COCIR SELF REGULATORY INITIATIVE FOR MEDICAL IMAGING DEVICES

COCIR member companies are committed to contributing to the challenges for a greener and more sustainable world economy by developing new environmentally performing technologies and concepts, while at the same time ensuring cutting edge performance with improved clinical value of medical imaging devices.

COCIR companies proactively committed to the European Commission to develop a Self-Regulatory Initiative under the Ecodesign Directive to reduce the environmental impact of medical imaging equipment.

In November 2012, the European Commission acknowledged the initiative recognising the benefits for society and healthcare.

The goal of this publication is to raise awareness of operators, users and health care professionals and inform them about good environmental practices to operate CT equipment to lower the environmental impact by reducing unnecessary energy consumption.

How to save energy through proper use

COCIR strongly believes that the greatest gains can be realised when industry, regulators and healthcare providers partner to optimise the use of technology.

Energy consumption in hospitals

Healthcare equipment represents 19% of a hospital’s energy demand and medical imaging equipment is a class of high-energy consuming products widely used today in hospitals.

Computed tomography is a widespread medical imaging technique that utilises computer-processed X-rays to produce tomographic images or ‘slices’ of specific areas of the body. X-ray slice data is generated using an X-ray source that rotates around the area to be studied.

Computed tomography (CT)

Good environmental use behaviour can significantly reduce energy consumption by up to 50%, as determined by the COCIR study on CT (www.cocir.org). The graph represents daily energy consumption and savings of a CT scanner measured in two different scenarios: low power mode (46%) and when powered off overnight (right).

→ By using low power mode during night hours the daily energy consumption can be reduced by 30%.
→ Switching the CT scanner to the off mode overnight can save up to 48% of the daily energy consumption.

On average, the estimated energy savings are as much as 8.8 MWh per year in the scenario-off.

Energy-efficient medical devices play a key role in reducing environmental impacts, but achieving higher rates of energy efficiency also requires better management of devices when they are not in use.

Energy savings for CT equipment in different use scenarios (see page 3).

COCIR Study on CT potential for improvement (2013) – Contribution to healthcare environmental sustainability

Computed tomography has been increasing in recent years (e.g. in the United States it increased from 3 million examinations a year in 1980 to about 70 million annually in 2007).

Heat dissipation and dimensioning of an air conditioning system

Nearly 100% of the energy consumption of a CT system is released by the CT as heat. CT scanners come in two different versions: air-cooled or water-cooled.

For air-cooled CT systems, the heat is released to the scan room so correct regulation of the air-conditioning system is important and can have a significant impact on energy consumption.

With water-cooled CT systems, the waste heat is removed by chilling units or the hot water can be directly discharged to the sewage. While water cooling has no impact on the scan room temperature, the energy consumption of pumps and chillers has to be considered.

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POTENTIAL FOR IMPROVEMENT

A 2013 study by COCIR in the context of the COCIR Ecodesign Self-Regulatory Initiative shows that most energy is consumed when the equipment is in idle mode, mostly due to detectors, power supplies, computation and controls being active for long periods of time.

The typical energy consumption of a CT, even if switched to low power mode for a 12-hour overnight period, shows the predominance of the idle mode.

The study also shows that Computed Tomography technology has a limited potential for energy savings through technical improvements. 13.8% of the daily energy consumption can be saved if the low-power mode is used overnight, otherwise 5% is the maximum achievable reduction in energy consumption. As shown, the correct use of low-power modes or switching to off mode can reduce energy consumption by up to 48%.

MEASURING AND DECLARING ENERGY CONSUMPTION

As there are no existing standards, COCIR has developed methodology to measure the energy consumption of CT systems. The methodology defines use scenarios, protocols, parameters and measurement procedures. It is available for download from the COCIR website.

The energy consumption of a CT scanner is highly dependent on how it is used.

- **USE CASE SCENARIOS**
- **DEFINITION**
- **DURING A 12-HOUR NIGHT TIME PERIOD**
- **DURING A 12-HOUR DAY TIME PERIOD**

<table>
<thead>
<tr>
<th>USE CASE SCENARIOS</th>
<th>DEFINITION</th>
<th>DURING A 12-HOUR NIGHT TIME PERIOD</th>
<th>DURING A 12-HOUR DAY TIME PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCENARIO-OFF</td>
<td>The system is shut down to Off mode according to the user manual. In Off mode the system consumes no energy.</td>
<td>System on, 20 Abdomen Routine scans</td>
<td></td>
</tr>
<tr>
<td>SCENARIO-LOWPOWER</td>
<td>The system is switched to LowPower mode. In LowPower mode the system functions on the low-energy consumption state that the user can select according to the user manual. No scanning possible.</td>
<td>System on, 20 Abdomen Routine scans</td>
<td></td>
</tr>
<tr>
<td>SCENARIO-IDLE</td>
<td>The idle mode represents a ready-to-scan state of the system</td>
<td>System on, 20 Abdomen Routine scans</td>
<td></td>
</tr>
</tbody>
</table>

Daily energy consumption is measured for each one of the three scenarios. Additional scenarios can be defined and measured as well. The following format has been defined by COCIR member companies to communicate energy consumption of CT scanners.

The following energy consumption values have been measured according to the COCIR Self-Regulatory Initiative CT Measurement of Energy Consumption.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>USE CASE SCENARIO*</th>
<th>ENERGY PER DAY</th>
<th>UNITS</th>
<th>DEVIATION, JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCENARIO-OFF</td>
<td>XXX</td>
<td>kWh/d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCENARIO-LOWPOWER</td>
<td>YYY</td>
<td>kWh/d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCENARIO-IDLE</td>
<td>ZZZ</td>
<td>kWh/d</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The system use scenario varies according to customer needs during overnight hours. According to the standard, the system is in active use for 12h during the day and inactive for 12h overnight. The 12h overnight may be in Idle, LowPower, or Off modes with corresponding daily energy consumption values.

Measured values in this table are to be used for economic estimation purposes only. These values do not imply, and are not to be used for, conformance to any clinical or safety requirements.

A GOOD ENVIRONMENTAL PRACTICE SAVES 8.8 MWH PER YEAR FOR A TYPICAL CT SCANNER. THE LONGER THE TIME IN LOW-POWER MODE OR OFF MODE, THE HIGHER THE ENERGY SAVINGS.