Factor Correction (PFC) equipment is installed to ensure that the pf is automatically maintained above the charging threshold of 0.95. The correct type and rating of this equipment is based upon the total power, the uncorrected pf, and levels of harmonic currents.



**MORRISONS**



**158968**  
ANNUAL kWh  
**SAVINGS**



**PAYBACK**  
**£14,300**  
ANNUALLY

Based on electricity costs of £0.09 /kWh

“This retrofit installation has delivered significant energy savings at impressively low project costs. Payback on the investment will be achieved in less than 2.5 years and we are currently looking at rolling out a comprehensive retrofit program across our estate.”

Energy Manager,  
Morrison Supermarkets



## LOAD SUMMARY

The following section contains pre-and post installation power data measured over a duration of 7 days – pre and post installation respectively.

### BEFORE LOW LOSS TRANSFORMER INSTALLATION (JAN 2012)

	Amps				kVA	kW	kvar	PF
	L1	L2	L3	N				
<b>Max</b>	544.2	490.6	418.0	185.6	336.9	306.6	139.7	0.91
<b>Min</b>	204.8	172.5	157.3	17.2	127.5	116.1	52.9	0.91
<b>Average</b>	374.5	332.6	291.0	103.3	235.7	214.4	97.7	0.91

	Volts		
	L1-N	L2-N	L3-N
<b>Max</b>	240.3	240.8	240.2
<b>Min</b>	233.2	232.4	232.8
<b>Average</b>	236.1	235.9	237.0

#### Recorded Power (7-day)

kWh	36027
kvarh	16414

### AFTER LOW LOSS TRANSFORMER INSTALLATION (FEB 2012)

	Amps				kVA	kW	kvar	PF
	L1	L2	L3	N				
<b>Max</b>	559.2	493.2	472.3	199.5	323.8	294.7	134.3	0.91
<b>Min</b>	199.7	164.2	153.0	23.0	117.8	107.2	48.9	0.91
<b>Average</b>	360.5	321.3	280.5	104.0	216.3	196.8	89.7	0.91

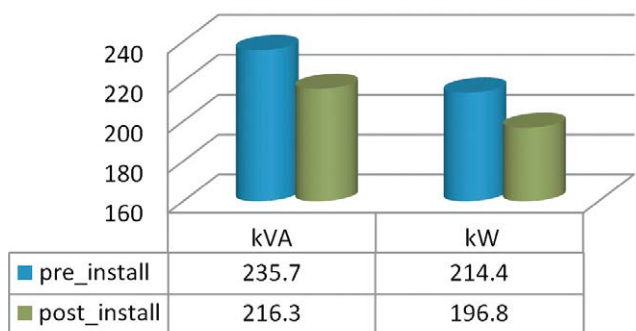
	Volts		
	L1-N	L2-N	L3-N
<b>Max</b>	238.6	238.6	238.7
<b>Min</b>	221.1	219.3	221.6
<b>Average</b>	225.1	223.9	226.2

#### Recorded Power (7-day)

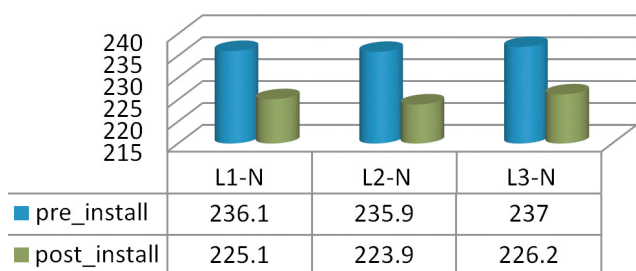
kWh	33068
kvarh	15066

## PRE-AND POST INSTALLATION DATA COMPARISON

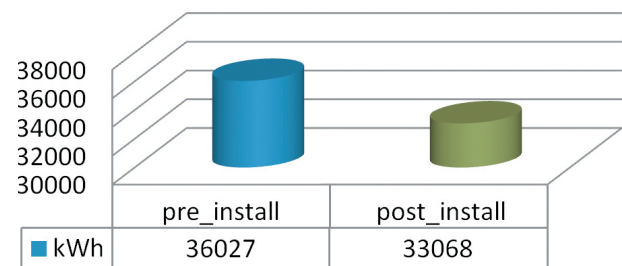
### POWER USAGE



### VOLTS



### RECORDED POWER



## ENERGY SAVINGS

The reduction from **36,027kWh** per week to **33,068kWh** represents an **8.2% saving**.

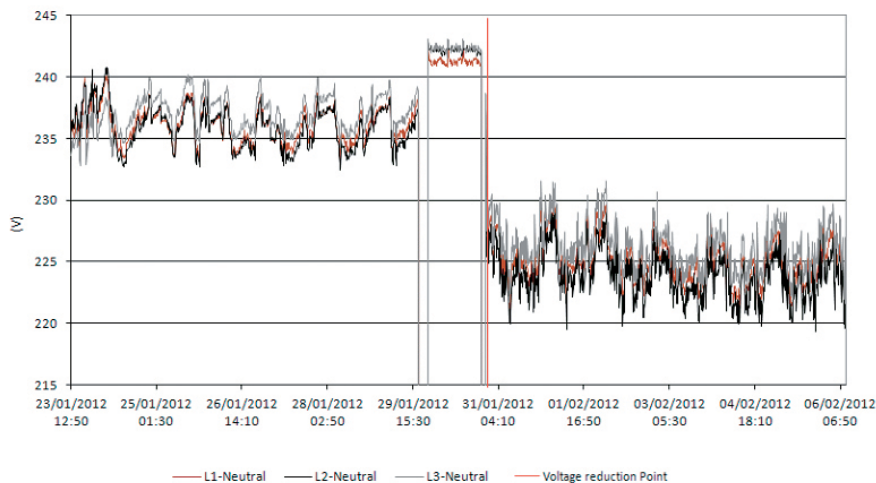
On a projected 1,873,404kWh prior to installation, **annual savings are 153,868kWh.**

## RECORDED POWER DATA

The following data shows the electrical characteristics for the 14 day monitoring period.

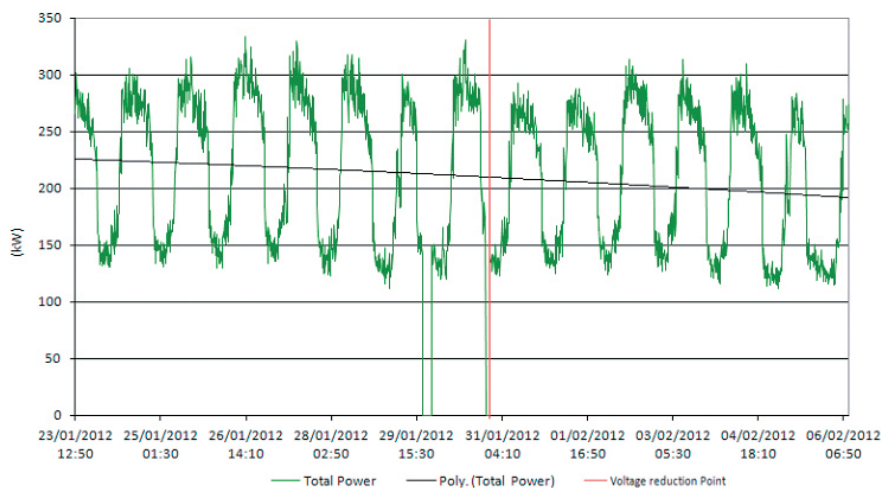


### VOLTAGE DATA



### POWER DATA

The following graph details the recorded total power during the period of the survey with trend line.



### AVERAGE POWER DATA

The following graph details the recorded total half hour average power during the period of the survey.

