

Hemel Hempstead Fire Station: A case study on behaviour change, CO2 reduction and sustainability.



Hemel Hempstead fire station is probably a typical example of many public sector buildings of its time. It was built before environmental issues including climate change became so prominent and when energy was cheaper. It is a wholtime station with two fire appliances and the DEPU (decontamination and environmental protection unit) and has had varying levels of ambulance crews based there. There are also four full time HFRS day workers based there. In addition to this there are several rooms used by the community and this use has increased over the years. Two years ago the DVLA also started running a driving test centre on site two days a week.

The building still had metal single glazed windows, no insulation or poor insulation in limited areas, two ancient boilers and all lighting wasn't of the energy efficient type or linked to sensors.

This process and the creation of HFRS's carbon reduction group was as a result of the governments carbon reduction commitment (CRC). This scheme was created to encourage a reduction in CO₂ emissions by 25 % from a 2008/09 base by 2012/13."

When I started the process of trying to persuade colleagues to use resources at work in a smarter way my plan was relatively simple:

- Find out how much energy the station had used historically.

- Put together a presentation to persuade colleagues.
- Collect their ideas on how to improve things across HFRS.
- Prove how much energy we could save just with behaviour change.
- Create competition between watches at Hemel Hempstead.
- Persuade HFRS / HCC to reinvest some of the savings to drive more change.
- Reward staff at Hemel Hempstead for their efforts.

Of course the journey itself was not as simple as I had anticipated – the good news is that it worked really well.

In April 2011 I spoke to all four watches on site regarding cutting CO2 emissions associated with running the site. The main thrust of the presentation was that by reducing our impact we could:

- Help in the fight against human induced climate change.
- Save taxpayers money.
- Gain rewards for doing so.

Whilst I accepted that the above points were placed in order of priority, as far as I was concerned I also realised that others may put them in a different order or even argue that one could be deleted from the list. What I did point out was that as a warmer climate will impact all public sector organisations, especially those on the front line, and as such, climate change is definitely a fire service issue. If there were people who didn't care about any of those points they were probably in the wrong job.

The presentation at this stage was fairly rudimentary. It covered the following areas:

Why am I interested in this issue?

Background on me, volunteering with Greenpeace UK, interest in electric vehicles, my own journey to being an activist.

Why should you be interested in this issue?

Climate change effects on the fire service, future generations, and wildlife.

What has the service done / is it planning to do?

Planned improvements for fire stations by HFRS / HCC, this showed everyone was playing their part.

Panorama clips and questions.

Excerpts from a Panorama programme that showed that when you got climate change advocates and sceptics in a room they actually agreed on most of the science behind human induced climate change.

Other explanations for climate change.

A short tour of some of the “explanations” given for climate change that did not involve human activity and how they were incorrect according to mainstream science.

Getting a clear picture.

How some of the big emitters are spreading doubt to protect their business models.

Tipping points.

An explanation as to how tipping points, once breached, would leave us with no clear path back to normality (melting of the north pole, losing the Amazon to forest fires, thawing of the arctic tundra and resulting methane emissions).

Co2 emissions interactive exercise 1

The biggest emitters by amount of CO2.

Co2 emissions interactive exercise 2

The biggest emitters per head of population.

What can we expect to see as a result of climate change?

A degree by degree exploration of temperature rises and what the effects would be.

How would we keep track of improvements?

Here I explained the energy system we had at the time and how I would communicate results to the staff, via emailed reports and a CO2 board to display results.

Collecting staff ideas and feeding them back to the Carbon Reduction Group.

Collecting ideas from staff was a key part of the process. It made them feel more involved and it made total sense that staff from a wide range of backgrounds and previous careers would have some good ideas. One of the key pieces of information to come from this was that for the most part people were happy to take part but also wanted physical improvements to buildings to bolster their efforts.

Here is a summary of results from the first twelve months of the project:

	2010 – 2011, 12 MONTHS BEFORE PROCESS	2011 – 2012, 12 MONTHS OF PROCESS
APR	£709.32	£567.25
MAY	£713.22	£533.10
JUNE	£629.16	£528.56
JULY	£676.88	£526.37
AUG	£648.22	£511.27
SEPT	£648.03	£519.39
OCT	£731.73	£591.13
NOV	£755.87	£633.12
DEC	£860.66	£710.18
JAN	£853.88	£697.21
FEB	£728.30	£635.69
MAR	£745.02	£637.81
TOTAL ELECTRICITY USE in £'s.	£8700.29	£7091.81

The above figures related to electricity use only and showed an 18% saving. We also saved 14% on gas although in fairness weather could have also played a part which is why I decided to concentrate on electricity use. Remember also that this saving was achieved purely by staff actions and not introducing more efficient equipment.

2013:

By the end of 2013 physical improvements were starting to be implemented at the station. These included double glazing and some LED lighting. This was partly due to staff suggestions but also recognition by the service of the change in culture at the station. The service also purchased new sofas for the mess deck as a thank you to the staff for their efforts.

We also had a set of recycling bins supplied by the local council, there was no system for recycling at the station previously and as a result our waste was halved (it had all been disposed of in one bin before). This also produced a financial saving.

This news began to ripple out to other stations and led to more stations coming on board and I ran a training course for energy champions to enable them to take the model I had used and apply it to their own workplaces. The presentation I had developed was upgraded by training and development centre and had a professional voice over. We had at least one energy champion from each station in Hertfordshire, training centre and command and control. By the end of 2013 results had improved.

2014:

By 2014 I was publishing each watch's energy use for four full shifts each month and making it more of a competition. Green watch had used the least electricity most often in 2014 and a local franchise of Domino's pizza agreed to supply green watch free pizzas as a reward for this as they had a budget for corporate social responsibility. They were gratefully received! This also helped foster the competitive spirit towards reducing energy use. I also arranged for a certificate of commendation from Greenpeace UK for the station to recognise their efforts.

During 2014 a small domestic gas boiler was installed purely to cater for hot water at the station, previously the older boilers were not able to heat water without heating the station to some degree also, even in summer! Installing the small domestic boiler was a cheaper way of reducing waste and emissions than replacing the older boilers which could now be used just for heating. New heating controls were also added to the boilers at a cost of £300:00 which enabled further reductions in gas use.

The double glazing at the station was completed, and there was a recognition that all these improvements had made the station a more pleasant environment to work in as well as being more efficient.

By the end of 2014 we had saved 34.8% on gas use or £8125.46, for electricity the savings were 32.4% or £9077.79 giving a total figure since 2011 of £17203.25.

Please see appendix 1 for how 2014 shaped up.

2015:

In 2015 the lights in the appliance bay were connected to a PIR system so that they only came on when people were in the bays. The bays at Hemel Hempstead are a large area housing three appliances and a number of Ambulance vehicles.

The swap to LED lighting was completed in the rest of the station.

Red watch had a period of eleven consecutive months using the least electricity which I made sure was rewarded by another certificate from Greenpeace UK which was presented by the DCFO and the local paper did an article on it.

In 2015 I did a business case for the service to provide branded reusable water bottles on the basis that the bottled water we carried on the appliance was nine pence per bottle and reusable bottles could be sourced for ninety pence.

In other words a reusable bottle would pay for itself once people used it for a tenth time and monetary as well as single use plastics savings could be made. Bottled water was still carried on the pumps but were only to be used once your personal issue bottle was empty. We increased the amount of water available but as most incidents didn't require more than the contents of the personal issue bottle (one litre, the single use bottles were smaller) single use plastic bottle use dropped by around 40%.

ECO-FRIENDLY

Firefighters' 'green' success

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Firefighters have been praised by Greenpeace after slashing their CO2 emissions by 26 per cent by using less electricity.

Staff at Hemel Hempstead fire station have been at the forefront of an initial trial and are the first in Herts to reduce their heating and electricity output by a quarter, in line with the government's Carbon Reduction Commitment. Between 2011 and 2014, the station's eco-friendly efforts saved more than £17,000.

The initial savings were made by turning lights and appliances such as computers, dishwashers and drying cabinets off when not in use, making sure doors and windows were shut in cold weather and using less hot water.

Some of the cash saved was then put towards buying energy-saving equipment such as motion-activated LED lights and a new domestic boiler.

Deputy Chief Fire Officer Darryl Keen said: "The continued attention to carbon reduction will have a long term positive impact on Community Protection budgets and if this were to be replicated across all sites, its effect would be significant."

From August last year to June this year, Red Watch used the least electricity of all four watches, and now Greenpeace UK has awarded a certificate recognising this.

Watch commander Jim Attenborough said: "The two watch commanders, Andy Esson and later Steve Bradford, and the whole crew should be proud of their achievement and it should be an inspiration for the other crews at Hemel Hempstead as well as all staff in the fire service."



Hemel Hempstead Fire Station's Red Watch have been commended for using the least electricity of all four watches

The fact that staff were given a clear path as to what to do to reduce emissions, kept informed of what their efforts were achieving and having their efforts publicised and being rewarded for them was now really starting to pay off. The investment in the building was also having an affect too.

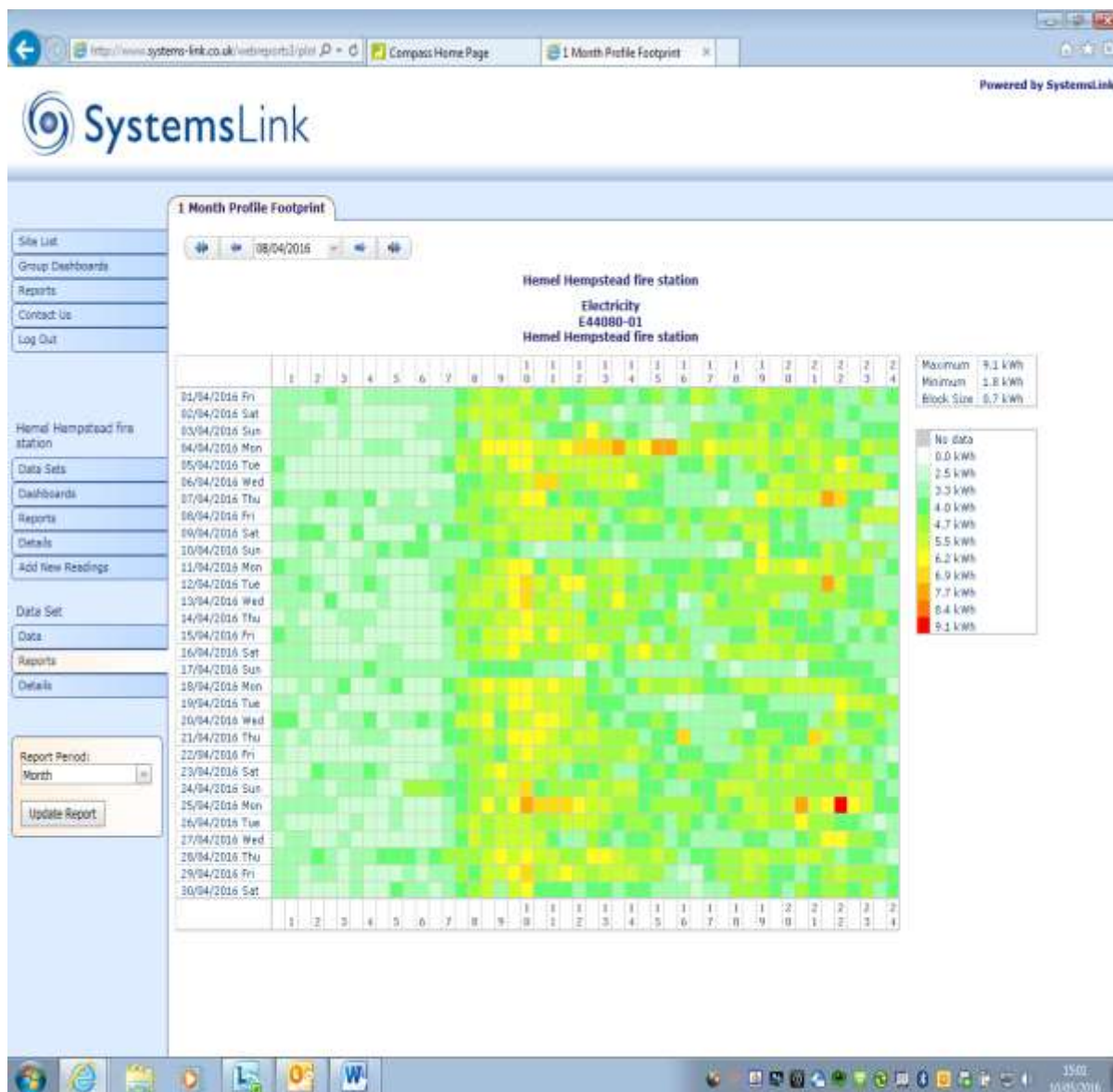
In 2015 Nando's provided a free evening meal to Red watch for using the least electricity most often that year.

By the end of 2015 we had reduced electricity use by 42% or £12480.72 and gas use by 42% or £12604.13 giving a total figure of £25,084.85.

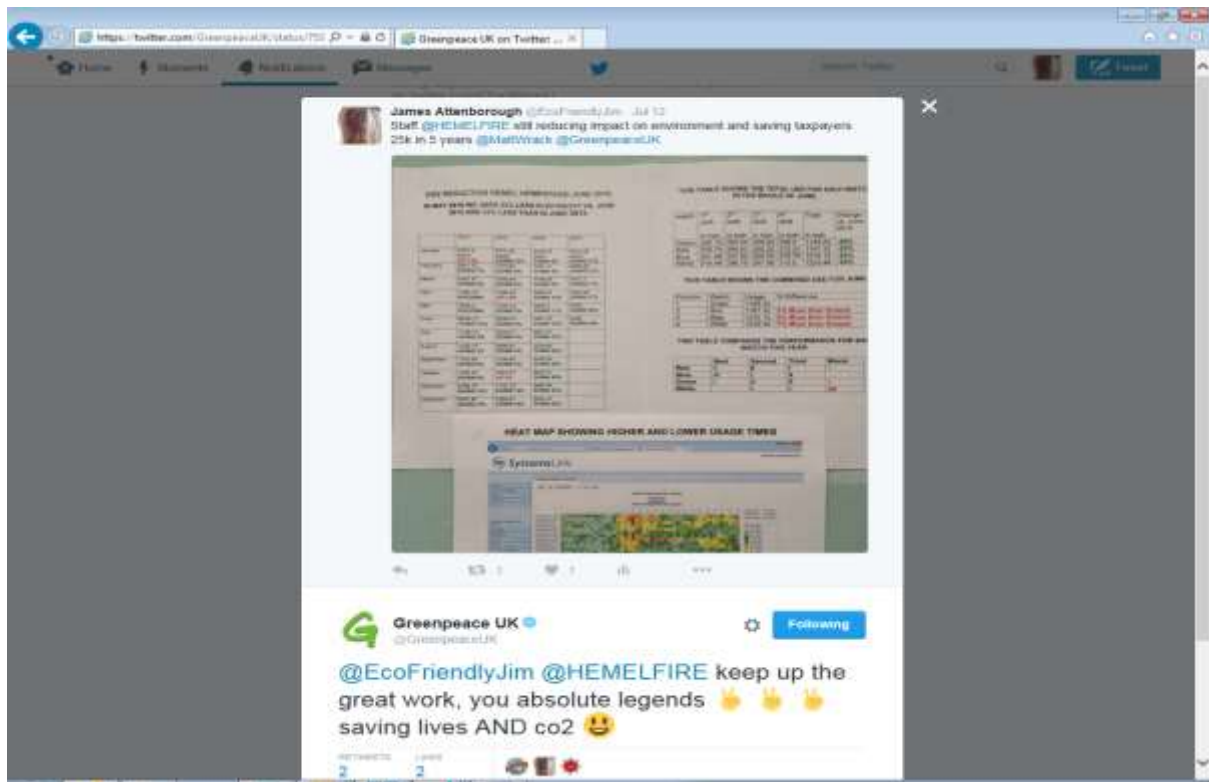
Please see appendix 2 for how 2015 finished up.

2016:

In 2016 we changed our energy monitoring system to Systems Link. A much more user friendly interface and we also worked out a way of splitting the energy use to match our shift system on wholtime stations. This made the job of working out what each watch had used a lot easier. It used to take two hours per month but with the easier system this was reduced to around twenty five minutes. Also it was now possible to produce a heat map showing high and low use times for each month:



There was also more publicity from Greenpeace UK on twitter:



By the end of 2016 gas use had reduced by 65% saving a total of £19,401 and electricity use had dropped by 54% saving a total of £17,334.70. The total saving versus the 2008/9 baseline was £36,735.70

Please see appendix 3 for the full report on 2016.

2017:

2017 saw a sustained increase in electricity use from June onwards. This was due partly to an increase in use of the fire stations community rooms and another team being based at the station, there may have also been an element of campaign fatigue and we worked hard to get things back on track in 2018.

In 2017 in collaboration with other fire services (London, Avon, Essex, Greater Manchester and Hertfordshire) the first national energy saving competition for fire stations was launched. It ran from December to March 2018, this helped to refocus efforts and Hemel Hempstead came a respectable ninth out of fifty four stations. A good result considering previous actions carried out by staff at Hemel Hempstead. The top three stations and the best placed from each service were recognised by WWF UK and Greenpeace UK for their hard work.

2017 also saw a category added to the annual H.E.A.R.T. awards for carbon reduction and sustainability which I had lobbied for.

Blue watch used the least electricity most often in 2017 and were rewarded with a white water rafting session at the Lee Valley Centre.



By the end of 2017 gas use had slipped back to a reduction of 42% saving a total of £23,820.17 since 2011 and electricity use had slipped back slightly to 51% saving a total of £21,363.18 since 2011. The total saving versus the 2008/9 baseline was £45,183.35.

Please see appendix 4 for the full 2017 report.

2018:

As a result from feedback from staff at Hemel Hempstead we changed the way the winners were calculated. Instead of simply adding the number of times each watch had used the least electricity we now award four points for using the least electricity, three for coming second, two for coming third and one for coming last. This change to a positive scoring method recognised that although a particular watch may have come last one month they were still making a positive contribution to the process. It also meant that consistently coming second gained more recognition and kept the competition alive for longer.

By May 2018 we were once again using less electricity compared to May 2017.

Please see appendix 5 for how the figures are reported in 2018.

Summary:

Presenting to the staff at Hemel Hempstead was at times challenging and there were some very involved discussions about the subject. Trying to persuade others that some of the choices we have all made are damaging to the environment and society can be a difficult sell. Nobody likes to think that choices they have made or activities they enjoy are perhaps regrettable when looked at from a different viewpoint.

The fact that we were able to get enough staff on board to make such a big difference has been worth all the work. I would say that I have gained much from this experience in terms of communication skills, presentation skills, having challenging conversations and to a certain extent conflict resolution. All these areas of development have, I feel, also made me a better fire safety inspector too.

There have been many benefits for the organisation, staff at Hemel Hempstead and myself. I am proud of what my colleagues and I have achieved, the improvement of our impact on the environment, the money we have saved and the positive image that has been portrayed of Hertfordshire Fire and Rescue Service. I have had support for this work from all levels of the organisation and have won over many people on the way.

I feel that involving staff in the process is key as well as explaining why you want people to change their behaviour, and at the end of the day showing people that there is something in it for them personally in terms of avoiding a runaway climate change scenario and rewards also smoothed my path.

For any further information please feel free to contact me:

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APPENDIX 1

CO2 REDUCTION DECEMBER 2014.

The table below shows electricity usage at Hemel Hempstead we can see that usage was **DOWN 14%** in December 2014 compared to December 2013 and **DOWN 26%** compared to December 2011.

	2011	2012	2013	2014
January	12197.97 (kwh)	9960.32 (kwh) DOWN 18%	9969.13 (kwh) UP 0.1%	8770.36 (kwh) DOWN 12%
February	10404.43	9081.45 DOWN 13%	8421.57 DOWN 7%	7775.63 DOWN 8%
March	10643.41	9111.23 DOWN 14%	8287.67 DOWN 9%	7808.08 DOWN 6%
April	8102.99 DOWN 20%	8096.28 DOWN 0.1%	7390.13 9%DOWN	7449.55 UP 0.8%
May	7615.53 DOWN 25%	8282.58 UP 9%	7599.6 9%DOWN	7344.19 DOWN 3%
June	7551.21 Down 16%	7974.6 UP 6%	6829.13 DOWN 14%	6540.23 DOWN 4%
July	7519.46 DOWN 22%	7358.75 DOWN 2.1%	7140.72 DOWN 3%	6956.41 DOWN 3%
August	7303.96 DOWN 21%	7225.93 DOWN 1.1%	7084.72 DOWN 2%	6888.81 DOWN 3%
September	7420.15 DOWN 20%	7781.07 UP 4.9%	7303.42 DOWN 6%	7036.92 DOWN 4%
October	8444.66 DOWN 16%	9133.12 UP 8.2%	8543.8 DOWN 6.5%	7943.33 DOWN 7%
November	9044.98 DOWN 16%	9767.9 UP 0.9%	8769.78 DOWN 10%	7730.78 DOWN 12%
December	10145.45 DOWN 17%	10330.36 UP 1.8%	8691.45 DOWN 16%	7488.63 DOWN 14%

THIS TABLE NOW SHOWS THE TOTAL USE FOR EACH WATCH IN THE WHOLE OF DECEMBER.

watch	1 st shift In kwh	2 nd shift In kwh	3 rd shift In kwh	4 th shift In kwh	Total In kwh	Cost per hour at work
Red	472.89	449.01	445.54	444.55	1811.99	66p
Green	482.34	467.68	510.6	463.72	1924.34	70p
White	520.37	544.55	436.73	498.09	1999.74	73p
Blue	507.84	501.3	469.53	467.78	1946.35	71p

Position	Watch	Usage	% Difference
1	Red		-
2	Green		6% More than Reds
3	Blue		7% More than Reds
4	White		10% More than Reds

This table shows how well each watch has performed in 2014.

	Best	Second	Third	Worst
Blue	III	III	III	IIII
Red	IIIIIIII	III	-	I
White	I	IIII	II	IIII
Green	I	II	IIIIIIII	I

Red watch have clearly been the stand out performers in 2014.

The following table shows our gas usage per year and our performance against the CRC target.

Year	Use	%Reduction vs. 2009	Saving in £
2009	554565.83		
2010	513953.85	7%	£812.20
2011	461800.82	17%	£1855.20
2012	507641.32	8%	£938.38
2013	459763.33	17%	£1895.88
2014	361458.66	34.8%	£3435.50
		Total =	£8125.46

The following table shows our electricity usage per year and our performance against the CRC target.

Year	Use in kwh	%reduction vs. 2009	£ saved vs. 2009
2009	132760.2		
2010	127760.49	4%	£350.15
2011	106393.69	20%	£1845.77
2012	104103.58	22%	£2006.12
2013	96031.3	27.7%	£2571.09
2014	89732.89	32.4%	£2654.81
		Total =	£9077.79

So since 2009 we have saved a total of **£17203.25** on gas and electricity and reduced our CO2 emissions from electricity use by 32.4% and from gas use by 34.8%.

In 2014 alone we saved £6090.31 compared to what we were spending in 2009.

The addition of a smaller domestic boiler to do the hot water for the station has really paid off on top of the measures we have all taken and the double glazing being completed. This has also helped us beat the Carbon Reduction Commitment target for gas albeit a year late (that has more to do with infrastructure than behaviour).

APPENDIX 2

CO2 REDUCTION DECEMBER 2015.

IN DECEMBER 2015 WE USED **20%** LESS ELECTRICITY VS. DECEMBER 2014 AND **31.5%** LESS THAN IN DECEMBER 2013.

	2012	2013	2014	2015
January	9960.32 (kwh) DOWN 18%	9767.9 (kwh) UP 0.9%	8770.36 (kwh) DOWN 12%	8318.79 (kwh) DOWN 5%
February	9081.45 DOWN 13%	8421.57 DOWN 7%	7775.63 DOWN 8%	7441.11 DOWN 4%
March	9111.23 DOWN 14%	8287.67 DOWN 9%	7808.08 DOWN 6%	7578.66 DOWN 3%
April	8096.28 DOWN 0.1%	7390.13 9%DOWN	7449.55 UP 0.8%	6440.41 DOWN 14%
May	8282.58 UP 9%	7599.6 9%DOWN	7344.19 DOWN 3%	6558.3 DOWN 11%
June	7974.6 UP 6%	6829.13 DOWN 14%	6540.23 DOWN 4%	5951.02 DOWN 10%
July	7358.75 DOWN 2.1%	7140.72 DOWN 3%	6956.41 DOWN 3%	6061.21 DOWN 13%
August	7225.93 DOWN 1.1%	7084.72 DOWN 2%	6888.81 DOWN 3%	5219.42 DOWN 24%
September	7781.07 UP 4.9%	7303.42 DOWN 6%	7036.92 DOWN 4%	5283.53 DOWN 25%
October	9133.12 UP 8.2%	7303.42 DOWN 6%	7943.33 UP 9%	5632.51 DOWN 29%
November	9767.9 UP 0.9%	8769.78 DOWN 10%	7730.78 DOWN 12%	5945.24 DOWN 23%
December	9767.9 UP 0.9%	8691.45 DOWN 16%	7488.63 DOWN 14%	5954.37 DOWN 20%

THIS TABLE SHOWS THE TOTAL USE FOR EACH WATCH IN THE WHOLE OF DECEMBER.

watch	1 st shift	2 nd shift	3 rd shift	4 th shift	Total	Change vs. last month
	In kwh	In kwh	In kwh	In kwh	In kwh	
Blue	372.63	389.86	350.74	357.18	1470.41	-9.1%
Red	419.9	385.63	378.19	350.74	1534.43	+1.6%
Green	394.97	411.58	382.21	354.81	1543.57	-3.2%
White	402.16	407.39	400.4	378.41	1588.36	-0.4%

This table shows the combined use for December.

Position	Watch	Usage	% Difference
1	Blue	1470.41	-
2	Red	1534.43	4.2% More than Blues
3	Green	1543.57	4.8% More than Blues
4	White	1588.36	7.5% More than Blues

This table compares each watch so far this year.

	Best	Second	Third	Worst
Red				
Blue				
Green				
White				

The following table shows our gas usage per year and our performance against the CRC target.

Year	Use	%Reduction vs. 2009	Saving in £ vs 2009
2009	554565.83		
2010	513953.85	7%	£812.20
2011	461800.82	17%	£1855.20
2012	507641.32	8%	£938.38
2013	459763.33	17%	£1895.88
2014	361458.66	34.8%	£3435.50
2015	322952.84	42%	£4479.17
		Total =	£12604.13

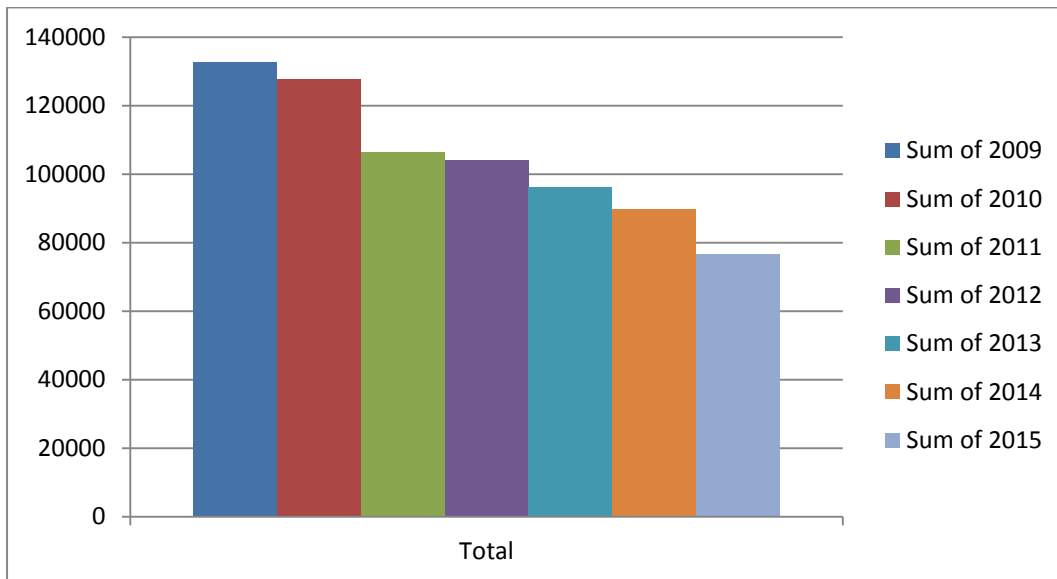
The following table shows our electricity usage per year and our performance against the CRC target.

Year	Use in kwh	%reduction vs. 2009	£ saved vs. 2009
2009	132760.2		
2010	127760.49	4%	£350.15
2011	106393.69	20%	£1845.77
2012	104103.58	22%	£2006.12
2013	96031.3	27.7%	£2571.09
2014	89732.89	32.4%	£2654.81
2015	76573.04	42%	£3753.78
		Total =	£12480.72

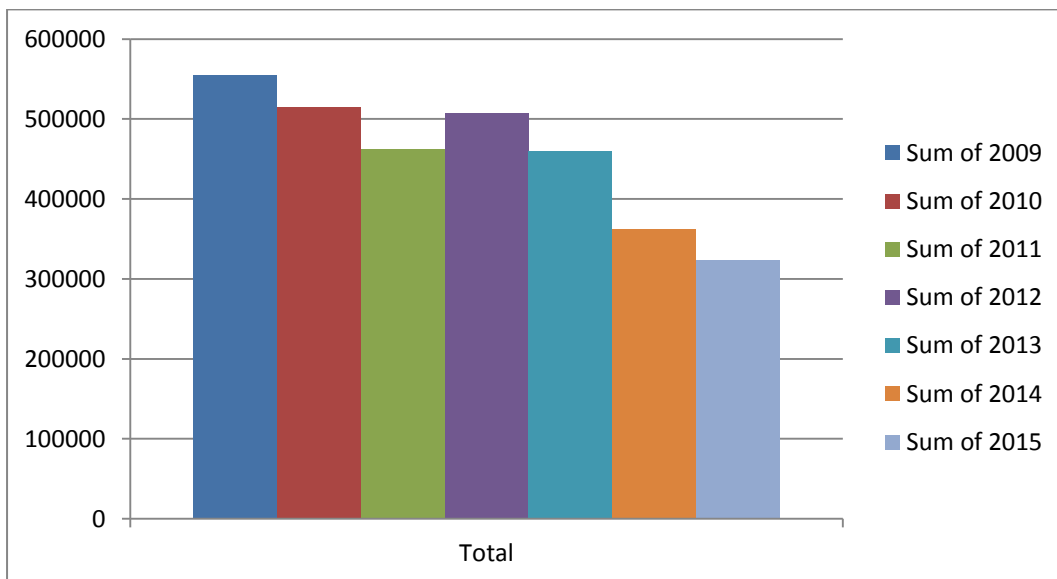
This means that from 2011 onwards (when we started this process) we have saved a total of £25,084.85.

Some of those savings are down to the improvements on site (LED lights, new heating settings and the new boiler) but the rest will be down to remembering to switch off items and closing doors and windows.

Electricity use 2009 -2015 in kilo watt hours



Gas use 2009-2015 in kilo watt hours



APPENDIX 3

CO2 REDUCTION DECEMBER 2016.

IN DECEMBER 2016 WE USED 5% LESS ELECTRICITY VS. DECEMBER 2015 AND 35% LESS THAN IN DECEMBER 2013.

	2013	2014	2015	2016
January	9767.9 (kwh) UP 0.9%	8770.36 (kwh) DOWN 12%	8318.79 (kwh) DOWN 5%	6612.65 (kwh) DOWN 21%
February	8421.57 DOWN 7%	7775.63 DOWN 8%	7441.11 DOWN 4%	5866.98 DOWN 21%
March	8287.67 DOWN 9%	7808.08 DOWN 6%	7578.66 DOWN 3%	5972.1 DOWN 21%
April	7390.13 9%DOWN	7449.55 UP 0.8%	6440.41 DOWN 14%	5352.68 DOWN 17%
May	7599.6 9%DOWN	7344.19 DOWN 3%	6558.3 DOWN 11%	4839 DOWN 26%
June	6829.13 DOWN 14%	6540.23 DOWN 4%	5951.02 DOWN 10%	4506 DOWN 24%
July	7140.72 DOWN 3%	6956.41 DOWN 3%	6061.21 DOWN 13%	4478 DOWN 22%
August	7084.72 DOWN 2%	6888.81 DOWN 3%	5219.42 DOWN 24%	7439 UP 43%
September	7303.42 DOWN 6%	7036.92 DOWN 4%	5283.53 DOWN 25%	4626 DOWN 13%
October	7303.42 DOWN 6%	7943.33 UP 9%	5632.51 DOWN 29%	5342 DOWN 5%
November	8769.78 DOWN 10%	7730.78 DOWN 12%	5945.24 DOWN 23%	5377 DOWN 10%
December	8691.45 DOWN 16%	7488.63 DOWN 14%	5954.37 DOWN 20%	5669 DOWN 5%

THIS TABLE SHOWS THE TOTAL USE FOR EACH WATCH IN THE WHOLE OF DECEMBER.

watch	1 st shift In kwh	2 nd shift In kwh	3 rd shift In kwh	4 th shift In kwh	Total In kwh	Change vs. last Decemb er.
Blue	365.42	355.8	364.65	377.95	1413.82	- 4%
White	398.05	374.26	330.17	355.63	1458.11	- 8%
Green	354.29	373.02	363.58	377.06	1467.95	- 5%
Red	370.61	346.79	353.05	403.09	1473.54	- 4%

This table shows the combined use for December.

Position	Watch	Usage	% Difference
1	Blue	1413.82	-
2	White	1458.11	3.1% More than Blues
3	Green	1467.95	3.8% More than Blues
4	Red	1473.54	4.2% More than Blues

This table compares each watch so far this year.

	Best	Second	Third	Fourth
Blue		I	III	II
Red		III	III	II
Green	II			I
White			I	

August and July added (no watch based figures were available until now).

Congratulations to Blue watch – they used the least electricity more often each month in 2016!

The following table shows our gas usage per year and our performance against the CRC target.

Year	Use	%Reduction vs. 2009	Saving in £ vs 2009
2009	554565.83		
2010	513953.85	7%	£812.20
2011	461800.82	17%	£1855.20
2012	507641.32	8%	£938.38
2013	459763.33	17%	£1895.88
2014	361458.66	34.8%	£3435.50
2015	322952.84	42%	£4479.17
2016	193811.48	65%	£6932.05
		Total =	£19,401

The following table shows our electricity usage per year and our performance against the CRC target.

Year	Use in kwh	%reduction vs. 2009	£ saved vs. 2009
2009	132760.2		
2010	127760.49	4%	£350.15
2011	106393.69	20%	£1845.77
2012	104103.58	22%	£2006.12
2013	96031.3	27.7%	£2571.09
2014	89732.89	32.4%	£2654.81
2015	76573.04	42%	£3753.78
2016	60980.41	54%	£4152.98
		Total =	£17,334.70

This means that from 2011 onwards (when we started this process) we have saved a total of £36,744.70 and reduced CO₂ emissions from electricity by 54% and from gas by 65%.

APPENDIX 4

CO2 REDUCTION DECEMBER 2017.

IN DECEMBER 2017 WE USED **9%** MORE ELECTRICITY VS. DECEMBER 2016 AND **17%** LESS THAN IN DECEMBER 2014.

	2014	2015	2016	2017
January	8770.36 (kwh) DOWN 12%	8318.79 (kwh) DOWN 5%	6612.65 (kwh) DOWN 21%	6186 (kwh) DOWN 6%
February	7775.63 DOWN 8%	7441.11 DOWN 4%	5866.98 DOWN 21%	5167 DOWN 12%
March	7808.08 DOWN 6%	7578.66 DOWN 3%	5972.1 DOWN 21%	5337 DOWN 11%
April	7449.55 UP 0.8%	6440.41 DOWN 14%	5352.68 DOWN 17%	4873 DOWN 9%
May	7344.19 DOWN 3%	6558.3 DOWN 11%	4839 DOWN 26%	4947 UP 0.25%
June	6540.23 DOWN 4%	5951.02 DOWN 10%	4506 DOWN 24%	4891 UP 8.5%
July	6956.41 DOWN 3%	6061.21 DOWN 13%	4478 DOWN 22%	4831 UP 7.8%
August	6888.81 DOWN 3%	5219.42 DOWN 24%	4425 DOWN 15%	5050 UP 14%
September	7036.92 DOWN 4%	5283.53 DOWN 25%	4626 DOWN 13%	5337 Up 15%
October	7943.33 UP 9%	5632.51 DOWN 29%	5342 DOWN 5%	5936 UP 11%
November	7730.78 DOWN 12%	5945.24 DOWN 23%	5377 DOWN 10%	5809 UP 8%
December	7488.63 DOWN 14%	5954.37 DOWN 20%	5669 DOWN 5%	6194 Up 9%

THIS TABLE SHOWS THE TOTAL USE FOR EACH WATCH IN THE WHOLE OF DECEMBER.

watch	1 st shift	2 nd shift	3 rd shift	4 th shift	Total
	In kwh	In kwh	In kwh	In kwh	In kwh
Green	330.84	440.32	404.45	345.82	1521.43
Red	425.69	432.99	377.54	333.18	1569.4
Blue	361.71	431.55	403.33	391.19	1587.78
White	330.33	425.54	381.46	422.25	1609.58

THIS TABLE SHOWS THE COMBINED USE FOR DECEMBER.

Position	Watch	Usage	% Difference
1	Green	1521.43	-
2	Red	1569.4	3% More than Greens
3	Blue	1587.78	4% More than Greens
4	White	1609.58	6% More than Greens

THIS TABLE SHOWS EACH WATCHES PERFORMANCE THIS YEAR.

	Best	Second	Third	Fourth
Red				
Blue		I		
Green				I
White	I			

CONGRATULATIONS TO RED WATCH WHO HAVE EDGED AHEAD OF BLUES BY FINISHING SECOND MORE OFTEN, LETS SEE IF WE CAN REDUCE USE FURTHER IN 2018. PRIZE TO BE CONFIRMED.

The following table shows our gas usage per year.

Year	Use	%Reduction vs. 2009	Saving in £ vs 2009
2009	554565.83		
2010	513953.85	7%	£812.20
2011	461800.82	17%	£1855.20
2012	507641.32	8%	£938.38
2013	459763.33	17%	£1895.88
2014	361458.66	34.8%	£3435.50
2015	322952.84	42%	£4479.17
2016	193811.48	65%	£6932.05
2017	319514.	42%	£4419.17
		Total =	£23820.17

The following table shows our electricity usage per year.

Year	Use in kwh	%reduction vs. 2009	£ saved vs. 2009
2009	132760.2		
2010	127760.49	4%	£350.15
2011	106393.69	20%	£1845.77
2012	104103.58	22%	£2006.12
2013	96031.3	27.7%	£2571.09
2014	89732.89	32.4%	£2654.81
2015	76573.04	42%	£3753.78
2016	60980.41	54%	£4152.98
2017	64563.	51%	£4028.48
		Total =	21363.18

This means that from 2011 onwards (when we started this process) we have saved a total of £45,183.35 and reduced CO2 emissions from electricity by 51% and from gas by 42%. The additions of LED lights, double glazing new boiler controls and a new hot water boiler have aided us.

APPENDIX 5

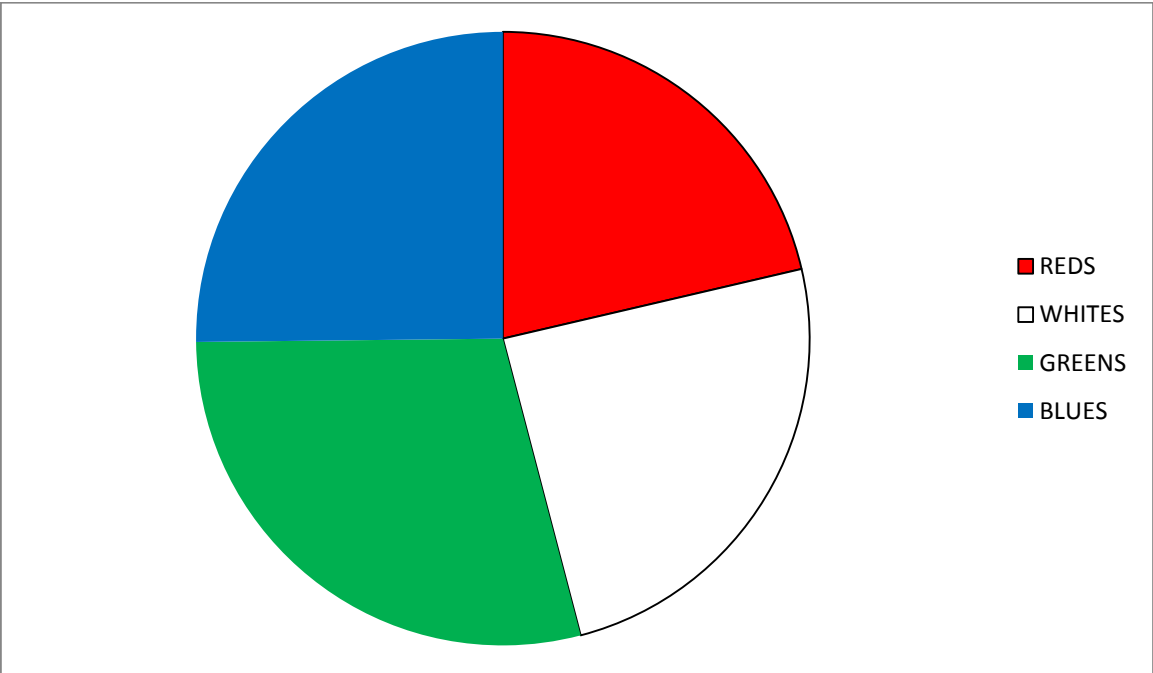
CO2 REDUCTION MAY / JUNE 2018.

IN MAY / JUNE 2018 WE USED 8% AND 13% LESS ELECTRICITY VS. MAY / JUNE 2017 AND 30% AND 29% LESS THAN IN MAY / JUNE 2015.

	2015	2016	2017	2018
January	8318.79 (kwh) DOWN 5%	6612.65 (kwh) DOWN 21%	6186 (kwh) DOWN 6%	6399 (kwh) UP 3.4%
February	7441.11 DOWN 4%	5866.98 DOWN 21%	5167 DOWN 12%	5260 UP 1.8%
March	7578.66 DOWN 3%	5972.1 DOWN 21%	5337 DOWN 11%	5529 UP 3.6%
April	6440.41 DOWN 14%	5352.68 DOWN 17%	4873 DOWN 9%	5121 UP 5%
May	6558.3 DOWN 11%	4839 DOWN 26%	4947 UP 0.25%	4577 DOWN 8%
June	5951.02 DOWN 10%	4506 DOWN 24%	4891 UP 8.5%	4234 DOWN 13%
July	6061.21 DOWN 13%	4478 DOWN 22%	4831 UP 7.8%	
August	5219.42 DOWN 24%	4425 DOWN 15%	5050 UP 14%	
September	5283.53 DOWN 25%	4626 DOWN 13%	5337 Up 15%	
October	5632.51 DOWN 29%	5342 DOWN 5%	5936 UP 11%	
November	5945.24 DOWN 23%	5377 DOWN 10%	5809 UP 8%	
December	5954.37 DOWN 20%	5669 DOWN 5%	6194 Up 9%	

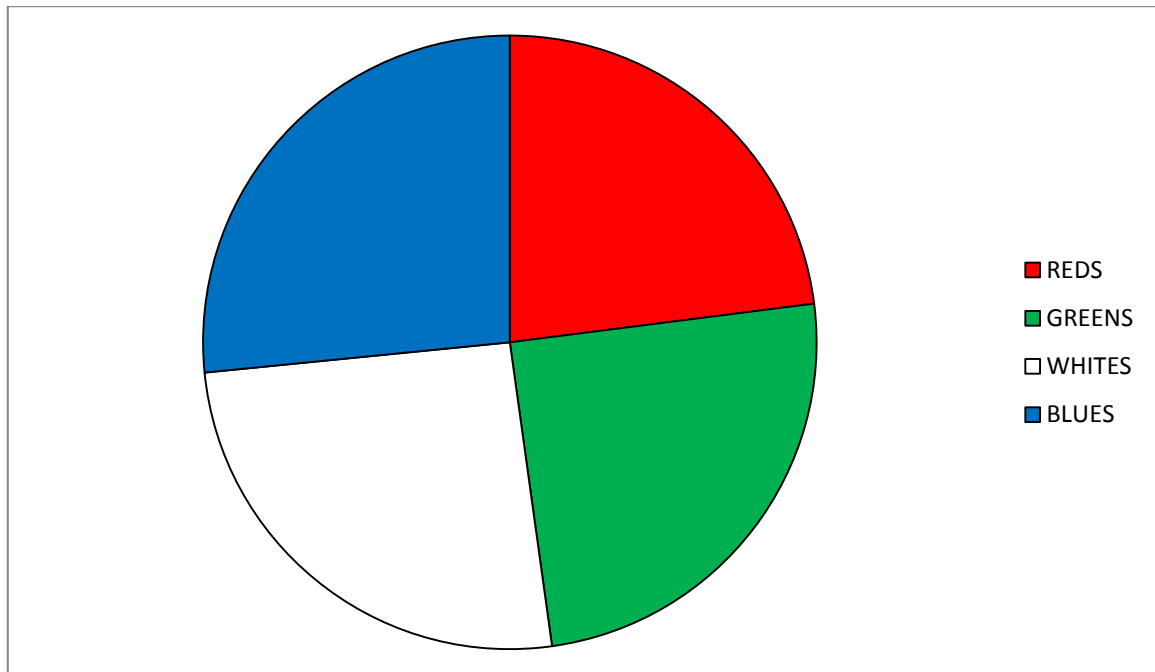
**THIS TABLE SHOWS THE TOTAL USE FOR EACH WATCH
IN THE WHOLE OF MAY:**

watch	rank	Total Electricity use In kwh	% difference
Red	1	953.45	-
White	2	1096.73	+ 15%
Blue	3	1123.99	+ 18%
Green	4	1290.88	+ 35%



**THIS TABLE SHOWS THE TOTAL USE FOR EACH WATCH
IN THE WHOLE OF JUNE:**

watch	rank	Total Electricity use In kwh	% difference
Red	1	1022.8	-
Green	2	1104.13	+ 8%
White	3	1140.07	+ 11%
Blue	4	1182.44	+ 16%



THIS TABLE SHOWS THE PERFORMANCE BY EACH WATCH THIS YEAR:

	Points	Best	Second	Third	Fourth
Red	18*				
Green	16*				
Blue	14*				
White	12*				

*4 POINTS FOR A WIN, 3 FOR 2ND, 2 FOR 3RD, 1 FOR COMING LAST.