Energy Efficiency Audit – 2016

Nurendale Ltd.,

Materials Recovery Facility, Rathdrinagh, Navan, Co Meath

This audit has been carried out in accordance with Conditions 7.1 and 7.2 of Waste License Number W0140-04 which state that;

(i) The audit should be carried out in accordance with the guidance published by the [Environmental Protection] Agency, “Guidance Note on Energy Efficiency Auditing”;

and

(ii) The audit shall identify all practical opportunities for energy use reduction and efficiency and the recommendation of the audit will be incorporated into the Schedule of Environmental Objectives and Targets.

Google Earth Image showing site outlined in white with main energy consuming facilities shaded red

The facility is owned and operated by Nurendale Ltd., Rathdrinagh, Beauparc, Navan, Co Meath

Facilities Manager; Cathal Smith

Operations Manager; Dermot O'Brien

Environmental & Safety Officer; Darragh Mink

1. Main Report

The site is located in the townland of Rathdrinagh, Beauparc, Navan, County Meath. It is bordered by the N2 to the west and Knockcommon Road to the north. It is 4.7 hectares in area and contains three industrial buildings, one office building and a number of small mixed use buildings. These buildings were described in the 2011 Energy Audit prepared by O'Callaghan Moran & Associates in October 2012.

Activities

The 2011 Energy Audit referred to above described the site activities as follows:

"The main activity is the processing of non-hazardous waste to recover materials suitable for recycling and to minimise the quantity of treated waste disposal to residual landfill. Ancillary activities include vehicle washing, fuel/oil storage, surface water reed bed treatment, skip repair and refuse derived fuel production."

The facilities located on the site are described in detail in the 2011 Energy Audit. The changes in activities and facilities that have occurred since then include;

a) The installation of a solid recovered fuel production (SRF) facility in Building 1, which was previously used only for holding and sorting dry mixed recyclable material.

b) The reconstruction of Building 3 following fire damage and the re-commissioning of the two SRF facilities.

c) An increase in activity in the administration building as a result of an increase in the capacity of the call-centre. The reception and administration functions that existed here in 2011 continued unchanged.

The numbers of staff working on site at the time of the audit are shown below;

Call Centre	Accounts	Bin truck admin	I.T	Pay roll	Debt Collection	Reception	Shed 1	Shed 2	Shed 3	Night shift/ Maintenance	Agency	Shovel Drivers	Yard Management	Total
40	5	4	1	2	7	1	5	7	6	10	5	3	3	99

Receiving bay in Building 1 showing loading shovel in action

Reed bed used for surface water treatment

Discharge from solid recovered fuel production facility (Untha 1) in Building 2

Intake for solid recovered fuel production facility (Untha 2) in Building 2

The site is illuminated by manually operated wall mounted external lights. The administration building is heated by a combination of free standing and wall mounted electric panel and oil filled heaters. Heating control consists of on/off and timer switching and internal thermostats.

2. 2016 audit

The audit was carried out during March 2017. It consisted of two site visits/inspections, two meetings with the operation and environmental managers and the collection and processing of energy consumption data for 2016 provided by ESB's MRSO and the facility operator.

The audit covered the period 1st January 2016 to 31st December 2016 with references to available historic data.

The audit was based on electricity usage data provided by ESB's MRSO and Gas Oil consumption data provided by the site Operations Manager. It covered the whole site and all activities based on the site.

The energy management system on the site includes the timely operation of the main plant, the automatic recording of Gas Oil distribution and the reading of electricity meters.

In the course of this audit the following exercises were carried out;

a) the recommendations of the 2011 Audit were reviewed

b) a schedule of electrical plant was prepared and used to create a theoretical electrical load profile. An operating diversity of 60% was assumed to allow for part load operation and occasional down time

c) the theoretical electrical profile was compared with recorded load data to ascertain the accuracy of both.

d) the schedule of electrical plant was reviewed to determine what improvements in operation/efficiency were feasible.

e) an updated list of recommendations was prepared

The audit did not cover individual items of mechanical plant.

Electricity Consumption

Electricity consumption was reviewed with reference to a series of graphs showing half-hourly load throughout the year.. see charts a) and b) below. These graphs showed that electricity consumption was consistent with activity on site. All observed anomalies are noted below the relevant graphs. Monthly consumption and annual totals are shown in tables 1 and 2 below.

Gas Oil consumption

Gas Oil distribution is logged using a JigsawM2M fuel management system. The total consumption of 248,178 litres during 2016 compared with 278,492 litres during 2011.

3. Recommendations

a. To improve the accuracy and resolution of the theoretical electricity load calculations

b. To compare the above calculations with recorded loads (using MRSO data) regularly

c. To prepare/update a list of practical measures for reducing electricity consumption. This list to include the approximate cost of each measure and the resulting reductions in electricity consumption and reductions in cost of electricity

d. To monitor more closely the operation of the Loading Shovels to determine if there are options for reducing Gas Oil consumption. These options should include installation of conveyors and/or scrapers to reduce use of Loading Shovels, increased efficiency of loading cycles (reduced hours of operation, reduced travel distances) and use of more energy efficient vehicles.

e. To examine the heaters in the administration building to determine and assess what improvements are possible. These assessments should include examining the options for improving time and temperature control of existing heaters, replacing existing heaters with more efficient units (PIR controlled convectors, HRV with heat pumps etc.,), reduced air ingress, improved insulation..

4. Schedule of energy consuming buildings, plant and equipment

The energy consuming buildings covered by this license are shaded in red on the Google Earth image shown on page 2 above. Details of these are shown in the 2011 Audit referred to above.

A schedule of fixed electrical plant and mobile diesel plant is attached at appendices A and B..

5. Energy conservation policy

Site energy policy is as described in the 2011 Audit referred to above.

There are very few practical opportunities for significantly reducing energy consumption in this facility.

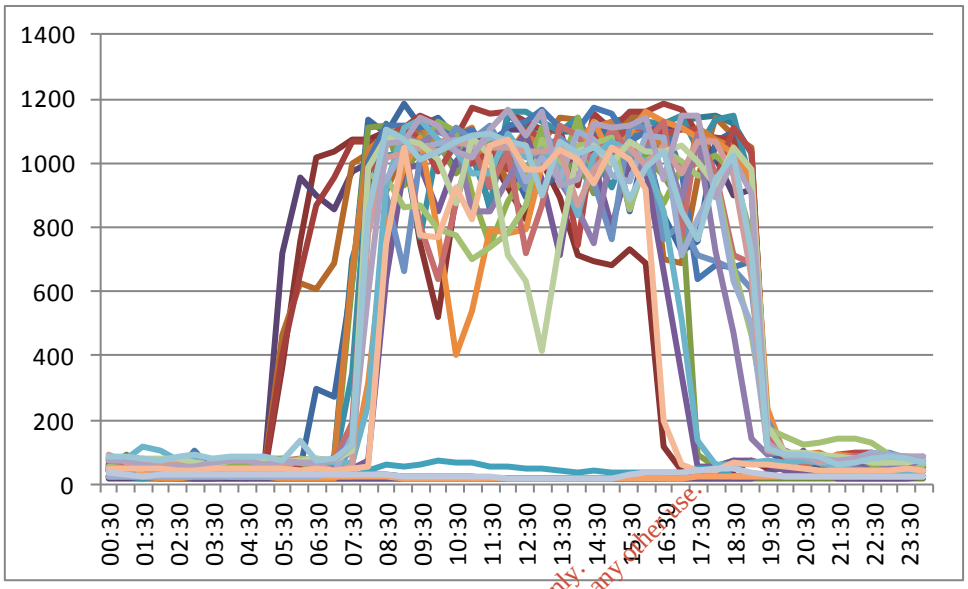
All of the fixed process machinery is powered by electric motors with speed control as appropriate. This ensures that the power consumption is continuously adjusted to match mechanical demand. Power factor correction equipment is used to minimise the impact of speed control on power quality.

The loading machines are used to transfer material to and from the process plant and to carry out an element of sorting. The element of sorting (typically spotting large items that need to be separated out before processing) means that it is not practical automate this process at this stage.

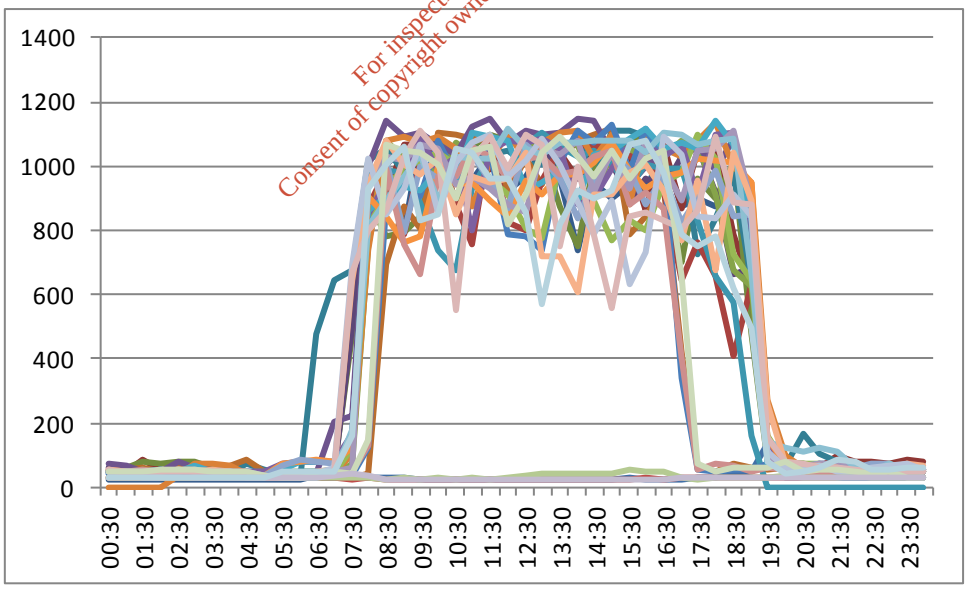
The main site policy for both the fixed and mobile machinery is to keep them operating or available for operation at full and efficient output throughout the working day. Energy conservation policy is secondary and unwritten but despite this is clearly an important part of the overall operational policy which includes optimising overall efficiency wherever practical.

6. *Charts and tables*

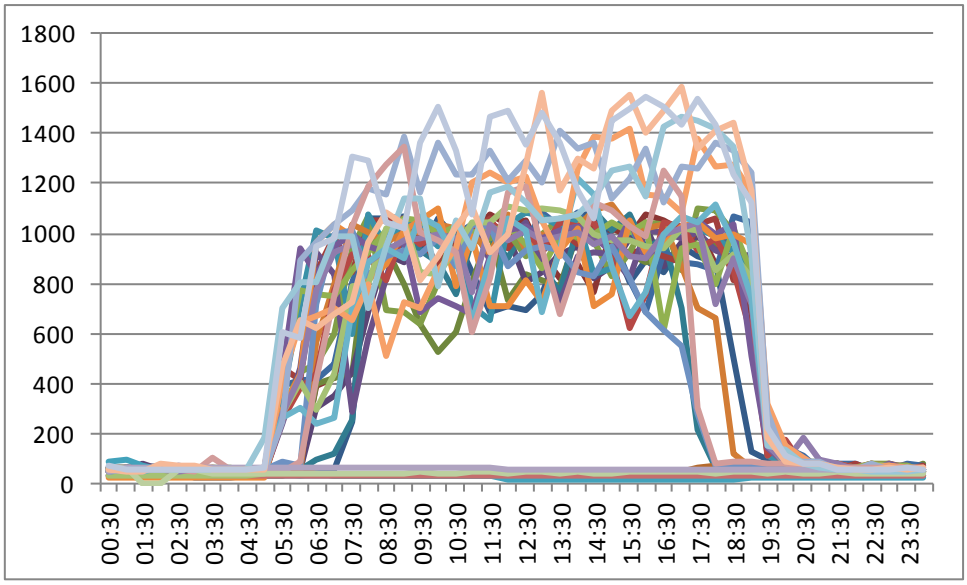
a. Charts showing half-hourly electricity demand for MPRN 10305228890 (MV supply)



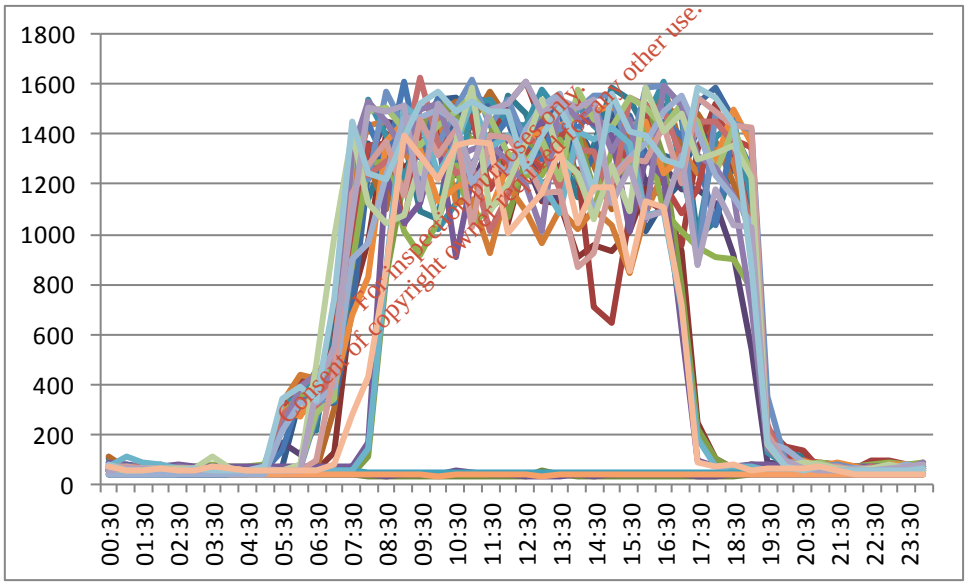
Daily graphs of electricity demand in kW during January 2016



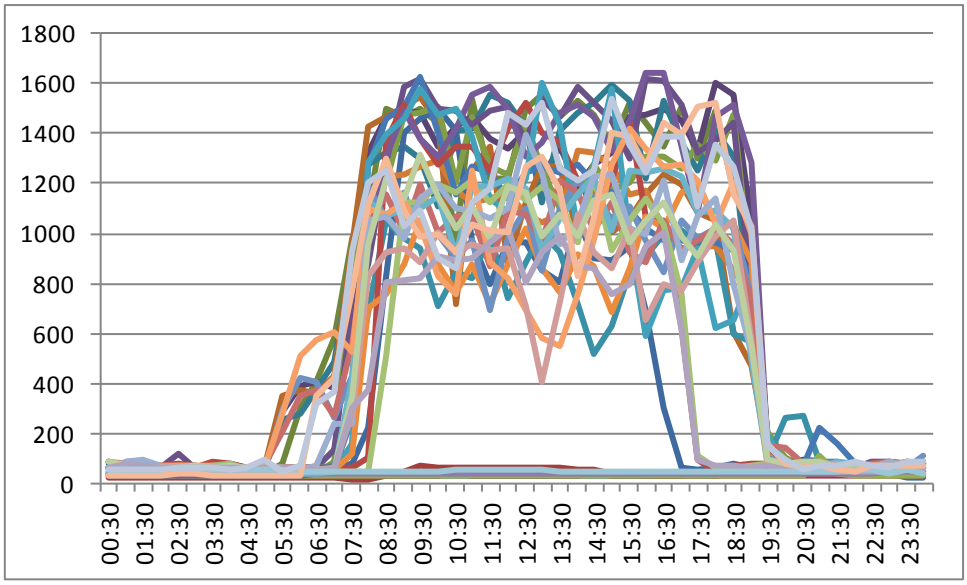
Daily graphs of electricity demand in kW during February 2016



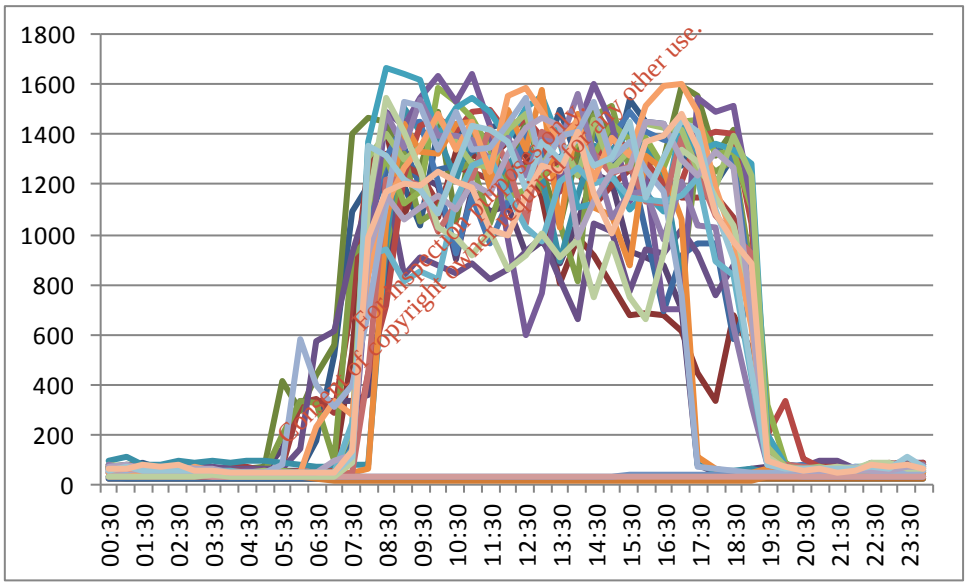
Daily graphs of electricity demand in kW during March 2016
(The increase in load during March the result of a new Untha shredder coming on line in Building 1)



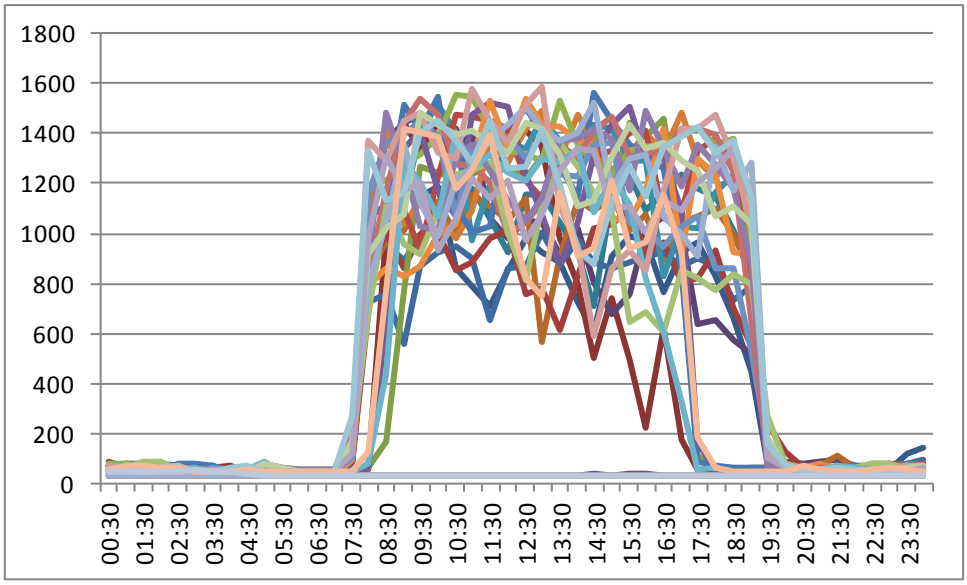
Daily graphs of electricity demand in kW during April 2016



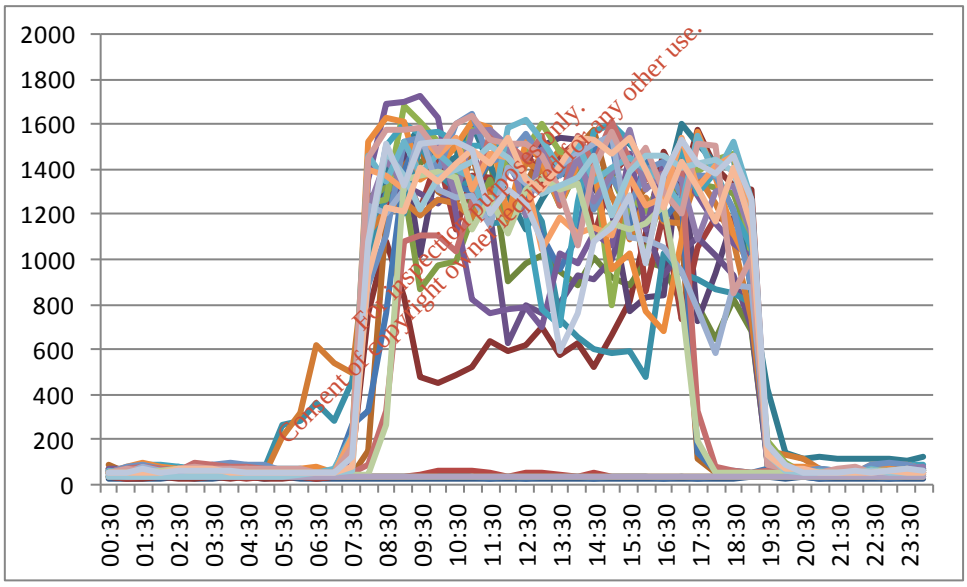
Daily graphs of electricity demand in kW during May 2016



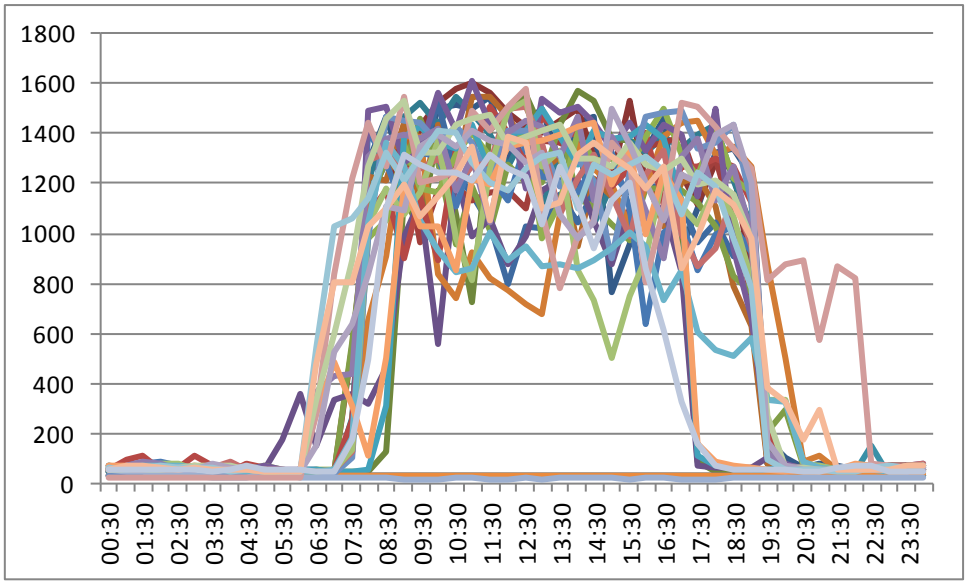
Daily graphs of electricity demand in kW during June 2016



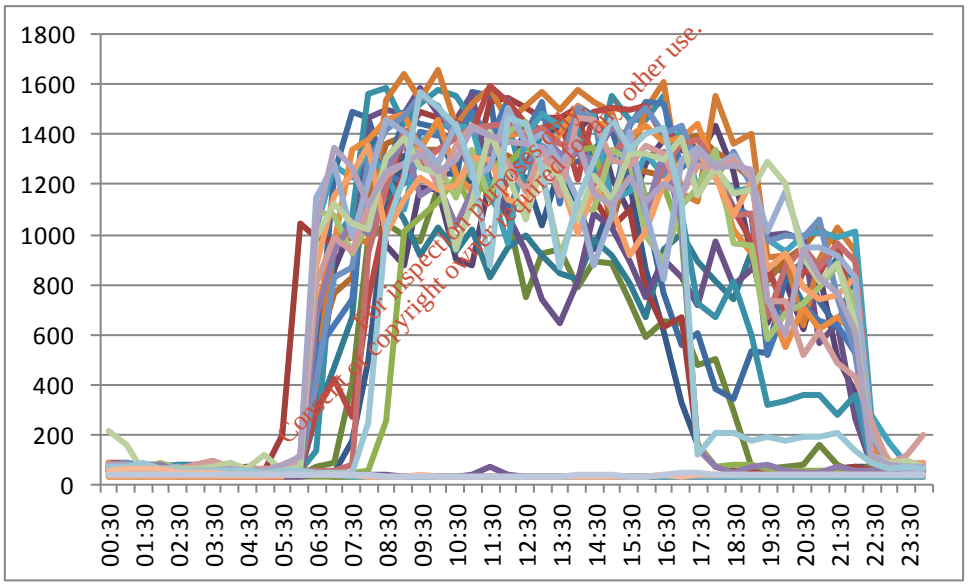
Daily graphs of electricity demand in kW during July 2016



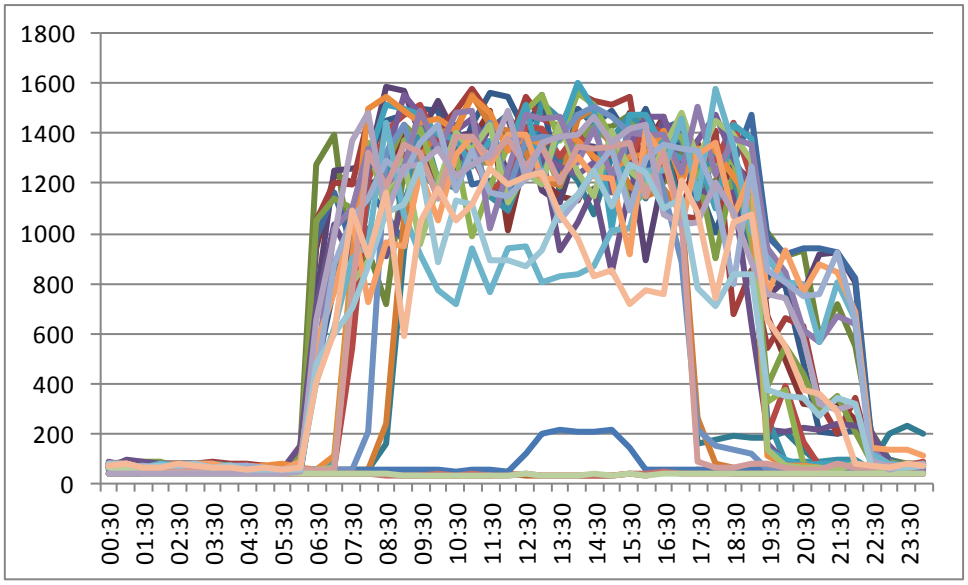
Daily graphs of electricity demand in kW during August 2016



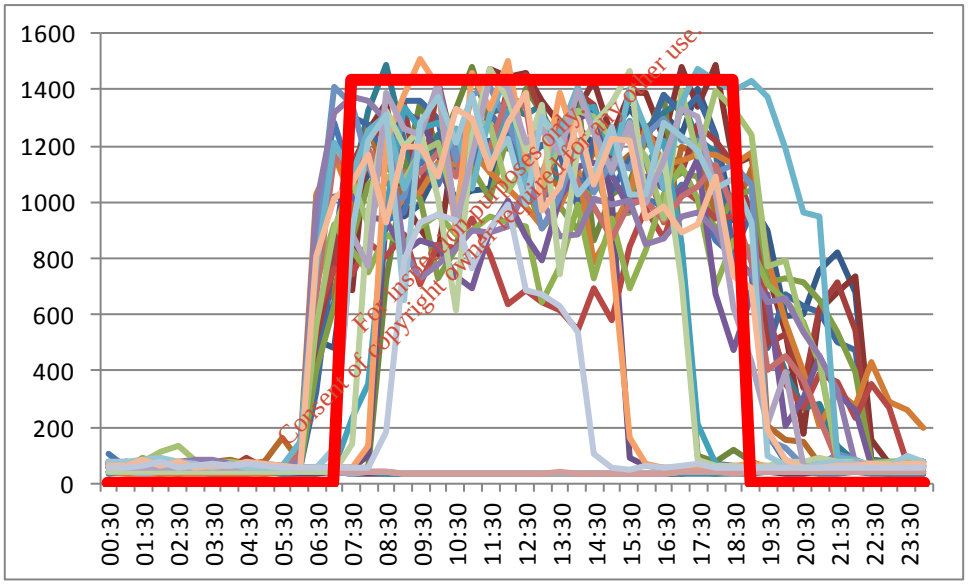
Daily graphs of electricity demand in kW during September 2016



Daily graphs of electricity demand in kW during October 2016

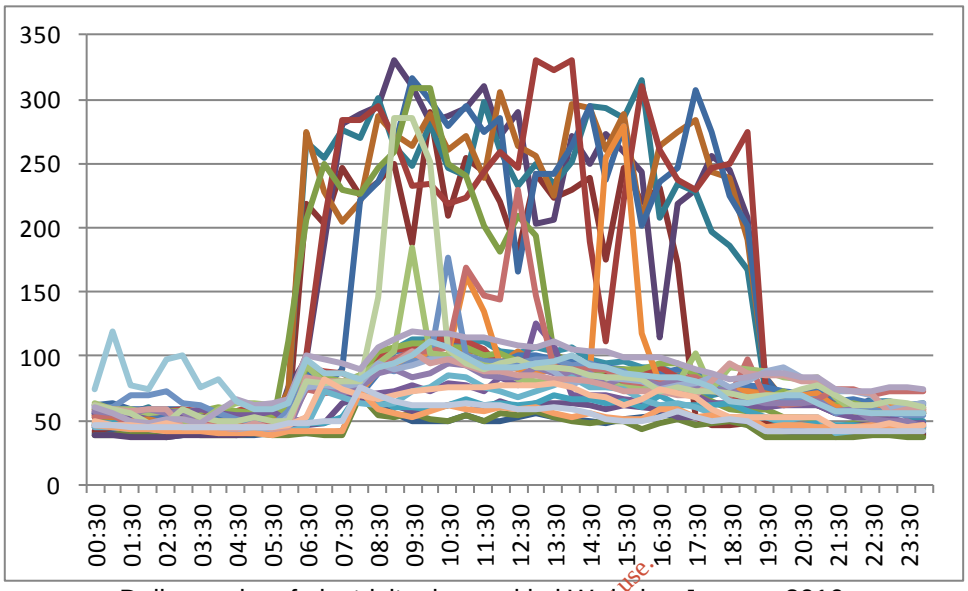


Daily graphs of electricity demand in kW during November 2016

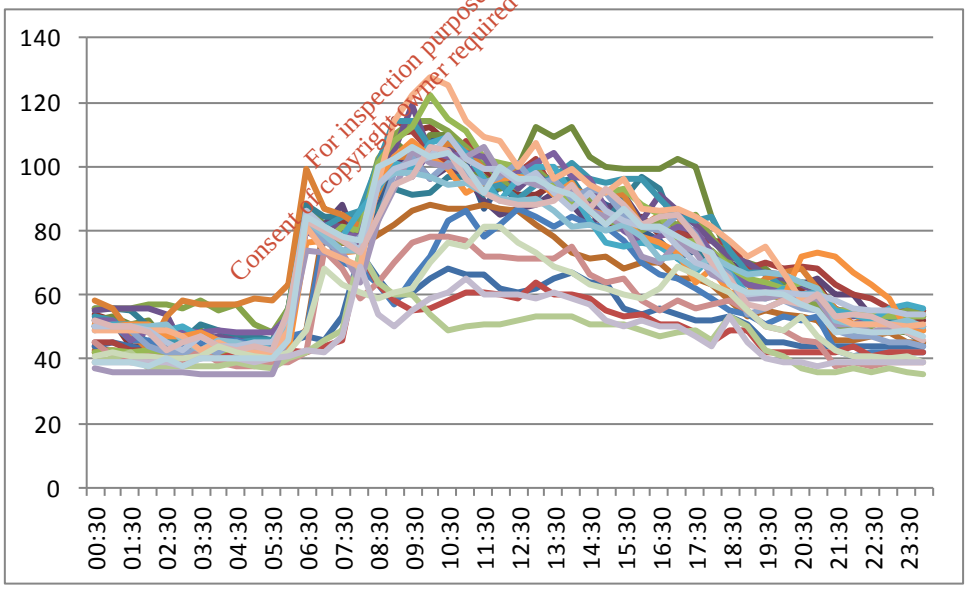


Daily graphs of electricity demand in kW during December 2016
(Theoretical demand calculated from schedule of plant shown in red.. assuming 60% diversity)

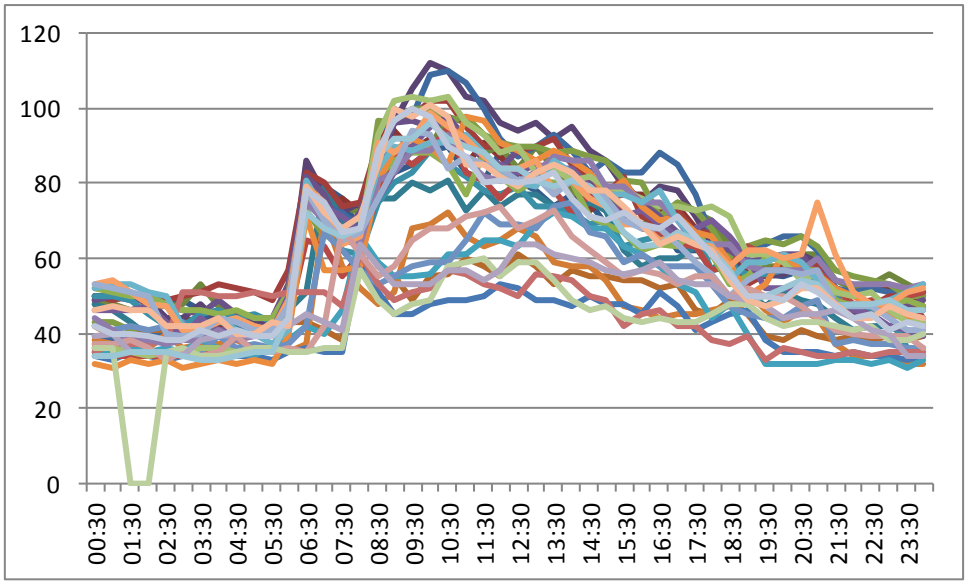
b. Charts showing half-hourly electricity demand for MPRN 10020199880 (LV supply)



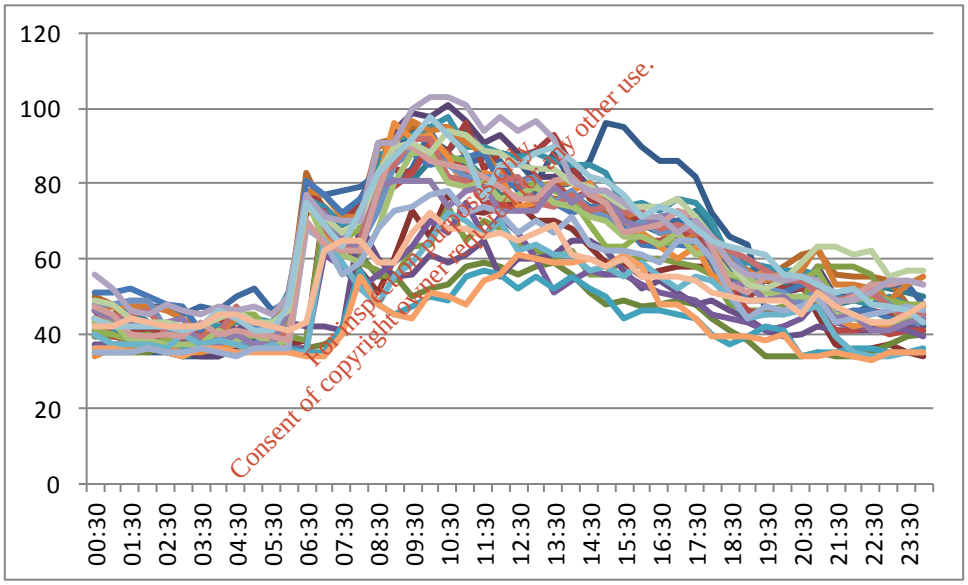
Daily graphs of electricity demand in kW during January 2016
(The reduction in load during January is the result of Building 1 being transferred to the MV supply)



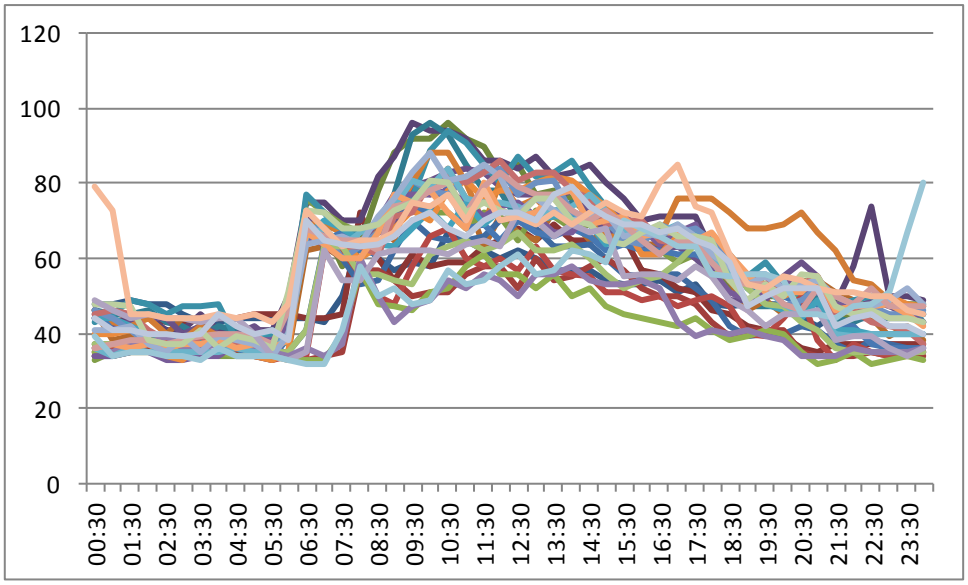
Daily graphs of electricity demand in kW during February 2016



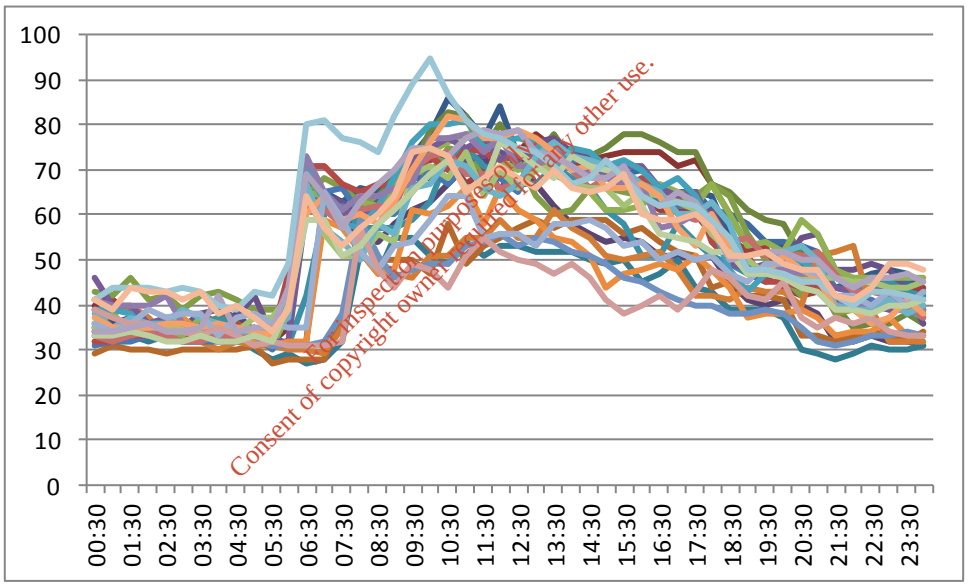
Daily graphs of electricity demand in kW during March 2016



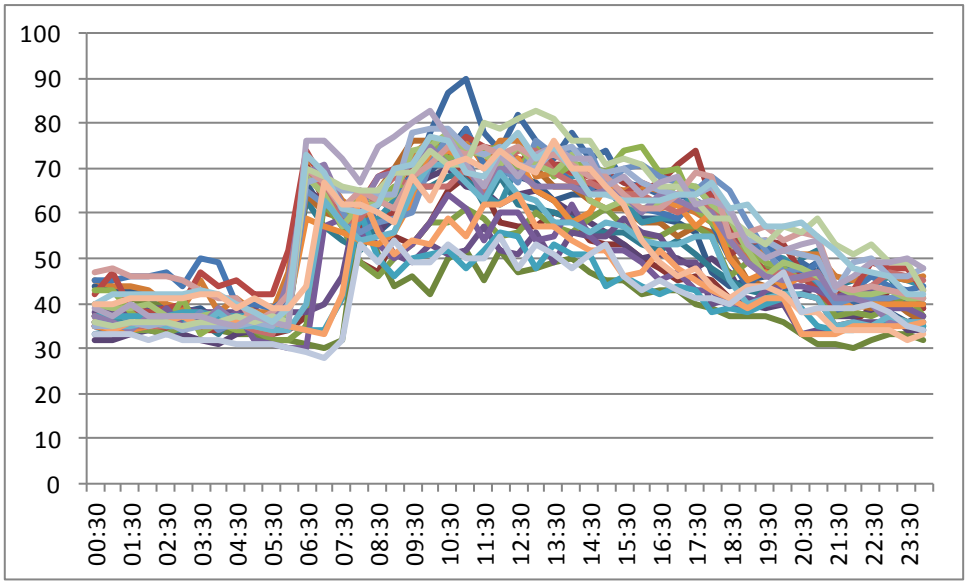
Daily graphs of electricity demand in kW during April 2016



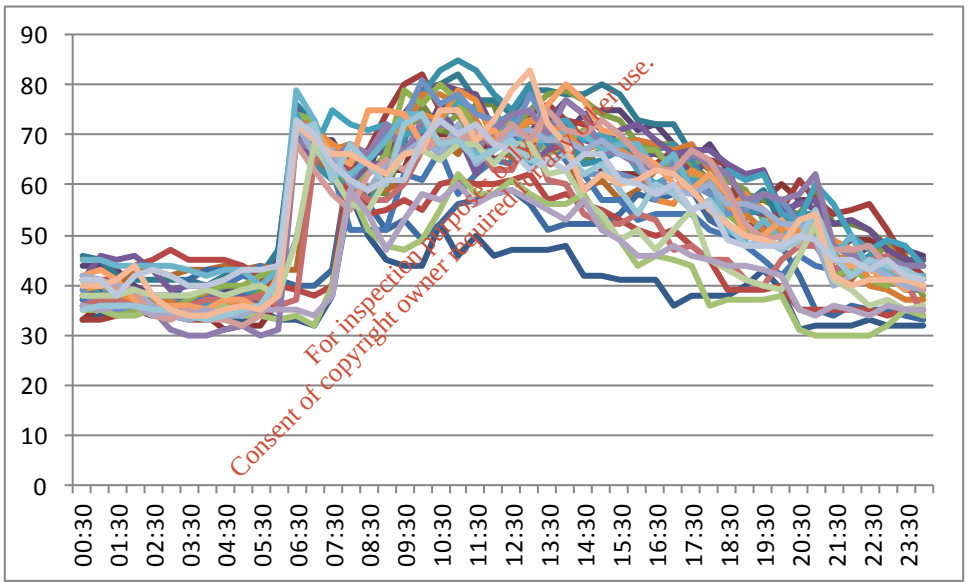
Daily graphs of electricity demand in kW during May 2016



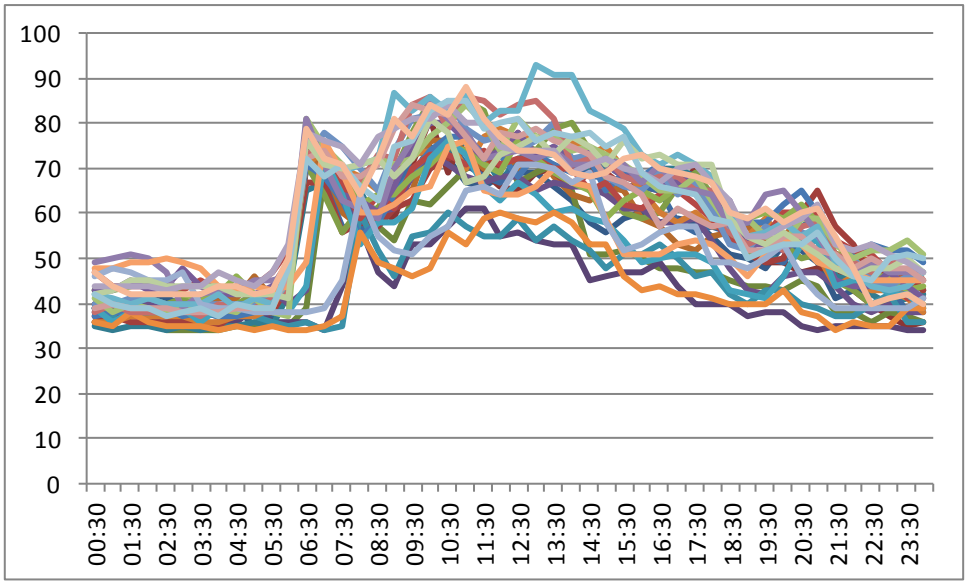
Daily graphs of electricity demand in kW during June 2016



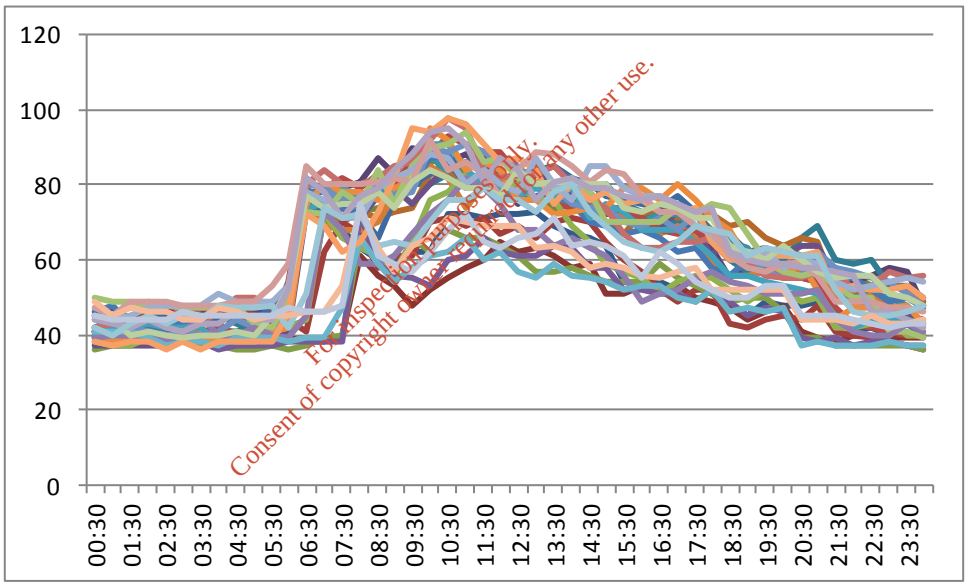
Daily graphs of electricity demand in kW during July 2016



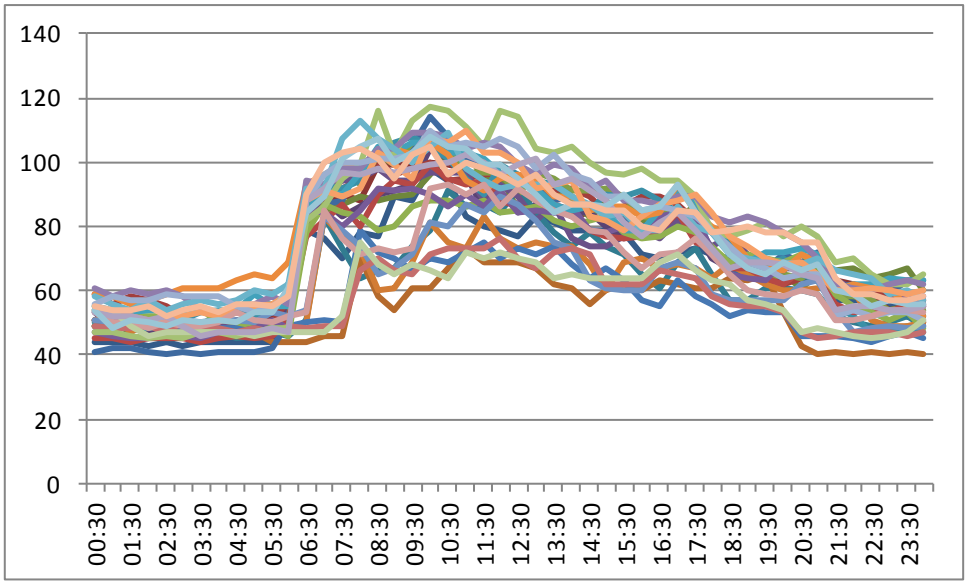
Daily graphs of electricity demand in kW during August 2016



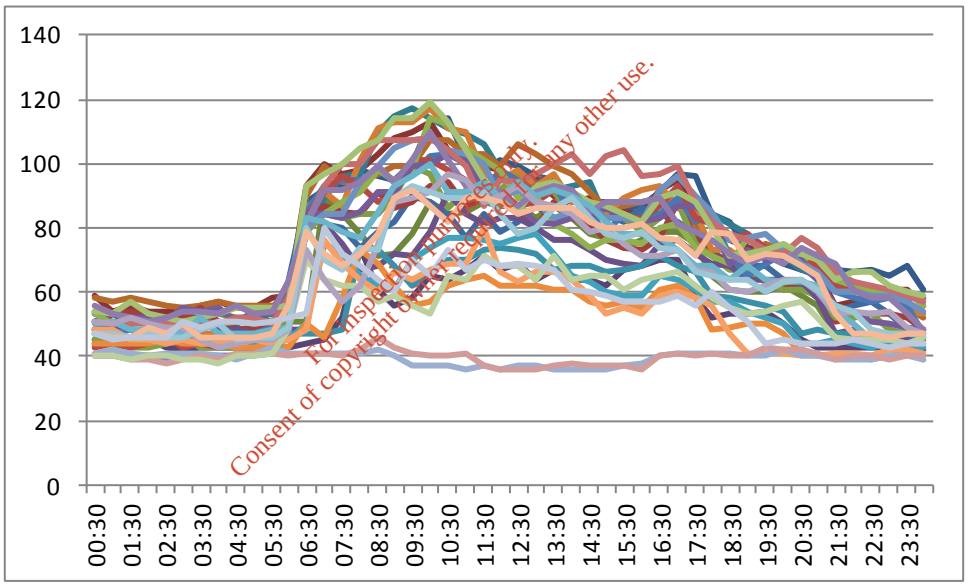
Daily graphs of electricity demand in kW during September 2016



Daily graphs of electricity demand in kW during October 2016



Daily graphs of electricity demand in kW during November 2016



Daily graphs of electricity demand in kW during December 2016

c. Tables showing monthly electricity consumption

Month	kWh
January	304,022
February	288,268
March	335,323
April	424,000
May	351,252
June	365,658
July	348,469
August	390,266
September	384,688
October	431,922
November	438,790
December	375,718
Year	4,438,375

Table 1 - Monthly electricity consumption during 2016 for MPRN 10305228890

Month	kWh
January	64,448
February	46,150
March	43,622
April	41,566
May	40,600
June	36,996
July	38,141
August	39,629
September	40,036
October	44,030
November	50,593
December	49,098
Year	534,907

Table 2 - Monthly electricity consumption during 2016 for MPRN 10020199880

Associated CO_2 emissions during 2016

There were no CO_2 emissions resulting from this consumption.

All electricity consumed during 2016 was purchased from Vayu and/or Panda Power. The CER Fuel Mix and CO_2 Emissions 2015 figure for Vayu (All Ireland) and Panda Power was 0 tCO_2/MWh

A total of 248,178 litres of Gas Oil was consumed on site during 2016

Associated CO_2 emissions = 665.91 tonnes

Based on SEAI conversion factor of 10.169 kWh per litre of Gasoil and Appendix IV to EPA Guidance Note Fuel to Carbon Conversion Factor for Gasoil of 263.87 g CO_2/kWh

7. Summary Report

Consumption of different energy streams at the site.

Table 1 - Site Energy Usage

			Period: 01/01/16 to 31/12/16
Energy Stream	**Annual Quantity**	**Units**	**Comments**
Electricity Consumed Onsite	4,973,282	kWh	Half-hourly data for audit period provided by MRSO
Electricity Imported	4,973,282	kWh	
Electricity Generated Onsite (CHP sites only)		kWh	
Electricity Exported Offsite (CHP sites only)		kWh	
Natural Gas Total		kWh (Gross CV)	
Natural Gas for CHP		kWh (Gross CV)	
Gasoil	248,168	litre	Delivery details for audit period provided by Operations Manager
LPG		litre	
Light Fuel Oil		litre	
Medium Fuel Oil		litre	
Heavy Fuel Oil		litre	
Other – please specify			

Signed;_____
Facilities Manager; Cathal Smith

Signed;_____
Operations Manager; Dermot O'Brien

Signed;_____
Environmental Manager; Darragh Mink

Signed;_____
Energy Efficiency Auditor; Tim Cooper, Conservation Engineering Consultant

Date; 5th May 2017

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Appendix A – Schedule of fixed electrical plant

This schedule lists the maximum load of each fixed electrical item of plant in operation during March 2017. It is recommended that further details are to be added as resources permit.

Shed 1					**Shed 2**					**Shed 3**		
Item	**Load (kW)**	**Hrs/Day**			**Item**	**Load (kW)**	**Hrs/Day**			**Item**	**Load (kW)**	**Hrs/Day**
M+J	132					5.5				M+J 6000	250	
M+J	132					7.5					250	
	7.5					11					7.5	
	4					5.5					3	
	5.5					4					4	
	4					9.2					3	
	9.2					2.2					3	
	9.2					3					11	
	3					11					30	
	3					5.5					7.5	
	9.2										4	
	7.5				Total	64.4					5.5	
	3										9.2	
	11										9.2	
	4										9.2	
	22										9.2	
	55										9.2	
	3										4	
	2.2										5.5	
	9.2										7.5	
	7.5										7.5	
	15										7.5	
	5.5										7.5	
	5.5										7.5	
	5.5										11	
Untha	315										11	
	5.5										7.5	
	4										7.5	
	5.5										7.5	
											30	
Total	804.5									Untha	315	
											7.5	
											7.5	
											5.5	
											4	
											4	
										Untha	315	
											7.5	
											7.5	
											5.5	
											4	
											4	
										Total	1433	

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Appendix B – Schedule of mobile plant

Diesel Plant		
Item		
Volvo 110F Loading Shovel		
Volvo 220 Loading Shovel		
Volvo 110G Loading Shovel		
Teleporter		
Hoist		
360 Track		