Reducing Radiology Reporting Workstation Energy Consumption

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Introduction & Aims

• Radiology departments are intense consumers of energy with high carbon footprints due to constant use of:
  • Interventional suites, CT & MR scanners
  • PACS reporting workstations

• Anecdotally, numerous reporting workstations are active 24 hrs/day at the Royal London (RLH) and St Bartholomew’s (SBH) hospitals, even when not in use

• We aim to accurately estimate the annual energy consumption of these workstations and to identify an energy saving strategy
Methods

• January – March 2023

• Workstation energy states were categorised as:
  • IN-USE
  • ACTIVE, not in use (CPU and monitors switched ON but not in use)
  • IDLE (CPU switched ON, but monitors OFF)
  • SLEEP
  • OFF

• Energy consumption (kWh) for each workstation energy state was digitally calculated using CE-certified electricity consumption metered-plugs
Methods

• Energy states of all departmental workstations (n=41) were manually assessed at the end of a working week to estimate workstation energy states during a night shift

• Workstation energy states for evening/weekend and daytime hours were estimated using night-shift workstation energy states and the maximum rostered radiologists on duty during an evening/weekend or daytime shift

• Annual workstation energy consumption and running costs could then be estimated, and compared with scenarios in which all workstations not IN USE were programmed to SLEEP or OFF
Results

Compared to workstations **IN USE** or **ACTIVE, not in use**, workstation energy consumption falls by:

- Approximately a factor of two when workstations are **IDLE**
- Approximately a factor of seven when workstations are in **SLEEP** mode
- Approximately a factor of eleven when workstations are **OFF**

![Figure 1: Workstation energy consumption per hour](image-url)
Results

Average workstation energy states are displayed for:

- Weekday shifts (40 hr/week)
- Evening & weekend shifts (44 hr/week)
- Night shifts (84 hr/week)

Figure 2: Current Workstation Energy States (n=41)

- Weekday shifts:
  - IN-USE: 41%
  - ACTIVE, not in use: 0%
  - IDLE: 15.7%
  - SLEEP: 0%
  - OFF: 5.3%

- Evening & weekend:
  - IN-USE: 14%
  - ACTIVE, not in use: 17.0%
  - IDLE: 15.7%
  - SLEEP: 5.3%
  - OFF: 0%

- Night:
  - IN-USE: 3.0%
  - ACTIVE, not in use: 17.0%
  - IDLE: 15.7%
  - SLEEP: 5.3%
  - OFF: 0%
Results

Estimated annual workstation energy consumption is:

- **51,414.6 kWh/y (£17,481)**
- Current energy cost: £0.34/kWh

Estimated energy savings if workstations SLEEP when not IN USE:

- **23,974 kWh/y (£8,151)**

Estimated energy savings if workstations are OFF when not IN USE:

- **26,123 kWh/y (£8,882)**
Discussion & Intervention

• Workstations cannot be safely switched OFF every night, as essential cybersecurity and software updates cannot be missed.

• Workstations can be safely updated when programmed to SLEEP however.
Discussion & Intervention

• Long periods of workstations remaining **IDLE** or **ACTIVE, not in use** significantly contribute to high energy consumption in the Royal London & St Bartholomew’s hospitals radiology departments

• Implemented intervention:
  • Workstations programmed to **SLEEP** when not **IN USE**
  • Predicted to reduce departmental energy consumption by an estimated 23,974 kWh/y, also saving the hospitals £8151 per year
References

• Büttner et al. Switching off for future—Cost estimate and a simple approach to improving the ecological footprint of radiological departments. Eur J Radiol Open. 2021; 8:100320.
• Prasanth et al. Greening Radiology. JACR. 2011; 8:11.

Conflicts of interest: None declared