

Reducing Energy From Computer Use - QIP Starter Guide

Background Information

Emergency Departments have many computers, which collectively use a large amount of energy. An effective way to reduce energy consumption from computers is to reduce the brightness on the monitor display. Although the effect for an individual computer is small, because each ED has so many computers, the energy and cost savings for an entire ED can be considerable.

In Departments that have made this change so far as part of the *GreenED* programme, users have generally not noticed any significant difference in the day to day usage of screens when brightness is reduced, and some ED staff have reported a reduced strain on the eyes with reduced levels of brightness. ^(1, 2) The UK Health and Safety Executive recommends adjusting brightness to suit lighting conditions in the room. ⁽³⁾

Other effective methods which have demonstrated reductions in energy use from PCs include automatic switch off PCs in non clinical areas or encouraging users to switch off the computer manually with 'Switch Me off When not in Use' stickers, and altering time to sleep mode settings. Activating sleep mode significantly reduces the power consumption of the PC, whereas activating screen saver mode alone does not.

Scope

Computers within the ED, used for both clinical and administrative purposes.

Please note that if your ED has a dedicated PACS viewer screen this should not be included in this project.

Aim

1. To reduce energy consumption of computers throughout the emergency department by reducing screen brightness to 50%.
2. Ensure computers in non clinical areas are turned off when not in use.

SMARTER AIMS

S	Specific Aim	Reduce energy consumption by reducing ED PC monitor brightness to 50%.
M	Measurable	Reduction in energy measured in kWh. Carbon and cost savings.
A	Achievable	Achievable by <i>GreenED</i> team members
R	Relevant	Contributes to reduced carbon footprint of the ED. Reduces financial spend.
T	Timing	Project time frame 1 month.
ER	Environmental Rewards	Reduced carbon emissions from ED

Timeline

This estimated timeline for completion is 1 month. Below is a suggested timeline of activities - but this can be tailored according to department.

Week 1 - Establish Baseline

- Discuss the project with the *GreenED* team in the department.
- Make a list of all the computers in your department in which you intend to reduce brightness and record pre-existing screen brightness on these computer.
- Identify any computers which may be suitable for switch off when not in use - ie in ED administrative areas, or in clinical areas which are not used overnight. If possible, try to determine how many of these PCs are left on at night by doing checks out of hours.
- If your computers are programmed to go to sleep after a certain time period, then it will be necessary to determine average hours the computer is in use. This data should be available from the IT department. If the computers do not go into sleep mode (ie only a screen saver is activated) assume they are activated 24 hours a day.
- The most accurate way to measure electricity use at each brightness setting is to use a plug in wall monitor in order to measure electricity consumption (in Watts/hr) at your hospital. If using this method, use the formula below to calculate a baseline electricity consumption.

$$\text{Baseline Electricity Consumption (kWh per day)} = (\text{Number of Computers} \times \text{Average Hours Use Per Day} \times \text{Energy Use (Watts/hr)}) / 1000$$

- If you do not have an energy monitor available in your department, example calculations can be viewed in Appendix 1, or using the *GreenED* calculator spreadsheet using averages obtained by the *GreenED* team across NHS PCs in the UK. Please note these figures would be **estimations only**.

Week 2 - Alter Computer Settings

- Reduce brightness on all eligible screens in ED. The recommended level is 50%. Do not alter brightness on screens dedicated for radiology reviewing or PACS viewers. In some cases, IT have central control over screen brightness, in which case it may be necessary to liaise centrally with IT.
- If there are computers left on and not used overnight (ie in administrative areas) encourage staff to either turn these off completely, or liaise with IT about installing dedicated automatic switch off software. Consider using 'Switch me off when Not in Use Stickers'

Week 3 -Monitor Changes

- Check computers again to ensure the screen brightness changes have been maintained.
- Sample number of PCs switched on when not in use (ie non clinical areas)
- Ensure that ED staff members are aware of the change and discuss any problems that may arise. A useful balancing measure may be to survey staff and ask when they noticed the change, without initially disclosing this information. Other balancing measures may include a trial of clinical tasks by a small group of clinicians at different screen brightness levels (ie reviewing X rays) and surveying to see if there is any impact on clinical work.

Week 4 - Calculate Impact

- If monitor settings have been maintained at the new settings, then recalculate energy consumption and subtract this from the calculation done in week 1 to obtain daily energy savings in kWh.

New Electricity Consumption (kWh per day) = (Number of Computers x Average Hours Use Per Day x Energy Use (watts/hr)) / 1000

- Projected annual carbon emissions saved can be calculated by multiplying the kWh saved by 365 (Days per year) by the carbon emissions per kWh of electricity depending on your country. The hospital facilities and estates team may have a figure specific for your hospital, but if not the following national averages for grid electricity consumption can be used, depending on your locality. ^(4, 5, 6)

Country	Carbon Emissions (CO2e per kWh)
Ireland	0.254
UK	0.275
Australia	0.7

- Costs will be different in each institution. Check with your sustainability team or estates team how much electricity costs in your hospital.
- If submitting for *GreenED* accreditation, please provide details of your calculations on the *GreenED* portal if possible.
- Please consider writing up your project as a case study so others can learn and to grow the evidence base.

Next Steps

- As electricity consumption by computers is dramatically reduced by activating sleep mode, can sleep mode settings be optimised to reduce time to sleep mode when computers are not being used?
- If you have been successful in reducing energy consumption in the ED why not expand the project to the wider hospital or region?

References

3. Reducing Screen Brightness, *GreenED* Imperial Case Study.
4. Reducing Screen Brightness, *GreenED* Derriford Case Study.
5. UK Health and Safety Executive. Working with Digital Display Equipment. Available from: <https://www.hse.gov.uk/pubns/indg36.PDF> Accessed 23/1/25
6. Sustainable Health Energy Authority of Ireland. Conversion Factors. Available from: https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors_2024. Accessed 23/1/25
7. Australian Government, Department of Climate Change, Energy, the Environment and Water. Australian National Greenhouse Accounts Factors 2024. Available from: <https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-account-factors-2024.pdf> Accessed 23/1/25
8. UK Government GHG Conversion Factors for Company Reporting 2024. Department for Energy Security and Net Zero. Available from: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024> Accessed 23/1/25

Appendix 1. Mean Energy Consumption

Monitor Brightness (%)	Mean Energy Saved (Watts/hr - vs 100%)
100	
90	1.01
80	2
70	3.34
60	3.76
50	4.57
40	6.35

Appendix 2.

Example Calculations if no energy monitor available:

1. Calculate Baseline Use Per day

Baseline Electricity Consumption (kWh per day) = Number of Computers (50) x Average Hours Use Per day (24) x (Mean Energy Saved @ 100% to 50% Brightness i.e 4.57)/1000 (to convert to kWh)

= 5.48kWh per day @ 100% to 50% brightness

2. Calculate Projected Annual Electricity Savings.

= 5.48kWh*365

=2000kWh per year

3. Calculate Projected Annual Carbon Savings

Ireland

2000 (kWh) x 0.254 (kg of CO₂e per kWh) = 508 kg CO₂e

UK

$2000 \text{ (kWh)} \times 0.275 \text{ (kg of CO}_2\text{e per kWh)} = 550 \text{ kg of CO}_2\text{e}$

Australia

$2000 \text{ (kWh)} \times 0.7 \text{ (kg of CO}_2\text{e per kWh)} = 1400 \text{ kg of Co}_2\text{e}$