

Energy Sparks for... School management

Energy Sparks is an online energy analysis tool and energy education programme specifically designed to help primary and secondary schools reduce their electricity and gas usage through the analysis of smart meter data. Energy Sparks helps schools reduce their carbon emissions, and make a real contribution to addressing the 'climate emergency'.



Energy Sparks has been developed by Transition Bath, a registered charity in England and Wales, whose aim is to build a sustainable future. Energy Sparks is currently provided free to schools through funding by the Department of Business, Energy and Industrial Strategy.



Freshford Church School used energy information provided by Energy Sparks to **reduce annual electricity costs by £740.**

Whiteways Primary School used energy information provided by Energy Sparks to **save 35% in annual gas use.**

Stanton Drew Primary School used Energy Sparks to **reduce storage heater costs by 28%.**

"I initially got involved with Energy Sparks as I thought it would inspire the children to be more eco-aware. Little did I realise back then how much we would be saving now! ...We should be able to save £800 annually so that's over £15 extra per child per year - all thanks to Energy Sparks."

Andrew Marriott
Deputy Head

Federation of Bishop Sutton and Stanton Drew Primary Schools, Bath and NE Somerset



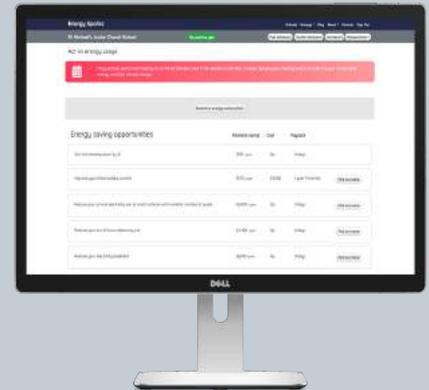
Automatic charting and analysis

Energy Sparks analysis focuses on low cost measures which can help schools save energy and fight climate change. On average 50% of gas and electricity is consumed at schools when they are closed and the buildings are unoccupied. Energy Sparks highlights opportunities for energy saving at at your own school through:

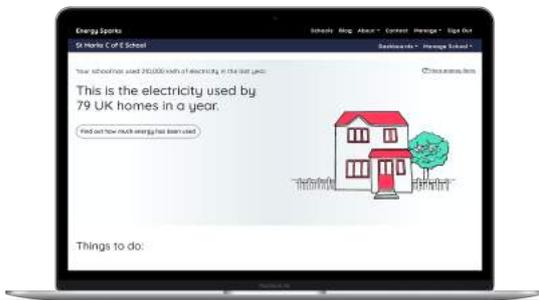
- Reducing out of hours use
- Improving control of school boilers
- Advice on purchasing of new energy efficient equipment
- Benchmarking versus other schools

Notification of changes in energy consumption

Energy Sparks provides online, email and text notification of changes in energy consumption with recommended energy saving actions tailored just for your school. Suggested energy saving interventions and capital investments are prioritised for each school to maximise cost and energy savings.



Energy Education Support



Energy Sparks aims to provide school pupils with life skills in understanding energy, learning about the problems of energy generation and climate change, as well as empowering them to support their own school to save energy.

Energy Sparks has over 60 energy related activities which pupils can participate in through eco-teams or class based learning. The activities include downloadable lesson plans for teachers and worksheets for pupils. Schools gain points for completing activities and these contribute to a scoreboard where pupils can compete with other schools providing extra motivation.

If you have any questions about Energy Sparks then please email us at hello@energysparks.uk
You can also contact us via social media:  @energysparks  @EnergySparksUK

Energy Sparks for... Teachers

Energy Sparks provides extensive support to teachers and eco-teams in learning about energy and climate change within the context of your own school.

- ✓ Eco-team and curriculum linked energy saving activities.
- ✓ Energy related lesson plans and downloadable resources.
- ✓ Support for pupils in designing and carrying out experiments to monitor energy related data and behaviour patterns at school.



"The Energy Sparks website is very easy to use, and the children have found it interesting to measure how energy is used differently in different parts of the school... The children are motivated by the competitive element as well as the desire to save money and energy..."

Warrick Barton

Headteacher

Pensford Primary Schools, Bath and NE Somerset

Built-in activities

Energy Sparks has an extensive list of built-in energy related activities and lesson plans from which you can choose. These are categorised by:

- **Education** level (Key stages)
- **Subject** (English, Maths, Science, Design & Technology, etc.)
- **Topic** (Climate change, Earth and atmosphere, Energy, etc.)
- **Timescale**

The majority of the activities and lesson plans are within the context of your school and make use of the extensive charting and analysis of your school's smart meter data provided on the website.

Completed activities or lessons can be recorded on the website for which your school will gain points. These points contribute to a scoreboard where you can compare your progress against other schools locally and nationally.



Teacher's dashboards

The starting point for teachers using Energy Sparks is your 'Teacher's Dashboard' which is specific to your school.



This provides a focal point for your energy related teaching, including:

- **Charts:** showing your school's recent gas and electricity use.
- **Alerts:** highlighting recent significant changes in your energy use, and hints and tips on how to reduce your energy consumption.
- **Suggested lessons and activities:** to make choosing a lesson plan or eco-team project easy, the dashboard provides a list of suggested activities. These are contextual to the time of year or a recent change that Energy Sparks has noticed in your energy usage.
- A **timeline** of completed activities and actions.

"The website is a great resource for adults and children with activities and data which allow children to apply their mathematical and scientific skills and knowledge.

I would highly recommend to any other school."

Jennie Nixon
Head of School
Whiteways Primary School, Sheffield

Pupil's dashboard

Energy Sparks has a separate dashboard designed for school pupils, which presents energy information in a more pupil friendly manner.

The content is focused on encouraging pupils to actively engage in promoting energy saving in the school and take part in energy saving activities. The dashboard aims to provide them with a greater understanding of energy and climate change.

Energy facts are introduced to help pupils understand the energy, monetary or climate impact of energy use within their school.

Support for pupils is provided in designing and carrying out experiments to monitor energy related data and behaviour patterns at school.



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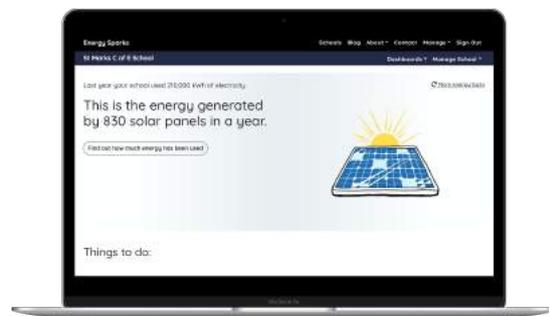
Stanton Drew Primary School used Energy Sparks to **reduce storage heater costs by 28%.**

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Energy Sparks for... Pupils

Caring for the environment

We all know that it's important to save energy. Every time we perform the simplest task that uses energy - from switching on a light to turning on the TV - the natural resource used to create that energy is depleted. And once it's gone, it's gone. Fossil fuels such as coal, oil and gas, which we still depend on to provide much of the world's energy, are a finite resource and will run out sooner than many of us realise.



At the same time as stripping the planet of its natural resources, our energy consumption is also affecting our climate. Each time a fossil fuel is burned, carbon dioxide is released into the atmosphere, changing the Earth's natural climate and weather systems. The consequences include flooding, diminishing ice caps, droughts and extreme weather conditions.

Saving Money

Energy isn't free. Your school, parents and carers need to pay for all the electricity and gas you use. So wasting energy is the same as wasting money - and we know that's not a good idea!

It might seem like children and young people can't do much to help. But every time you turn off a light bulb or close the door to keep the heat in, you're saving energy. You can also help by reminding adults to turn the heat down in the winter, buy energy-smart light bulbs and use appliances the right way. There are lots of easy ways to save energy at school and home - and all those energy-savers add up to a big impact on the environment.



"Energy Sparks is amazing. It is great to find out how much electricity and gas our school uses and how much we can save. It has made me more confident at understanding graphs. The activities encourage us to work as a team, and have more of an impact."

KS2 pupils

Freshford Church School, Bath and NE Somerset



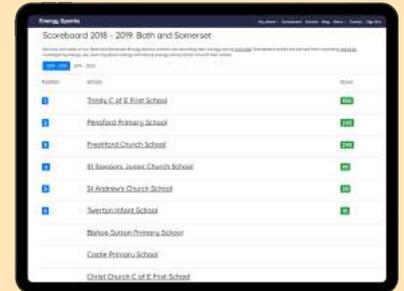
How Energy Sparks can help



Energy Sparks will show you how much energy your school is using each day. You can use this information to help your school to save energy, and help protect the environment. Energy Sparks will show you how much electricity your school uses for lights, computers and whiteboards, and in the school kitchens. It will also show you how much gas your school uses for heating classrooms, for cooking and for heating hot water.

Score points

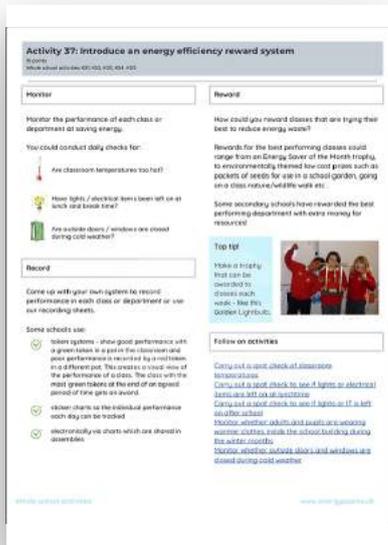
For each activity you carry out and record on Energy Sparks, you will get points. You will be able to compete against other local schools to see who can earn the most points, win prizes and save the most energy.



Energy saving activities

Energy Sparks will also give you lots of activities you could try at your school to save energy. For example you could:

- Carry out a spot check to see if lights or IT equipment are left on at lunch time.
 - Measure classroom temperatures to see if your school is too warm
 - Monitor whether outside doors and windows are closed during cold weather to keep the heat in
 - Design posters and signs to spread the energy-saving message
 - Make a video about saving energy
 - Organise a switch-off campaign at school
- And lots more!



You can use the Energy Sparks graphs to see how much difference your changes have made to your school's energy use, and even use your maths skills to find out how much money your school has saved.



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Pupils at Freshford Church School used the Energy Sparks energy management tool to identify energy wastage of £740 per year

Energy Sparks helped this school to identify an inefficient freezer and inspired school management to purchase a more efficient replacement freezer (at a cost of £300). The electricity savings will pay for the investment within 4 months. Over the 10-year life of the freezer this could save the school around £7,400+ – enough to buy 1,500 library books!

What is Energy Sparks? Turning energy data into energy savings through a UK Government supported innovation to help schools save energy and costs*.

- Energy Sparks is an **interactive online platform with a pupil and teacher homepage**. It provides tools for analysing your school's energy consumption and activities based on your school's data. The information can **highlight potential to achieve energy savings**.
- Energy Sparks also has an **online alert system**, with optional email or text options to notify you of changes in electricity and gas consumption if the heating or hot water is accidentally left on at weekends or during holidays, or if the boiler starts coming on too early. It also sends texts and emails to remind you to turn appliances and heating off for upcoming holidays.
- An important part of Energy Sparks is **pupil education**; pupils can act as strong advocates for change in schools. Energy Spark's educational activities can also **provide pupils with skills in understanding energy** which can be applied in their future lives.

“Energy Sparks is amazing. It is great to find out how much electricity and gas our school uses and how much we can save. It has made me more confident at understanding graphs. The activities encourage us to work as a team, and have more of an impact.”

Pupils at Freshford Church School.



How did pupils use Energy Sparks to identify energy waste?

- After the summer holidays pupils noticed that the Energy Sparks chart displaying **‘baseload’ electricity had dropped over the holiday period** (a drop of 0.9 kW). Pupils discovered that the kitchen staff had turned off the fridges and freezers over the summer holidays, explaining the drop.
- To understand the efficiency of the school freezers, the pupils **borrowed some appliance monitors from Energy Sparks** to record how much electricity each individual freezer used. This showed **one of the freezers to be very inefficient**.
- The pupils **wrote a letter to the head teacher and school business manager** explaining their findings and asking for the freezer to be replaced, to save energy, reduce the school's costs and reduce CO₂ emissions.
- The school **management agreed to replace the freezer**. Energy Sparks showed the school's 'baseload' to have reduced by 0.7 kW, saving about £740 per year (as shown in the chart overleaf).

What is a baseload? Why is this useful information for a school to be able to see?

- The 'baseload' is the **amount of electricity a school uses out of hours** when there is no one in the building, typically from appliances which have been left on e.g. ICT servers, fridges, freezers or items on standby e.g. laptops, photocopiers.
- Energy Sparks has several charts which show the baseload (see Figure 1 for an example).
- Energy Sparks also has an **alert-based system** which displays online notifications and sends emails or text messages if the baseload changes significantly; this can indicate if something has been accidentally left on.

Figure 1: Energy Sparks 'Baseload' electricity chart



*Energy Sparks is one of the innovations developed as part of the Non-Domestic Smart Energy Management Innovation Competition, led by the GB Smart Metering Implementation Programme. More information can be found here: <https://www.gov.uk/government/publications/non-domestic-smart-energymanagement-innovation-competition>.

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**This is the potential saving as a direct result of the freezer upgrade. However, the size of the saving over time may be affected by other changes in equipment or activity that a school makes.*

Case Study 2: Whiteways Primary School

Using energy information provided by Energy Sparks to save 35% in annual gas use



Energy Sparks helped Whiteways Primary School to identify that their school was being heated during non-school hours. This led them to change (at zero cost) the timing of their boiler controls. This saved the school 35% of their annual gas costs.

“Engaging with Energy Sparks has been a really worthwhile experience. Not only has the school saved money, the children have become more aware of the ways that they can help to reduced energy use. I would highly recommend to any other school.”

Jennie Nixon, Head of School, Whiteways Primary School, Sheffield

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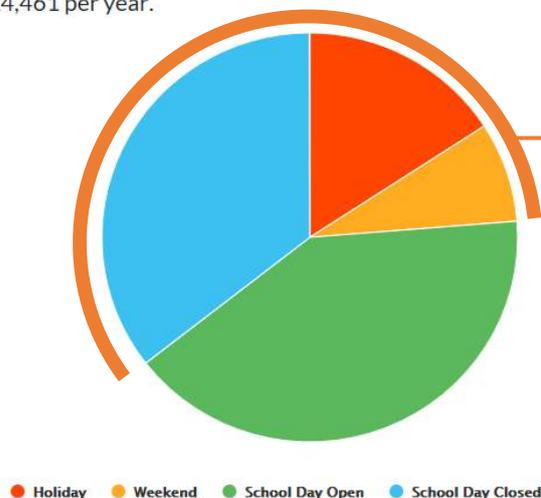
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An important part of Energy Sparks is **pupil education**; pupils can act as strong advocates for change in schools. Energy Spark’s educational activities can also **provide pupils with skills in understanding energy** which can be applied in their future lives.

How much energy is your school wasting out of hours?

Breakdown by type of day/time: Gas

This chart shows when you have used gas over the past year. 59% of your gas usage is out of hours: which is above the average of 50%. The best schools only consume 25% out of hours. Reducing your school's out of hours usage to 25% would save £4,461 per year.



The analysis for Whiteways Primary School highlighted that **59% of the gas usage is when the school is closed** – out of school hours during the week, at weekends and during holidays.

Case Study 2: Whiteways Primary School

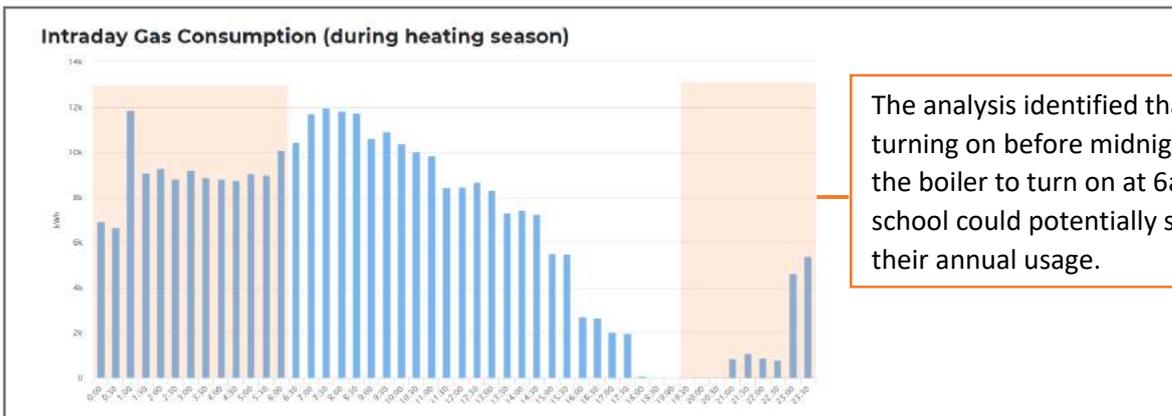
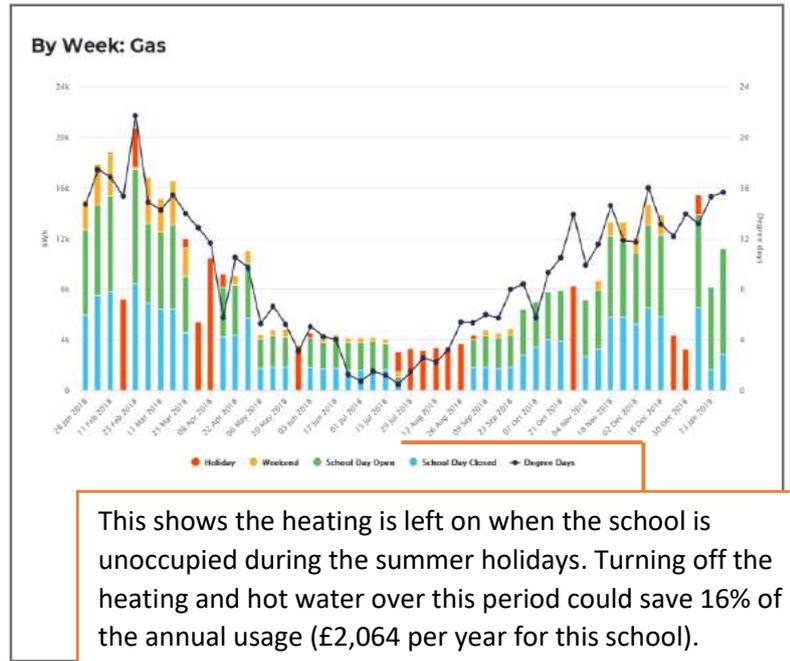
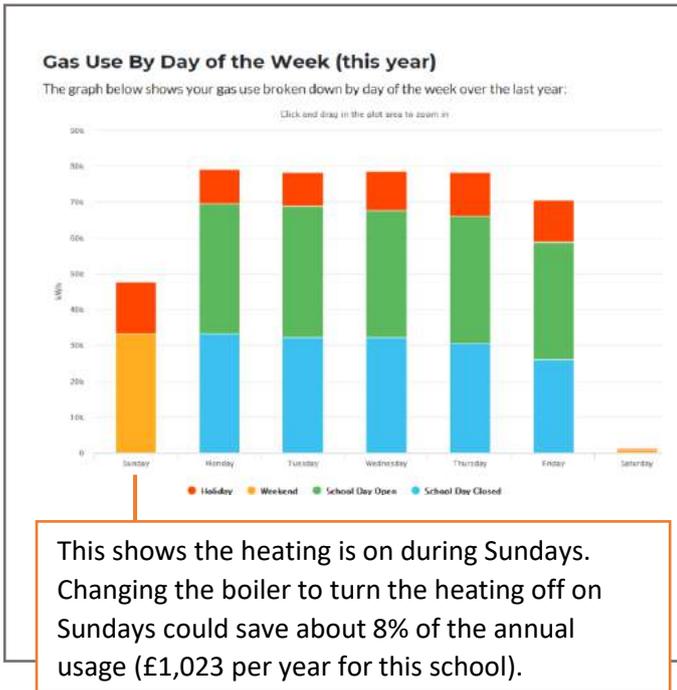
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Energy Sparks also identified further actions which, if taken, could help Whiteways Primary to further reduce their gas consumption. The possible actions highlighted by Energy Sparks include:



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Case Study 3: Storage Heater Control

Using Energy Sparks to reduce storage heater costs by 28%.
This saving covered the installation cost within 16 weeks



'Our school at Stanton Drew is a tiny village school of only 53 children and as such we need to look after spending carefully. I was aware that we had one of the highest per pupil spends on energy costs in the local authority so I was keen to look for savings. I initially got involved with Energy Sparks as I thought it would inspire the children to be more eco-aware. Little did I realise back then how much we would be saving now! Our initial visit from the Energy Sparks team identified installing 7-day timers on our night storage heaters as a way to save some money. For a small school such as ours a £400 outlay on timers seemed a lot at the time but making the money back in savings in only 16 weeks is much better than I expected. We should be able to save £800 annually so that's over £15 extra per child per year - all thanks to Energy Sparks.'

Andrew Marriott, Deputy Head, Federation of Bishop Sutton and Stanton Drew Primary Schools

Summary

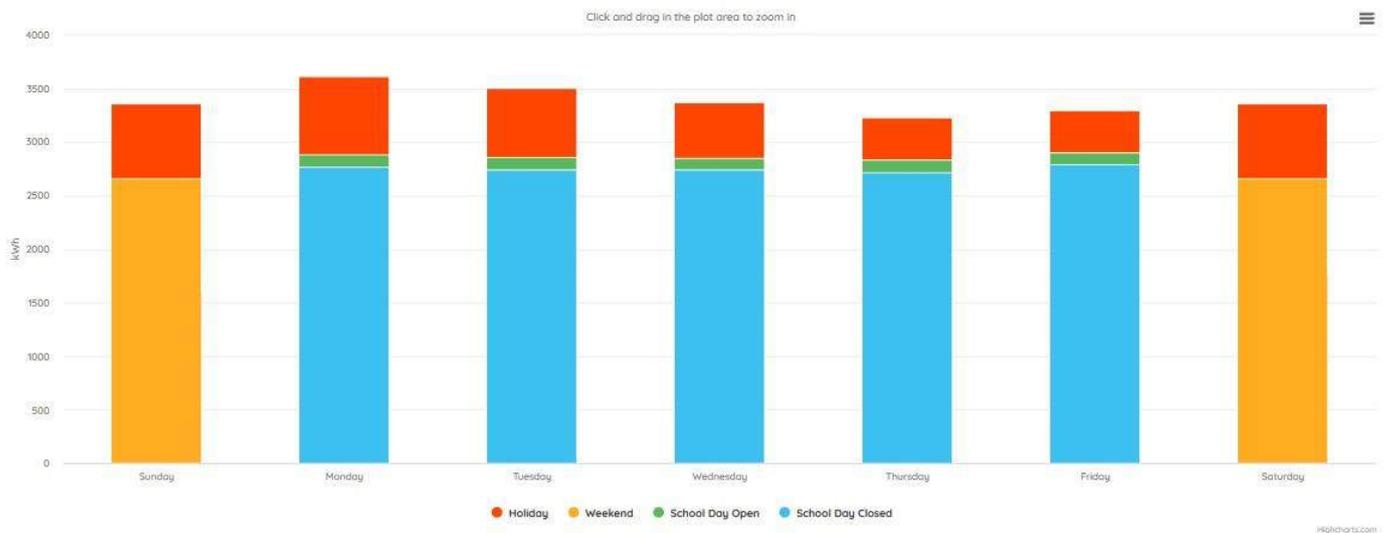
Stanton Drew Primary School used Energy Sparks to help them reduce the electricity consumption of their storage heaters by 28%. They realised that their storage heaters were running during the weekend, and that by installing a 7-day timer, costing £400 they could save £700 per year in electricity costs.

Analysis

Energy Sparks has specific analysis for storage heaters. For Stanton Drew if you look under Energy Sparks 'Learn more about your school's energy use' charts and advice, and find, the 'Storage Heater by Day of the Week' chart in the 'Storage Heaters' section:

Storage heater usage by day of the week

This chart shows the breakdown of the consumption of electricity by storage heaters by day of the week:



Question: Are there any differences between the days of the week - if so can you explain them?

Question: At many schools the storage heaters are left on at weekends because the timer doesn't understand days of the week (24 hour timer)? Are storage heaters left on at your school during the weekend? Installing a '7-day' timer which might cost the school £400 could save your school 6,800 kWh or £800 per year. Contact Energy Sparks hello@energysparks.uk for advice on changing timers if you need help?

The chart shows that the storage heaters at the school were running at weekends, and the contextual advice at the bottom the potential energy saving opportunities, which for Stanton Drew were £800 per year.

Case Study 3: Storage Heater Control

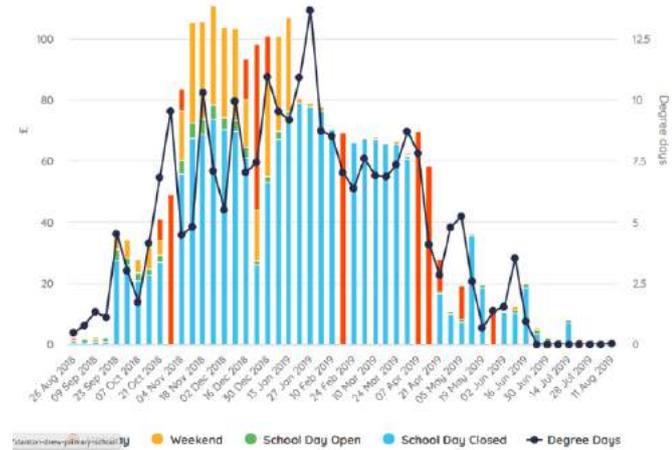
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The impact of installing a 7 day timer

Taking the advice on the Energy Spark's website the school installed a 7-day timer in December which allowed them to automatically turn the storage heaters off at weekends. The installation cost £400, which was paid back in under 16 weeks.

The Energy Sparks chart to the right shows the impact of this change. Energy Sparks charts specifically highlight weekend (orange) and holiday usage (red) as reducing usage outside school hours is often the most cost-effective way of reducing costs. If you look at the chart you can see the storage heaters are using electricity at weekends up until December but not in January.



With a 7-day timer the school will still need to manually switch the storage heaters off over holidays if the school is unoccupied and frost is not a concern. Stanton Drew could have saved a further £300 this year by turning the heaters off during the Spring and Easter holidays; Energy Sparks has an 'Alert' system which you can sign up to which will send you email or text reminders to do this. It also has alerts to remind you to turn heating off at the end of the heating season e.g. in May, by automatically checking the weather forecast for you and working out when it is warm enough to recommend turning the heaters off.

Lessons Learned

- Stanton Drew Primary School used Energy Sparks to look at their Storage Heater electricity usage and saved £800 in annual electricity costs for an investment of £400 – getting their money back on the investment within 16 weeks
- Over 10 years, this is a potential saving of £8,000 for an investment of £400 – which is a very good return
- However, further work on reducing Storage Heater usage over holidays has the potential to save up to an additional £300 per year by signing up to the Energy Spark's alert system which will provide reminders of when to turn the Storage Heaters off

If you have any questions about Energy Sparks please contact us: hello@energysparks.uk

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Case Study 4: ICT Servers

Replacing an old inefficient ICT server saved Trinity First School £1,600 in electricity costs per year, returning the investment in 2.5 years



'Working with Energy Sparks has been brilliant. It is always lovely to find ways of saving money but to do so whilst not just maintaining but improving standards is a double bonus. Plus, we have been able to do meaningful work with the children on environmental issues alongside making changes which have a positive impact on the environment.'

Amanda Seager, Headteacher, Trinity First School, Frome

Summary

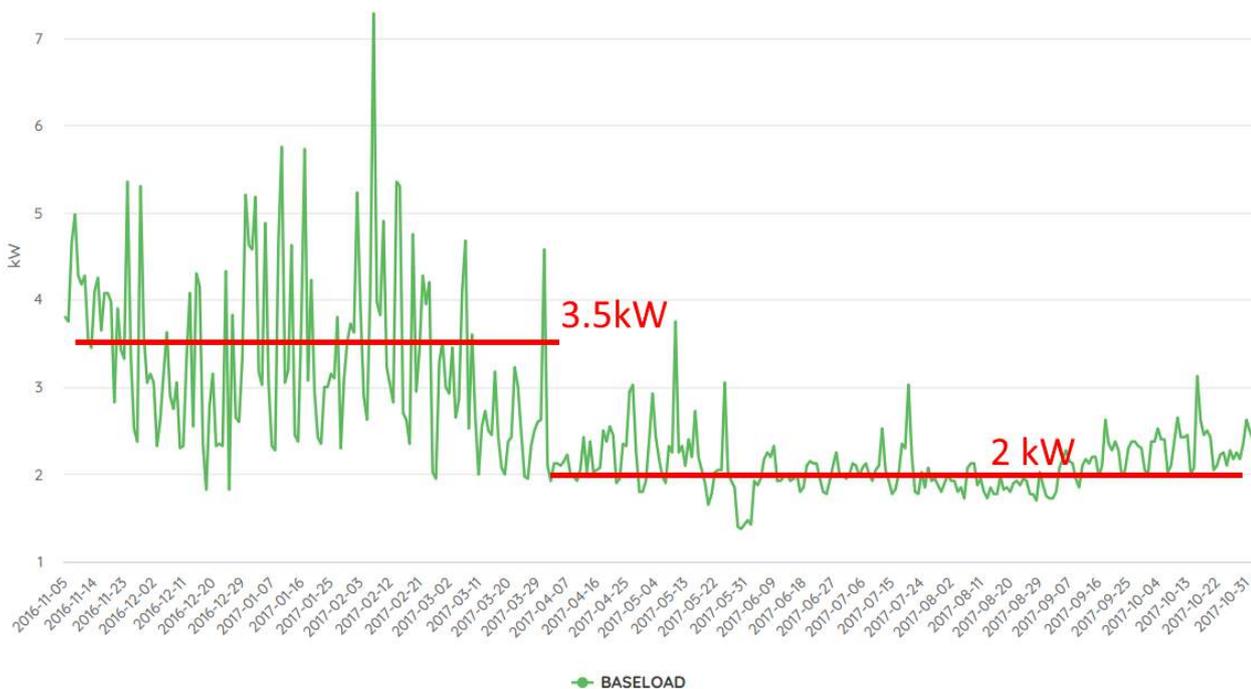
Trinity C of E First School in Frome saved £1,600 per year in electricity costs when they spent £4,200 on replacing their aging inefficient ICT servers.

Analysis

ICT infrastructure has been the cause of a significant rise in school electricity consumption over the last 2 decades. However recently this increase has reversed as new ICT servers have become more energy efficient, desktop PCs have been replaced by energy efficient laptops and tablets, and some schools have moved their ICT infrastructure to the cloud.

ICT servers have been a significant component of this increase as they are left on 24 hours a day, 365 days of the year, and particularly older servers manufactured prior to 2015 can be very inefficient.

Energy Spark's has a variety of ways of looking at electricity consumption, including those which focus on 'baseload' – the consumption of appliances left on when the school is unoccupied. Energy Spark's baseload charts show the impact of the replacement server at Trinity:



The baseload dropped 1.5 kW from 3.5 kW to 2 kW. This is about a 13,000 kWh and £1,600 annual reduction in electricity consumption. This one change represented as 23% reduction in the school's annual electricity consumption.

Case Study 4: ICT Servers

Replacing an old inefficient ICT server saved Trinity First School £1,600 in electricity costs per year, returning the investment in 2.5 years



Further Information

- If you are considering upgrading your ICT servers you should consider 2 options: purchasing a more efficient server, or move your servers offsite to ‘the cloud’ (see DFE advice [here](#))
- Cloud servers mean that all your server onsite electricity costs can be eliminated and ICT support costs can be significantly reduced; cloud servers are shared ‘as virtual machines’ between multiple users groups, so out of school hours others can use the server meaning its electricity consumption is not wasted
- If you are considering upgrading your existing servers and want to understand the benefit in electricity savings we recommend you assess the power consumption of your current servers using a mains electricity monitor ([cost about £15](#), or available free from Energy Sparks, pictured to the right:). You can do this as a learning activity with your pupils, following the Energy Sparks activity instructions found [here](#). This will be able to give you an accurate assessment of your current servers’ consumption and the potential saving of moving to a new server. Newer servers are faster, so it might even be possible to consolidate several servers into a single server – but when purchasing you need to ask about the new servers’ electricity consumption.
- There are several other ways to reduce electricity consumption from ICT in schools:
 - Replacing desktops with laptops or tablets
 - Making sure that the desktops you have are configured to switch to standby when not used
 - With the help of your pupils audit other ICT infrastructure in schools (e.g. using a mains appliance monitor), to identify inefficient printers or photocopiers, and those without a standby function. Often schools have redundant networking equipment which can be removed after ethernet has been replaced by Wi-Fi
 - Air conditioning costs can be reduced by increasing the room temperature in server rooms, or simply by reorienting the servers so there is a smoother airflow of cool air into the servers’ fans and out the other side. Research shows you can run your server room temperature as high as 27°C without affecting your server’s efficiency.



More detailed information on what you can do to reduce your ICT electricity consumption is available on the Energy Sparks website [here](#).

Lessons Learned

- You can often justify replacing old ICT infrastructure on electricity costs reductions alone
- Energy Sparks provides a wide variety of tools to help you understand your electricity consumption; ICT often can be 30% of a school’s consumption
- Energy Sparks activities get your pupils involved in identifying energy guzzling ICT infrastructure and other appliances whilst also learning energy life skills which they can share with their families at home.
- Energy Sparks also provides benchmarking – allowing you to compare your electricity consumption with other schools either on an overall basis or more narrowly for example on baseload
- Energy Sparks alerts provide monitoring of your electricity and gas consumption via your school’s smart meter data, and immediately notify you if your consumption increases for example if an errant appliance has suddenly increased its consumption

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Case Study 5: Replacing storage heaters

Trinity First School replaced storage heaters with air conditioning in its Early Years classroom block, saving about £1,500 per year in electricity costs



'Working with Energy Sparks has been brilliant. It is always lovely to find ways of saving money but to do so whilst not just maintaining but improving standards is a double bonus. Plus, we have been able to do meaningful work with the children on environmental issues alongside making changes which have a positive impact on the environment.'

Amanda Seager, Headteacher, Trinity First School, Frome

Summary

Trinity C of E First School in Frome saved £1,500 per year in electricity costs when they spent £10,000 on replacing storage heaters with air conditioning and upgrading to LED lighting in their Early Years classroom.

Storage Radiators

Storage radiators work differently from other forms of heating in that they consume electricity overnight, store the energy, and then release the stored heat to classrooms during the day. In contrast most gas and air conditioning heating systems consume gas to produce heat immediately, so only consume energy during the school day.

Storage heaters can be very inefficient as they don't know how cold it is likely to be during the following day, and therefore how much heat to download and store from the electricity grid overnight. They therefore try to store as much heat as possible whether the following day is likely to be hot or cold.

Storage heaters try to save money by making use of cheaper overnight electricity (economy 7 or differential tariff) which costs about 7p/kWh compared with 12p/kWh for daytime electricity. Overnight electricity is cheaper to produce because there is less demand. However, many schools don't have access to differential tariffs, or they can work out more expensive as the daytime rate (typically 13p/kWh) is higher.

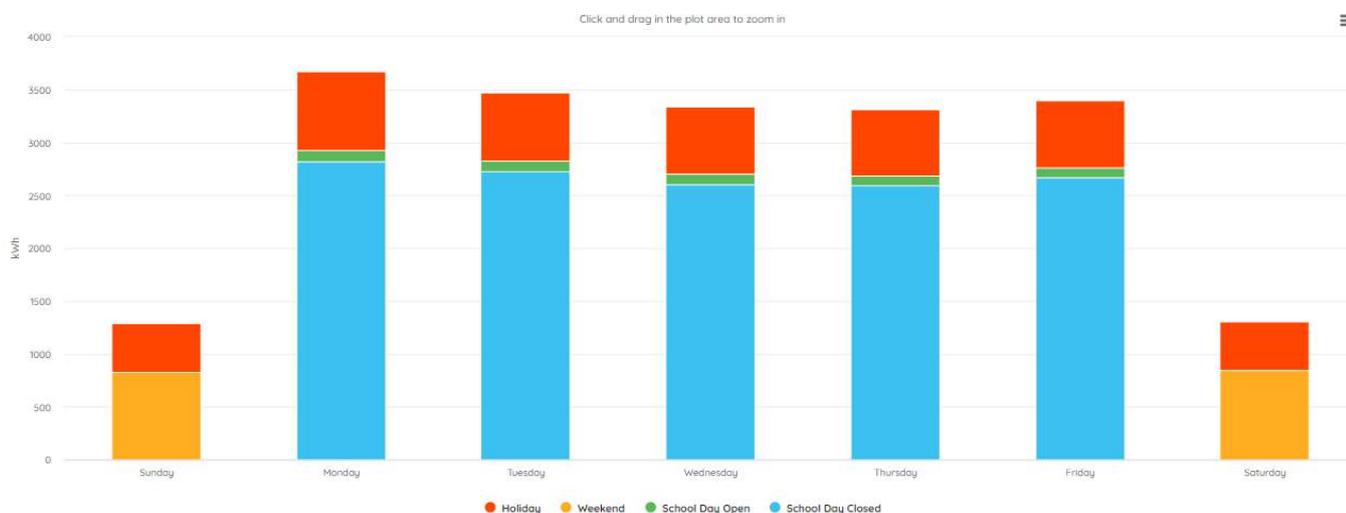
Storage radiators are often installed in rural off-grid locations where mains gas is not available or in isolated or temporary classroom blocks where the cost of laying a gas main is prohibitive.

Make storage heaters more energy efficient or switch to a different source of heat

If you are looking to save money on the running of your school's storage heaters, you have several choices:

1. Energy Sparks provides specific data presentation tools for analysing the energy used by your school's storage radiators e.g.

This chart shows the breakdown of the consumption of electricity by storage heaters by day of the week:



Use Energy Sparks to make sure the timing of your storage heaters is controlled well: see [Energy Sparks Case Study 3](#) where Stanton Drew School saved £800 per year using Energy Sparks and got a return on their investment within 16 weeks

Case Study 5: Replacing storage heaters

Trinity First School replaced storage heaters with air conditioning in its Early Years classroom block, saving about £1,500 per year in electricity costs



2. Evaluate whether your school would benefit from switching to a differential tariff (economy 7) – Energy Sparks provides tools for accurately determining this
3. Consider replacing the storage heaters either with gas (a fossil fuel – so may not be good from a carbon perspective!), air conditioning or air source heat pumps

Air conditioning

Trinity School took a decision to replace its storage heaters in an isolated classroom block 2 years ago and decided to upgrade the heating system to air conditioning, reducing their electricity consumption, costs and carbon emissions.

Air conditioning (air to air heat pump for heating) has several advantages over storage heaters:

- It provides a more comfortable environment with better thermostatic control than storage heaters
- Air conditioning doesn't rely on stored heat so can be turned on on-demand
- Air conditioning can heat up a room very quickly, so less heat is wasted before the school is open in the morning
- It's about 3 to 4 times more energy efficient than storage heaters because it extracts free latent heat from the outside environment and converts it to more concentrated heat to warm the inside of a building (explanation [here](#))

For Trinity First School the options were:

	Annual Heat Requirement Demand kWh	Efficiency	Energy requirement kWh (Demand)	Fuel cost p/kWh	Annual cost	Capital cost	Payback (years)	CO2 emissions (kg/year)
Existing storage heaters	12,500	100%	12,500	12	£1,500			2,875
Existing storage heaters (economy 7)	12,500	100%	12,500	12	£1,500			2,875
Air conditioning	12,500	350%	3,571	12	£429	£8,000	7	821
Gas heating	12,500	85%	14,706	3	£441	£12,000	11	3,088

Economy 7 wasn't an option because it would have increased the daytime rate for the rest of the school making the overall electricity bill more expensive. Switching to gas heating was more expensive because of the capital cost of installation and the cost of laying a gas pipe across the school playground. Carbon emissions are also significantly lower for air conditioning systems, in this example a 70% reduction over storage heaters and 73% reduction over gas.

Air-source heat pumps, which use a similar underlying technology to air conditioning systems – producing hot water rather than hot air, will have similar economic benefits, and may be eligible for a subsidy under the UK Government's Non-domestic Renewable Heat Incentive Scheme (RHI).

Lessons Learned

- Energy Sparks provides specific tools for analysing your school's storage radiators
- Air conditioning systems or air source heat pumps can provide a cost effective and more thermostatically comfortable replacement for storage radiators. They also offer the best way of significantly reducing your school's carbon consumption.

If you have any questions about Energy Sparks, please contact us: hello@energysparks.uk

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